

THE SOCIOCULTURAL DIMENSION OF BIODIVERSITY

IN KENYA

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NATIONAL BIODIVERSITY REPORT

NATIONAL MUSEUMS OF KENYA

THE REPUBLIC OF KENYA

FOR: THE UNITED NATIONS

JANUARY 1992

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The Sociocultural Dimension of Biodiversity in Kenya

I) Introduction

1) Defining Biodiversity

‘Biological diversity...is the full manifestation of the nation's environment, ecosystems and species, including all the genes and genetic material comprising the biochemical/chemical structures which form the molecular basis of heredity and speciation (i.e evolution of the species) (UNEP,1991, p.3)

So begins the UNEP document **Guidelines for the Preparation of Country Studies On Costs, Benefits and Unmet Needs of Biological Diversity Conservation Within the Framework of the Planned Convention on Biological Diversity, May 1991**

2) Biodiversity as a Function of Cultural Diversity

On the same page the authors of the document make the comparison between cultural diversity and biodiversity. ‘Viewed in the same sense as a country's culture, biological diversity is the country's heritage. It is a heritage as well as an asset, over which the nation state exercises sovereignty and has the right of ownership, management and use.’(UNEP, 1991, p. 3).

It is the goal of this document to persuade the reader that not only is the biological diversity of a country similar to its' cultural diversity but that cultural diversity itself evolved with, supports and maintains biodiversity. A second goal is to suggest some of the policy and institutional directions that are necessary to preserve biological and cultural diversity at minimal cost to the state.

3) The Scope of This Document

a) Redefining the Nature of Kenyan Society

In order to fulfill these goals this document has been divided into four main sections. The first is a redefinition of social classification in Kenya that will show just how it is that cultural diversity both marks and maintains biodiversity. The second is a brief description of social dynamics in Kenya. The third consists of four short case studies with accompanying recommendations as to what kind of steps need be taken to maximize biodiversity in diverse human ecosystems at minimum cost to the state. The fourth will suggest a perspective on development and economy that if followed will allow for a maximization of economic returns while minimalizing environmental degradation and economic underdevelopment.

It will also be stressed that society and the wider natural environment have evolved together. Therefore the human and cultural dimensions of biodiversity go back ultimately to the evolutionary origins of humankind in Kenya's rift valley over two million years ago. In that sense Kenya becomes an experiment in the maintenance of biodiversity since it is for human kind the longest inhabited place on the face of the earth.

In order to better understand present conditions and future possibilities it will be argued that the ecological and social dynamics that are specific to Kenya at the present time started as early as thirty thousand years ago. Then the ancestors of today's hunter gatherer peoples were masters of the land. Much later they began to lose parts of it to incoming pastoralists, horticulturalists, maritime traders and much, much later, settler farmers. Their story and its present relevance will be dealt with in the first case study.

This perspective calls for a modification of the usual classification that many historians and anthropologists have made of the societies that have come to comprise the present day Republic Of Kenya. Such a change of perspective has a bearing on how we understand the components of the present day nation state, as well as its problems and prospects.

b) The Significance of Cultural Practices in the Preservation of Biodiversity

It also means that cultural practices that are often classified as belonging to the realm of 'ceremony or belief' need to be considered part of a society's ecological adaptation. A good example is that of the sorio ritual of the Rendille (see appendices). Changes in this 'cultural domain' as a result of modernization and development interventions often result in threats to the wider environment. At the same time they open up a wide array of possibilities in natural resource management by widening the options available to the 'man on the ground.'

c) Four Case Studies

In order to more clearly see the conservation issues facing different parts of Kenya a general overview of the social and ecological dynamics of the country will be outlined followed by a more focused look at four representative areas. These were chosen to show the reader the different predicaments that face planners working to preserve biodiversity among societies whose social organization and ecological adaptations contrast dramatically, yet who coexist in the same country.

d) Research and Policy Issues

The final sections will deal with the research and policy recommendations that need to be carried out to better understand the sociocultural dimension in the preservation of the full range of Kenya's flora and fauna. The implementation of these recommendations will assist Kenya to more fully exercise sovereignty over its natural resources while at the same time fulfilling its commitments to the international community.

A forum called C.I.R.C.A., and modeled on the concept of 'ad hococracy' or 'flex firm', described in some detail in the Appendices will be suggested as one way of organizing the expertise that will be needed to address these and related issues in the near future.

II) The Nature of Kenyan Society

1) Traditional Scholarship

An examination of some of the many histories of Kenya will show that it is common practice to classify the component ethnic groups of Kenya according to the linguistic relationships of the three major language groups in the country-Cushites, Nilotes and Bantus (Fedders A., Salvadori C. 1980).

These relationships correspond to territorial groupings and sub groupings and which include local adaptations to particular ecosystems (Kesby 1977, Ojany 1988). When understood in the light of oral tradition we can come to understand much about the migration of the numerous peoples who have made Kenya their home. Such information highlights certain features of ethnicity and common origin but

deemphasizes other equally important features as can be seen in the following two examples (Vansina, 1985).

a) Bantu Relationships

For example when analyzing the relationships of the various Bantu speaking peoples near coastal Kenya one scholar tells us, 'Thus late in the first millennium proto-Sabaki became differentiated into Mijikenda, Swahili, and Pokomo. Later during the second millennium, each of these languages in turn became differentiated into the different dialects spoken today. Thus Pokomo speakers settled along the lower Tana river...Swahili speakers...dispersed into coastal towns the length of the coast...while the nine Mijikenda peoples, settled in their hilltop kayas, or villages, each developed their own dialect.' (Spear 1981, p.37)

What we do not see from this kind of presentation is that despite the racial and linguistic origins of the Swahili in Bantu Africa once they converted to Islam they defined themselves in terms of Arabian and Persian genealogy, had access to the literacy, worldview and technology of the Islamic world. Thus they became an essential component in the Indian Ocean trade creating from their privileged position a maritime civilization of wealth and sophistication. A cursory glimpse at one of the most recent bibliographies on coastal Swahili peoples show that for centuries they were a major economic force in the Indian Ocean trade and its relation to the African Continent (Wilding, 1990).

Not only were they caravan leaders to the interior of Africa but they acted as cultural and commercial go betweens and suppliers to the outside world for items from the interior. These products were usually related to wild animals such as the tusks of elephants or the feathers of ostriches.

For up to a thousand years their demand for ivory for export overseas no doubt had a serious impact on elephants and a host of other species that fed this kind of trade. In the nineteenth century world exports increased dramatically and such pressures on species like the elephant set the stage for twentieth century world wide bans on the ivory trade.

Elders of remote peoples such as the Nkebotok (see case studies) still tell stories about Swahili ivory traders visiting their homeland. These anecdotes most likely refer to conditions before the turn of the century. We still do not know what changes in the general environment took place at this crucial period because of these activities or, for that matter, changes in the flora on the coast that occurred with the establishment of spice plantations up and down the Indian Ocean coast during the nineteenth century (Spear 1981).

b) Cushitic Relationships

i) The Wata

Another example of classificatory confusion can be found in the chart of linguistic and ethnic relationships displayed in the appendices of the book **Peoples and Cultures of Kenya** (Fedders A., Salvadori C. 1980). In the tree diagram outlining the relationships among the Cushitic peoples of Kenya the group and dialect called Wata is placed in an equivalent position to the other Galla (Oromo) languages.

Although the kind of Oromo spoken by the Wata is no doubt subtly different from others the significant feature of the Wata is their small numbers, the fact is that they are spread across the Oromo territory in small groups, that they do not marry with the Oromo who are pastoralists and that they prefer to hunt and gather rather than herd livestock. In this regard they may have more in common with similar groups

scattered across Ethiopia and East Africa than with their pastoral hosts.

In evolutionary terms they are most likely remnants of the original hunter gatherer peoples who were the exclusive inhabitants of this part of the world until a little less than three millennia ago. As such they are now a kind of pariah group 'encapsulated' among larger tribes of pastoral peoples. (Levine 1974, Woodburn 1988)

ii) The Somali

If one examines this chart again and checks the demographics of these ethnic groups one finds that the combined group of Cushitic peoples of Northern Kenya and Southern Ethiopia are not as numerous as the more than four million Somalis who make up the bulk of Cushitic peoples in the Horn of Africa. Again, like the Swahili, through their participation in the greater Islamic 'common market' they have had an influence on the region far in excess of their actual numbers. In addition, they have had access to information and resources that the groups living in the interior until recently could not obtain directly from the outside world, thus adding to their comparative economic advantage (Cassanelli 1982).

Taking elephants as an example, again one gets the distinct impression from reading explorer's literature that the gradual disappearance of this species from the Indian Ocean coast of Somalia into the interior had much to do with the familiarity of Somali guides and traders with the needs and demands of the outside world-in this case nineteenth century European ivory hunters and traders (Bull 1988, Brown 1989).

2) The Need for a New Taxonomy of Societies in Kenya

To better understand the ecological and social dynamics of societal evolution in East Africa what is needed is a classification system that can cut across linguistic and administrative boundaries in such a way as to present the objective enquirer with a matrix of definitive societal features that can be measured against each other. These can then be used to explain why it is that some groups occupy more territory than others and how they have maintained their territory, power and influence in a regional sphere of competing and cooperating ethnic groups.

Such a system has been developed by Lenski and Lenski (Lenski L., Lenski J. 1987). In the next two sub sections we will describe the basic features of this classification system according to them and then apply it to the Kenyan situation. We will then propose a hypothesis that correlates the association of high or low biodiversity in tropical ecosystems with the kind of societal type. Such a hypothesis, if validated through the kind of fieldwork that is suggested in the concluding sections, may have many practical implications in the design and costing of what is entailed in the protection and utilization of those areas in a country characterized by richness of species.

III) An Evolutionary Taxonomy of Kenyan Society

1) A Universal Taxonomy of Human Societies

There are ten kinds of societies that have evolved on the face of the earth, each one having risen from the other. However once a new social form arose, through peaceful migration or conquest it often established itself as the dominant social form in an area, either wiping out, encapsulating or absorbing the previous social form and inevitably reducing its former territory and political power (Schmookler 1984).

The ten kinds of societies are:

- a) Hunting and gathering societies
- b) Simple horticultural societies
- c) Advanced horticultural societies
- d) Simple agrarian societies
- e) Advanced agrarian societies
- f) Fishing societies
- g) Maritime societies
- h) Simple herding societies
- i) Advanced herding societies
- j) Industrial societies

At the beginning of the list societies are most egalitarian and least hierarchical. By the end of the list we have societies that are most hierarchical and least egalitarian.

2) Basic Definitions of Societal Types

The following indicators give simple definitions of the key technological (and by implication, ecological and economic) aspects of the above listed societal types.

- a) Hunting and gathering-dependance on wild game and plants using bow, arrow and spear
- b) Simple horticultural-farming that does not use the plow but implements of wood and stone
- c) Advanced horticultural-farming that does not use the plow but employs metal tools and weapons
- d) Simple agrarian-farming with plows but restricted to use of implements made of copper or bronze
- e) Advanced agrarian-farming with plows but use of iron and metal tools
- f) Environmentally Specialized Types- these have evolved independently at different times and places in human history and share the common feature of specializing in the use of marginal ecological environments.
- i) Fishing-relies primarily on that aspect of technology useful for fishing near permanent bodies of water
- ii) Herding-concentrates technology on those tools necessary for survival in grasslands with low rainfall
- iii) Maritime-these comprise societies who have developed a sophisticated enough technology to use the waterways for trade and commerce at a time when the movement of goods is cheaper than other modes of transport and which gives that society a comparative economic advantage.
- g) Industrial societies-are characterized primarily by the use of sophisticated technology that is linked to the consumption of non renewable sources of energy such as fossil fuels

3) Configurations of Social Types

Speaking in terms of quantity and not quality as we move from the earliest to the latest societal types the level of a society's overall technological and social complexity rises. There are more parts to society, a greater number of distinct roles and greater hierarchy. At the same time each form of society is larger than the one that went before it. It occupies more territory, and as one theoretician of social evolution argues, it becomes more aggressive in its competition for power and resources with similar societies that it meets with on its expanding frontier (Schmookler 1984).

Demographically each type 'contains' more people than before and needs to use its resources more intensively. It is here that social evolution becomes a threat to biodiversity for it is likely that the following hypothesis may be proven by historical and contemporary research in ecology and ethnobiology.

4) The 'Clarfield Index' for Biodiversity and Human Evolution -A Hypothesis

The hypothesis is very simple and will no doubt need to be modified. It is that as societies in tropical environments evolve from one type to another or as one type superimposes itself on others of a 'lower' order, then the number and spread of wild species in the area tends to decrease. In short the greater the social complexity the less the overall biodiversity.

In the case of East Africa this may be complicated by two phenomena. The first is the large amount of plants and animals imported by Europeans from all over the world during the last hundred years (Morris 1973). The second is that some forested areas that were once the homes of hunter/gatherers have been occupied by horticulturists and pastoralists who have retained the use of many of the plants and animals in the system and left many of them alone. However, consideration of a reduction in endemic biodiversity may support the hypothesis in a more modified form in these still forested areas.

The reader who is interested in evaluating this approach in greater detail is directed to the literature of macrosociology and comparative social evolution (Parsons 1966, Darlington 1969, Maxwell 1984, Fiske 1991). It is concerned with developing lists and charts made up of comparative indicators that outline degrees of social complexity, from hunter to gatherer through to post industrial society. They use many of the following categories to develop matrixes of related features common to all societies and that evolve together. Some of them are: population size, permanence of settlement, division of labor, kinds of religious beliefs, kinds of games, marriage practices, social inequality, kind of government, kind of law enforcement and type of property.

One model of the evolution of societies is reproduced on the following page from Lenksi and Lenski's book **Human Societies**, P. 82.

