WHO OWNS THE KENYA COAST?
THE CLIMAXING OF LAND CONFLICTS ON THE INDIAN OCEAN SEABOARD

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ABBREVIATIONS

AFC	Agricultural Finance Corporation
Cap	Chapter (of the Laws of Kenya)
CDA	Coast Development Authority
DC	District Commissioner
DRSRS	Department of Resource Surveys and Remote Sensing
Govt	Government of Kenya
ICDC	Industrial and Commercial Development Corporation
IDB	Industrial Development Bank
KAA	Kenya Airports Authority
KADU	Kenya African Democratic Union
KCB	Kenya Commercial Bank
KANU	Kenya African National Union
KPA	Kenya Ports Authority
KWS	Kenya Wildlife Service
NMR	National Museums of Kenya
PC	Provincial Commissioner

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INTRODUCTION

Nowhere in Kenya has the structure of land ownership and the control of resources changed so drasticaly over the last three decades as in Coast province. The war of liberation was supposedly fought on the highlands. Yet the prize of victory was the whole of Kenya. Independence brought with it vast opportunities for the bold, the enterprising and the powerful to exploit resources throughout the length and breadth of the country. Opportunities were of course greatest in those areas, like the coast, where

a) the population was sparsely distributed and there were vast areas of seemingly empty land.

b) there was a rich endowment of natural resources such as minerals, ocean frontage, forests and tourism - compatible natural features

c) soils were fertile and water plentiful

d) land ownership was ill - defined with few demarcated and registered properties, the rest being held under communal and traditional tenure

e) the local population was friendly and well-disposed towards strangers

f) attitudes and perspectives were largely traditional and not yet awakaned to the rapacious dictates of modern commerce, and where assets (properties, industries, business) were available on the cheap from the retreating Europeans and belaguered Indians. Under the goal - guile in fact - of indigenisation it was easy for the emerging ruling elite to manipulate the land tenure system within the permissible boundaries of the law for the purpose of enriching some groups and disenfrachising others. The powers of land adjudication, plot allocation, title registration and revocation and land acquisition were selectively applied by local officials and their superiors based in Nairobi. This was not necessarily the official policy of the govenment of the time, whose avowed mission was to foster unity, freedom and economic prosperity. It was a clearly articulated hidden manifesto whose execution was facilitated by appointing district governors (provincial and district commissioners) and other top regional officials on the basis of loyalty and commitment to certain causes.

Well-meaning and laudable state policies and structures were amenable to deliberate misinterpretation and abuse. Take for instance trust land. It is an institution designed to protect rural populations from landlessness and destitution, with the county councils - supposedly democratic and responsible organisations empowered to promote the welfare and interest of their electorate - as the custodian of district resources on behalf of the local community or tribal peoples. But the legislation is silent on the definition of community or tribe. The result is that the legislation (Trust Land Act) can be misused to allocate land to people who have no connection whatever with local tribes. This problem is not peculiar to Kenya; it is universal in Africa. Settlement schemes were to be

designed and executed solely for the benefit of people - albeit Kenyans - imported from hundreds of miles away while the local poor go wanting. We will discuss in greater detail later how the distribution of natural and state benefits was done in a similar manner.

The one question that comes to mind and would need to be answered is why should such an obvious and potentially dangerous trend have gone unnoticed for so long? Why was it not checked in time? Did the people deliberately cast a blind eye? Was there a cover-up? Was there nobody to articulate these issues? Where were the intellectuals, the academics, the local leaders? Clear signals were emerging from the mid-1970s, when questions about dispossession and expulsions in Digo-land were beginning to appear in the press and in parliamentary debates.

Who were the immigrant elite who ruled the coast during the decade following independence? They were men who were hand-picked by President Kenyatta to ensure the incorporation and integration of the coast (remote, exotic, and largely Muslim if viewed from Nairobi, and certainly a former KADU stronghold) into the mainstream of Kenya's economic and social life. They were men who had served the colonial government in junior civil service positions such as clerks, district officers and teachers, with a sprinkling of university graduates. They controlled positions in the civil service (especially provincial/district administration, ministry of lands and similar key departments), state corporations, banks and the biggest employment and revenue base in the province, that is the port of Mombasa. In terms of western education they were better educated than the Swahilis (this term is used here in its wider sense to include the Miji-kenda and the Swahili - speaking Muslim population of the Coast), the Arabs and the indigenous tribes such as Digo, Giriama, Pokomo and Taita. Positions of power and influence enabled the members to gain access to choice beach plots, fruit farms, shops and hotels. Asset acquisition and development activities were facilitated by bank credits dispensed by members of the same elite. It was all done in the name and spirit of national development, a high presidential priority. The achievement of this ideal was further supported by universal respect for the president, the desire for unity, harmony and social integration; and the lure of jobs to be generated by new development. In the event the jobs never went to the locals. Upcountry employers imported labour from the native districts of the business owners and personnel officers. The local population had great faith in the civil service which was modelled on the old colonial order with its earned reputation for efficiency, fairness, balanced judgement, integrity and aversion towards nepotism and corruption. They had come to terms with the misdeeds of the British (mainly in terms of cultural dispossession) and were looking toward a period of relative peace and growing prosperity.

In the circumstances ones power, influence and capacity for self-enrichment was directly dependent on proximity or "connectivity" with the president or those around him. Apart from insider clan alliances (Kiambu versus Murang'a versus Nyeri) there was the Alliance - Makerere axis, the old colonial civil service corps, the emerging leaders in the armed and security forces. Immediately outside the caucus of trusted advisers and emissaries there was an outer ring of favoured ministers and local politicians who facilitated policy implementation and execution of presidential decrees. This set-up gives legitimacy to any action, however improper, designed to transfer resources from locals to strangers. If

local leaders improve their own positions in the process, however marginally, they are not likely to upset the cart by alerting their followers to the long term threat.

Trusted suppoters and clansmen are also useful in junior positions. A building inspector in town hall could for instance smoothen the approval of controvertial building plans which would not otherwise pass muster. A land adjudication officer could conveniently put aside a few small-holdings for self, relatives, friends and superiors. A trade officer would authorise new licences and a public health inspector condone a hotel or restaurant without adequate sanitary facilities. And so on and so forth. In short, having the right to man in the right place was how to do it. Connections in the customs department, the port and income tax office carried obvious benefits. The point being made here is that under such a massive onslaught of state power, influence and coersion there was little that the Digo fisherman, Mazrui teacher or Giriama farmer could do to retain control over ancestral lands or sacred forests. It was well beyond his worldview and comprehension how the state machinery worked and why the authorities took the decisions they did.

The post-independence ideal of unity, stability, development and a non-tribal society directed venom and resentment backwards towards the colonisers. Misbehaviour by officials and dishonesty on the part of leaders were looked upon as minor misdemeanours not worthy of serious attention. As the Swahili's say, "Kuteleza si Kuanguka", i.e. to slip is not to fall. A slip of the hand or the pen could be tolerated. The region, it was believed, had to modernise, including land demarcation, expanded financial markets, rising indebtedness, wage labour instead of self-employment, cash crops instead of food, tourists from Europe, bars, casions. The focus of this euphoria was the nation rather than nationals. The development ethic was fuelled by aid agencies, bilaterals and development bankers. Sector-specific development banks were established by the government to promote the "Africanisation" of business and agriculture e.g. ICDC, AFC, KCB (a commercial bank with a strong development mission) and IDB. Multinationals were enlisted to assist with oil refining, cement production and hotel investments. The Swahili language was appropriated as the national language, with strong suggestions that it was the language of commerce with no proprietor. The argument went that there was no tribe called the Wa-Swahili. By extension the resources of the Coast were also national resources, available to everybody and belonging to none.

The 1980s saw attempts to reverse the trend, not by empowering the people of the Coast and reinstating their lost wealth, but by diverting the flow of benefits to a new class of rulers. The same methods were used to serve a different set of beneficiaries. Since the choice sites and business opportunities had already been taken, other methods had to be used to create chances. Hence the unabashed alienation of communal lands, facilities and sacred places.

PURPOSE AND PROPOSITION

The business of this paper is to analyse the origin, development and complexity of land-related conflicts on the Kenya Coast with a view to better understanding how and why such conflicts arise and hopefully even mitigate their effects. The ultimate aim is to prevent future conflicts. To reverse the effects of past iniquities would be well beyond the aspiration of any paper, however well researched.

Recent events have demonstrated in a dramatic fashion that continuous monitoring of potentially dangerous official and business behaviour is essential. It is a matter of national survival rather than academic enquiry.

The principal argument is that the very values which the country's constitution seeks to preserve, that is unity and stability, are being undermined by inequitable settlement and resource exploitation policies. Conflict generators are meticulously conceived and embellished techniques of dispossession and empoverishment. These techniques are easy to monitor and even measure.

THE CONTEXT AND GEOGRAPHY

The People

The Coast Province supports about nine percent of the national population (*Table 1).* The coast population increased significantly from 1979 to 1989, rising from 1.34 million to 1.83 million inhabitants. This represents a 37 per cent increase. While precise data are unavailable, the rapid growth in population continues to place significant pressure on the coastal environment, its resources and supporting infrastructure. Population pressure is particularly great in urban centres such as Mombasa, the population of which has doubled in the last 15 years. Map 1 shows the population distribution. People are concentrated along a 30km wide strip stretching from Lunga Lunga in the south to Mambrui in the north; in the immediate environs of Wundanyi/Voi; in the Lamu archipelago; and arround isolated settlements in Tana River District. Vast areas inland are sparsely populated, supporting either nature reserves or a pastoral economy.

Table 1 - Coast Population

DISTRICT	*NUMBER OF PEOPLE*
Kilifi	*591,903*
Kwale	*383,053*
Lamu	*56,783*
Mombasa	*461,753*
Taita/Taveta	*207,273*
Tana River	*128,426*
Total	*1,829,191*
National Total	*21,443,636*

Source: Central Bureau of Statistics; Kenya Population Census, 1989, Vol.1

Each of the districts (Map 2) has at least one major urban centre. The demograhic and urbanization statistics for the coast bear a great resemblance to similar data for Kenya's other two high potential and arable regions - the Lake Basin and Central Highlands. Population growth statistics are typical of the countrywide trend. However, between 1969 and 1979 Lamu District registered a 6.9% growth rate per annum, the highest in the country (average 3.8% p.a.).

The urban population in Kenya was estimated at 19% of total population 1989 and is expected to reach the 45.7% mark in 2025. In 1989, the population of

Mombasa (272 sq. km.) was estimated at 500,000 people. About 25% of this population lives below the poverty line.

Rural populations are small-holder farmers owning less than a hectare of land or pastoralists. Most are poor. In Kwale District, 22.5% of the population are landless. About 50% of this section of the population earn less than Sh. 600 per month. Rapid population growth has greatly increased the demand for land and the fruits of land. Land conflicts have become inevitable.

Urbanisation

The most urbanised part of Coast Province is the Mombasa metropolitan area. For example the overall growth of population in the Nyali-Bamburi-Shanzu area has resulted in rapid urbanisation. Large numbers of people seeking employment opportunities are moving into the area between the main road and the beach, as well as the surrounding areas. Growth in residential development has been spurred by the Nyali Bridge, conveniently linking urbanised Mombasa Island with the area. This has allowed a significant number of workers to live in the area and commute to the island for work. High-income residential developments are mostly located between the hotel developments along the beach and the main road. Inland and along the north main road, medium- and low-income residential development is increasing. Inland of the road, residential development is displacing indigenous arable agriculture.

Roads and other infrastructure development are not keeping pace with increasing development in the north coast, causing severe shortages of potable water and power. Moreover, hotels continue to develop in plots landward of the original beach hotels and are beginning to encroach on existing residential areas. This situation is complicated by an unpredictable influx and temporary settlement of refugees, creating huge demands on the meagre public facilities and degaradation of the local environment. Although there is a land use plan for the area, administered by the Municipal Council of Mombasa, development has not adhered to the plan. Decisions about land use and new development are not made according to any comprehensive analysis of current supply and future demand for municipal services (CDA 1996 p16).

Increasing commercial and residential development, urbanisation pressures and uncontrolled land use changes have placed a significant strain on existing services and infrasturcture in the area. Trends suggest increasing growth of many sectors within the area, all of which will exacerbate the public service and infrastructure problems already being experienced. Exisitng land use policies and plans have proved inadequate to mitigate the existing development impacts, and will not be able to cope with future demands. Uncontrolled development and the inability of public services and infrastructure to keep pace with development threaten the environment, continued economic prosperity, public health and the quality of life of residents. All of these factors are interwoven and affect one another. Solutions will require a coordinated and very aggressive approach.

HISTORICAL AND NATURAL RESOURCES

The Kenya coast has played an important role for over 2,000 years in East Africa when merchants sailed from Arabia in search of gold, spices, ivory and other goods. Dating back to the seventh century, Arabs settled on the coast, and built trading centres and settlements along it. The Portuguese had established

trading posts along the coast since 1498 but were driven out in 1790 by the Arabs. Although many settlements have retained prominent facets of Arab culture, the coastal area has progressively integrated the distinct races of African, Asian, European and Arab people. The coastal culture has provided the country with its national language, Kiswahili. Many of the earlier trading posts have become important urban centres, including Mombasa, Lamu and Malindi.

Historical Sites

Because of its long history of human activity, Kenya's coast has an estimated 70 significant historical sites and monuments. Out of these, 58 have been designated as National Monuments and Reserves. These historical sites and monuments include isolated ruins of houses, mosques, tombs, townships - example, Gede Ruins - and fortified areas such as Fort Jesus. They also include monuments like the Vasco da Gama pillar at Malindi, and urban areas of historical and architectural importance, such as Mombasa Old Town.

The coastal habitats of importance in Kenya include coral reefs, mangroves, Kaya forests, marine and inland reserves, and historic sites. Today, they provide the foundation for Kenya's coastal economy.