5) Three Caveats

a) Quantity versus Quality

The first caveat concerning the above system is that these are quantitative not qualitative comparisons. For example ever since the French philosopher Rousseau began discussing the comparative satisfaction of modern and traditional societies many philosophers have argued that human happiness and even health is better served if one is living in a hunter and gather society. (Rousseau 1984, Sahllins 1972, Lee 1969, 1981, Vargas Lhosa 1987).

b) Individual versus Group Well Being

On the average the individual members of other societies may not be well off for all their collective wealth and power. Second, in the contemporary situation some of these societal types have died out since by now bronze tools have been replaced with more sturdy metals or iron.

c) Hybrids and Transitional Types

Finally many of the societies in the developing world are transitional hybrids combining features from two or more of the above outlined 'ideal types'. The Bukusu described in the case study of the area of Bungoma appear to stand midway between a horticultural and agricultural society.

Nevertheless, these categories still have much explanatory value since the transitions are not all from preindustrial to industrial society. Many previously pastoral groups in East Africa are now agro pastoral groups and some hunter gatherers have added aspects of pastoral activities to their repertoire of subsistence strategies.

IV) A Social Taxonomy of Kenya

The following taxonomy gives a description of the main social types to be found in Kenya. I have added some detail in order to put them in a context for those familiar with the history and ethnography of East Africa. A one and a half page summary of this section can be found in the appendices.

1) Hunter gatherers

a) 'The First People'

Throughout Kenya there are still groups of people who make their living hunting wild animals and collecting wild plants. Over the millennia they have retreated into the least accessible parts of Kenya to avoid the incoming pastoralists, horticulturalists, maritimers, agricultural settlers and industrial entrepreneurs. In many instances, for example among the Masai and Turkana, they are clearly recognized by the incoming pastoralists as the indigenous inhabitants of the region and are called 'the first people'.

They often inhabit forests, forested mountains and sometimes semi arid lands. As the price of their survival as semi distinct societies they live in complicated forms of symbiosis with their 'hosts', that is the larger societies who through immigration have occupied much of their former territory. (Huntingford 1929, Galaty 1977, Spear 1981).

In two documented instances it has been shown that they provide a refuge for destitute pastoralists during periods of drought when livestock herds are decimated. However, this only partly explains why they have survived until today. (Clarfield 1989, Clarfield and Lowe 1991)

These groups are known by different names in different parts of the country and speak a variety of mutually unintelligible languages, although some scholars suggest that they all once spoke versions of the click languages now found only among the San 'bushmen' of Southern Africa. Some of the names of these people are Nkebotok, Wata, Dorrobo, Ogiek, Boni, Dahalo and Midgan (Spear 1981).

The most recent surveys of hunter gatherers suggest that there are many more of these groups surviving in East Africa than was previously suspected and there is growing evidence that they may be above average managers of a broad range of wild and domestic plants and animals. They may also be the best indigenous managers of natural resources in the country but not enough research has been done to say that definitively (Blackburn 1991).

b) Tsavo National Park-A Negative Example

Recent history has presented us with one test case that may show us how we can estimate the 'negative costs' or in other words how expensive it becomes to monitor, maintain and protect flora and fauna when hunters and gatherers no longer control and cull the wild and domestic plants and animals

found in their traditional territories.

The creation of the game park of Tsavo was predicated on the resettlement of its hunter gatherers, the Ariangullu. They were the traditional hunters of elephants and other wild game that was abundant in Tsavo twenty five years ago. In the interests of modern, professional park and wildlife management they were resettled outside their traditional homeland.

Soon after, it was necessary for park authorities to cull elephants where hitherto the Ariangullu had hunted them, perhaps on a sustainable basis. The clearing of the park of human inhabitants then allowed poachers unhindered access to a territory which until the resettlement had been effectively patrolled by the indigenous inhabitants (Marnham 1980).

Now in 1990s the options of a cost effective community management of this park is not a viable alternative. The results are that enormous amounts of men, money and material are needed to maintain the present balance of nature in Tsavo and keep out poachers since the community best able to adapt to these circumstances are no longer in situ.

We also have no idea of the indigenous uses of the many plants that no doubt were part of the Ariangullu medical and food plant repertoires. Their descendants are now farmers and living in different parts of the country.

2) Horticulturalists

The classic pre colonial and colonial example of a horticultural society in Kenya are the Kikuyu and related Bantu groups who have farmed around Mount Kenya and in other similar well watered highlands. They were less egalitarian than the hunters and gathers who preceded them, having rudimentary chiefs, larger population densities and more permanent settlements. Thus they could field larger numbers of fighters and had greater food surpluses which in turn fueled their expansion and maintained their territory. Similar groups are the Mijikenda of the coastal forests, as well as the Luhya and Kisi of southwestern Kenya.

Societies such as the Luo who once were predominantly pastoralist, over the last two centuries have become more and more agropastoral, as well as doing much fishing and thus have come to resemble a classic horticultural society. It has even been argued that they had such concentrated numbers and food surplus that they could have evolved into the kind of horticultural state common in Uganda and West Africa had they not been 'preempted' by the establishment of Kenya Colony by the British (Salim 1984).

In the move towards a more modern society it is interesting to note how different aspects of modernity have been selectively adopted and elaborated by a variety of ethnic groups. So before continuing, let me give a few very brief, indicative examples based on my own observations and numerous discussions with Kenyan and non Kenyan colleagues.

Among hunter gatherer groups many men became guides for what used to be known as 'white ' hunters ; thus providing hunting expertise above and beyond the Europeans learned ability. This often gave those few elders access to modern amenities through accumulation of growing cash surpluses (Bull 1988).

The Kikuyu are famous for business, perhaps as a result of seeing first hand the practices of English commercial farmers in their homeland and their proximity to Nairobi, thus creating a demand for the products of a farming economy geared to supplying the city.

The Luo are famous for education and intellect and supply lawyers and academics for the growing legal firms and Universities throughout the country.

The traditional aspects of these societies and their selective specialization in terms of modernization

theory is hard to explain but deserves more investigation since the practical results have serious consequences for biodiversity. For example Kikuyu intensification of agriculture has no doubt reduced the spread of wild plants and animals in their territory. But recent research shows that the traditional knowledge is still alive (Gachathi 1989). Likewise, the demographic explosion among the Luyha in Luo land has no doubt put pressure on similar resources (Tierney 1986)

Since independence the Kikuyu best exemplify the transformation of a horticultural society into a agricultural one. There has been a transformation from loosely allied tribesmen to small plot farmers, owning their own land, feeding themselves and the city and entering the international business world of Nairobi.

3) Pastoral Societies

There are a variety of pastoral societies to be found in Kenya, mostly in the semi arid and arid lands that make up two thirds of the country's area. All concentrate their energies on maintaining varieties of domestic animals in areas where agriculture is nearly impossible.

a) The Transformational Role of the Kenya Somalis

The most successful are the Kenyan Somalis whose development of extended family ownership of herds and wells as well as trading and transport companies have linked their primary production with wide regional networks of trade. This has given giving them resilient layers of economic security and credit and this in turn gives them a comparative advantage over other pastoral groups.

Their adherence to Islamic commercial law, their growing literacy and their connection to coastal and foreign markets in Arabia and the Gulf have given them access to and an understanding of commercial techniques such as business loans and access to banks. Although it is not well documented, researchers who have worked among the pastoral groups of northern Kenya recognize that the Somali commercial presence has done much to stimulate the economic growth of the north and help provide the south with a steady stream of meat on the hoof. On the other hand some see these traders as the spearhead of a Greater Somalia movement that covets much of Northern Kenya.

During drought and times of food scarcity they are the first people that the Samburu, Rendille and Turkana nomads turn to for assistance and credit. From an outsider's point of view the terms may not always be equitable but from the insider's point of view the guarantee of the promises of the trader are rarely broken, providing security in times of food shortage.

b) The Inland Pastoralists

The 'inland' pastoralists comprise the Oromo, Maa speakers, Rendille and Turkana.

i) The Maa Speakers

The Samburu and Maa are mainly cattle herding peoples who although cut off from major regional trade maintained their independence and much of their territorial integrity during colonial times. Partly as a result of cultural taboos against killing wild animals their homeland maintains large herds of mammals that are of aesthetic value to the wider world thus transforming the economic potential of their rangelands. A growing, modernized elite is contrasted with traditional pastoralists who have yet to see real benefits from keeping their livestock out of restricted areas.

ii) The Turkana

The Turkana are part of a cluster of cattle herding groups who over the last century have adopted camels. They are the most expansionist of the non Islamic pastoralists. They are characterized by loose social structure and opportunistic migrating paths. They have suffered much from drought but continue to expand at the expense of neighboring pastoral groups whose social structures are less flexible, such as the Samburu.

They have few taboos and therefore are not ideal wildlife guardians but more or less leave alone the hunter gather peoples such as the Nkebotok who live among them. These areas may have high degrees of biodiversity since they are located in riverine forest in the middle of the basically dry Turkana plains and deserts (Gulliver 1963).

iii) The Borana

The Borana were a group of egalitarian pastoralists who defined themselves over a period of five centuries in opposition to the hierarchical kingdom of the Christian Amhara of Highland Ethiopia. Part of this dynamic was a move south into what is now Northern Kenya. Their institution, notably the Gada, insures tribal peace and cooperation and preadapted them to the move towards modernity. They have a similar range of options as do the Somali and may have in part imitated their system. There is much conversion to Islam yet they maintain their linguistic and ethnic differentiation from the Somalis and are an economic block of growing power in Kenya's rangelands (Legesse 1973).

Many former pastoralists have become farmers or agro pastoralists. The indigenous forests of the north such as the one in the Mount Kulal Biosphere and on Marsabit mountain are threatened by these, from the Oromo point of view, 'successful' adaptations to diminishing territory and rising populations.

4) Fishing Societies

There are really only two of these remaining in Kenya. The first is the El Molo of Lake Turkana who number about five hundred. The second who may number about a thousand are a similar group called the Il Chamus who fish at Lake Baringo. These societies are marginal survivals of a much earlier forms of society from a period many thousands of years ago when Kenya's lakes and rivers were higher, population density was lower and fish were more abundant (Scherer 1978).

5) Maritime Societies

In addition to their Islamic faith the Swahili are differentiated from other coastal peoples through their past creation of a maritime civilization. This society dominated East Africa until the coming of the British. They were republican in practice between and among themselves yet great slave traders and owners and were centralized forcefully by the Omanis in the eighteenth century.

The Swahili were traders and middleman between Africa, the Middle East and Asia. They were bypassed economically during colonial times by the introduction of railroads and the dismemberment of their empire by the British who made the coast a protectorate (Spear 1981).

With the coming of independence their coastal area became a tourist paradise for Europeans. Extensive hotels were built attracting labor from other parts of the country. The Swahili are becoming a minority in their own homeland through the peaceful migration of outsiders (Schoorl and Visser 1991).

There is now an outcry over environmental degradation in the area because of this indigenous and exogenous migration. Integrating and modifying the indigenous knowledge that the Swahili and their Mijikenda cousins have may help reorient the kinds of developments possible in the region and have some effect on the practices of tourists, immigrant laborers and farmers towards a more sustainable use of local

resources. At the same time the rise of Islamic fundamentalism on the coast indicates that the coastal dwellers will remember their dominance of the interior one hundred years ago and do not want to be dominated by peoples whom they once dominated.

6) Transitional Groups

Agro pastoralists can be found in the central rift valley and include most of the Kalenjin peoples and the Pokot. These people practice slash and burn horticulture and maintain herds of goats, sheep and cattle. They combine a number of features of pastoral and horticultural systems but tend to be more settled and agricultural with each passing year. Since 1982 they have had a large influence on how state revenues are distributed and publicly support the administrations favoring of their region arguing that they are catching up for the neglect they suffered during the first twenty years of independence.

7) Agriculture

Advanced modern agriculture was brought by European settlers to Kenya at the turn of the century, especially to the central highlands and the area around Kitale and Kisi, all hilly, wet districts that could and still profitably grow European plants and animals. By the time of independence the techniques and products introduced by the settlers had changed the perceptions of the central Bantu, notably the Kikuyu, who in opposition and competition to the British established the first independent regime in Kenya that lasted until 1982.

They took up the products and practices of the Europeans and slowly transformed a horticultural society of tribesmen into an agricultural society of what social scientists would technically call peasants, producing food for themselves and for the growing urban masses of the cities.

In some cases some of the larger ranches and estates have remained in the hands of Europeans who have made the Republic of Kenya their home. Many of these large ranches are havens for threatened species of plants and animals and on that basis alone are providing long term service to the nation. Others were simply transferred to the ownership of the new elites without their land being divided into small parcels.

All land in these high yield agricultural areas has ceased to be held communally. It is now owned by individuals, from small holders to large holders, connected by roads. These constitute areas which provide food through cooperatives and private buyers. Management Techniques are taken from the full repertoire of modern agriculture and include everything from terracing to the use of tractors.

Much the same has happened in Kisi and Kitale with the addition of the continuation of export crops like coffee and tea for the international market, also popular in Kikuyuland (Kitching 1980).

As a result much pressure has been put on the land to farm it extensively. There has been much soil erosion but also much compensatory terracing, as well as deforestation for firewood and no doubt a resulting decline and loss of endemic species. Recent research has shown the wide varieties of plants known to the Kikuyu but we do not know how abundant they are and what is their spread (Gachathi 1989). To what degree the importation of foreign food stocks such as new varieties of maize, threatens sustainable agriculture will be taken up in one of the four case studies that deals with a similar horticultural group living in Bungoma.

8) Kenyan Industry

Like agriculture, modern industry is a technical import but has been taken up by city dwellers and fueled by population growth in the rural areas where the landless try to find employment in the cities and a better life style. This predicament is a common theme taken up by Kenya's modern novelists and makes good sociological reading.