Coral Reefs

A fringe reef system spans the length of the coast from the Kenya/Tanzania border to the city of Malindi, with scattered fringing reefs continuing northward to Somalia. This extensive reef system is critical to activities such as fishing and tourism. Kenya took the lead in Africa by establishing protected marine areas and today there are four marine reserves, encompassing five percent of Kenya's reef areas.

Mangrove Forests

Kenya's coastline has about 53,000 hectares of mangroves in nine species, occuring mostly in creeks, bays and estuaries. Some villages still exploit mangroves for their wood both for commercial sale and subsistence use. Depending on the size class, mangroves are harvested for their wood both for commercial sale and subsistence use. Mangrove wood can be used for building purposes, firewood or making charcoal. There are currently many proposals for the establishment of salt ponds and shrimp farms in the mangrove areas, however a number of concerns have been raised about these developments (CDA 1996 p2). Periurban mangrove forests in Port Reitz and Port Tudor (Map 3) are threatened by over exploitation, pollution (sewage, toxic wastes, oil spills, and nonbiodegradable solid waste) and urban development.

Table 2. - Area Covered by National Parks and Nature Reserves in Coast Province.

Total Area	**Ha**
	16, 846.35
Kora N. Reserve	1,757.58
Dodori N. Reserve	783.00
Tana R.P.N.R.	169.07
Tsavo E.N. Park	7,184.43
Tsavo W.N. Park	6,501.80
Marine N. Reserve	165.94
Malindi M. N. Park	6.09
Gedi N. Monument	0.41
Watamu M.N. Reserve	32.59
Watamu M.N. Park	11.33
Shimba H.N. Reserve	188.24
Mpunguti M.N. Reserve	12.96
Kisite M. N. Park	32.84

Source : DRSRS

National Parks

A significant proportion of coast province land is contained in national parks. Table 2 shows the list of parks and nature reserves as well as the marine reserves at Malindi, Watamu, Mpunguti and Kisite. The location of each is shown in map 2. Not suprisingly Tsavo is the oldest, best known and largest. The 13,686 km^2 of Tsavo in the province takes up a large chunk (about 66%) of Taita District and a small portion of Tana River District. This has resulted in acute land shortage in Taita, with a high population concentration in the Voi-Wundanyi corridor and another one in Taveta. Intensive settlement along park boundaries was reported as long ago as 1982 (Eriksen et al 1996). Even now the grazing of livestock on park land is quite common. Livestock distribution maps show the presence of cattle at the western edge of Tsavo west (Map 4) and sheep/goat along the southern boundary of the Kora National Reserve (Map 5). These maps can be considered reasonably reliable since they are based on aerial counts by the Department of Resource Surveys and Remote Sensing. Tsavo West also has a sizeable concentration of elephants (Map 6) who are a nuisance to farmers close to the park. Other animals unpopular with the farmer are wild pigs, baboons, porcupines and buffalo. The normal conflicts and problems emanating from current nature conservation policies are well known and need not be repeated here. The impact in Coast Province has been particularly harsh because the people are not as vocal and aggressive as their colleagues in the Rift Valley, where park administration has come under particularly abrasive criticism. The Taitas in particular resent being hedged in by the Tsavo.

Lowland and Kaya Forests

The coastal areas contain important coastal lowland forests which support a high diversity of flora and fauna. These resources are important parts of the coastal ecosystem and also provide additional tourist destinations. The Kaya Forests of the Kenya coast are relic patches of the once very extensive lowland forest of East Africa. Today these forests are protected as sacred places and are still historically used by Mijikenda elders for prayer purposes and other ceremonies (Spear, 1978). These forests are being protected by the National Museums of Kenya as Forest Reserves, especially in the Kwale and Kilifi districts. However, many of these Kayas have been thinned out and are in danger of being lost completely.

The following are the better known coastal indigenous forests:

- Arabuko-Sokoke forest close to Malindi town. The Sokoke scops-owl is unique to this forest.
- Diani forest which is home to rare species like the Angolan black colobus monkey
- Shimoni forest which grows on coral rag
- Kaya forest groves which are scared to the Mijikenda community. It is estimated that over 30% of Kenya's endangered species of trees are found in these forests (WCK 1997).
- A rich collection of forests along the shores of the Tana River; here we find endemic species of primates, four species of threatened trees and fifteen threatened bird species.

In addition the Taita hills have 45 forest reserves with three endemic birds, plants, an endemic snake and the rare Angolan colobus monkey.

Map 3 shows forest cover in Kwale District. The forests are being rapidly depleted, with the few remaining large forest areas located quite a distance inland, well away from the major centres of population. Escalating land and timber prices and population growth will put even greater pressures on these forests.

LAND TENURE SYSTEMS

Land ownership or tenure refers to the manner in which individuals or groups in society hold or have access to land including the conditions under which such land is held. Several types of land tenure exist. Communal land tenure bestows equal rights of access to land amongst members of a given tribe (community). Membership of a family is the basis of access to land under family control while under feudal tenure access to land is given at the pleasure of the feudal authority. Individual tenure gives exclusive title to hold land to a particular person. Under English/Kenya Law land is held at the pleasure of the state.

The above forms of land ownership/tenure systems are not mutually exclusive.

Traditional Land Ownership System

The Miji Kenda, the dominant African tribe of the coast apart from the Taita, initially settled by the seashore. They were gradually pushed further inland to pave the way for Arab settlements. The term Miji Kenda describes the settlement pattern, which was based on the nine sub tribes of the people. They settled in nine fortress villages, one for each of their tribes (GOK/Gedion Were 1988). Inside the fortress villages, which were located in forests with only one exit, crop farming thrived.

The Miji Kenda believed that the earth was their mother and she was fertilized with rain by a supreme being. All members were her children and had equal rights to her. A stranger could only use the earth at the pleasure of the elders. All members were entitled to cultivate vacant land provided that no one else was tilling the land at the same time. A man who died tilling the land would leave it for the benefit of his children. Land outside the Kaya was used for cattle grazing and hunting. Everyone was equally entitled to benefit from it.

Thus the Miji Kenda practised a blend of communal ownership with recognition of individual title to cultivated land.

The Arabs who displaced the Mijikenda from parts of the seashore were predominantly Muslims. Islam recognizes individual tenure to farmland and land in trading centres; pasture, forests and water points are the properties of the community (Ummah) and are sustained from the bounties of God.

Pastrolist tribes in the arid and semi-arid zones have their own traditional systems for sharing pastures and water in wet and dry seasons. Tana River District for example has a large livestock population (maps 4 &5).

Modern Land Ownership

In a developing economy such as Kenya's where agriculture is the mainstay of the economy, land is a most valuable asset. Owing to the historical development of land laws and land reform there are three categories of land today.

1. Government Land:

This is land owned by the government of Kenya and includes land set aside for public use and forest reserves outside trust land. There is no provision for allocating such land unless the use it was set aside for is no longer a priority. Even then, it can only be availed for development if it has been planned in accordance with the Land Planning Act. Such land is administered under the Government Lands Act Cap 280 if it is registered under the Registered Lands Act Cap 300 and the Registration of Titles Act Cap 281.

The Commissioner of Lands is authorised to act for the Government in dealing with such land. The President can also exercise his discretion to allocate such land.

2. Trust Land

Formerly known as the native reserves, the land is held by the county council on behalf of the people who are ordinarily resident there. Customary land rights are of application here. The relevant Act is Cap 288 (The Trust Land Act). For a detailed analysis of the constitutional, legal and practical problems of administering trust land see Juma and Odhiambo (1996).

3. Private Land

Persons, legal or real, may hold leasehold or freehold interests in land at the pleasure of the state which can compulsorily acquire the land under the Land Acquisition Act Cap 294 and fully compensate them in accordance with the provisions of the Act.

Thus three types of land tenure exist in Kenya today. These are:-

* Customary Tenure : This applies to trust lands under the jurisdiction of the county councils except for parcels alienated to individuals.

* Freehold Tenure: Absolute title is granted to individuals by the government. Such individuals do not pay land rents once the title is registered.

* Leasehold Tenure : Leaseholds are granted by the government, county councils or individuals with freehold titles to land, for definite periods but subject to land rents, special conditions or covenants.

The Mazrui Lands Act.

The Mazrui were at one time the ruling elite in Mombasa and by extension the coast of Kenya. They alongside other Arab families owned large tracts of land in Mombasa, Kwale and Kilifi areas. Other wealthy land owners included the Busaidi family, other Omani families and Swaleh Nguru.

In 1931, the authorities registered a trust of 2,716 areas in Kilifi for the benefit of the Mazrui. Fittingly, the colonial administration passed the Mazrui Lands Ordinance. This latter became the Mazrui Lands Act which was repealed in 1989. The Standard newspaper (16th January 1990) reported that hardly a month after the repeal, there was an influx of new squatters, illegal grabbing of

the land, selling of plots to outsiders and quarrying of coral blocks and murram. No compensation was paid to the trust beneficiaries.

Executive Powers to Allocate Land.

The Government through the Commissioner of Lands can allocate land that is not immediately required for public utilities. The Government can also allocate land that is required for development or use that is in the national interest. The procedure for such allocation is to prepare a physical plan and offer the land to the highest bidder at an auction which should be publicised well in advance.

Various categories of land are exempted from this procedure but the Commissioner is expected to put the public interest first in exercising his discretion.

CONFLICT SIGNALS

The ability to identify and evaluate signals of conflict - ongoing or potential - enables one to define and characterise the scope of the conflict and probably to assess possible impacts. The signals are invariably not just hard facts or tangible phenomena, but rather a mixture of truths, trends, sentiments, moods and verifiable reports of occurances. It is not difficult to monitor or even measure these signals, given a competent observer. Here are some indicators relevant to the Kenya coast.

Rumour and Intra-community Messaging.

One of the basic staples of neighbourhood and village rumour is who has sold or purchased what proprety or farm; who has inherited the land left by the recently deceased; how so-and-so lost his farm to money-lenders; why the old man down the road sold his farm to finance the eldest daughter's wedding. This is the raw-material of east African novelists and journalists, based on daily happenings in the "majengos", "ngambos", urban slums, villages and fishing settlements. Layered onto this colourful tapestry is the build-up of family conflict and superstitious beliefs. Muhammed Said Abdulla's Swahili classic Kisima Cha Giningi constructs a plot around the mysterious murder of a wealthy landowner, whose body was discovered in a Kaya-type cave shrine with inheritance as a suspected motive. Thus land conflicts, superstition and violence are closely connected in Swahili-land. Admittedly land-related murders within the family are far less common in Coast Province than in Central Province or Nyanza. But they do occur.

The build-up of resentment, dissatisfaction and disharmony are reflected through the messages exchanged in the barazas (i.e. informal conversation clubs, not the official baraza associated with government business) and mikahawa (coffee-houses); it is picked up by writers, poets and journalists. Local leaders can get involved through complaints voiced by aggrieved parties. Preachers in mosques and churches, taking the cue from the suffering of some parishioners, will start covering these inequities, knowing full well that their pronouncements will be reported to the authorities. Protests voiced through the religious establishment assume a measure of legitimacy and cannot be totally ignored.

Litigation through the courts rather than the chief or community elders is a serious step taken as a last resort. The costs are prohibitive. Both the quantity and type of litigation are important. Numbers have risen drastically over the last decade (both actual cases and those reported in the media, which are only a proportion) for a variety of reasons, including the increasing awareness of the people, rising educational levels, competition among legal firms seeking work, and the relative breakdown of the land planning, allocation and registration systems. The emergence of socially active NGOs has also contributed to the rise in litigation cases.

The cases fall into six categories:

1. Inheritance
2. Boundaries
3. Ownership/possession
4. Environmental protection and defence of social facilities and common property
5. Change of use
6. Compensation for land acquisition

Each type will be briefly discussed below with specific examples where possible.

1. Inheritance : Arbitrary application of customary, English and Islamic laws has generated a lot of business for the courts. Customary law is evolving with the written laws, since it is recognised by the govenrment and the legal profession as an important component of family law. The Muslims on the other hand have their own courts, the Kadhi's court to adjudicate inheritance and family desputes, based on well established and universally recognised fourmulae. In fact there has been a long-running battle between the Government and Kenyan Muslims over proposed amendments to the law of inheritance, with Muslims refusing to submit to secular laws in this matter. They want the application of the sharia to be automatic in this context, rather than subject to a written will. This is an issue which is likely to develop into an ugly confrontation unless the government approaches it with tact and an open mind.

2. Boundaries : The land registration system used in Kenya is based on the registration of title rather than documents, which means that both the ownership and plot boundaries are demarcated and registered and the owner is indemnified by government against adverse claims. If the system works there should be hardly any litigation. However of late it has not worked very well. Land surveyors (licensed by law) and the Registrar have been known to demarcate and register plots with contentious boundaries. In the South Coast a common ploy of new buyers from upcountry is to purchase a small plot and then expand the boundaries many times over before registering the plot, leaving owners of adjoining land with much reduced plots. It is evident that the land registration system can work only if there are competent and honest professionals to operate it.

Boundaries next to an existing road or lane can change overnight from a road frontage to a boundary between plots, leaving the landowner without access. There have been cases of road reserves being allocated as plots, without regard to existing land owners. Here is a case reported in Mombasa:

Mr. X is the owner of a commercial property at the junction of Foundary and Likoni Roads in Mombasa Mainland South. Mr. Y is allocated the road reserve and in the process fences off the access to Mr. X's property. Mr. X has filed an injunction in court to stop the Government and the Municipal Council from allocating the land to Mr. Y and prohibit the two from granting Mr. Y a change of user. In the event a temporary injunction was granted

3. Ownership and Possession: This is where the mess is most evident. Disputes can arise between family members; business partners; legitimate owners with title who are confronted by people carrying title documents to the same land; villagers and townsmen on the one hand and developers who are allocated common land on the other; long-term settlers on trust land, which by rights is held in common, and new allotees who by virtue of their newly acquired title can conveniently label the settlers as squatters. In August 1997 residents of Takaungu, a coastal village about 50km north of Mombasa, warned of bloodshed if the Minister of Lands and Settlement did not stop a foreign private developer from occupying their beach plots. The developer had already fenced off 70 acres of prime beach land owned by the residents. Their attempts to discuss the matter with the District Officer had been in vain, leading them to believe that influential individuals were involved (East African Standard Sat, 9/8/97). This is an example of extra-judicial litigation, in that the villagers took their case direct to the Minister through the media. It probably had the potential of greater effect (the outcome is not known) than court action because the courts would have demanded proof of title which the villagers would not have been able to produce. Their claim was that the land had been allocated to them in 1990 by the government.

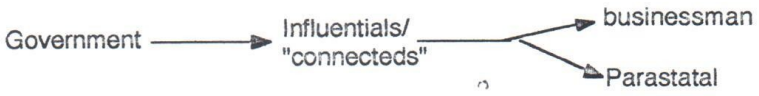
Another interesting case involves a hotelier and a family in Wasini, both of them in fact indigenous to the island. Wasini lies off Shimoni, about 70 km south of Mombasa, with an ancient Swahili settlement and several historical sites. The hotelier found his title revoked after a long inter-clan battle which ended up in the courts. The land reverted to its "original" owner whose family had held the property for generations, even before adjudication.

The courts themselves have been caught on the wrong foot in that as the custodians of justice and equity they must be seen to be defending the rights of the majority, irrespective of what the law says about documentary evidence to title. In June 1993 Justice Gideon Mbito declared that the court could not be hindered from granting an injunction against the government and that the government had no exclusive right to approve or annul decisions relating to private land ownersip. (East Africa Standard Friday 13/6/1997).

4. Environmental Protection and Defence of Social Facilities : Land for public facilities and public open spaces has traditionally been viewed as sacrosant, enjoying the protection of the zoning regulations as well as local government legislation which requires local authorities to provide schools, play grounds, health centres, libraries, streets, public conveniences and the like. However greed and the failure or at least decline of the two basic institutions (i.e. planning machinery and local government administration) as well as the land management function have meant that these facilities are no longer inviolate. Even land reserved for a DC's house (Mombasa), DC's office (Malindi) and the law courts (Mombasa) has been known to find its way into private hands. In June 1997 three Mombasa advocates sought a court injunction to restrain an Asian

businessman from occupying, developing or transfering 0.4 acre of land which had originally been reserved (actually allocated for the purpose by the President) for the expansion of Mombasa law courts (Daily Nation Sat. 14/6/97). The Asian businessman claimed that he had purchased it from well-connected individuals, resident in Nairobi, who in turn had been allocated the land by the Government. Again, it is clear that proximity to top decision makers (referred to above as connectivity) counts and that to get prime plots on the coast one has to be in Nairobi. The Mombasa branch of the Law Society was party to the suit. It is ironical that the Asian businessman was represented by a prominent human rights lawyer, Pheroze Nowarjee. As in nearly all similar cases, a temporary injunction was granted.

Thus the process of individualisation and commercialisation of public land takes the following course:



Government's embarrassment is further compounded - but to no avail - where opposition politicians resort to litigation on behalf of their constituents. When undeveloped land belonging to public institutions in Kwale (exhibition grounds, prison, civil service club) and a public park were allocated to local politicians and quickly flipped over to a hotelier, the National Development Party threatened to go to court to restrain the hotelier from developing the land. The DC pleaded ignorance of the matter. Alleging that politicians had also been allocated land belonging to Diani Police Station and Msambweni District Hospital, the NDP official is reported to have said

> The time for Kwale to have leaders who mind the welfare of their people is now. The electorate should vote in people whose interest in politics is not just to enrich themselves". Daily Nation - Thur. 29/5/97.

In the politics of self-enrichment land is a major pawn.

5. Change of use: Irregular allocations are almost always followed by change of use e.g. from public open space to commercial. There are also cases where road reserves as already discussed are converted to residential use, or where single family dwellings are converted to multi-family. An interesting case involves the owner of a house in Nyali, a posh Mombasa suburb, who objected to the adjoining owner building maisonettes (row houses) and a mosque on the grounds that the development would strain existing services and that the early morning call to prayer would interfere with his sleep and privacy.

6. Compensation for Land Acquisition : Compensation cases are few and far between nowadays, unlike the 1970s and 1980s when there were large public investments in tourism infrastructure e.g. airports and roads. In any case it is the rich who would be affected, since poor people live either in squatter settlements or rural trust land. Compensation for trust land is restricted to the value of improvements only as determined by the DC - a good indication of adequacy.

Recent litigation is therefore a good indicator of emerging issues and potential combatants. It offers limited recourse to a few people who can afford to go to court. In fact it is inimical to the interests of the poor since the court places the burden of proof on the agreived party and a likely remedy is monetary compensation for a priceless asset or amenity.

Media Signals

Can we learn anything from media reports? The answer is yes, but. Facts (accurate or otherwise) are mixed with assessment and persuasion. Journalists and editorial staff are hardly impartial when it comes to an emotive subject like land. Information is likely to be couched in readable language for popular comsumption. A few sample headlines will illustrate the point :

- FURY OVER GRABBED LAND
- HURDLES BEFORE CONSERVATION PROJECT
- LAND ALLOCATIONS WORRY OFFICIAL
- MINISTER CANCELS LAND DEALS
- PROBE CLAIM, PC ORDERS
- 400 FANS PULL DOWN WALL ON SPORTS FIELD

Not only are such headlines difficult to ignore but they also help to draw the attention of activists and defenders of the poor to follow up individual cases for further investigation and possible action. Unfortunately there are no Kenyan journalists who have specialised in land matters, like for example economic or political correspondents. The subject has not therefore received objective and analytical scrutiny. University students and researchers in land economy, tenure and law - and there are several from Coast Province are unwilling to jeoperdise their careers through unnecessary exposure.

The radio channels (effectively Kenya Broadcasting Corporation) are almost silent when it comes to reporting land matters except when a goverment minister issues title deeds to villagers or when the president orders in a public forum that the resettlement or rehabilitation of squatters be expedited. It is on the TV that one is more likely to observe critical issues and emerging problems. For instance images of gleaming hotels (complete with nude tourists basking in the sun) and unkempt beach-boys selling trinkets are juxtaposed against makuti houses near-by; so-called squatters are interviewed and take the opportunity to ventilate their pain and suffering; a District Officer demonstrates how a new project will bring development and jobs to his dominion; a harambee meeting for a new school raises only a few thousand shillings; a rusty pipeline carrying water to Mombasa from Mzima Springs runs next to a smouldering rubbish tip on Makupa Causeway. The advertisements in particular tend to emphasise the gap between the good life on the one hand and destitution on the other.

Global TV channels such as the CNN, BBC and Sky help to reinforce the status quo by emphasising the pleasures to be had by tourists in seaside resorts, Shimba Hills or Tsavo.

Imagery, Symbolism and Language

The absentee landlord, the tycoon and the developer are stereotypes which are convenient culprits for land-related misdeeds on the Kenya coast. They are terms which are invariably and indiscriminately applied to Arab and Asian

businessmen without any verification of the facts. In fact an absentee landlord is more likely to be an European (English or Italian) with a beach villa in Diani, Nyali or Watamu than an Arab or Indian with land on Mombasa Island or Changamwe. There is a long tradition of owning houses separately from the land, especially in Mombasa, and landowners are anything but absent. They collect monthly or yearly ground rents personally or through agents. In the unplanned settlements landlords are Swahili, Arab or Kikuyu, with only limited participation in the market by other ethnic groups (Yahya and Nzioki 1995).

On the north coast, especially in the Kilifi-Watamu-Malindi-Mambrui corridor references to "Wataliana" are associated with Italian businessmen, investors, agents and landlords. There have even been media reports of Mafia connections and gang activity. Thus "Wataliana" has become a collective pejorative nomenclature describing all white businessmen of doubtful pedigree.

In architectural terms the "Wataliana" culture is symbolised by the steep thatch roof (without a ceiling) over exposed coral walls, copious verandah, lush bouganvellia. These villas are attractive to look at and symbolise an alternative (southern Europe/east Africa commuter corridor) life-style. From the point of view of the municipality and the government such investment represents progress, development and a leisure-based economy. However the social impacts and poverty-inducing consequences are seldom seen.

Changing Ownership Patterns

Dispossession results in impoverishment and destitution. All three are indicators of potential conflict situations. The actual techniques of dispossession will be discussed later, but for now we need to note that the initiator is either an official agency (government department, parastatal or ruling party) or private entity. Collusion between the two is also common, in that government officials (e.g. chief, DO, land officer or minister) have been known to use their position to evict people and annexe land in a private capacity. However to the observer of conflict, three factors or trends are important. First, the volume of ownership changes tells us how much land is involved and how many people have been affected. Such data are available in urban areas, settlement schemes and other demarcated zones where land is registered and transactions recorded; however this is only a small proportion of the total land area. We know for instance of the ownership changes in the leisure enclaves of Likoni, Diani, Galu, Msambweni and Shimoni in the south; Watamu-Malindi-Mambrui in the north; or the settlement schemes in Kwale (Diani), Kilifi (Magarini) and Lamu (Kenyatta) Districts. However there are vast areas of trust land where farms and buildable plots change hands informally. Rather than outright sale which has to be approved by the local land control board, transfers take place through the mechanism of rental. Such arrangements have for instance been in use in the Rift Valley for three decades, thus enabling "telephone farmers" to grow wheat and barley on land rented from Maasai tribesmen on yearly tenancies with the blessing of farm credit institutions such as the Wheat Board and Kenya Breweries. In Coast Province there are no land data on the extent of such conversion from subsistence to externally-controlled commercial farming. Another variant of this is the mining concession (for precious and semi-precious stones) in Taita/Taveta/Wundanyi.

Secondly we should be interested in the speed at which land ownership changes take place. The faster the pace the greater is the impact. The rapid growth of Ukunda, Kikambala, Kilifi and Malindi for instance could be due to the massive population displacements in the surrounding regions as land is acquired and settled upon by commercial farmers and leisure industry developers. The sense of shock and emotional stress caused by the overnight disappearance of neighbours, of ancestral icons, of familiar trees, thickets and buildings, of mosques, chapels, graveyards and other symbols of time and continuity, can be overwhelming. For example trees feature prominently in the coastal repertoire of place-names. The baobab, tamarind, mango, tangerine and lime have all lent their elegant Swahili names to places. Mkomani (a variety of palm commonly found on the beach) in the northern suburbs of Mombasa has been supplanted by Ratna Square and assorted shopping malls. It is a matter of numbers. When towns grow at 6 - 8 per cent a year the result is that the community has to regenerate or reproduce an equivalent size of infrastructure, assets and places every ten years, either on virgin land or on top of the existing structure.

The third factor when analysing the impact of dispossession and ownership changes is compulsion. Was there any forcible eviction? Or intimidation and blackmail? Was land compulsorily acquired by government for public purposes? Although statutory compulsion is sweetened by conditions relating to fair compensation, disturbance and prompt settlement, poor people lack the knowledge and resources to take full advantage of their statutory rights. I have discussed this problem in great detail in another work dealing with land acquisition in Mombasa (Yahya 1976). Cases of forced evictions by new purchasers are common.

Squatters are a permanent feature of the coastal land scene. Ugly confrontations between the so-called squatters and land owners are reported regularly in the media, but this is only a minor portion of the problem since there are many instances of a symbiotic and mutually beneficial relationship between the squatter and the landowner. In these situations the squatter helps to look after the farm and provides labour in exchange for the privilege of cultivating temporary crops, keeping his own animals or building a house on the farm. What is distressing though is when people who have settled on trust or state land for generations are suddenly declared squatters because the land has been allocated to an individual or a public facility has to be built. For example Malindi has a long-standing squatter problem which goes back many years. This issue featured prominently in the 1997 electoral campaign. The incumbent KANU MP, who subsequently retained his seat, has among his credentials a strong record of championing squatters' rights. From time to time government promises resettlement or the issueing of title deeds but little happens in spite of the fact that rural and forest squatters appear to wield greater collective power and influence than their urban counterparts. Large squatter colonies in Mombasa - Chaani, Likoni, Mtongwe, Kisauni and Kongowea to name but a few - and several others in Malindi town seem to have been effectively pulled into the ambit of the urban economy, albeit at great economic and social cost. That is whereas land ownership and control is the primary purpose and source of security for the rural squatter, the urban squatter is motivated by access to urban services and employment. Urban squatters are pacified by slum upgrading projects, of the type successfully executed in the early 1980s in Chaani with the help of the World Bank. No such formula has been discovered by the

government to help alleviate the public problems and private pain caused by rural squatting. Even settlement schemes (Bura, Lake Kenyatta, Diani, Kipini, Magarini, Gedi, etc.) have not been that successful, since it is not the local squatters who stand to benefit but immigrants from other regions. Minister of Lands Katana Ngala gave out title deeds in November 1997 (appropriately timed and placed, being weeks before the general elections) at Jumba Primary School in Malindi and he took the opportunity to announce the government would provide titles to all squatters on government land in Coast Province. He was accompanied by his permanent secretary, Mutuma Kathurima (KBC TV 15/11/97). The government had started preparing title deeds for Ramada, Aden, Kikomeni and Kikombe Tele areas. In future only genuine squatters would benefit from fresh allocations. At the same time the Minister nulllified the allocation of 100 acres of land at Malindi Sabaki Livestock Holding Grounds, then occupied by more than 2000 squatters.

Exploitation is accompanied by a general perception among the poor and even not-so-poor that the livelihood of the many is being sacrificed for the gain of the few. Because of the manner in which the media sensationalise land grabbing cases, the ensuing resentment is especially directed towards politicians and some prominent businessmen. The sale of a farm in Kwale to a hotel caused a lot of bitterness and even violence, since it displaced many local families. In another case 300 squatters in Diani have sued the Attorney General and five private developers over a piece of land which has been in dispute for four decades. The land, consisting of two parcels with a total area of 2269 acres, was allegedly bequeathed to the local Digo community when the lease expired in 1958. It probably reverted to the state, whatever that would mean in real terms.