The pollutants that accompany such activity are beginning to change the face of the country and their effluent have potentially disastrous effects on Kenya's ecosystems (McRae 1986).

It has been convincingly argued though, that the evolution of modernizing elites in each society within each of the above social types was a process already set in motion during colonial times and that individuals who had access to cash managed to consolidate their land and animal holdings. This has created competing elites based on access to education and floating capital. This dynamic has been suggested as the root cause of the formation of classes in the modern Kenyan state (Kitching 1980).

Since the Kikuyu elite was gradually replaced by a Kalenjin elite in 1982 we have seen what one political scientist has called a 'circulation of elites'. Multiethnic states like Kenya may evolve equitably when more and various ethnic groups enhance the opportunities of their kinsmen through political power without substantially violating the gains of the previous elites or when multiethnic parties arise. However this system may collapse as disenfranchised groups try and empower themselves through forcing a federal system based on tribe on what is still defined as a unitary state.

A judicious reading of newspapers and magazines in the country gives the impression that these elites try to maintain a balance between two kinds of solidarity. The first is with their kin in the rural areas and the second is with their equals from other ethnic groups in the cities who compete for positions of power and influence. Such tensions and their accompanying rising expectations will no doubt put pressures on the present political system to devolve power and decentralize its decision making power. This in turn may allow districts and communities to have a greater say in the conservation and utilization of their natural resources. If the transition is successfully managed then Kenya may benefit from some of the aspects of the modern liberal state. If not it could evolve into a federal system run by the 'big men' of each tribal region.

9) The Third Wave

Part of this process of change has been linked to the end of the cold war and a world wide revolution in the decentralization of communications that allows for easy access to free information and data banks. These technologies defy national borders through television, fax machines, computers and video. They allow non governmental organizations to establish themselves and present a counterpoint to the mighty weight of the state. The embrace of and access to this new and egalitarian information technology may be a crucial aspect of whether or not nation states like Kenya will have any say in the role they play in the future global economy (Toffler 1990).

Despite the fact that the present Kenyan administration classifies computers as labor saving devices in the hope of maintaining high employment, it is now commonly accepted that more jobs are created with computerization than without. All private businesses in the country have spent enormous amounts of money computerizing and training their staff to maintain the competitive edge that is essential to success in the international economy.

V) Culture, Ecology and Biodiversity

1) Ecology Explains Culture

Since the nineteen sixties human ecologists have sought to explain much of what was previously categorized as religious or 'irrational' behavior in ecological terms, showing the biological rationality of the

system.

'Ethnographic examples were soon forthcoming. New Guinea ritual and warfare were linked to population dispersion, the potlatch reinterpreted as a means of resource distribution and India's sacred cow identified as an important...source of fuel, traction and (for the lower castes) food' (Hefner 1983 p. 548.)

2) The Critique of the Ecology Explains Culture School

The critique of this position comes from a number of sources. The first is that as Hefner points out, 'Nothing better guarantees the lack of communication between human ecology and the social sciences than the insistence that only the natural environment constrains cultural adaptation or that only natural urges inform social interest.' (Ibid. p.551).

3) The Issue Defined

The matter can be put very simply. 'Religions' and symbolic domains of behavior may have hidden ecological functions or, alternatively the symbolic definition of life may have drastic effects on ecologies.

a) Example Number One

The first issue can be seen among the Rendille a group of camel herding nomads who live in Northern Kenya. It appears that until recently Rendille birth control practices have balanced the number of people to camels in a camel based economy where animals reproduce slowly. Thus the whole age set system, the camel economy and associated religious beliefs and practices have supported a low birth rate (Beaman 1981).

b) Example Number Two

The other example can be seen in Latin America where the dominant religion is against birth control and population is now pushing into the rain forest of the Amazon basin where indigenous peoples' traditional religions and intersocietal competition have together kept the relation to resources more evenly balanced. The relevance to biodiversity is simple. Pressure to convert environments rich in species to monocropping or cattle ranches may have their origins in the values of world religions that have preached man's total dominion over nature and the Church's rights over the reproduction of its women faithful (Darlington 1967, Clarfield 1991).

In contemporary Kenya traditions of polygamy coupled with modern medicine and a change to a world religion are no doubt the three key factors behind the development of intensive agriculture and the growing landlessness of large families. Together these socio\ecological forces have pushed marginal members of densely settled, usually farming populations into wetlands, forests, and arid lands. This creates undue pressure on resources and sets them in conflict with the hunters, pastoralists, fisherfolk and the like. The diagram reproduced on the following page gives some idea of how this is affecting Kenya's arid north.

4) Culture as Cause and Consequence

The point that is being made here is that cultural practices are both cause and consequence of the maintenance or destruction of biodiversity. This is not to say that preindustrial societies were 'golden ages' where societies lived in harmony with nature (Diamond 1988). Many societies including some hunters and gatherers in prehistoric times have destroyed the very resources and species that kept them alive (Fagan 1989). And, a second look at the chart reproduced from Lenski's book will show that social evolution is a dynamic process whose punctuated equilibrium is masked by periods of relative ecological stability. The rise of Islam, the Mongol invasions, the Roman and Aztec empires are all examples of the dynamism (and quite often violence) of history during the preindustrial period.

However, given the overwhelming momentum of the forces of modernization that are at work in East Africa, the speed of the transformation and the intentions of the public pronouncements of the modernizing elites of Kenya to forge a unified nation with minimal ethnic divisions, the fact that loss of cultural diversity is directly linked to the loss of biodiversity is a real one.

VI) Four Case Studies

The following four case studies represent four different kinds of communities and the challenges that face them and the country's planners, if the degree of biodiversity that characterizes their ecological adaptations is to be better understood and conserved.

The first deals with a community of forest dwelling hunter/gatherers who live between a major game park and reserve. The second concerns one group of semi arid land pastoralists who live in a United Nations Biosphere Reserve. The third concerns a community in the overpopulated heartland of Kenya's horticultural/agricultural heartland. The final one deals with the assault on coastal cultures, in particular the maritime Swahili whose homeland has been incorporated into the world division of labor through the recent, explosive growth of tourism and labor migration to the coast from other parts of Kenya.

A) Case Study Number One `The Nkebotok of Southern Turkana'¹

1) African Hunter/Gatherers in Crisis

Twelve thousand years ago there was only one kind of human society. The world was home to a wide variety of hunter-gatherer groups who had adapted to every possible ecological niche on earth, from the arctic to the tropics (Coon 1972). Twelve thousand years later, the few societies who have maintained variations of a hunting-gathering economy are under pressure from outside demographic forces. The comparative emptiness of their home territory attracts immigrants from nearby, land hungry pastoral, horticultural, agricultural and town dwelling peoples, armed with new and hardier species of crops and domestic animals, all in search of a better life for themselves and their children (Lenski and Lenski 1987).

Throughout the African continent small groups of hunter-gatherer peoples have not just survived but thrived in the marginalized environments that their more powerful neighbors have not settled. They have come to inhabit 'remnant forest' on the banks of remote rivers or in once isolated mountain ranges. The Nkebotok are one such group of people; hunter-gatherers, but who have added riverine based horticulture and the raising of sheep and goats to their hunting, gathering and honey collecting activities. They represent the kind of communities who lived in Kenya just over three thousand years ago when as Kesby points out much of East Africa was covered with dense forest.

`...East Africa would support closed forest or dense woodland communities were it not for human activities... most of East Africa was in the past covered with such communities.' (Kesby, 1977, p.32)

¹ This summarizes the 45 page report on research conducted earlier this year by Geoffrey Clarfield, Department Head of Ethnography and David Lowe, Research Associate for Biodiversity, both at the National Museums of Kenya. The data collection and analysis behind this document are the result of a small-scale departmental training and research exercise. The report cites 72 reference sources and includes 16 figures, tables and text boxes describing the ethnobiology, geography and biological diversity of the study area. Pre-publication copies are available for \$6 or equivalent from the authors at NMK, PO Box 40658, Nairobi, Kenya.

During the last two thousand years immigrant agropastoral, horticultural and maritime societies have settled in Kenya, often establishing themselves in what was once hunter-gatherer territory. As these societies expanded, the hunters retreated into the mountains, forests and deserts until representatives of an advanced industrial society incorporated Kenya into its own expanding empire (Morris 1973). When the English established their colony, Kenya was a blend of societies representing almost every societal type ever evolved at different levels of expansion. The system was largely frozen during seven decades of colonial rule.

In 1964 independence unleashed mounting demographic forces that had been checked during colonial times, resulting in migratory waves of land-hungry settlers reaping the fruits of their new found freedom. Kenya's integration into the global economy brought the added stress (and benefits) of tourism and export-oriented agriculture.

The creation of game reserves was often the first official step towards conserving wildlife. This usually occurred without considering that their most knowledgeable and efficient stewards were often resident hunter-gatherer peoples. The natural resource management techniques of hunter-gatherers and some pastoralists are the primary reason that Kenya still has a relative abundance of the animals that attract tourist income.

2)The Nkebotok Homeland

In a recent article listing Kenya's remaining indigenous forests the Turkwel riverine forest is not mentioned (Allway and Cox 1989). The Turkwel has its source in the highlands of Kenya's Central Rift Valley and meanders for a few hundred kilometers until it empties itself into Lake Turkana. The ecological composition of its central area has been recently studied by the United Nations (Amuyunzu C.L. and Oba G. 1991). It is estimated that on either side of the river there is a thick forest which is at places up to five kilometers wide. Thus there is at least four hundred square kilometres of forest up and down the Turkwel.

The Nkebotok are Turkana-speakers, living in the northern Kenyan Rift Valley within and along the narrow riverine forest of the Turkwel River. The first written account of the Nkebotok describes a small group of successful hunters, gatherers and farmers living in the southern Turkwel forest surrounded by more powerful and aggressive pastoral tribes (von Höhnel 1891).

These hunter-gatherer farmers seem to have a steadier food supply than most of their neighboring plains-dwelling nomadic pastoralists. Growing evidence suggests that they sustainably manage the forest and adjacent plains to meet their own needs, while acting as guardians of the system.

3)Symbiosis with Neighboring Pastoralists

They have a complex and as yet little understood symbiotic relationship with a large section of these Turkana pastoralists, the Nsinyoka, who live to the east of them. The Nsinyoka raise camels, cattle, sheep, goats and donkeys. Households move frequently and independently. The system is not random and there is a tendency to follow a yearly migratory route within their home area; an area filled with wildlife.

The pastoralists avoid the river due to livestock disease vectors including tse tse flies in the dense bush and gallery forests. The Nsinyoka, utilize this area only for watering livestock or if there are no other forage resources available (Ellis et al. 1987).

The Nkebotok and Nsinyoka have been trading for decades. The Nkebotok provide grain in exchange for small stock. This trade may have helped the Nsinyoka avoid depending on government relief during recent droughts. The Nsinyoka look down upon the Nkebotok. They call them by what in their eyes is a derogatory name, 'the poor ones'. The Nkebotok live their 'affluent' life by the river unconcerned about the low social status that comes from not having herds. To them, honey is preferable to milk, wild game is better than livestock and the forest is more desirable than the plains.

4) Core Elements of Success

Nomadic pastoralists must migrate to maximize access to the few grass and browse species needed by their main asset, livestock. The Nkebotok rely instead on a large variety of species with overlapping periods of local availability, thus attaining greater food security and social stability without disruptive relocation.

a) Utilized Species

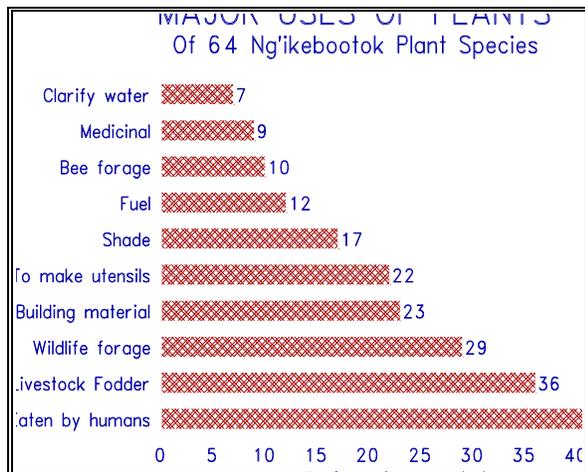


Figure 1.

Wildlife is attracted to Nkebotokland from the two nearby game reserves by the presence of an intact indigenous forest, ripening crops and continuous flowing water. At least 30 species of mammals are residents of the area. So far 64 plants are known to be used for medicine, food, fodder, or construction material (Figure 1). Of these, 65% are eaten by humans, 58 percent provide fodder for livestock, 14 percent are medicinal, 36 percent are used for utensils, 37 percent for construction, and 28 percent are appreciated for their shade. Other uses include ceremonial functions, toothbrush twigs, fuel, fibre and condiments. In addition, informants report that 30 species are consumed by 18 different wild animals including bees and termites. Part of this varied consumption contributes to the human food web, as honey, termites and game meat.

b) Farming

The Nkebotok have farmed indigenous and introduced crops along the river banks for over 100 years. 17 documented varieties of sorghum are grown; each with an individual local name and distinctive traits. Grain stores are identified by the particular mix of sorghum varieties grown by each farmer. Farmers experiment with neighbor's seeds when they need to farm a new plot due to river flooding. Maize, green grams (mung beans), pumpkins and a variety of vegetables are also grown. Trade in goods, mostly through barter, provides variety and additional stability to the overall economic system.

c) Hunting

A number of animals threaten farmers' crops. Elephants have to be chased every night during the rainy seasons. Those animals that are found destroying someone's crops are themselves killed and eaten, with the exception of elephants who are only scared away-unless they become too persistent a menace (perhaps one per year is killed).

Traps are set in known animal paths to secure the fields and to obtain wild meat. Smaller animals are actively hunted as food, but with moderate frequency. One informant reported that he had hunted 16 different species at one time or another. These included dikdik, gazelle, impala, baboon, monkey, zebra (five years ago), buffalo, eland, squirrel, rabbit, giant forest squirrel and a sand cat. Birds slain in the sorghum fields are roasted and given to children to eat.

d) Mining, Livestock and Wage Labor

Other economic activities include keeping livestock, mining gold and exchanging services, locally for barter and for wages outside the area. Nkebotok keep livestock in small numbers. Individual animals are often received as compensation for goods and services supplied to pastoral neighbors. Alluvial gold has been mined in the area since 1967. It is a reliable income supplement to traditional economic activities. Income from gold is equitably available for any able bodied man or woman since earnings are proportional to invested labor.

e) Respect for the Forest

Use of the forest is non-destructive except in times of severe hardship. Even then damage is restricted. Mainly branches are cut to avail fodder to the few livestock. Entire trees are infrequently cut to make charcoal. In these cases there is usually a dual purpose, such as clearing a new field for crops or discouraging elephants (which favor certain trees). The 'echoke' fig (*Ficus sycamorus*), is spared even when an entire field surrounding it is cleared because its fruits are eaten by all Nkebotok and its upper reaches are used for building platforms that store food. Respect for the forest and its products is ingrained in the land use behavior of the Nkebotok. This is clearly seen in the way wooded lands are returned to tree cover through fallowing.

f) Hunting Peaks

Hunting is often a response to stress and competition. Food shortages during times of drought prompt active pursuit of game as a food supplement. Otherwise game is only hunted or trapped when animals become a "threat to the shamba (field)". Therefore, hunting fluctuates seasonally within a given year, and probably has a periodicity over the years that correlates to drought cycles, although this has not been investigated. Wild animals are not killed for sport, sale or barter.

g) Kinds of Cooperation

The relationship between human and wildlife populations shows one kind of symbiosis since wildlife habitat is left intact, even actively protected by the Nkebotok. It is a mutualistic relationship in that both wildlife and human populations gain advantage from the activities of the other.

Kinds of cooperation and exchange or 'mutualism' with neighboring ethnic groups, including bartering, contributes to the stability of the system and enhances security. There exist many different types of obligations, exchange of services, taboos and social cooperation between neighboring groups and which appear to correspond to periods of food scarcity.

Reciprocity underlies the way that labor is exchanged among neighbors or family members, but elders are especially dependent on the services of family and neighbors.

h) Two Examples of the System's Dynamic Equilibrium

Interactions with wildlife, other human groups and the surrounding vegetation have regulatory impacts on all parts of the system, though these are not yet well understood. One example includes the existence of ecological symbiosis between the Nkebotok and wildlife.

Wildlife compete with humans for cultivated crops. While wild animals are entirely consumptive towards crops, humans provide labor to assure the success of the plants. By hunting, the Nkebotok recapture a portion of the energy lost to these competing consumers, while reducing the competition. Wildlife also gain from human cropping activity. They are provided with a rich supply of highly nutritious fodder, maintained in a concentrated area by the labors of Nkebotok cultivators.

Another example of symbiosis at work here, consists of humans protecting the habitat occupied by medicinal and other useful plants, while many of the plant species meet human survival needs. The large fraction of plants that are edible or have other important uses leads to the question: to what extent are Nkebotok forest management techniques responsible for the current configuration of species? Has there been selective cutting of forest trees to favor the survival of useful species and reduce the number of undesirable trees? We do not yet know.

i) Private Ownership and the Maintenance of Equity

Only the most romantic social scientist would miss the centrality of private property in Nkebotok society. For example, honey hives, termite mounds and agricultural plots are all owned by their users. Ownership is generally inherited from father to son. Yet inequality has been reduced to a minimum because people's needs are satisfied through a variety of activities, through sharing and access to ample available resources.

Wild game belongs to those who are part of the hunt and the meat is shared out among close kin. Farm plots are also owned by individuals and families but often people with extra time or sons or daughter can work on other people's plots to be paid in kind. There is much conviviality and sharing within a village and the evidence that is available so far is that there is little economic differentiation among the Nkebotok.

In short Nkebotok society is characterized by a marked degree of equality where families have comparable opportunities and all have access to the resources of the ecological niche that they exploit. Such a system of social relations is commonly found among hunter-gatherer societies throughout the world.

j) 'Man' at the Top of the Food Web

The presence of a top level predator in an ecosystem (in this case, man the hunter) serves to increase species density in the system (Paine 1966). This is because the predator or hunter will more frequently cull those animals which have become most prevalent.

An unpublished, 50 page expanded version of the above summary can be had on request from the Department of Ethnography, National Museum of Kenya, Nairobi.

5) Recommendations-Research and Policy

One of the most pressing issues in Kenya is that of land tenure. We recommend that authorities recognize the Nkebotok's special relationship with their forest habitat and the land tenure considerations that may arise from this relationship. Since the land is still communally held and the government has not opted for a

group ranch scheme in this district there is still time to take a more innovative approach in those districts which still have traditional land tenure.

Security of land ownership and access rights for people who understand and maintain the ecology of the forest makes environmental sense and ultimately, economic sense. Only when people feel it is theirs will they continue to take care of it.

Perhaps the most viable means of protecting the biological diversity of the Turkwel River forests and surrounding rangeland is to set them under legal management of the Nkebotok community. They are the most knowledgeable caretakers available considering their pragmatic understanding of the ecosystem. Furthermore they have a vested interest in the maintenance of the forest and they have proven their success at keeping this environment intact over the past century.

This plan will be even more successful if the Nkebotok community receives additional benefits from their knowledge of and maintenance of the forest and wildlife. Creative schemes to tap their knowledge while generating a tangible profit from the conservation of this environment need to be considered. If tourism is developed in the area at any level, Nkebotok residents would be ideal tour guides for walking treks through the forest.

Except for the evergreen strips of land along the banks of the Turkwel, farming is limited to times when the river is high enough to fill the irrigation intake canals, and to moisten the soil further from the river, or when rainfall is sufficient.

Our second recommendation involves the strategic release of waters from the Turkwel Dam so as to maximize the growing season. Considerable increase in crop yields can be gained by expanding the time during which the river is high, thus expanding the arable area without requiring expensive irrigation canals and gates.

Canal irrigation would bring the forests and wildlife into greater conflict with agricultural land use. Ideally, water release policy would balance the benefits between far downriver residents, Nkebotokland residents a short distance from the dam, and national interests such as power generation, wildlife conservation and food production.

Two wildlife sanctuaries, Nasalot National Park and South Turkana Game Reserve are situated along this intertribal zone. This may be a coincidence. However, it may be worth investigating whether the concentration of wildlife found in this area is due to socio-historic factors. It may be that the low competition levels from livestock (including disease reservoirs) made this area favorable to wildlife (Isack 1976). The habitat provided by the riverine forest of the Weiwei and Turkwel extend the natural range of wildlife from these sanctuaries, northward through Nkebotokland. The tourist potential could be significant. Conservationists are now focussing their attention on community participation and 'Ecotourism' in order to equitably distribute tourist revenues coming from wildlife viewing. This approach is based on evidence that wildlife are more effectively protected when nearby communities gain from their existence.

We have argued that the traditional hunting practices of the Nkebotok and other hunter-gatherer communities are not a threat to wildlife. On the contrary, the evidence indicates that it is ecologically healthy and sustainable. There is a certain symbiosis between wildlife and Nkebotok hunter-farmers. There is a hunting ethic that prohibits killing reproductive age individuals, and hunting is practiced only occasionally, in defence of one's crops or as a last resort food source during difficult times. When there is a drought, food is scarce for wildlife as well and populations need to be culled or else they will succumb to starvation and will damage the habitat in their desperation for food.

In the larger document referred to above we have also argued that for over one hundred years the Nkebotok have flourished without major assistance from outside sources. They have done this while many clans in Turkana land were devastated by drought and forced into famine relief camps or settlements. And they have done this while maintaining the vitality of the Turkwel River forest, without hunting out any of the wild animals that live in and around this area in great abundance.

The reason that a society like the Nkebotok escaped the attention of the community of social scientists and development workers was because of a tendency to focus on those societies that were failing to maintain their food security.

In keeping with one recent stream of thinking in the field of biodiversity and conservation we argue that more attention need be given to indigenous successes. We also contend that the 'secrets' of such success will be found through two kinds of research. The first is a clear understanding of the indigenous knowledge basis of societies like the Nkebotok. The second is based on comprehensive studies of the human ecology and symbiosis of these hunter-gatherers and farmers in relation to their pastoral 'host' societies.

Such a research proposal must be part of two kinds of survey. The first is that of forest dependant hunter gatherers throughout East Africa and the second an ethnobiological survey that will result in a computerized data base on East African Indigenous Knowledge. From the point of view of social science such concerns take into account the sociological study of what are often called 'guest' or 'pariah' groups with issues that concern the preservation of systems characterized by a high degree of biological diversity thus bringing together to previously unrelated branches of human investigation (Gerth H. and Martindale D. 1952, Park, 1950).

There is growing ethnographic evidence that societies like the Nkebotok are found in pockets all across Africa (Time Magazine 1991). They are the descendants of the last of the hunter-gatherer societies that predate the development of horticultural, herding and agricultural societies who are now the majority on this continent. They have many lessons to teach us about the management of complex ecological systems and the use of the endemic plants and animals living in their territories.

B) Biospheres, The Tragedy of the Commons and Indigenous Adaptations

1) Introduction

In this short case study we will examine the predicament of maintaining biodiversity among pastoralists in arid and semi arid lands. The model that is commonly held is that pastoralists overgraze their territory, destroy the natural tree cover and wipe out the many endemic wild plants and animals that live in their range in order to survive.

This model is based on an interpretation of human ecological dynamics called the 'tragedy of the commons.' Here we will briefly review the argument, mention its main defects, discuss two cases where it does not apply and see if those cases can teach us lessons about planning for the maintenance of the Mount Kulal Biosphere in Northern Kenya.

2) The Tragedy of the Commons

In 1968 Garrett Hardin wrote a famous essay called 'The Tragedy of the Commons' (Hardin 1968). The argument in its application to herders' use of rangelands has been summarized by Mcay and goes as follows:

'A herdsman puts his animals on a pasture that he uses in common with other herdsmen. Even though there are signs that the condition of the pasture will worsen with additional stocking, it is only rational for each herdsman to add more animals to his herd. This is because he gains the full benefits of each additional animal while sharing the cost of overgrazing with the other herdsmen. The positive utility to the individual herdsman of adding an extra animal is +1; the negative utility is but a fraction of -1' (Mcay and Acheson 1987 p. 3)

This interpretation is based on two assumptions. The first is that there are no indigenous controls on an individual's right to put his animals on the range and second that the pastoralists will overstock until there is widespread range degradation and the resultant effect of starvation through loss of herds.

Whether official or unofficial, Hardin's view has informed much government policy towards pastoralists in East Africa. Their objective has been to free up the rangeland by settling pastoralists in towns, but they have rarely given sufficient attention to how these soon to be settled pastoralists will make a living and where their livelihood and food will come from.

3) The Critique of The Tragedy of the Commons

Criticism of Hardin's position has come from many sources. The first one is that pastoralists only rarely depend on livestock for food. There are always other sources even if they are not the preferred ones. The dividing line between pastoral, agro pastoral, and an agriculturalist whose son takes cattle out to graze is often hazy.

The second one is that seen over time, pastoral systems can be resilient. They can change and adapt and are more flexible than they have been given credit for. Finally, much of the crisis of pastoralists in Africa have not been because of pastoralists but because since the independence of most African states a quarter of a century ago power has been given to leaders who represent the interests of horticulturalists and agriculturalists. Access to modern technology, foreign aid and a correlated population explosion has allowed them to push their farms into the former dry season grazing lands of pastoral peoples. (Galaty J.G., Salzman P.C., Aronson D.R. eds. 1981).

Sometimes this has already happened before independence. A very simple example from Kenya is the problem of Masailand. 'Overgrazing' and 'range depletion' has in the north of Masailand as much to do with drought and demography as it has to do with the fact that the green and wet area around Nairobi (a Masai word) was once Masai dry season grazing land. Once this important component of the Masai pastoral system was taken away then the rangeland becomes stressed.

4) The Nsinyoka Again

The Turkana Nsinyoka pastoralists live east of the Nkebotok. They are one of the Turkana pastoral groups who during recent droughts have not lost all their animals and have not shown up begging for food in famine relief centers. They have managed to survive and to some degree prosper.

A group of ecologists and anthropologists studied the Nsinyoka and other Turkana for a period of ten years. Their results were given in an unpublished report to NORAD. Some of their findings have been summarized in a recent article in one of the issues of the Journal Human Ecology dedicated to articles that debated the issue of the tragedy of the commons (McCabe 1990).

After analyzing the demography, available plant and animal resources, Turkana migratory patterns and taking into account that so far there had been no taking over of rangelands by agriculturalists nor drilling of technologically inappropriate bore holes, McCabe's group found a number of linked factors that guaranteed successful pastoral adaptation to arid and semi arid lands in Northern Kenya.

They are:

- a) The defined pastoral group has need of access to a large, diverse range such as those over 10,000 square kilometers.
- b) The group needs guaranteed access to productive dry season ranges.
- c) They must maintain high mobility and be allowed and able to move freely through these ranges.
- d) They must maintain low to moderate stocking rates.
- e) There must be high to moderate livestock units per person

(Ellis et. al 1987)

The corollary of this set of features is equally important since it touches on factors inherent in susceptibility to famine:

- a) Sedenterization.
- b) Lack of access to dry season ranges.
- c) High densities of livestock and people, relative to regional carrying capacities.