A proposal to convert part of the Tana River Delta, a wetland of international importance, into a private prawn farm in the mid-1990s was vehemently opposed by local residents including leaders and politicians. There were also protests from leading conservationists world-wide, and ultimately the president had to intervene and cancel the project, and a national steering committee was formed to oversee the conservation of the wetland (Eriksen et al 1996).

Cultural Intrusion

The percolation of alien life-ways and values into the coastal cultural fabric has already been alluded to. The change process is a useful indicator of social disorientation and stress. One could well argue that society is enriched by immigrant communities. However there has always been a strong resistance in the coast to western education and influences from the interior. This factor, together with material dispossession, has reinforced perceptions of cultural invasion especially among the Swahilis. When familiar landmarks and ancient shrines like Kongo Mosque and numerous Kayas are appropriated by individuals for commercial development there is general alarm and sense of insecurity. On August 2nd 1997 Dr. Charles Maranga Bagwasi, Secretary General of the National Development Party demanded the nullification of illegal land allocations in Msambweni and Daraja in Kwale District. He wrote to the Kwale DC complaining that the local community had been given a raw deal, since the on-going allocation was benefitting not the rightful owners but cabinet ministers, parliamentarians and government officials (Sunday Nation 3/8/97). Two months before that, Coast PC Timothy Sirma had ordered the provincial forest officer to investigate allegations that some people were destroying forests;

mangrove and Kaya forests were being invaded and trees cut down. The PC issued a strong warning, saying "we are not going to allow that to happen" and waving the stick of the law (Daily Nation 4/6/97). He warned of impending ecological disaster if forests were destroyed. He especially singled out Arabuko Sokoke and Kararachi Mpendakula forests in Kilifi District, both gazetted forests. However official concern was counterweighed by pleas by Kilifi squatters who, claiming that they had been landless since independence, urged government to degazette part of the two forests for their settlement. But they gave the government the alternative of resettling them elsewhere once and for all. Only a few weeks earlier veteran Kamba politician Mulu Mutisya, Chairman of the Presidential Commission on Soil Conservation and Afforestation had also urged forest officers to ensure that Kayas and mangrove forests were not violated by developers. It is quite evident that the Forest Department is ill equipped to protect gazetted forests in the country. In any case the demographic and economic pressure are too strong and well beyond the technical competence of foresters.

Land allocation controversion in the Tana delta and adjoining coastline are likely to cotntinue well into the next century, since it is part of the wild north" and one of the last areas where land is there for the taking. Kipini beach plots were the subject of an acrimonious exchange between elected leaders (members of parliament and councillors) and KANU activists, implicating in the process the Permanent Secretary in the Office of the President (Daily Nation Sat. 21/3/98).

Apart from the destruction of venerated forests the cultural landscape has been severely affected by the mutilation, defacement or adaptation of other cultural symbols such as ancient and historic buildings, monuments and public open spaces. For instance Mombasa's Ocean Drive was not only renamed Mama Ngina Drive but has been under severe attack from developers and church groups. To Mombasa residents the drive is more than a scenic promenade. It is practically the only public open space with a view of the ocean; it also contrains ancient baobabs and the remnants of an extinct Swahili village. Attempts to allocate the land have met with outcries from the public; nonetheless a small portion has already been developed with luxury villas and office blocks.

Voiceless Youth

In may 1997 a group of angry young people pulled down a wall which a developer had built around a volley-ball field in Changamwe. The grounds had been used for local, national and international tournaments since the beginning of this century, producing some of the best players in the country. The youth were led in the demolition effort by the area councillor and the Secretary of the Coast Volleyball Association while police on the ground, outnumbered, looked on (Daily Nation Sat. 31/5/97). Thus playing fields and school grounds are being indiscriminately allocated, depriving children and young people of essential amenities. Unskilled jobs, such as tourist guides, vendors and beach boys are becoming increasingly scarce and inaccessible to school leavers since the authorities are under pressure from hoteliers to clear the beaches. In the Malindi resort region the tourism, transport business is dominated by hotels and travel agencies, many of them foreign owned. Many jobs in the tourism industry - waiters, cooks, guides, travel staff - need sophisticated college training which is not available to local youths. The result is that these jobs are taken by outsiders.

DISENDOWMENT METHODS AND NASCENT IMPACTS

The people of the Coast have lost control of the rich natural endowments bequethed by their ancestors. Hundreds of thousands are landless or squatters, with access to neither land nor water, since routes to the ocean have been blocked by land demarcation and private fences. Fishermen have a problem getting access to the ocean. In fact this is one of the many problems taxing the minds of CDA and KWS, who have proposed the establishment of designated and protected fish landing sites. These two organisations, together with NMK are the only institutions which seem to be able to confront and analyse the problem in a reasoned manner devoid of ulterior motives. They have three things in common: a semi-autonomous status; leadership by renowned and dedicated scholars committed to the public good; and a competent planning and management capability. Government departments proper are burdened with so many impediments that they cannot effectively do their work. For example no structure/strategy planning has been done for many years. Even Mombasa does not know where it is going, in spite of an annual growth rate of 5% or thereabouts. Socio-economic and environmental data are not available except where a project has recently been implemented or is on the drawing board. There is a strong case for compiling a provincial atlas to incorporate the main types of data necessary for not only land management but also infrastructure and land use planning. The capacity already exists in DRSRS but somebody has to design the project, mobilise the funds and excite the interest of policy makers. But data can be misused, and no amount of planning can help the people unless it is accompanied by competent, effective and honest management and programme implementation.

Native observers of coast land problems believe that although there has been an undesirable (from their point of view) trend since independence, things started to get out of hand around 1988. Before that all allocations had to be considered by the DDC and plots were advertised. But there have been hardly any advertisements since 1986. Only people who have access to the higher achelons of government are allocated plots, which really means people who are from outside the province. Among the locals it is only the ruling party officials and die-hards-the so-called "Kanu hawks" - who have benefitted, while ordinary men and women are ignored. The decree promalgated in the 1970s requiring presidential consent for all allocations and transfers of land near the beach still stands, making it even more difficult for the vast majority of the people to transact in such land. The decree, an administrative fiat with no statutory basis, is prone to gross abuse by top-level officials and politicians. A welcome development is that whereas after independence allotees came from mainly one tribe, since 1978 the range of beneficiaries has been widened to include other tribes, although this could hardly be consolation to coast people.

Techniques of Dispossession.

A highly centralised system of land allocation which was the problem all along, has seemingly given way to local structures in that another presidential decree in mid-1997 provided for allocation within the districts themselves by committees of local representatives. Unfortunately the majority of "local representatives" are not-indigenous coastal people, nor are the overseers, i.e. the district and provincial commissioners. As a result the vast majority of the allotees are

upcountry people. Effectively it is the provincial commissioner who allocates, while the committees merely endorse his decisions. Recent allocations show overwhelming numbers of upcountry beneficiaries, with token Mijikenda, Somali, Luo and Taita civil servants. This trend is causing alarm and resentment among local people who question the motive believed such large scale dispossession and impoverishment. As one interviewee wondered, "Is ther a hidden agenda?" No wonder that in those areas where land is largely undemarcated e.g. Mariakani, Kaloleni and the islands of the Lamu archipelago the people have rejected settlement schemes. The belief among economists and development planners that registerable title to land brings economic prosperity - almost a - truism needs close scrutiny when it comes to the situation on the Kenya coast. The whole of the coastline, from Shimoni in the south to the Somali border to the north, has been allocated. Could that have been the intention of the Trust Land Act? How are these allocations going to benefit the local communities? In Tana River there was only one title deed in 1991, owned by a prominent local politician, the rest of the land being trust or state land, hence available to the people. Now most of the beach - front land is in private lands.

The second method of dispossessing the local people and the government is to condemn a government building and sell it to a "private developer". As there are many old and dilapidated buildings in the various administrative outposts, this is an easy ploy if you can get the local provincial works officer to cooperate. It happened to Kwale Civil Service Club. These officers carry enormous responsibility on their shoulders. For instance a "part development plan" i.e. local area plan can pave the way for change of use and reallocation by the district plot allocation committee.

Yet another method used by officials based in Nairobi is to collude with local politicians and agents for the purpose of identifying "vacant" plots. Title deeds are then issued praudulently without the original owner's knowledge. The existence of dual titles is no longer a rarity and potential purchasers have to be very careful. Untitled vacant land outside villages is presumed ownerless and appropriated.

The fourth technique, of which several examples have already been given, is to privatise public facilities e.g. school land, playing fields, government farms, offices and so on. What this means is that at some future date the government will have to find the money to acquire land to provide the same facilities if currently acceptable standards of provision are to be maintained.

Fifth, the market is heavily weighted against the small, poor and probably illitrate land owner. He can easily be persuaded or even conned into selling his farm for pittance. There are agents whose job is just that. Sixth, we have already mentioned the widespread practice in Kwale district of immigrant purchasers traudulently enhancing their small plots by staking a claim on neighbouring land.

The seventh tactic is to buy out "squatters". Again the people have no choice but to accept whatever money they are offered, knowing full well that the administrative police could be mobilised any time to evict them. Poor people are easily lured with cash to give up their customary land rights.

Finally a successful developer or businessman can be deliberately provoked by creating a new plot on the road reserve in front of his property, thus denying him access. This normally results in a prolonged legal battle, but in the end he is

forced to buy out his new neighbour in order not to lose more money. The allocation of road reserves is yet another indicator of not only professional ineptitude but also insensitivity to the present and future needs of society.

Environmental Loss

This brief analysis of dubious title creation methods has not touched on another parallel process which is equally harmful. The rate of environmental loss in the province is quite alarming. While detailed information can be found in recent reports and publications from KWS, CDA and NMK, the following are the main trends.

Beach Access. Members of the public and fishermen find it increasingly difficult to gain access to the beach, as already discussed above. In Mombasa nearly all fish landing sites have been allocated to KPA, KAA and private individuals. CDA and DDC are seeking solutions to the problem. Thus both recreational and economic opportunities are being severely curtailed by inadequate planing of subdivisions and allocations, and by the inability to protect existing facilities.

Urban Wastes. Solid waste, sewerage and industrial effluents are a major problem, especially in the major cities and surrounding areas, such as Mombasa, Malindi, Watamu and Lamu. Alll the solid waste from say Mombasa Island is dumped on Makupa Causeway, where reclaimed land has acquired market value and speculators have started fencing off large areas for possible future industrial use. Such land would have been better used for recreational purposes as playing fields and public parks, which are scarce on the island. The CDA has made some attempts to plant trees in the area, but a proper structure plan is needed for this unique area which combines a transportation corridor, land reclamation, mangrove forests, and the eastern extremes of Tudor estate. It is in fact the interface between two important harbours, Kilindini and Tudor.

There have also been reports of the dumping of toxic wastes imported from Europe, which poses serious threats to public health in the future.

Since only a small proportion of the urban population is served with sewerage treatment works, large quantities of sewage are released into the creekes and open seas. The result is already becoming evident in say Malindi.

Beach Hotels. Pollution from beach hotels through solid wastes, sewarage and detergents is taking a heavy toll on the beaches and fisheries. It is not in the interest of hotel keepers to invest in expensive waste management facilities, while the local authorities lack the capacity to monitor infringements and enforce the law. On Funzi Island for example it is feared by local fisheries experts that sewage from a new hotel will pollute fisheries and threaten the livelihood of fishermen. The beaches and marine life are also exposed to oil spills from passing tankers.

Mangrove Forests. It is becoming increasingly difficult to protect mangrove forests. Politicians can misinform the Lands Department and get forest allocations. For instance land under mangrove forest has been allocated in the name of the Diani Settlement Scheme. On Funzi Island 4 ha. of gazetted mangrove forest was allocated to a politician and subsequently sold to an Italian. He cleared half the land and translocated sand from a nearby beach in order to create a new beach on the mangrove swamp. When the forest officer from Kwale

went to investigate the incident he was arrested and held in custody for several days. When his boss in Nairobi heard about this he sent askaris to demolish the fence erected by the Italian. Subsequent events did not auger well for the future of conservation, for the Provincial Forest Officer was transfered, the Italian produced a title deed in court to prove sovereignty and construction work was proceeding in mid 1997 in spite of a court injunction.

Kayas and Indigenous Forests. The enormous cultural and ecological significance of Kayas has already been alluded to. Their decimation deprives future generations of an important cultural asset; robs the nation of a resource rich in plant and animal life and renowned for its biodiversity; and dipletes local biomass reserves as well as weakening the ability of local communities to deal with environmental stress. The forests complement agricultural, pastoral and fishing activities. For example only certain types of trees are suitable for building boats, and those trees are becoming scarce by the day. Fortunately the omnipresent mango trunk also makes good dugouts and outriggers.

Water Catchment Areas. Mombasa's perenial thirst is well known. Its water has to come from hundreds of kilometres away. Public water sources have not been immune to wanton allocation. Lamu Town's water catchment was allocated to two companies in 1996, although it had been gazetted (Kenya Gazette Notice no. 606 of 24/3/93) as a water catchment area under the Water Act. The DC described the reserve as the town's lifeline and promised to revoke the allocation if confirmed.

Industrial Pollution. Haphazard location of industries, without adequate preparatory studies and environmental impact assessments, has resulted in extensive damage and human discomfort at the local level while promising to be an even greater problem in the future as more minerals are found and manufacturing moves out of Mombasa. Villages within a 50km radius of Mombasa are already budding industrial towns. Mazeras and Kilifi are expanding fast. Kaloleni is the unfortunate recipient of a highly polluting cement plant which showers dust and fumes over a large inhabited area. Residents have protested but to no avail. Since the authorities are unable or unwilling to prosecute, legal recource for the local people lies in civil action, and the drawback here is that if for whatever reason the court rules in favour of the industrialist/developer, there is nothing further that can be done; and in any case even if an injunction were awarded, it could be ignored with impunity.

Illegal-Reclamation. Beach-front plot owners build unauthorised sea walls to prevent erosion or to reclaim more land from creekes and the beach. This not only interferes with marine life e.g. turtle breeding areas but also distorts natural water flows and could have an impact on another part of the sea-shore through accentuated erosion or sand deposits. Such walls also prevent fishermen from beaching their boats and the public from getting beach access. Setback requirements by MMC and KWS (100ft or 37.7m) are not enforced (CDA 1996).

Finally there are the historic sites and monuments including whole built-up areas in Lamu and Mombasa, not to mention numerous strategically located beach sites. Of course developers would have to love their hands on such sites, gazetted or not, and NMK has had to be on the alert. Greater cooperation between NMK, local communities and developers could result in innovative

mutually beneficial methods of exploiting the full potential of these assets (Yahya 1997).

RESILIENCE AND REDRESS

The Kenya Coast was recently engulfed in violence emanating from Likoni (Mombasa District) and spreading to Kwale District. This violence lasted about two months, claiming the lives of many and shattering an important sector of Kenya's economy. The chronology of events is as follows:

August 1997.

13/8/97

On that day13 people including 6 police officers were confirmed to have been massacred when about 100 raiders unleashed a night of terror at Likoni, Mombasa. They stole 30 guns and 5000 rounds of ammunition and later petrol-bombed the police station among other buildings. In addition they freed the people who were in police custody and kidnapped three policewomen.

The raiders were suspected to be holed up in Shimba Hills which are close by and in fear of more attacks, several Likoni residents fled Likoni Estate to seek refuge elsewhere.

15/8/97

The attackers raided the predominantly Luo slum of Maweni in Kongowea, Mombasa. Ujamaa and Shika Adabu villages were also invaded. This called for the scouring of the Simuani caves, Kaya Waa and Kaya Bombo forests where 10 members of the gang were arrested by Administration police and General Service Unit personnel.

Over the next few days, as the violence moved on north to Mtwapa, and the death toll increased, people continued taking refuge at the Likoni Catholic Church where the Kenya Red Cross Society extended aid. Some of the 69 suspects already arrested started appearing in court.

18/8/97

A Mombasa politician Emmanuel Karisa Maitha was arrested in connection with the violence as bloodshed spilled over to Kwale in the South and Kilifi District in the North. By this time, the pressure exerted on the government by opposition leaders, lobby groups and religious leaders was so great that a high level security meeting was held to draw up new strategies to counter the violence.

The violence continued as is depicted by a stampede at the church when unknown people lobbed stones into the area. By then, the death toll had risen to 36 and destruction of property continued as 400 waterfront kiosks were brought down to ashes in Malindi. By 20/8/97, the number of suspects in police custody stood at 309 including Mr. Omar Masumbuko (East African Standard August 21st 1997).

22/8/97

Raiders attacked the Likoni Catholic Church shooting two people dead. President Moi orders the police to curb the violence before issuing a week's ultimatum.

September 1997

1/9/97

Uncertainty reigned over the re-opening of primary and secondary schools in both Mombasa and Kwale districts following the displacement of approximately 100,000 people. These schools included Ng'ombeni Primary, Matuga Primary Schools and Noor Islamic Orphanage and Education Centre (Daily Nation 1st September, 1997). The Kenya National Union of Teachers said that some teachers had applied for transfers.

4/9/97

Armed raiders killed a man in Likoni while two houses were burnt down at Kona ya Mtongwe. Over the next few days six more people were killed at Msambweni and Shelly Beach.

9/9/97

President Moi's notice/ultimatum ended causing residents to flee in fear of brutal reprisals from the General Service Unit personnel. However, masked raiders staged a lightning attack at Likoni.

11/9/97

Twelve people were killed at Ukunda and Diani on the south Coast where more property was set on fire. In addition, some raiders are seen disappearing into the Kaya Kambe in Kaloleni division.

15/9/97

The death toll rose to 67 after a gang of more than 70 robbers staged a day-light raid at Mkomani and stole sh 3 million. Two people suspected to have been administering oaths to the violence perpetrators were arrested.

Soon after three churches were burnt in the Kikoneni area of Msambweni division, Kwale District. Then 68 of the 300 suspects arressted were released without being charged (Daily Nation 23/9/97).

6/10/97

Between 30 and 50 armed gangsters raided Majaoni village in Mombasa North and stole property estimated at sh. 500,000. A lawyer told of a plot in which prison warders allegedly attempted to kill some of the 170 remanded suspects whom the government (prison department) had earlier failed to produce in court. The total number of those arraigned was 204 while the death toll was 67.

31/10/97 - 3/11/97

Eight armed raiders connected to the Likoni violence, were killed and four arrested following a shootout with police in Similani caves and Kaya Bombo area of Kwale District.

THE MAIN ACTIVISTS

To date, there has not been any suspect proven in court to be a perpetrator of the Coast violence. Therefore those mentioned below are but suspects or persons mentioned in the media as having some connection with the events.

a) Ex-Servicemen and Former Policemen

These are suspected to be behind the Coast violence. One of the reasons given is that the marauding mobs attacked with military precision. The ex-servicemen alleged that their families were harassed by policemen who were holding more than 30 ex-servicemen as on 20/8/97 (Daily Nation 20/8/97).

Mr. Omar Masumbuko , the self-styled chairman of the Coast Youth for Kanu was arrested on 20/8/97. The prison department failed to produce him in court on 3/10/97. He was charged with robbery with violence, burning the Likoni Police Station and taking oaths that bind him to kill when called upon to do so. A Ugandan newspaper "The Crusader' claims that his real name is Ali Mulungi, a Ugandan who served in the army of the deposed dictator Idi Amin.

b) Mr. Emmanuel Karisa Maitha

He was a Mombasa based Kanu politician charged with possession of offensive weapons and preparing to commit a felony. He was remanded in custody twice due to a withdrawal of a 'habeas corpus' application. On 9/9/97 he was moved to Manyani prison which is in a remote semi-arid area about 200 kilometres from Mombasa. He had been arrested in Mombasa on 18/8/97. On 19/9/97 he was released on a sh. 2 million bail and two surities of the same amount.

c) The following were arrested for allegedly being involved in the violence on 16/8/97.

Safina founder Member - Mr. Mohamed Khelef Khalifa
Chairman Human Rights Commission Coast Chapter - Prof. Al- Amin Mazrui.
Chairman of National African Democratic Union Party - Mr. Ali Chizondo.
Imam of Masjid Jihad - Mr. Hamisi Juma.

Mr. Khelef Khalifa and Prof. Al- Amin Mazrui were granted a bond of sh. 100,000 with a similar surety but Mr. Chizondo faced a capital offence which was unbailable.

On 7/9/97, the magistrate ordered the officer commanding Shimo la Tewa Prison to take Mr. Ali Chizondo and Imam Banda to hospital.

d) Other suspects included Mr. N. Biwott, a cabinet minister and Mr. Rashid Sajjad a nominated MP and assistant minister who were accused in parliament on 20/8/97. Mr. Sajjad defended himself and Mr. Biwott made a personal statement in answer to the allegations.

Several months later on 20/3/98 a 95 year old traditional medicineman appeared before the Mombasa Senior Resident Magistrate accused of administering an oath to Omar Masumbuko and his colleagues binding them to kill; of robbing a police constable of a rifle and ammunition; and setting ablaze Likoni Police Station and other government buildings.

The Law Society of Kenya had already written to the Attorney General urging them to prosecute those responsible for the raids; it would otherwise seek justice through other means. The Mombasa Catholic Bishop John Njenga also called on the government to arrest and prosecute those implicated (Daily Nation 13/1/98).

SUPPOSED REASONS

The general view is that the violence was a political move spurred on by socio-political pressures. This was deduced from the fact that the marauding raiders tended more to inflict pain rather than to steal. The following theories have been forwarded:

Firstly, the violence may have been a fight for Majimboism (federal government) as indicated in various leaflets circulated in the area written 'Majimbo juu, pwani kwa Mijikenda' (Daily Nation 25/8/97), i.e. Long live Federalism, the Coast is for the Mijikenda.

Secondly, witnesses interviewed confirmed that the raiders aimed at flushing out all non-coastal people (Sunday Nation 17/8/97).

This was reportedly due to 'land grabbing' or acquisition of coastal land by well-connected non-coastal people at the expense of the local people who were rendered squatters on their own land. Employment opportunities are also slim for the local people as the government has not set up as many training institutions as they have in non-coastal regions. Therefore the skilled workers from up-country are at an advantage. In addition coastal land owners from up-country set up businesses but do not employ the locals. They import labour from their home areas.

Thirdly, the Opposition blamed the government for masterminding the wave of violence in order to derail the pressure for constitutional reforms thus forestalling the constitutional debate that was going on at that time. Slogans painted on walls near Matiga pointed to a political motive exacerbated by tribal and land tensions (Sunday Nation 17/8/97).

EFFECTS

Many innocent people were killed and others seriously injured. In total over 70 people died in the orgy of violence including policemen, civilians and raiders. Thousands of people were rendered homeless as their residences were destroyed or burnt down by the arsonists.

The tourism industry suffered drastically following live coverage by international media of the Likoni attack. For instance at least twelve tourist hotels in Malindi closed down as tourists left abruptly or cancelled their reservations. Other hotels were burnt down. Domestic tourism suffered just as much as international tourism. Losses of at least sh. 1 billion were incurred in the industry in August and September (East African Standard 16/10/97).

There was an increase in crime and there was no place to report crime. Apart from Likoni other police stations were torched whilst traffic police were removed for three weeks from the Ukunda - Likoni road thus letting matatu (taxi) operators rule (Daily Nation 1/9/97).

Local people lost confidence in the security system as the police were unable to quell the violence immediately. Residents also complained of police harassment and alleged brutality.

Some economic effects/results of the violence include :

- Business premises were destroyed thus halting some commercial activities.
- Public transport, telephone services and other utilities were disrupted.
- Matatu fares and grocery prices shot up in Kwale following the disturbances.
- There was a low turn-out at the Agricultural Society of Kenya show which is normally a landmark event in the Mombasa business and social calendar.
- More than 100 hotel workers were suspended or sent on leave due to booking cancellations. Thus temporary/seasonal unemployment was experienced.

These were the immediate effects which touched the daily lives of the people. At the political level however the violence signalled the arrival of a new era in coast politics. Not only did large numbers of up-country people leave the affected areas, thus tipping the balance of electoral power in favour of KANU, but a new awarenes and militancy was aroused among the Miji-Kenda, especially on the south coast. A new federalist political party called Shirikisho was formed by Digo and Duruma intellectuals, and although registered barely a month before the Dec 20 1997 elections, it managed to mobilise so much support that KANU's prospect in the region appeared quite poor. In the event Shirikisho bagged the Likoni seat and narrowly missed another two.

The analysis of the 1997 general election results is beyond the scope of this paper. The point being made is that the land question contributed significantly to the new coast politics, a situation which has in fact just unfolded and whose long term effects are not certain. The forces behind the 1997 conflicts will probably never be known, in spite of vigorous efforts by the Law Society of Kenya, which mounted its own investigation and urged

the Attorney General to prosecute the Mombasa businessmen and four politicians (Daily Nation 13/1/98) thought to have been involved. The Law Society threatened to take private legal action if the AG failed to act.

Transgenerational justice demands that the circumstances fuelling potential conflicts be corrected. Massive dispossession, environmental loss and destruction of cultural assets have to be arrested and even reversed. The very institution of trust land has to be revaluated and such questions asked as, who should be the trust beneficiary? Have the trustees done their job well? How can the concept of trust be reconciled with freedom of movement and of settlement? Are trusts incompatible with equitable investment and development? Are private trusts feasible? There could well be a case for empowering the county councils to manage all land within their boundaries, and in the process restricting the powers of the Lands Department and the district administration. Thus the councils would have the power of preparing land polies, strategies and land use plans for the whole district as well as implementation. At the same time CDA, KWS and NMK will have to assume even greater responsibility in terms of advocacy and facilitation. For now they are the people's experts and defenders.

Continuation of present policies and practises will almost certainly trigger similar turbulence on the north coast, which is a much longer and more complex stretch. There are several potential conflict zones which need individual and localized attention e.g. the Gede-Mambrui-Magarini triangle, Witu, Lamu mainland and archipelago, and the Tana delta. If we move inland, the future of the Tsavo National Park needs to be re-evaluated in the context of the land needs of the Taita.

Further conflicts must be expected within Mombasa itself, which is growing at a pace far in excess of the city's capacity to provide jobs, housing, school places and other services. The urgly cycle of invasion, evictions, court injunctions and media images of homeless families will become a common occurance, as it is in Nairobi.

All these trends call for greater policy making, planning and monitoring capacity in central and local governments. They also place a special burden on the civil society and scholars, the burden of observing, recording, analysing, prognosticating and warning. There is no sign that is happening.