(Ellis et. al 1987)

In short the argument against a simple application of the tragedy of the commons to cases of drought among pastoral peoples is that individuals are not and never were totally unconstrained by the social system and local culture to increase their herds at will.

There is much sharing and redistribution of livestock to the have nots of society. The use of dry season grazing is essential to survival. And, there are some simple low cost/low tech suggestions for pastoralists to be able to maintain their herds and their own food security without terrible environmental degradation and without selling them off at cut rate prices during crises, thus being forced to enter the famine relief camps.

5) The Mount Kulal Biosphere

Mount Kulal is a forested mountain that rises to 2,295 meters east of the shores of Lake Turkana near the oasis of Loyengalani. It has a number of different vegetation zones and towards the top it supports a small town called Gatab. It is the home of a number of competing and cooperating ethnic groups, mostly pastoralists who use its resources, but it is considered by one ethnic group, the Areal, to be a significant part of their home territory. (Lamprey H.F. and Yusuf H. 1981).

Mount Kulal was part of an extended ecological study undertaken by UNESCO throughout the seventies and much of the eighties to examine how pastoral peoples may have been putting stress on the rangelands in and around Mount Kulal. The arguments put forward by its researchers in their project publications reach similar but slightly modified conclusions to those who studied the Turkana Nsinyoka.

The UNESCO team felt that the rangelands of the north could actually support more animals than at present without undue environmental degradation but that degradation existed because too many people and animals were concentrated in specific areas, while others were unused.

The project researchers did not go into the social and political reasons as to why this was the case. However, project recommendations are valid and similar in substance to those made for Turkana district (Lusigi W.J. and Glaser G. 1984).

What the UNESCO team did not sufficiently investigate is that some ethnic groups were doing better than others and that this was because the entire range of their ecological, social and ritual system had evolved the flexibility to sustainably manage herds in and around the Mount Kulal region and the mountains and hills south of it.

One of the goals of this annex is to draw attention to indigenous success stories, based on the assumption that they can be maintained by adequate legal protection and government encouragement. Therefore we will now take a brief look at one of these successful groups, the Areal. But before doing so let us briefly enumerate some of the main features and functions of a Biosphere so that in the recommendations the needs of the biosphere and the realities on the ground can somehow be connected.

6) The Functions of a Biosphere

a) What is a Biosphere ?

According to an unsigned UN folder on the subject, 'A biosphere is a unique category of protected area dedicated to helping discover solutions' to the problems of environmental degradation (Unesco, undated). It is also a legal entity created by the National Government under the auspices of the United Nations. Its mandate and goals include perpetuating and learning from traditional forms of land use, while at the same time improving management of natural resources. It consists of a core area, a buffer zone and areas dedicated to rehabilitation.

An examination of the Unesco Documents for Mount Kulal show that the area around the forest of Mount Kulal probably corresponds to the core area, the plains and hills form the buffer zone and the desert plains the area no doubt set aside for rehabilitation. To what degree this biosphere can be maintained and the forest on its higher reaches maintained depends on two things.

The first is the recognition that we at present no little to nothing about indigenous models of natural

resource management of the people who live on and around the mountain and the second is will national agencies put the necessary minimum of resources aside to tie the pastoralists over during the inevitably recurring droughts that are part of this areas climatic cycle? Also, will climate change further increase desertification and thus demand changes in pastoral production ?

7) The Areal

a) Resiliency and Survival

Fratkin spent a number of years living and studying the Areal of Northern Kenya (Fratkin 1986). Ethnically they are a difficult group to define because they are made up of a loose alliance of clans who draw their membership both from birth as well as significant immigration from the 'purer' more clearly defined clans and territories of the Samburu and Rendille (Spencer 1973).

Individual Areal elders can at different times claim rights as Areal, Samburu and Rendille, but most of the time they remain as Areal in Areal territory which is situated between the main areas of the Samburu cattle herders to the southwest of the Mathews Range and the Rendille camel pastoralists to the east of these mountains in between Samburu and Marsabit Districts near Northern Kenya's great 'desert lake', Turkana.

Fratkin has argued that the Areal have managed to spread their animals widely and selectively and they use a variety of herding and movement strategies to maintain the life of their herds and people. Unlike the Rendille they have not submitted to the temptation to concentrate their numbers around towns or boreholes.

For those readers who do not have the time to read through the extensive UNESCO reports, their allies the Rendille have recently lost much of their rangeland to other tribes in the last twenty years and they have begun to sedentize in large towns. They are often supported by famine relief from charitable organizations and have created large swathes of man made desert from the trees that they have cut down to use as firewood and fencing for animals.

Fratkin concludes that the Areal have been more successful than the Rendille in adapting to changed circumstances because of a variety of cultural and ecological factors. In short he suggests that looser forms of social organization and ritual systems have a direct effect on the success or failure of environmental adaptation and the prevention of environmental degradation.

He outlines five major features that distinguish the Areal from the Rendille and that are the criteria of their success and quoted as follows:

1) Settlement composition, although largely agnatic, includes affinal and non kin relations, reflecting a less corporate structure than the Rendille and an openness to immigration and recruitment that characterizes Areal society.

2) Less emphasis on lineal inheritance and primogeniture with bilateral inheritance from the mother's cattle herd.

3) A flexible rather than a strict internal division of labor.

4) A lack of ritual hierarchy.

5) The instability of the domestic group that results in periodic fission and fusion of different...household groups based on both environmental (seasonal) and social variables e.g. fission as a resolution of conflict.

b) A Note About Plants

Although it may be stressing the obvious Mount Kulal is home to more than 700 species of plants, most of them native to East Africa (Hepper, F.N., Jaeger, P.M.L., Gillet J.B., Gilbert M.G. 1981). That is 10 % of the number of plants in Kenya. The maintenance of viable pastoral systems and especially their support with imported or stored fodder during periods of drought will no doubt be the more cost effective way of maintaining the viability of these wild plants and trees than ex situ herbariums and green houses.

That is not to say that these may not be necessary as a second layer of genetic and botanic insurance. It is only to stress that the maintenance of biodiversity can at times be planned as a positive side effect of a more central development intervention.

8) Recommendations

It goes without saying that reducing stress on the system will maintain the number and spread of wild plants if pastoralists are living off their herds.

It also follows that there will then be less temptation to hunt wildlife. If in addition pastoralists can be included in profit sharing schemes from wildlife preservation in their area then overall plant and animal biodiversity may be maintained without access to large amounts of foreign capital.

This can be facilitated in a number of simple ways. However those engaged in pastoral development usually agree on three essential points and which provide for the following:

- a) Interventions for maintaining an adequate supply of forage for livestock
- b) Interventions for maintaining an adequate flow of food from livestock to humans
- c) Interventions for assuring an adequate supply of food resources other than livestock products.

(Ellis et al. 1987)

In addition some form of community profit should be arranged for:

- a) not killing large wildlife species

and

- b) restricting access of domestic stock to wildlife in selected zones set aside for the 'free' propagation of wild plants and animals.

C) A Sudden Minority

1) Cultural Clash at the Coast

From the point of view of social dynamics the problem of the coast is as follows. The very specialized stress/release mechanism of advanced industrial societies (tourism) has been transferred to the Indian Ocean coast. In doing so an exaggerated picture of the materially acquisitive, libidinal side of Western society has been put on daily display in front of conservative, largely Islamic groups of fishermen, traders, and coastal horticulturalists. Anecdotes abound of the cross cultural problems that arise from encounters in this environment.

As a social system the coastal Muslim peoples have been defined (in recent historical time) as a prestige conscious, ranked society of Swahili traders leavened by an Omani elite living in symbiotic economic relations with the coastal Bantu farming communities of peoples like the Mijikenda and Pokomo.

The assumption in many development and conservation circles is that these two colliding systems of beliefs and values, the secular European and traditional Islamic can somehow be harmonized through cross cultural understanding. Such is the assumption of Schoorl and Visser's document on sustainable coastal tourism.(Schoorl and Visser 1991). This may not be possible since an Islamic reaction is the most likely result of the traumatic penetration of Western leisure values into what was a recently a conservative Moslem society. Iran and more recently Algeria are the most recent examples.

2) The High Shall be Brought Low

For over two thousand years the Indian Ocean coast of Kenya has been involved in long distance, trans oceanic trade. Until recently most of that trade was in the hands of the Swahili peoples, named after the Arabic word for coast, 'suwahil.'

Since their early conversion to Islam over twelve hundred years ago these maritime traders have lived in their island republics, exchanged the ivory, feathers and gold of the interior for the luxury goods of India and the Near East and established a technologically advanced, literate trading civilization that stretched from what is now Somalia down to Mozambique.

Until about 1900 the Swahili and their Omani brethren were the masters of the coast, sometimes as independent groups or sometimes as clients of the Omani sultans based in Oman or Zanzibar.

However as Spear outlines in his book Kenya's Past the 19th century commercial empire that was being developed by the Sultan of Zanzibar was ultimately overtaken by Britain in its fight to eradicate the remnants of the slave trade in the Indian Ocean. Once done, the Imperial authorities did not take it upon themselves to adapt and strengthen the local economy with substitute activities. What they did instead was change the whole sociocultural dynamic of the region by building a railway from Mombasa to Uganda (Miller 1971).

This famous 'Lunatic Express' and title of a book about East African history describes the complicated political and economic machinations that produced the railway. Since in its' initial years the railway did not make money it was subsidized by the Crown and thus eventually precipitated the creation of Kenya Colony. The Kikuyu highlands were opened up by the railway and this rich farming area became the center of a historical dynamic that moved the drama of East Africa from the coast into the interior with its center in the railway stop town of Nairobi. Thus the Swahili, a sophisticated, worldly, urban and literate elite were bypassed in their own hinterland by an imperial power with apparently limitless manpower and resources.

The British, probably out of respect for the cultural and religious achievements of the Swahili, created a series of coastal protectorates under traditional rulers who were shorn of their previous economic and

military power. In Kenya this protectorate was ceded to the new Republic in 1964 and whose political elite came from the Kikuyu highlands, thus finalizing the economic and political decline of the Swahili elite. So, from the early years of independence the coast, outside of the growing port of Mombasa, became an economic backwater. The port however attracted immigrants from outside of the coastal zone, a trend that has continued until today.

During protectorate times British policy seriously restricted internal migration and the Swahili were left alone. However in the seventies the touristic advantages of the coast attracted Kenyan and foreign investors. Tourist hotels were built at a spectacular rate and the foreign currency that was pumped into Kenya was significant. By the end of 1991 tourism has become Kenya's biggest earner of foreign currency. Such a quantum leap in economic development led to internal migration from outside of the coastal area. Kenya's independence gave each citizen the right to move where they wanted and there was no legal impediment to rural immigration. Within a short period of time the Swahili were a minority in their own homeland along with the Mijikenda coastal forest dwellers.

Let us now take a brief look at what that means in terms of the change in the local environment, what kind of ecological problems this tourist explosion has created and what role the Swahili and Mijikenda may have, if any, in the partial amelioration of these problems.

The most recent study of tourism is by Schoorl and Visser. The following summarizes some of their main points followed by my own analysis (Schoorl and Visser 1991).

3) Tourism on Kenya's Indian Ocean Coast

a) Brief Description

The coast covers an area of about four hundred and fifty kilometers. It is part of a series of linked ecosystems that are connected to it in parallel lines moving east to west. The most distinctive is the coastal forest which stretches inland for up to ten kilometers. It is not more than 50 meters above sea level and it receives about 750-1,250 mm of rain each year. The area is notable for its heat and humidity.

Coastal lands have been traditionally used for farming and pastoralism. There has been no population census since 1979. Even then it was estimated that there were 1.34 million people living in and along the coast, effectively making the Mijikenda and Swahili numerical minorities in what was once their near exclusive domain. Land tenure is characterized by absentee landlords and alienated land for tourist hotels. Some small farmers rent their land while others squat.

The coral reefs are one of the largest tourist attractions. The whole coastal ecosystem depends on the reefs and their relation to the mangrove forests. They yield many kinds of fish and are good sources of fuelwood and timber. Attempts to maintain some of the richest parts of these environments have been made through the creation of reserves.

All aspects of the coastal ecosystem are stressed to various degrees. The details of this stress and some of the solutions to them are well described in Schoorl and Visser's report.

Any community participation in the maintenance of biodiversity that is outside the domain of national, technical solutions such as aquariums or marine parks will need to take into account the people who have traditionally lived in these ecological zones.

They are classified from east to west as follows:

- 1) Coastal dunes and cliffs-inhabited by tourists and tourist hotels
- 2) Mangroves-utilized by coastal and island villages, Swahili and Mijikenda plus squatters and immigrants
- 3) Lowland dry deciduous forest -Mijikenda
- 4) Lowland moist forest-Mijikenda
- 5) Lowland dry deciduous forest-Nomads
- 6) Lowland woodland-Nomads
- 7) Riverine forest (Tana river)-Pokomo horticulturalists, Oromo nomads and hunter/gatherers
- 8) Acacia euphorbia bushland-Nomads
- 9) Lowland savannah-Nomads

Then there are national and forest reserves, in particular the Kaya forest centers of the coast found among the Mijikenda. These are ritual centers where plants of medicinal value are protected through traditional usage. (Hawthorne W., Hunt K., Russell A. 1981)

The evidence is growing that the massive influx of tourism and immigrant wage labor has put stress on all of these systems. Reefs deteriorate, forests diminish and perhaps species of fish become threatened. Sewage is poured into the seas and rivers, untreated (Samoiyls 1991).

What we do not yet know is the general human ecology of the coast, the input and output of energy, the ethnic division of labor, kinds of symbiosis, the relations between the nomadic interior and the forested coast as well as what contribution the inhabitants of these areas can make to its amelioration.

One point is clear. Of the more than eight hundred thousand tourists a year who come to Kenya four hundred thousand go to the coast and these numbers are equal to one third of the coastal population.

The protection of biodiversity in this area may therefore stand on a number of pillars. The first is to restrict the damage of the tourist hotels and their related activities. The second is to find alternate sources of food and energy for the immigrant workers to take stress of the coastal forest. This may further encourage the importation of food from other districts. The third is to preserve to some degree the traditional lifestyles of the indigenous inhabitants without encouraging a wide range of fundamentalist religious activity. Related to this is the need to better understand their indigenous knowledge of the plants and animals of the coastal environment to see how these can be both preserved or incorporated into regional development plans.

In the most recent bibliography on the coast of the more than seven thousand items listed very few deal with this important topic. Thus research on indigenous knowledge is again a high priority (Wilding, 1990).

b) Culture Clash

In my meetings with elders at the coast and with Islamic charitable foundations I have been told again and again that the behavior of Westerners on holiday show that they have little if no morality. The indigenous Kenyan finds it difficult to believe that most of these tourists live hard working and frugal life styles back home.

At the same time let us not forget that the tourist comes from an industrial civilization whose mode of excessive consumerism reflects power and leisure without a true consideration of the price of consuming non renewable resources.

c) The Islamic Reaction

One significant phenomena that needs to be investigated is the growing conversion of inland Mijikenda to Islam. It is possible that there is a direct correlation between the loss of Swahili economic power and the growing numbers of conversions to Islam on the part of the coastal Mijikenda peoples. If this is so it may be explained by the fact that as the Swahili were dealt out of power and influence in the East African hinterland they have tried to widen their economic and religious brotherhood with a drive to convert their coastal Bantu brethren to Islam, thus enlarging their constituency and potential political influence in the Republic.

The complaints of the Islamic coastal elders take on a different hue if what is really going on is a movement of political opposition to 'up country', non Muslim Kenyans and outsiders. If that be the case then the coastal dynamic is about the resistance of a once dominant Islamic minority who were the aristocrats of the coast and who within a generation became a service minority of dhow skippers and beach boys. One only has to listen to the mullahs and see the portraits of the fundamentalist Islamic leaders in the streets to recognize that coastal Islamic society is under going some sort of transformation.

d) A Maldivian Solution

The biodiversity and conservation question can then be put as follows. What are some of the cultural and technical solutions to maintaining the biodiversity of the coast. The first is to understand the human ecology of the coast in its more or less remaining traditional forms. This includes the study of indigenous knowledge and its partial incorporation into sustainable use of natural resources.

The second is technical having to do with reserves, parks, gene banks etc. and can well be taken care of by national institutions such as KWS (Kenya wildlife Services). The third is corporate. It would appear that the effective maintenance of the coast's biodiversity should be a concern of the hotels. They have the money to support research and conservation of their 'ecological capital' but have yet to be approached or pressured.

Finally the sensibilities of the traditional coastal communities can be protected by the creation of separate tourist villages or enclaves, staffed by upcountry immigrants but a part of whose profits go to maintain the monuments, charities and social life of the coastal Muslims.

This has been done in the Maldivian islands and deserves to be investigated.

The problems of Lamu for example could be solved by more selective kinds of social encounters between visitor and resident since Lamu town is a community that has been essentially disrupted by tourism. Lamu town could even maintain its UNESCO preservation site status more effectively if tourists were housed on a different part of the island.

Finally each world religion has a conservation ethic. They also have a predation ethic. These values need to be reinterpreted by religious authorities so that stewardship of nature has the blessings of the religious authorities. If not the conflict will be seen, as I believe it has been so far, between tourism fueled by outsiders who 'exploit' the local population. If conservation is seen as an import then biodiversity will be the victim and the dynamiting of coral reefs to keep the hotels in fish will continue.

Efforts are under way among Buddhist peoples in Southeast Asia to merge conservation with religious education but there has yet to be developed an Islamic conservation movement. The time is long overdue considering the recent events in the gulf.

D) Biological Diversity and the Agricultural Heartlands

1) Introduction

Calestous Juma has conducted field work in the area of southwestern Kenya known as Bungoma. In his writings he concludes that this mainly agricultural, private land holding area of farmers, part subsistence and partly commercialized, is under threat from over population, intensification of agriculture and government policies that hamper indigenous innovation.

He argues that, 'The future of biological diversity in Bungoma is largely dependant on current plans to expand agricultural production as well as the migration of human population. The rise in commercial economic activity in the region poses major threats to biological diversity. It should be emphasized that this process is already underway. The situation is not unique to the area but applies to most parts of the country' (Juma C., Kiriro, Amos, 1990).

If this be the case then Bungoma land and its biological and social dynamics are representative of most of the country's horticultural and agricultural heartlands. Let us briefly then take a look at the problems and prospects for maintaining biodiversity in these areas. The following is a short summary of his research in the area interspersed with my own comments and conclusions.

2) The Geography of Bungoma

Bungoma is a district located on the western slopes of Mount Elgon in Kenya's Rift Valley Province. It covers an area of 307,400 hectares. Its lowest point is 1,200 metres and its highest 4,000 metres above sea level. It is drained by a number of rivers including the Nzoia.

Fifty eight per cent of the area is classified as high agricultural potential because of its' volcanic soils and its good rainfall, 91,200-1,800mm per annum.

Bungoma comprises a number of distinct ecological zones, tropical alpine, upper highland, lower highland, upper midland and lower midland allowing for the cultivation of the following crops and livestock: sheep, cattle, goats, cabbage, potatoes, pyrethrum, wheat, barley, maize, coffee, tea, sunflower, sugarcane, millet, sorghum, beans, castor, papaya, macadamia nuts, pineapples, avocados and cotton. The informed reader will realize that most of these crops are not indigenous to Africa with the exception of sorghum and coffee.

Fifty per cent of the maize grown is consumed and does not enter the market. It is an example of yet another imported food crop which is now a staple in the area. Juma does mention that there is a tradition of growing indigenous food plants in Bungoma and that four different food production systems are interacting with each other. They are crops grown for consumption, crops grown for sale, indigenous food plants and both recent and ancient imports.

As is the case with much of horticultural and agricultural Africa the population growth rate is high, 3.98 per cent with fifty per cent of local residents under the age of 15.

All land is held privately and is inherited from father to son. The overall ratio of land to people has gone down since 1979. As a result, marginal lands will soon be brought under cultivation.

3) Threats to Biodiversity

All of the above forces Juma to conclude that:

- migration will increase
- inheritors of land will be tempted to sell off to speculators and consolidators of larger holdings
- smaller holdings will be put to full agricultural use, reducing forest cover and the use of wild plants
- modern education will threaten traditional ethnobiological knowledge and plant utilization
- new roads will provide incentives for modern food crops to be grown for urban centers
- deforestation will negatively affect water catchments
- new tea zones will further reduce indigenous forest cover
- pressure on Mount Elgon national park will mount for cultivation
- cattle keeping although often more economical on the family level increases erosion

-official government policy still favors full agricultural exploitation of Bungoma with no recognition of the problem of maintaining endemic food or wild plants

4) Indigenous Response

Juma argues that the Bukusu who live in Bungoma use a non Linnaean, functional classification of plants and animals that is supported by a non expansive traditional cosmology. In this system species may come and go but the names remain the same. Function dominates. And he argues against those who see the indigenous system as static.

He describes how the Bukusu search for new plant species, especially in the nearby Ugandan forest. One example being the recent introduction of the aerial yam '*dioscorea bulbifera* var. *anthropolophagarum*.' It was first domesticated in the Congo forest and has been moving eastward. Its edible part is exposed, it takes little amount of land to cultivate and comparatively little labor to harvest. It is therefore favored by households with land and labor shortage. With minimal irrigation it could increase its yield dramatically.

At the same time Bukusu have been attempting to domesticate local plants.

Farmers have visited the forest to take seedlings of wild and edible plants in order to cultivate them. They have then been raised on farms.

There is also evidence that the selling of indigenous food plants is part and parcel of competition in country markets suggesting that the local system has its own resilience against imported food crops

a) Old Customs New Plants

Despite the privatization of land and the incorporation of agricultural activities in the money market there still exist social practices that encourage the sharing of innovative practices and the exchange of seeds. One of these is called '*bukulo*.'

Bukulo is a complicated social practice whereby members of clans and lineages who have lost contact with each other can visit and receive hospitality and assistance from each other. This includes gifts of new seeds and the teaching of their uses. The aerial yam for example has been introduced to a number of areas in Bungoma through this system. The same thing has happened for a number of new breeds of domestic animals.

b) Legal and Administrative Difficulties.

There are however a number of impediments to this system. Many of the new seeds come from the forest which is protected by the forest acts. Thus individuals with seedlings or cuttings from the forest can be considered to be lawbreakers. This is a clear disincentive to innovation in this sphere. The Ugandan border forests are not treated in the same way but political insecurity in these areas has prevented further exploration.

The forest act going back to 1942 declared Mount Elgon a nature reserve in the pristine sense of the word. People should not live inside it. Perhaps the UN Biosphere system can offer a better model for the protection of the forest while at the same time being open to the needs of indigenous farmers and pastoralists. These issues raise a host of as yet unresolved legal and administrative issues.

5) Recommendations

The first recommendation is based on the fact that the forest act needs to be amended to take into account the domestication of wild species adjacent to local farmers. The act itself may be an impediment to the natural evolution of balanced ecological farming systems and their spread through indigenous institutions like 'bukulu.'

The second recommendation is that biodiversity in this high agriculture area has much to do with family planning. In a way analogous to that of pastoralists near biospheres, if the human population does not increase exponentially then much of the flora and fauna will maintain itself.

Throughout Juma's article there is an unspoken contradiction between the cosmological approach of traditional Bukusu and the fact that the more than fifty per cent of the district, the under fifteen year olds, probably do not believe in this traditional world view anymore. By weight of numbers the future is theirs and their Western style education has so far had no room for topics like indigenous knowledge and ethnobotany.

If knowledge is power then the research, archiving and dissemination of this knowledge is essential since it will influence on farm practice. It is seldom realized what persuasive power and prestige is associated with the inclusion of any topic in the local or national curriculum. The stylishness of such knowledge goes a long way towards motivating a population to act in the direction of conservation. Thus the inclusion of ethnobiological knowledge in the social studies programs of local schools is an essential first step towards community participation in the preservation of biodiversity in intensely farmed regions.

Finally, the setting aside of green houses and open fields subsidized and dedicated to the preservation of indigenous flora may be the botanical counterpart to the extensive series of game parks and reserves that now dot the country. National institutions such as the Ministry of Education, the Museums and the Kenya wildlife Services (KWS) must become active in this area alongside specialized research institutes such as International Livestock Centre for Africa (ILCA) and the International centre for Research in Agro-Forestry (ICRAF) that are located in Kenya.

The one advantage that areas like Bungoma have in the preservation of biodiversity is the high prestige value of schooling and education. If conservation can be persuasively incorporated into the curriculum there is room for some optimism in the preservation of biodiversity.

VI) The Fourth Wave

A) A Review of Basic Recommendations

The following is a brief summary of some of the key suggestions for the maintenance of biodiversity in the four above mentioned environments:

Hunters and gatherers living in indigenous forests are usually excellent managers and guardians of a

region's biodiversity. Since the area that they live in is less than two per cent of the country's land these people can be given the legal protection and land rights that would maintain them in the coming decades while a variety of modes of community development are worked out during this crucial 'breathing space.'

The situation with pastoralists has more to do with maintenance of a flow of fodder for animals during times of drought and the spreading out of herds over the rangeland during times of plenty. Biodiversity will in many instances take care of itself with the exception of large wild animals who may need parks or community projects to maintain them.

On the coast biodiversity depends on a number of factors but most of all the linking tourism with conservation, the incorporation of indigenous knowledge systems within local food production and the avoidance of a clash between Islam and the west where the environment pays the price as has been the case recently in the Persian Gulf. Tourist money can provide much of the money that will pay for the expertise to help monitor and maintain the coastal reefs and forests through the development of sustainable tourist practices.

In agricultural areas land must be set aside to maintain enough local species to conserve the genetic variety necessary to periodically reinvigorate agriculture and livestock husbandry.

All the above suggestions take into account the limited funds available in the national coffers and have more to do with educational and policy changes that are not expensive. Therefore it seems appropriate to end this document with a description of the predicament that Kenya finds itself in, a few years before the closing of the twentieth century and a few comments as to where it needs to put its energies for the common good.

B) Kenya as a Modernizing Horticultural Society

One way of quickly arriving at an understanding of the present nature of Kenyan society is to compare it to the great agricultural civilizations of Europe and Asia before the rise of industry. We will find that Kenya like many other modernizing horticultural societies is characterized by an absence of the essential features of these agricultural societies.

Some of these are the development of a detribalized peasantry dominated by an urban elite, a world religion of its own, indigenous literary scripts, hierarchical bureaucracies and a ruling elite characterized by leisure and conspicuous consumption.

One can do the same with the features of industrial society and mention the absence of an extensive network of factories, the dependence on non renewable fossil fuels, etc.

Until recently these above mentioned features were thought of as essential prerequisites for the industrializing and modernizing societies. However if as Toffler argues in the recent book **Powershift** industrial societies are involved in a painful transition to a less centralized form of production. It is characterized by a number of features such as the breaking down factories and companies into smaller modular units, the development of an education and production system that is highly dependant on computers and the understanding of systems and systems analysis in all fields, access to the growing number of electronic data bases via satellites, radio and Television. If this is true of industrial societies then modernizing horticultural societies may be able to move directly into the post modern world without the environmental destabilization and industrial white elephants of the 'developed' world. In short it can avoid the painful disruption and excesses of the industrial revolution.