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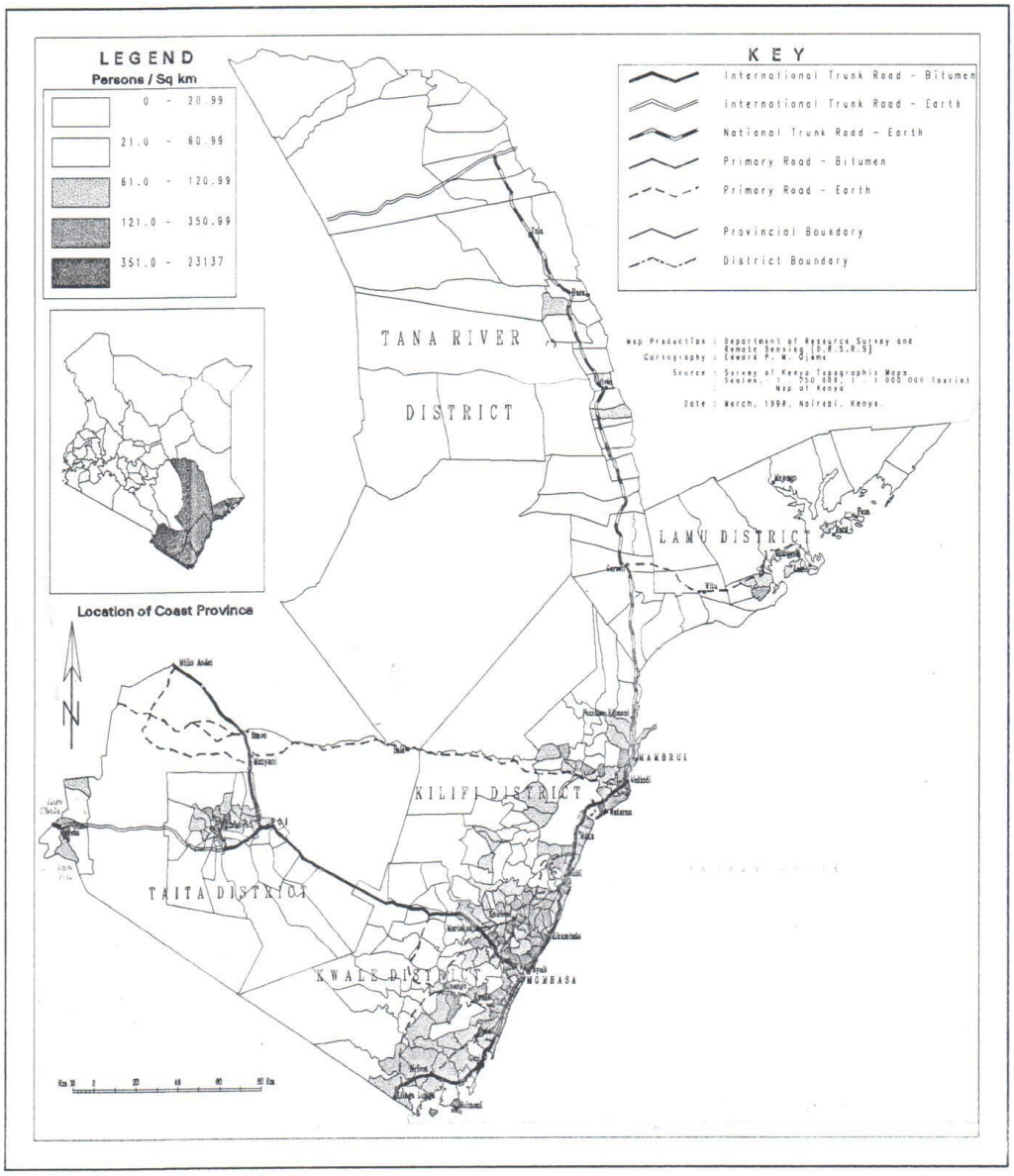
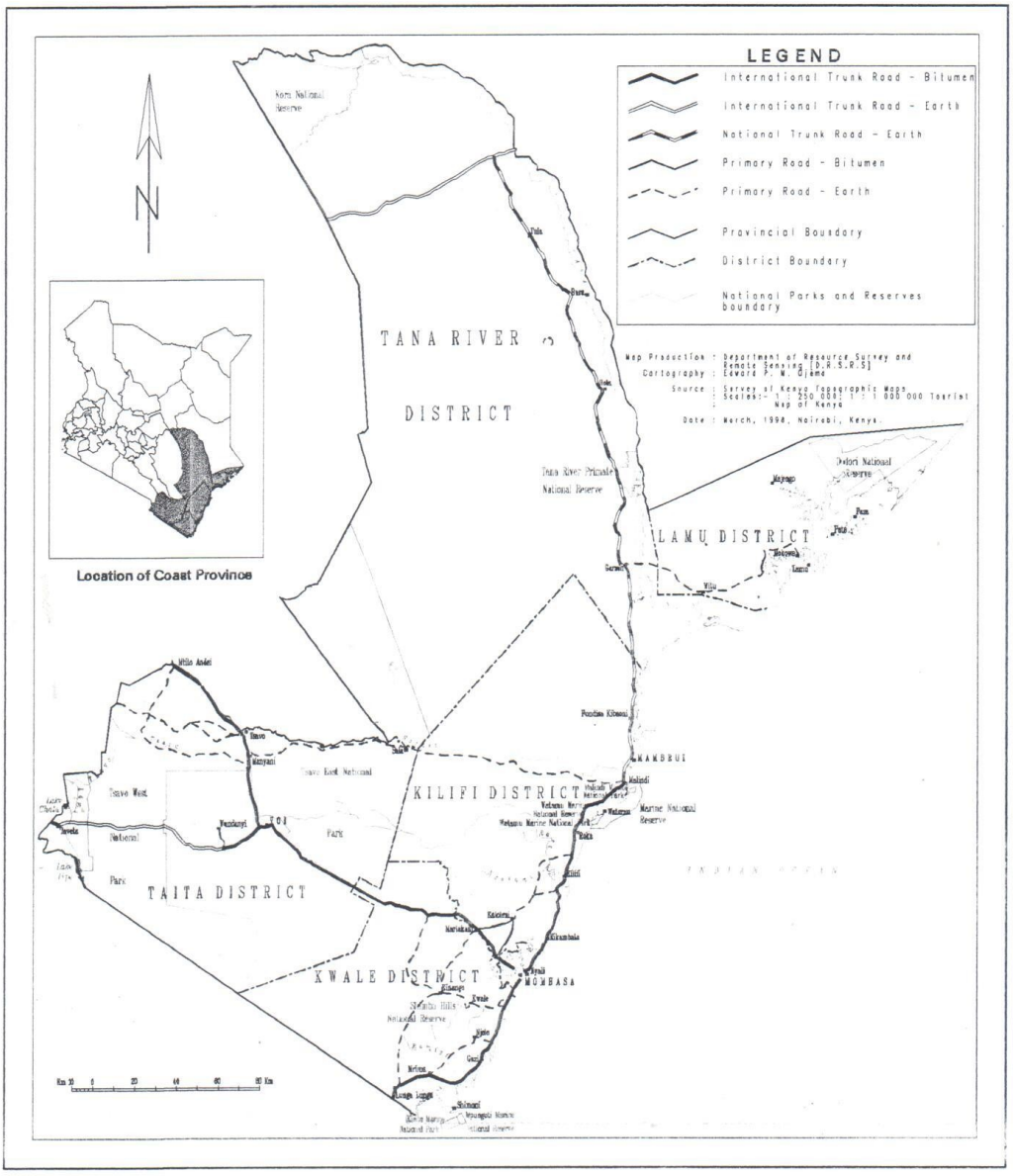
Map 1. Population Distribution

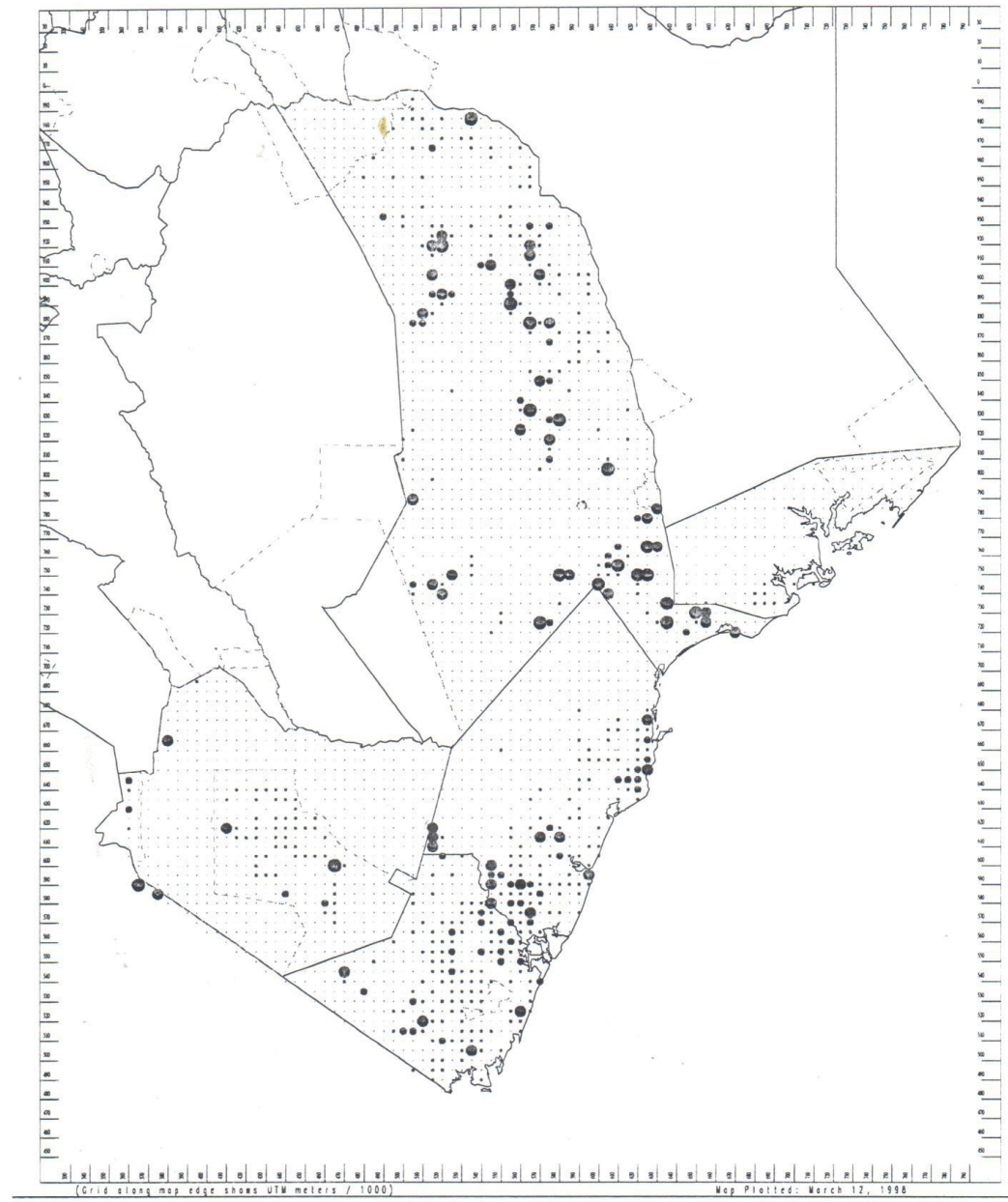


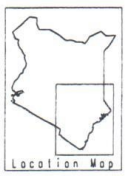
Map 2. District Boundaries and National Parks.



Map 3. Forests in Kwale District

Map 4. Cattle Population.





DRSRS Wildlife/Livestock Survey
Survey Name: coas98xx

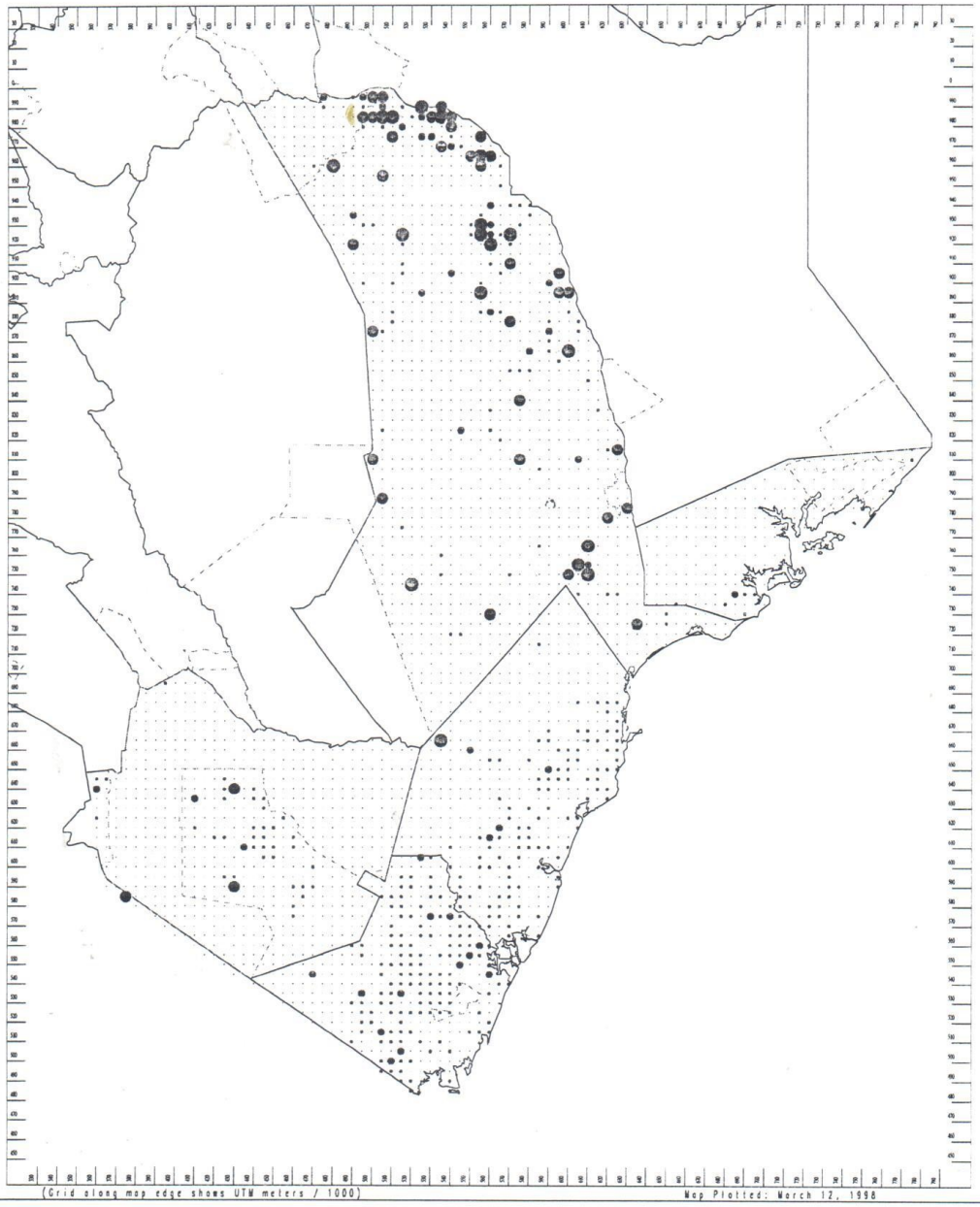
All Cattle - Observed

Department of Resource Surveys and Remote Sensing (DRSRS)
Ministry of Planning and National Development - KENYA

Protected Areas
District Boundary
Rivers
Unit Surveyed

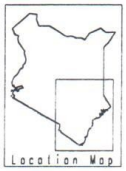
<50 50-100 100-200 >200

Map 5. Sheep and Goat Population.