Therefore it is just conceivable that societies like Kenya in their move towards modernity may be in some ways preadapted for the computer revolution. One can think of pastoralists plugging into satellite

networks to track their animals and where the rain is, as well as Open Universities educating rural farmers by satellite transmission in the latest on farm techniques.

However one of the defining features of any such 'post modern' economy and society is its well educated and versatile workforce. This is a result of a highly developed educational system and access to information.

The only way Kenya can develop an educated elite with these skills is to open up the higher education system by allowing the establishment of private universities and technical colleges and by emphasizing liberal education which it has been argued is the best training for a fast changing economy.

At the same time modern information, computer and technological skills must be brought to bear on that part of the economy which is still at the subsistence level so that it functions to give the rural laborer a surplus on which to enjoy life and improve his condition rather than be a slave to the soil.

What makes Kenya different in this regard is that the indigenous knowledge that is part and parcel of successful local techniques and the maintenance of biodiversity can still be incorporated in the curriculum so that children do not lose faith in literacy and so that the prestige of schools maintains indigenous knowledge. Biodiversity has been best served so far by the maintenance of these systems and it would be folly to destroy them in the name of progress.

The advantage of a modernizing horticultural society then is that it can choose the best from a variety of donors,-Japanese technology, European political forms, appropriate technology from the Indian subcontinent and the like.

Thus for the developing world a combination of advanced information technology and training linked with a selective modification and incorporation of traditional natural resource management and technical practices can usher in 'a fourth wave'. Such a movement of society and technology would combine preindustrial knowledge and practice with post industrial ways of organizing and using information. Such a perspective would protect biodiversity while generating the expertise that would maintain Kenya's position in a diversified world economy.

Finally the fact that countries like Kenya have maintained much of the biodiversity that is now a universal concern gives it a political bargaining chip with its donors in the transfer of techniques and technology to join the post industrial world-one that will be more and more based on systems and the fast and free flow of information.

However since the educational system is not yet geared to this approach it is imperative that research and collection in biodiversity and cultural diversity be accelerated in the coming decade before it disappears from the minds of the elders who are no doubt its last custodians of this oral tradition.

C) Research in Ethnobiology

It is clear that until now the forces of modernization have been antagonistic to the survival and incorporation of indigenous environmental knowledge in the development process. However there have been some attempts at systematizing some of that knowledge in the fields of medicinal plants and medical anthropology. Yet none of it is systematic or coordinated .

At an recent international conference held in Nairobi that dealt with wildlife research for sustainable development one of the resolutions called for an ethnobiological survey of East Africa. Such a survey would entail a comprehensive study of the classification and uses of the environment that Kenya's traditional societies still maintain (Kat.P. et al 1990).

At the same time this knowledge must be computerized so that it can be linked with other information systems such as that of formal botany, entomology etc.

Thus any future planner or researcher should have access to the following information for any site in Kenya and east Africa- a series of three dimensional charts on flora, fauna and past environments that can be added to and accessed at any moment using a satellite imagery grid type format. Such information is crucial to development interventions and the kind of policy issues recommended in this document.

For projects like an ethnobiological survey to succeed or for any other single issue, major project to move ahead without creating a new bureaucracy Kenya needs the institutional equivalent of what has been called an 'ad hococracy' or in the business world a 'flex firm'. This is a kind of institution maintained by a minimal staff that can incorporate the best expertise available to deal with a particular problem. It can be expanded or contracted at will and once the goal is achieved it can 'hibernate', maintained by a skeletal staff. In a world of constant environmental and political crisis it is an attractive component of any large institution .

Such institutions need to be 'embedded' in larger one that give them their continuity. The National Museums have developed the outline for such an institution to deal with environmental issues . It is called C.I.R.C.A.-the Center For Indigenous Resource Conservation in Africa. It is described in some detail in the Appendices.

D) Conclusions-Biodiversity and the State of the State

The conservation of biodiversity is part and parcel of how the state of Kenya acts. That is to say it will succeed or fail according to the philosophical framework the state will act under in the coming years. Historians of the modern world have had many years to examine the strengths and weaknesses of centralized versus decentralized planning. They are almost all unanimous that the latter is a more flexible and adaptive way of solving any of the problems that face a nation state be they biological, economic or political. When considering the future role of the state in the preservation of biodiversity in Kenya it may be of some help to first ponder the words of the historian Hugh Thomas,

'Four things need to be said...about the modern state: first, history suggests that the reason for national decline is, as a rule, that the state in the nation concerned has sought to do too much, not too little; that applies to the Roman Empire as to the Spanish; second, though the state should seek to provide security, it must also seek to avoid stifling the desire for opportunity and responsibility; third, that centers of power and influence, both public and private, should be diffused so far as is possible throughout the community; fourth, reformers need to bear in mind that the concentration of power in the state places an ever increasing power of patronage in the hands of those who manage it... The only appropriate way to change these arrangements for the better must be to dismantle the state's overweighty pretensions. The state can call on the loyalty of free individuals just as easily as it can on its own servants...these..often constitute the real foundations of freedom.(Thomas, 1981 p.549)

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C.I.R.C.A-The Centre for Indigenous Resource Conservation in Africa

1) A Framework for Coordination

A National Center for Biodiversity needs considerable coordination if it is to cover comprehensively the vast body of information, monitoring activities, policy, scientific enquiries and dialogue required to protect biodiversity. Successful coordination requires a well thought out structure to accomplish the following goals.

- * Contribute advice in setting priorities.
- * Avoid duplication, while ensuring comprehensive coverage of priority issues and geographic scope of activities.
- * Consider, devise and advocate national policy recommendations; for internal and international issues.
- * Endorse proposals in individual and group fund-raising endeavors; and negotiate with certain donor initiatives as a coalition (resulting in broader perspective and more competent voice).
- * Assess areas where national capabilities are lacking and require reinforcement through training, consultant assistance or support for infrastructure development.
- * Streamline wastage by coordinating implementation of research, monitoring, information management, education and maintenance of genetic material.

These tasks are extremely important because of the:

- 1) limited financial support that will be available in coming years (a more severe extension of an old problem);
- 2) increasing value being placed on access to biological resource material and information about it; and
- 3) state of urgency, given the declining condition of biological diversity in Kenya and worldwide.

Specifically, two parallel mechanisms are necessary; through committees of a single body. First, there must be greater coordination within NMK and its linkages to other organizations; effectively micro-level dialogue and coordination, engaging Department Heads and professional staff at NMK. Secondly, national and international (macro-level) issues and negotiations must be addressed supported by the broad perspective of experts from many related fields.

2) CIRCA

The Center for Indigenous Resource Conservation in Africa (CIRCA) being established at the National Museums of Kenya serves both these needs and others not yet mentioned. CIRCA has been under discussion among a number of planners at NMK since mid-1990.² As its name implies, it is designed as a resource and coordination center for research, education, dialogue, consulting, and the production of quality publications all of which address "indigenous resources" and their conservation.

Kenya's indigenous resources are those biological, technical and cultural resources that are based in Kenya in the forms of indigenously occurring species and genetic diversity, homegrown technologies, and traditional knowledge or expertise held by its culturally diverse peoples.

Conservation of these indigenous resources includes:

- * conservation of biological diversity in all its forms: habitat diversity, species diversity and genetic diversity (as defined in Section I of this document);
- * conservation of Kenya's diverse cultural heritage, especially that which relates to identification, categorization, use, management and protection of biological resources;
- * conservation of all Kenyan-bred technologies for using, managing and protecting natural resources, including both modern technologies born out of formal education and training, plus the traditional, rural systems of natural resource use and management that have evolved and been passed on over the generations through non-formal modes of training and education.

The process of conserving indigenous resources in all its forms encompasses the mandate of the Center for Biodiversity at NMK plus the broader responsibilities of much of the National Museums of Kenya. Given the necessarily inter-institutional nature of biodiversity conservation, an adjunct committee is suggested to link the efforts and represent the perspectives of the various parties.

This is especially important for negotiating at the international level over Kenya's role in global biodiversity management and use. These negotiations include agreements dictating Kenya's access to genetic technologies and material resources and its proprietary rights of control and remuneration for Kenyan genetic resources. It would also have a role in negotiations with the larger donors by representing the coalition of biodiversity institutions when macro-level biodiversity programs are being discussed. This would have to be carefully implemented though, so as to eliminate conflicts of interest in these joint negotiations among the coalition members for scarce funding sources and implementation of certain activities.

In addition to negotiating, the council would serve a national level advisory role. By pooling the perspectives of its constituent institutions, and developing unified positions through dialogue, it would be an ideal vehicle for government policy recommendations that relate to conservation of indigenous resources, including biodiversity. Furthermore, it would make recommendations to the group of institutions, with the aim of honing their priorities, avoiding overlap, ensuring comprehensive coverage and effectiveness of their activities.

² The concepts behind CIRCA were first described on paper in July 1990 in the form of a NMK proposal authored by Geoffrey Clarfield and David Lowe, following considerable discussion among the Director and Chief Executive of NMK, Dr. Mohamed Isahakia, the authors and a number of consultants and senior NMK officials.

3) Justification for CIRCA

In addition to the economically devastating threat to biological resource systems discussed throughout this document, there are a number of institutional problems that currently impede the effective protection of these resources. CIRCA aims to provide a number of mechanisms to minimize some of these constraints. Notable among the problems facing institutions are the following.

- * Lack of integrated knowledge about indigenous resources and traditional systems of sustainable natural resource management. Existing knowledge is scattered (geographically and institutionally) and is not well catalogued.
- * Lifestyles of communities that transmit indigenous knowledge and management technologies across generational lines are endangered.
- * Lack of a permanent or regular forum for researchers, policy makers, and subject specialists to exchange information and ideas which can contribute to:
 - unsustainable dialogue about important issues;
 - uninformed policy makers setting ill suited or contradictory agendas and embracing short-term solutions that often complicate or further degrade the situation;
 - stagnation, where creative solutions are often needed among professionals at the local, regional and interregional levels;
 - insufficient post-forum follow-up of recommendations presented at intermittent fora.
- * Insufficient steady funding to support the research, conservation and monitoring work that is necessary to be effective.
- * Weak links in institutional infrastructure, including equipment, replenishable supplies, transport and communication facilities, and skill shortages among staff.
- * Ineffectual systems of employee rewards and encouragements for institutional loyalty, initiative and innovation in problem solving on the job.

4) CIRCA Structure and Components

To an extent, CIRCA will be a self-defined vehicle for dialogue, coordination, consultation and expertise. It will begin as a forum designed to provide guidance to the central institution in biodiversity conservation and through wider dialogue, to other national institutions that share responsibility for biodiversity in Kenya. Ultimately, as it establishes itself as an authority, it will guide the nation in biodiversity policy issues, again, basing its counsel on dialogue and persuasion. Based on the quality of scientific leadership and prominence attained by NMK to date, we envision that CIRCA will ultimately become the first and leading Think Tank in Africa for conservation issues.

Initially, CIRCA will have the following components, comprised of overlapping participation in the various components, including the:

- Internal Advisory Council;
- National Coordinating Committee;
- Policy Development and Advocacy Section (Think Tank);
- Documentation Unit;

- Consulting Unit;
- Fund-raising Unit;
- Publishing Unit.

- a) Internal Advisory Council - to suggest priorities for research, monitoring, education and conservation activities pertaining to indigenous natural, cultural and technical resources, so as to provide a continuously balanced agenda and coordinated implementation of these activities.

Subcommittees would be responsible for specific tasks, much as existing subcommittees³ are currently, but they would all report back to the advisory committee, headed by the Director/Chief Executive. The advisory committee would address itself to:

- coordinated database development, access and application, including policies directing access to the facilities;
 - a balanced and comprehensive indigenous resources and biodiversity research agenda within NMK, including thorough ecological monitoring in the field, ethnobiological survey work, basic science, continued specimen collecting and taxonomy work and policy research;
 - balancing the emphasis on research with public education, community extension, direct conservation activity and policy information services;
 - ensuring comprehensive geographic scope of activities throughout Kenya;
 - keeping abreast with independent and cooperative activities of allied institutions and assessing the balances in NMK's relationships with these institutions, while reviewing the overall attention paid to indigenous resource conservation and education activities, making recommendations as appropriate;
 - encouraging additional efforts by appropriate parties to compensate for identified imbalances in the topical foci, geographic scope, cooperative relationships with other institutions or agenda of activities; and
 - continuing institutional development, including the further development of CIRCA towards its goal as regional think tank for indigenous natural, cultural and technical resources.
- b) National Coordinating Committee - to coordinate inter-institutional cooperation on indigenous resource issues including biodiversity, database information storage and access, joint projects, pooling of resources to increase efficiency, development of public policy positions, negotiating donor assistance, exchanges of technical expertise and staff training exchanges.

While the Internal Advisory Council would only have authority to gather information vis-à-vis the roles of other institutions and make recommendations to the Director, the national coordinating committee would serve as NMK's ambassadors by doing the actual negotiating with other institutions, donors,

³ Committees are not new at NMK. A biodiversity conference committee is currently planning and coordinating the upcoming biodiversity conference, which will be the first CIRCA forum. An editorial committee has been responsible for the NMK newsletter.

etc. Aside from this important and influential role it would function somewhat as a subcommittee to the Internal Advisory Council in that it would serve a specific function and would consist of members of the advisory committee.

- c) Documentation Unit - to gather and archive information and literature on all aspects of Africa's indigenous natural, cultural and technical resources. This unit would work closely with the Internal Advisory Council, computer technicians and consultants and the Museums research staff to oversee the coordinated development of the integrated database system discussed earlier in this document, including the access of appropriate portions of the data sets to other NMK researchers, collaborating institutions and to the general public.