(Grid along map edge shows UTM meters / 1000)

Map Plotted: March 12, 1998



DRSRS Wildlife/Livestock Survey
Survey Name: coas98xx

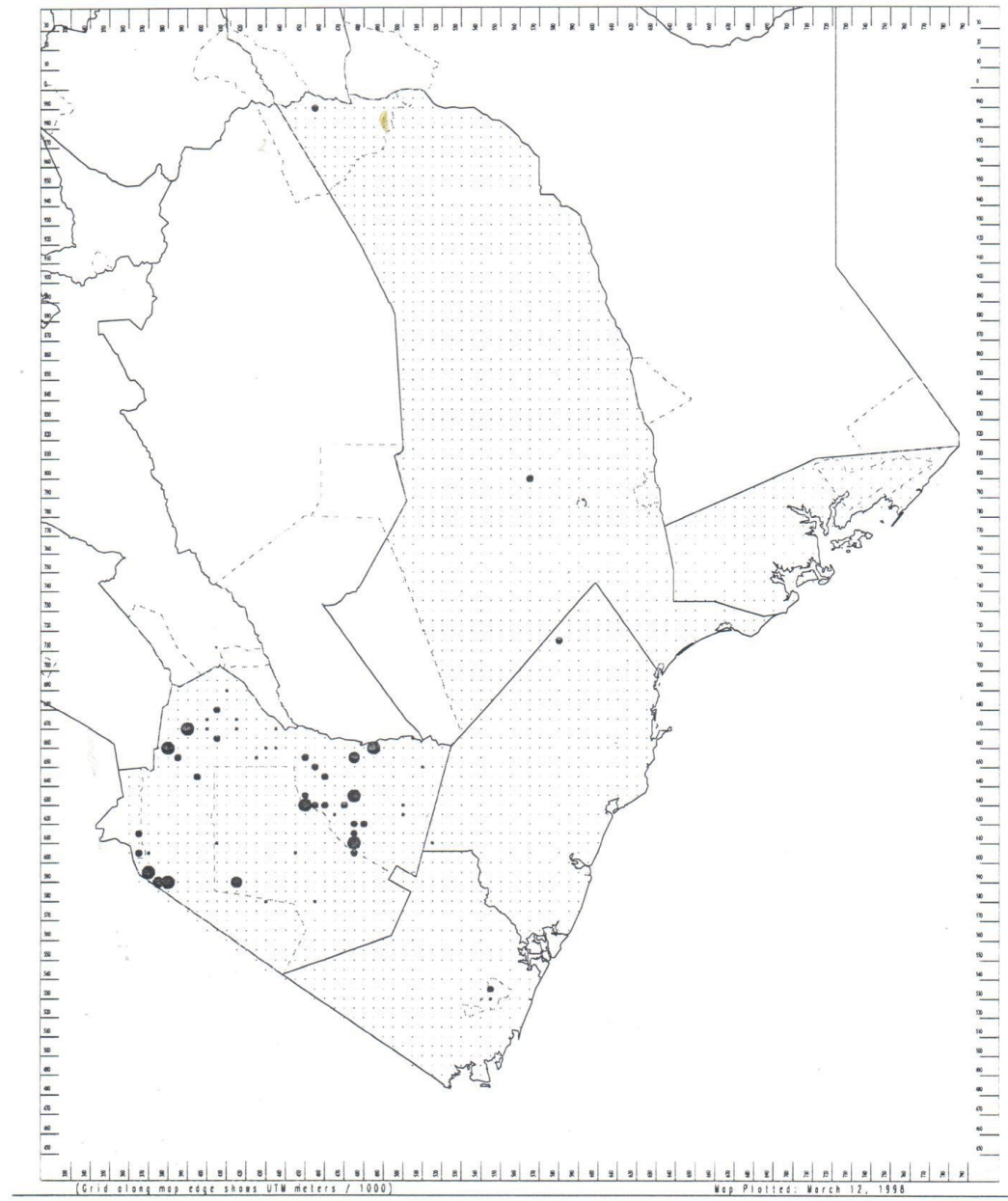
Sheep & Goat - Observed

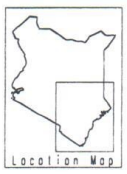
Department of Resource Surveys and Remote Sensing (DRSRS)
Ministry of Planning and National Development - KENYA

Protected Areas
District Boundary
Rivers
Unit Surveyed

<50 50-100 100-200 >200

Map 6. Elephant Population.





DRSRS Wildlife/Livestock Survey
Survey Name: coas98xx

Elephant - Observed

Department of Resource Surveys and Remote Sensing (DRSRS)
Ministry of Planning and National Development - KENYA

Protected Areas
District Boundary
Rivers
Unit Surveyed

<5 5-10 10-20 >20

→ G-M Mwtiso

SECOND MOMBASA & COASTAL WATER SUPPLY PROJECT
ENGINEERING & REHABILITATION PROJECT
SABAKI GROUNDWATER STUDY

SUMMARY OF RESULTS 1993

1. SUMMARY

Recent groundwater investigations along the Sabaki River near Baricho are all indicating that substantial groundwater resources are available, resources which might alleviate to a large extent the shortage of water at the main urban centres along the Kenyan Coast.

Two production boreholes were sunk recently on the south bank of the Sabaki River near the Baricho surface water intake works, where the river is confined to a narrow channel. The test results have shown that these boreholes are extremely productive and capable of yielding at least 1,000 m3/hr each, or a combined total of 48,000 m3/day.

Preliminary results from a detailed seismic refraction survey combined with resistivity soundings confirm that the productive underground water reservoir is present and very extensive, both upstream and downstream of the Sabaki Water Works.

These results have raised the hope that an important part of the water supply for the coastal belt can be met from this aquifer.

2. THE GEOPHYSICAL SURVEY

The presence of an extensive underground water reservoir below the Sabaki River, near the Baricho intake was earlier suspected and has now been confirmed with comprehensive geophysical investigations and test drillings.

The geophysical investigations to date consisted of a total of 14,000 m of seismic refraction lines and a total of 17 electrical resistivity soundings. About half of this was carried out in an area west of the main intake works on the North Bank, while the other half of the survey was done just east of the intake on the South Bank.

Interpretation of the seismic data has revealed that the valley is filled with unconsolidated sediments of a variable thickness, and that locally a deep incised channel is found in the alluvial flood plain. This is believed to be a buried palaeo river channel. The results have been used to site the first three exploratory boreholes on the South Bank and another two on the North Bank.

3. RESULTS

The North Bank

The dry surface layer has a low velocity in the range of 270 to 420 m/sec with a variable thickness from 2 to 8 m. The second layer has an average velocity of about 1650 m/s and a thickness ranging from 4 m at the hillside to more than 60 m within the flood plain. The bedrock, being the main refractor, has a velocity greater than 3,000 m/s. It is encountered at very shallow depths next to the valley side where the bedrock outcrops and increases to depths greater than 70 m at the deepest sections of the flood plain. The bedrock topography of this refractor is quite rugged unlike that of the surface layer. A general dip of this refractor to the south is observed from the valley sides but it is interrupted by a deep incision reaching over 60 m at the central sections of the alluvial flood plain.

Similar depths are obtained on the SE end next to the Lango Baya fault and all along the sections adjacent to the present river course.

From the resistivity soundings a surface layer with a resistivity of 5 to 13 Ohmm is observed. Its thickness is variable ranging between 2 and 9 m. The second geoelectrical layer has resistivities ranging from 50 to 70 Ohmm. This layer is thickest around the central parts of the basin and thins out towards the east and the north. The third geoelectrical layer has an average resistivity of 10 Ohmm. It is thickest at NB-1 where it occurs from 15 to 68 m deep. The deepest geoelectrical layer in the area has resistivities greater than 100 Ohmm. It generally dips from the north towards the central and eastern parts where it attains depths of 60-70 m.

The South Bank

The dry surface layer has a velocity in the range of 220 to 420 m/s and a thickness of 2 to 5 m. The second layer has an average velocity of about 1650 m/s and varying thicknesses between 0 m at the hillside to more than 50 m within the floodplain. The main refractor has a velocity greater than 3,000 m/s. It is encountered at very shallow depths next to the valley, where the bedrock outcrops and increases to depths greater than 50 m at the deepest sections of the flood plain. The bedrock topography of this refractor is uneven. A general dip of this refractor to the north is observed but it is interrupted by deep incisions.

The resistivity soundings show a surface layer with a resistivity of 4 to 10 Ohmm. Its thickness ranges between 2 and 10 m. Very low surface resistivities (< 3 Ohmm) are found in the eastern part of the flood plain. The second geoelectrical layer has variable resistivities ranging from 15 to 65 Ohmm. A general increase in depths northwards and eastwards from about 10 m to depths greater than 50 m is observed in all the profiles. Resistivities in this layer tend to decrease eastwards. The deepest geoelectrical layer in the area has resistivities greater than 100 Ohmm.

4. DISCUSSION OF RESULTS

The surface layer with velocities of 220 to 350 m/sec represents clearly the unsaturated superficial deposits of soils, silts and sands having a thickness of 2 to 6 m. The surface geoelectrical layer correlates well with this layer.

The second layer with average velocities ranging from 1600 to 1800 m/s represents the saturated alluvial deposits of fine to coarse sands, pebbles and boulders of different sizes, while it probably also includes strongly weathered bedrock. The resistivities of the second and third geo-electric layer of 10 to 65 Ohmm can also be associated with these sediments.

It is important to note that with the resistivity method different types of sediments can be recognized, as low resistivities (10-20 Ohmm) in this layer indicate finer materials such as silts and clayey beds, while the higher resistivities (>25 Ohmm) can be correlated with coarse sediments.

The third layer with average velocities greater than 3000 m/s and resistivities greater than 100 Ohmm is interpreted to represent fresh hardrock which in this case are limestones, sandstones or siltstones.

Borehole data could be used to calibrate the seismic and resistivity interpretation.

The seismic depth sections and geoelectrical sections have been used to determine the zones where the alluvial deposits are thickest. The zones interpreted to have bedrock depths greater than 60 m and 40 m on the North

Bank and South Bank respectively are deeply incised into the bedrock and are believed to be the palaeo channel which defines the "Sabaki Aquifer". The meandering river has deposited alluvial sediments of variable grain-size. The latter was determined by river flow velocity. Relatively fine sediments are expected in the wider parts of the valley, while in the narrow sections coarse sediments prevail.

The first exploratory borehole on the Southbank (SB-BH1 at 190W,050N) sited on the basis of the initial interpretation, has the following stratification:

0 - 5 m	Brown, silty sands.
5 - 38 m	Coarse sand with small boulders.
38 - 40 m	Dark clays and silt.
> 40 m	Weathered greyish rocks resembling limestones.

Water was struck at 6 m, and shot up to 2 m (Water Rest Level)

5. RECOMMENDATIONS

When reviewing these results, it is clear that additional seismic refraction lines and resistivity soundings will be needed on the South Bank to determine the extent of the deep incision downstream and delineate the best sites for the production holes. The planned lines at the North Bank should be carried out to enable a complete delineation of the deeper sections of the basin (palaeo channel). More resistivity soundings are recommended at the two sites to ascertain the type of sediments present.

6. THE NEED FOR FURTHER INVESTIGATIONS

Before far-reaching decisions can be taken for the development of these resources, a number of questions regarding the groundwater store have to be answered:

- what is the safe sustainable yield of the aquifer, ie. how much water can be pumped at a constant rate, without depleting the storage, even in extreme dry years?
- is the amount of groundwater available enough to supply Malindi, Kilifi, as well as Mombasa?
- what is the chemical and bacteriological quality of the water, and how does the quality fluctuate during the seasons?
- what measures are necessary to safe-guard the resource against contamination?
- what is the effect on downstream flow, or in more general terms, what is the environmental impact when abstracting very large volumes of groundwater?
- what management tools are required to enable an efficient exploitation of the water resources?

A decision to invest large amounts of funds for developing this groundwater resource, can only be justified on the basis of a certainty that the sustainable yield of the aquifer is sufficient at all times, and that all necessary precautions are taken to safeguard the aquifer against contamination.

To find a reply to these questions detailed hydrogeological investigations are required. These should reveal amongst others:

- the exact lateral and vertical extent of the aquifer (geometry);
- the recharge mechanism and recharge rate;
- the groundwater flow pattern under different abstraction rates and at variable river levels; and
- the variations in groundwater quality with the seasons.

A.

TERMS OF REFERENCE FOR AN ENVIRONMENTAL IMPACT ASSESSEMENT OF THE PROPOSED SECOND MOMBASA AND COASTAL WATER SUPPLY PROJECT

(Applicable for all source works development alternatives)

Introduction

1. The purpose of this terms of reference is to guide and structure the preparation of an environmental impact assessment of the Second Mombasa Water Supply Project.