Another major activity of this unit would be to actively seek literature related to indigenous resources (as defined) for development of a specialized library of periodicals, books, and occasional papers supported by a literature database. This center would eventually offer reference services internationally for which a fee structure would be worked out.

The Documentation Unit would also be responsible for developing and maintaining an image library, consisting of a high resolution digitized collection of photographs, slides, scanning electron microscopy and CATSCAN images from the various departments. These images would be categorized in a database for easy retrieval. Keeping them in digital form would allow easy integration into professional documents for publication.

- d) Policy Development and Advocacy Section (Think Tank) - to provide a forum for policy debate and advocacy concerning the management of indigenous resources within a development context based on the wealth of research experience, on-going cross-institutional dialogue and accumulating data on these issues. This unit would research legislative and policy issues regarding access, use and protection of these resources at the community, national and international levels including trade policy, technology transfer, land use and tenure policies, etc.

It would develop policy recommendations based on extensive discussions at broadly represented fora and seminars. These would include government representatives, international experts, members of the business community, and advocates of indigenous or rural resource-user groups plus research staff of NMK and allied institutions. Efforts would be made to hold frequent fora of this nature to keep the dialogue alive. Bulletins would be published to record and inform participants of the latest discussions and developments on current or developing issues.

Advocacy would reach government officials directly through attendance at these fora and through circulation of the Bulletin. In addition, occasional policy recommendation statements will be issued by the unit when appropriate. It is believed that NMK is one of few institutions that commands sufficient respect to be able to propose frank policy recommendations on resource issues to the government.

- e) Seminar Series - to air current issues of research, education, conservation technique and policy, a series of seminars will be organized on topics to be decided by a subcommittee of the Internal Advisory Council. The topics selected would be consistent with the research priorities determined by the advisory committee. Funding for these seminars will either be paid out of donor funds when available or will charge attendance fees if necessary. Whenever possible, international (at least regional) attendance will be encouraged to diversify the views presented and to strengthen regional and international linkages.

To launch the series, the Center for Biodiversity at NMK has organized a major international conference entitled, *Conservation of Biodiversity in Africa: Local Initiatives and Institutional Roles*, scheduled for the 26-30 of April 1992. Its focus will reinforce the development of CIRCA's agenda by discussing topics such as:

- regional issues in the management of biodiversity data-banks;
 - building data banks and geographical information systems for assessing and monitoring biodiversity;
 - past biodiversity as revealed in the fossil record;
 - present knowledge of biological diversity in Africa;
 - indigenous knowledge systems: ethnography of ethnobotany and ethnozoology;
 - Ex-situ and in-situ conservation efforts and the management of protected and non-protected areas;
 - conservation education and extension;
 - assessing and providing for training needs;
 - research and its role in conservation of biodiversity;
 - economic methods for assessing the costs and benefits of biodiversity conservation; and
 - legal issues and property rights.
- f) Consulting Unit - to make available specialized consultancy services to perform applied research, field studies and pre-investment studies relating to indigenous natural resources and traditional resource management/tenure systems. The CIRCA consulting unit would be part of a larger institution-wide consulting service supported by the expertise represented by all departments at NMK and consultants operating from other institutions or independently.

Develop a roster of institutions, independent consultants, NMK researchers and subject specialists encompassing a multi-disciplinary range (anthropology, environmental studies, human/natural ecology, agroforestry, etc.) with demonstrated competence in their fields of expertise. Maintain curriculum vitae on file for each candidate to market his or her expertise once selected as a possible candidate for an assignment.

The Museums would receive a service fee as a percentage of the payment to the hired consultant each time one of its consultants is chosen from the roster, thus generating income from maintaining an up to date listing of available expertise.

g) Fund-raising Unit - to coordinate the institution's proposal marketing process and strengthen staff skills in proposal development, writing and marketing. Seminars would be led by the more experienced proposal writers at NMK, supplemented by occasional guest lecturers to expand and improve the proposal

It would provide certain oversight to NMK's marketing strategy to avoid overburdening individual donors with too many different NMK proposals. It would also use its collective experience to help select the best donors for a specific proposal. This will help NMK's image as an institution speaking with a unified voice.

The Fund-raising Unit would also actively maintain contacts and public relations with donor organizations, by actively monitoring donor trends, seeking out new foundations and circulating NMK publicity material.

h) Publication Unit - to provide consistent and high quality publications that draw on the latest desktop publishing and image processing technologies that are capable of accessing an extensive library of images recording NMK's work.

The computer network that is being planned for NMK includes a local area network (LAN) that will allow department staff to send text to the publication department for embellishments and to conform its style to the NMK standard, thus projecting a unified institutional image.

Educational material supporting exhibits or extension work would also be refined by the Publication Unit in cooperation with the Education Department.

One output would be the introduction of a periodic bulletin or newsletter for circulation to institutions and individuals involved in environmental conservation, rural development, natural resource management and ethnographic research. The newsletter should be priced to cover recurrent printing costs.

5) Practical Steps

a) The Institutional Action Plan

A proposal for starting the various initiatives associated with CIRCA, is The Institutional Action Plan.⁴ It is a plan for simultaneously assessing the needs of each department and strengthening them through direct input of a leading specialist from that field.

In each area of Museum endeavor consultants who are leaders in their field will be engaged to carry out a series of training and planning sessions with department heads and some of their staff.

These consultancies will invariably pass through the following stages:

- 1) A detailed short course given by the consultant to the members of that department or unit that gives them a clear understanding of the state of the art in their specialty and that includes techniques and technology as well the financial implications involved in improving the performance of department personnel.
- 2) Working alongside senior department staff a description and analysis of the unit's functional level will be undertaken. This will include evaluations of physical facilities, technical equipment, the training levels of departmental staff, their educational needs, the ability of the department to work as a team and a history of the department and its members since its establishment.
- 3) Together the consultant and departmental staff will develop a comprehensive departmental plan for the next decade, one that will build on past success, present potential, the interests of the senior staff members and the degree to which they and their assistants may be capable of participating in a think tank and consultancy unit that will deal with natural and cultural resource management.

Some of the issues that must be addressed in detail are:

- a) How does the department in question gain access to information about the structure and activities of similar departments in analogous institutions in the region and throughout the world ?
- b) How can departments establish and maintain mutually beneficial relationships or kinds of cooperation with such institutions ?
- c) How can such relationships be harnessed in such a way that they componentially fulfill the stated goals and training needs outlined in the departmental development plan. ?
- d) Which individuals from national, regional and international institutions can be contracted on a part time basis to assist in think tank development and consulting activities ?

This exercise will benefit the Museums departments by:

- 1) exposing staff to an introduction of the state of the art technologies available
- 2) conducting a guided self-assessment of strengths and areas in need of development, thus enabling

⁴ The concept for the Institutional Action Plan was developed by Geoffrey Clarfield, Head of the Ethnography Department at NMK.

a clearer perspective; and

3) actually designing a development plan for the future.

The financial, administration, education, exhibitions and research departments each have their own unique needs. In each case there is room for improvement. This appendix has largely focussed on the research departments. Strengthening the institution as a whole will require improvements in the other sectors mentioned as well, especially if rapid expansion is to occur along the lines proposed. Basic typing and computer skills will go a long way to improving the ability of administration and financial sectors at NMK to cope with the growth.

As a final step of the Institutional Action Plan and the initial step of CIRCA, these departmental-level self assessments should end in an institution-level guided assessment which would bring together what was learned by departmental assessments and integrate these plans into a consolidated plan for the entire institution. This seminar-like format would engage all professional staff (researchers, administrators, senior financial staff and department heads) and would probably take several days, but would result in an atmosphere more prepared to take on the expansion and the challenges suggested by the CIRCA plan.

Appendix #3

Kenyan Social Dynamics

The basic kinds of societies that are found across space and time are as follows: hunter and gatherers, horticulturalists, pastoralists, fishing societies, maritime civilizations, agrarian states and industrial nations. During the last thirty years all of the world's societies have been incorporated into nation states and it is the goal of the newer states to become the technical and economic equals of the first industrial societies - notably Britain, France and more recently the United States and Japan.

In Kenya today we find examples of all of these kinds of societies with the exception of advanced agrarian states. There are still hunters and gatherers living in the mountains of the Mathews Range and along the forests of the Mau escarpment, peoples like the Okiek and the Wanderobo. Horticultural societies abound throughout Kenya, particularly among the Bantu speaking peoples such as the riverine Pokomo, the coastal Mijikenda and the highland Kikuyu.

However in Kenya, horticulture is always accompanied by cattle raising and in some cases residual hunting and gathering, but for these societies who farm the land most of their nutritional requirements come from horticultural activities.

In the Rift Valley and the Northern Frontier District live Kenya's pastoral peoples - the Masai, Pokot, Turkana, Samburu, Rendille, Gabra, Borana and Somali. These people tend their herds of camels, cattle, sheep and goats in various combinations, depending on the climate and the terrain, ranging from the Masai cattle herders near the Tanzanian border to the Rendille and Somali camel herders of the Northeastern deserts. Only recently have some of these nomads settled and taken up agriculture. By doing so, they have recapitulated some of the early history of Kenya where immigrant herders entered this region, adopted agriculture and settled down to a life of agro-pastoralism.

The Swahili are the best Kenyan example of a full fledged maritime civilization. Swahili society was and remains a coastal civilization, urban, oriented towards trading and selling, situated on the fringes of the Islamic world yet with a well defined literary tradition of its own. The technological sophistication of the Swahili enabled them to establish a civilization that prospered over many centuries until its caravans pushed far into the interior of East Africa by the late eighteenth century.

The Swahili city states were eventually swallowed up by the trading empire of the Sultans of Zanzibar and this nascent empire may have had the makings of an advanced agrarian state had it not been incorporated into the British Empire.

The British Empire was the greatest colonial adventure known to man and can easily be compared with past empires such as those of Rome or China. However, it was an imperium with a difference and that difference was its economy which was based on industrialism. Indeed, England was the first country to experience the industrial revolution in its pristine form and this gave it great military and economic strength, helping to make it one of the greatest world powers of the modern era.

Kenya colony eventually became part of this empire, putting the peoples of Kenya under one administration for the first time in their history. It was the Kenyan nationalists and the educated elite who inherited this system from the British and ever since independence, a quarter century ago, it has been their stated goal to make Kenya the equal of the advanced industrial states of the West through the process of 'development'. All foreign aid and internal policies are directed towards this end.

However, like most countries throughout Sub-Saharan Africa, Kenya still remains a society of mostly disparate ethnic groups with little historical experience of co-operation with one another; rural agropastoralists characterized by a relatively egalitarian division of labor, yet with a growing urban elite. Despite the existence of some large ranches and plantations Kenya remains a country of small peasant of tribally based small holders with a small and tenuous industrial sector based in Mombasa and Nairobi.

One caveat must be held constant. The above schema analyses and ranks societies according to their degree of technological complexity and social differentiation. This does not mean that the cultural forms, nor the acuity and intelligence, or wisdom of any of the individual members of the societies under study are any better or worse than that of an average member of one of the Western Industrial Democracies. The unecological practices of modern industrial states, plus the recent and devastating wars of the last fifty years should serve as ample reminders that these are structural comparisons, not moral ones.

The lack of development of an agricultural civilization and the fact that Kenya can be classified as a modernizing horticultural state may ironically give it a comparative advantage over other societies in the race towards a post modern polity.

Appendix # 3

From 1985 until 1987 I lived among and was adopted by the Dibsahai clan of the Rendille, a group of camel herding Cushites who dwell east of Lake Turkana in the hot plains of the Kaisut desert. One morning in April I woke up and witnessed a curious site. As far as the eye could see a thousands upon thousands of animals were streaming into the camp and nearby settlements from every point of the compass.

In the company of some Rendille warriors I hiked out a few kilometers from my camp and saw the same spectacle wherever I looked. When I asked the senior elders what was happening they looked at me in an irritated way and said simply, 'It is the time of sorio.'

I later discovered that four times a year almost all Rendille domestic animals are summoned back to the main camp from the distant satellite camps where they enjoy good grazing, sometimes hundreds of kilometers away from the main settlements where the elders, married women and children live. One animal from the herd is chosen to be sacrificed and eaten in front of each house and the blood of the victim is smeared on those animals who remain among the living.

As the elders explained it to me sorio has its origins long time ago and the sacrifice is seen as an offering to God to ensure that the herd of the first born son will prosper.

When taken at face value the whole operation appears to be an enormous waste of time and effort. However when seen from a different perspective the rationality of the system becomes more apparent.

First of all in the Rendille case the bulk of the herd is transferred from the father to the first born son automatically, creating great inequality between the male siblings of any elder. The Rendille recognize this resentment of the mostly disinherited younger sons and they are often subtly encouraged to emigrate away from Rendille land, to go live among the Samburu or Masai further south in country better suited for cattle herding.

Therefore one of the functions of 'sorio' is to ensure that the herd is intact and witnessed by all the elders who have any interest in that herd. Thus the moral force of the community is brought to bear against any sibling who might secretly want to steal or kill any of his brother's animals.

It also ensures that the collected elders of any one nomadic settlement see for themselves the general condition of their herds. As a result, they may then pressure the warriors to alter their herding strategy or they may decide to migrate en masse to better or safer pastures.

In the past, when with the exception of the Samburu, the Rendille had every man's hand turned against them, the custom of sorio was a sudden, quick method of clearing the rangeland in a way that would completely baffle any would be raider not familiar with the Rendille ritual calendar and herding practices.

The fact that the entire operation is part of a ritual imperative connects it to the idea that if sorio is not performed then God will punish the Rendille with drought, warfare and catastrophe which thus ensures compliance. We see then in this ritual a solution to problems of sibling rivalry, intergenerational conflict, the management of herds and shepherds as well as defensive techniques embodied in sacred imperatives.