2. The development project to be assessed is presently not yet specified as to the final technical alternative to be developed. However, the situation leading up to the present project considerations and pre-planning are as follows: The area of the Kenyan coast under review for augmented water supply through the project includes primarily greater Mombasa (island and mainland), the north coast up to Malindi, the major development centres on the immediate South coast, and the hinterland along this coastal strip. This area covers approximately 1000 square kilometres and has presently (1991) an estimated population of nearly 1.7 million inhabitants.

3. The estimated average daily demand for fresh water in this area is around 200,000 cubic meters. The demand from the Mombasa urban centre and surroundings, which is the focus of the present project proposal, counts for nearly 125,000 cubic meters of the above amount. However, the present total average public supply is less than 85,000 cubic meters of water, leaving a deficit that means strict water rationing with consequent restrictions on development and human use. Projections for future water demand in the Mombasa and surrounding area is estimated to almost 200,000 cubic meters daily by the year 2000.

4. The present public supply is provided from four sources;

Mzima Springs in Tsavo National Park	approx	35,000 cu.m
Marere Springs/Pemba River	"	9,000 cu.m
South Coast (Tiwi) boreholes	"	4,000 cu.m
Baricho treatment works on Sabaki River	"	35,000 cu.m

5. The Baricho treatment works operates at 2/3 capacity while the rest works at full capacity. The Baricho treatment works has a very high operating cost while the Mzima Springs has very low operating costs. Mzima Springs provides gravity fed clean spring water while Baricho cleans and treat extremely silt-polluted water from the river and pumps it to the consumers. A solution to the unsatisfactory water situation and provision of adequate fresh water supplies to satisfy the demand in Mombasa and surroundings is considered the highest political and development priority at the moment.

6. Responsibility for the executing arrangements for the environmental assessment rests with Kenya Government as potential borrower of project funds from the World Bank. The National Water Conservation and Pipeline

Corporation (NWCPC) represents the Kenyan Government on technical project matters and will be the contracting partner for the consultant undertaking the impact assessment. The World Bank's guidelines for environmental impact assessments will apply.

Background Information

7. The major components of the proposed project have not yet been agreed upon. The specific requirements of the assessment will therefore be formulated at a later stage.

A first phase of the project consisting of the rehabilitation of the old system, institution building, and the preparations for the main investment is dealt with as a separate project and is presently under appraisal. This limited project was initially classified a C-category according to the World Bank's Operational Directive 4.00 (needing no assessment), while the second phase was expected to be a category A, needing full assessment. However, the first phase project has a part (part II: Rehabilitation and augmentation works); (see below) which is a category B component needing limited assessment.

8. **FIRST PHASE PROJECT COMPONENTS:**

I. **Institutional support/capacity building:**

A. Consultancy and advisory services:
- Valuation of fixed assets and assessment of associated liabilities.
- Improvement of revenue collection.
- Improvements of financial system.
- Management information system.
- Preparation of corporate development plan.

B. Equipment and vehicles:
- Computer hardware, vehicles and various equipment.

C. Staff development training.

II. **Rehabilitation and augmentation works:** (needs full assessment)

A. Construction of production wells and wellfield development, including access roads, power supply, pumping equipment and pipeworks.

B. Transmission Main from wellfield to clear water well near existing treatment plant, including river crossing.

C. Improvement/remedial works at the Sabaki Intake Works.

D. Improvement/remedial works at the existing treatment plant.

E. Transmission main Sabaki/Mombasa including booster pumping stations.

F. Rehabilitation/extension of branch lines.

G. Remedial works and expansion of terminal reservoirs, with one additional reservoir.

H. Telecommunications system improvements.

I. Distribution system improvements (Mombasa).

J. Staff housing.

K. Mzima Springs pipeline repair and rehabilitation works.

L. Supply of consumer meters.

III. Studies and engineering.

A. **Step 1**
- Review and update of existing feasibility studies with special regard to the proposed Mzima Springs Project, including review of population and demand projections, environmental impact studies and preliminary engineering for the selected alternative.

B. **Step 2**
- Preparation of studies, detailed engineering designs, bid documents and evaluation of bids for all components of the Second Mombasa and Coastal Water Supply Project main investment phase (phase 2), (excluding project supervision) that is for:
- the selected alternative for source work development.
- water treatment.
- transmission mains with all ancillary structures (access roads)
- terminal reservoirs
- distribution systems in Mombasa and other coastal centres.
- ancillary structures (telecom., offices, housing, equipment etc.
- review of existing sewerage, drainage and sanitation systems.
- feasibility studies for long-term water supply source expansion.

C. **Rehabilitation and augmentation works.**
- Hydrogeological/geophysical studies for groundwater development near Baricho.
- Consultancy services for engineering designs, bid documents and evaluation.
- Sabaki Intake Model study.

10. Total project cost for all the above components of the first project phase is estimated to be US$ 40.00 million.

The major investment project to follow is not defined, but is expected to have a cost of an estimated US$ 200.00 million.

11. The need for this project is without question and the objectives it is intended to meet is to provide relief for the population from the precarious water situation in the project area. The urgent need for adequate and clean freshwater supplies to the population and for coastal development should be met without unnecessary delays, but the urgency must not lead to hasty and wrong decisions causing or leading to long-term negative or damaging external impacts affecting the sustainability of the natural resource base of the region.

12. The implementing agency is the National Conservation and Pipeline Corporation (NWCPC). The Corporation and its institutional systems and operations are also in need of rehabilitation and strengthening. This is

planned as an integral part of the first phase of the project.

13. Consultants were already in the early 1970's investigating additional sources for the augmentation of the "Mombasa Pipeline Board Supplies", seeking alternatives to provide sufficient additional water to meet expanding demands in Mombasa up to 1990. The client later decided to increase the scope of the study to incorporate not only supplies to Mombasa but to the entire coastal region north of Mombasa. Three alternative schemes were identified, two of which were based upon development of the Sabaki River while the third was based on further development of the Mzima Springs. (The existing Mzima pipeline dates back to the early 1950's.) One of the Sabaki River alternatives was preferred and implemented, but the project has never reached the capacity originally foreseen for several reasons.

14. A Japanese funded study of 20 identified alternatives for water supply to the coastal region was finalized in 1981. This study concluded in the end that water from the Sabaki River led into a storage reservoir at the Rare River and from there to Mombasa after treatment was the best alternative, with Mzima II and a regulating dam on the lower Tsavo river as the second best alternative.

15. Due to various delays leading to the present critical water supply situation on the coast which gives serious urgency to a solution, a second pipeline from Mzima Springs together with various rehabilitation works are now being considered as the easiest to realize with the lowest possible operational costs (A separate Terms of Reference for this alternative has been elaborated). However, recent discoveries of potentially rich water bearing layers in the subterranean old plaeo channel of the Sabaki River now gives rise to optimism as to the potential for significant borehole production in the close proximity to Baricho. Other dam- or impoundment solutions may also be considered.

16. Current status and timetable of the proposed project; Appraisal of the first rehabilitation and institution building phase together with the engineering credit facility is expected to take place in June/July 1991. The successful negotiation of this component could release funding of the US$ 40.00 million package by early 1992. The main component phase, still to be decided, could have a partly overlapping parallel development leading to its possible conclusion by the latter part of the 1990's.

17. There are none associated projects planned or in progress within the region which may compete for the same resources, although private development of local waterworks along the coast is a common result of the present situation. Particularly the large tourist hotels and certain industrial complexes are desperate to get adequate water supplies and are seeking alternative solutions. It is not expected that this will significantly affect the proposed project.

Objectives of the Environmental Impact Assessment.

18. The main focus of the environmental assessment will be on the water producing capacity of the selected source alternative, the pertinent

catchment area, and the effects on the downstream vegetation, wildlife, ecology and aquifer recharge of a reduced waterflow in the river systems as a result of the project. It will also focus on the disturbance created by project activities on wildlife in the Tsavo National Park and the impacts on tourism and the local population to the extent that may be significant.

19. Most of the activities covered by the first project phase consisting of rehabilitation works and institutional strengthening is likely to have limited negative environmental impacts. This has been anticipated by its classification as a C category project although this was later changed to a B category. Since this project phase is likely to lead directly into, or follow parallel to the preparation and design of the main project (second phase), the environmental impact assessment should take place as soon as possible.

Environmental Assessment Requirements

20. The regulations and guidelines which will govern the conduct of the assessment include:

- World Bank Operational Directive 4.00, Annex A: Environmental Assessment, and Annex B: Environmental Policy for Dam and Reservoir Projects, and pertinent Operational Directives, Operational Policy Notes, and Guidelines cited in Annex A2 thereto;
- National laws and/or regulations on environmental reviews and impact assessments.
- Regional, provincial or communal environmental assessment regulations.
- Environmental assessment regulations of any other financing organizations involved in the project.

Study Area

21. Almost independent of which major second phase alternative is selected in the end, the boundaries of the influence area to be studied by the assessment incorporates in broad terms an area that includes the south eastern flanks of Kilimanjaro within Kenya as the upper watershed of the Tsavo River, the Chyulu Hills as catchment area for Mzima Springs and other springs to the east of the Chyulus, Tsavo East and Tsavo West National Parks and the area between these hills, national parks and the sea, including the immediate offshore area. Particular attention will be focused on the rivers and springs in this area, including the Mzima River in its full length, the Tsavo River from its upper reaches to the confluence with the Galana River, the Galana (Sabaki) river from its confluence with the Tsavo River to the sea, the immediate offshore area near the mouth of the Sabaki River that includes the coral reefs, the Voi and Rare rivers, Pemba river and the water distribution areas The study area, include the areas used by wild animals that relates to the river ecosystems and water supplies. The study area also includes a broad belt of influence along pipelines and construction areas, related roads, dams, reservoirs and impoundments, camps and activities. Other areas adjacent to or influenced by the project should be considered with respect to impacts of the project. Such direct or indirect environmental influences or impacts from the project may include, for example, transportation corridors (e.g. access to water works and facilities, treatment plants and facilities,

distribution facilities, pipelines and related works). The indirect effects, particularly the influx of population caused or facilitated by access roads and project-related facilities, and the activities of that population including settlement, agriculture, poaching, pollution, and fuel gathering, may be more significant than the direct effects of the project.

Scope of Work

22. The scope is primarily to analyze the environmental impacts of the project, in particular impacts on the ecology, wildlife and vegetation that depends on the watersheds tapped by the project. Attention must be paid to the rivers and riverine ecology in the whole area including impacts on beaches and coral reefs off-shore. It will include impacts on tourism, the local population in general terms, and the tourism economy, considering also the impact an inadequate water supply may have on that industry and the population if the project is not implemented. Attention will also be given to alternative solutions and water sources, and to the stability of the upper watersheds.

Limnology, hydrology and geomorphology with particular attention on the sustainable water production, water quality and water balance of the complete area should be investigated, and safe water off-take limits under different climatic seasons should be estimated with specified probability margins. Specialized field studies or modelling activities may have to be carried out and the consultants will be asked to define the specific tasks in more detail for contracting agency review and approval.

CONSULTANT TASKS:

Task 1. Description of the Proposed Project:

23. Provide a full description of the project and its general setting; and as applicable:

The proposed project: general location and layout; size of area involved in total and in the various components (e.g., catchment area, drainage area, pipeline area, reservoirs areas, ponds and dams, camps and settlements, project roads, project related facilities, water distribution areas, other construction activities involved, staff required and new communities and other facilities involved; operation and maintenance; planned public or private off-site investments as a result of the project; life span.

Task 2. Baseline Data - Description of the Environment:

24. Assemble, evaluate and present baseline data on the environmental characteristics of the study area, using, as appropriate, maps, aerial photography and satellite imagery. The hydrologic balance of the area should be estimated. Where there are inadequate existing data, a full year of observations (to define a full annual cycle) is required as a minimum, and a multi-year monitoring program established. The baseline data shall be described in a way so as to be useful for long term monitoring and comparison.

Physical environment:

- Geology and geomorphology, seismicity and stability of the area.

Task 7. Identification of Institutional Needs to Implement Environmental Assessment Recommendations:

36. Review the authority and capability of institutions concerned with project implementation an environmental impacts, primarily the National Water Conservation and Pipeline Corporation, but also the National Parks and Wildlife Service, at provincial/regional and national levels and recommend steps to strengthen or expand them so that the management and monitoring plans in the environmental assessment can be implemented. The recommendations may extend to new laws and regulations, new agency functions, inter-ministerial and inter-sectoral arrangements, management procedures and training, staffing, operation and maintenance training, budgeting and financial support.

37. Recommend the establishment and composition of an In-House Environmental Unit in the National Water Conservation and Pipeline Corporation with adequate budget and professional staffing strong in expertise relevant to the project. It should be well represented at the project site, and work in conjunction with existing government agencies. The Unit should be established as early as possible to help ensure that pre-project baseline data are collected and environmental problems anticipated at an early stage. The Unit shall be established through a formal agreement with the Bank, and the Unit should ensure that monitoring, evaluation, and that mitigating measures are implemented.

38. Suggest the establishment and composition of an Environmental Advisory Panel of independent, internationally recognized, environmental specialists. The panel should advise the borrower periodically on all environmental aspects of the project, including environmental plans, procedures, budgets, and progress throughout the life of the project; and advise the In-House Environmental Unit's staff on training, functions, and relations with the Ministry of Tourism and Natural Resource, the Kenya Wildlife Service, the National Park authorities, the Environmental Secretariat and other related governmental institutions. Panel reviews should be held twice a year during preparation and implementation.

Task 8. Development of a Monitoring Plan:

39. Review project monitoring plans and if needed, prepare a plan to gauge the impacts of the project and to monitor implementation of any mitigating measures that may be recommended. This is particularly important in terms of the impact of additional water off-take from the rivers and springs in the study area, particularly in respect to the long-term sustainability of river flow patterns and riverine ecology, maintenance of wildlife and fish populations, aquifer recharge and consequently the sustainability and long term viability of the project. Include in the plan an estimate of operating costs and a description of other inputs (such as training and institutional strengthening) needed to carry it out. The In-House Environmental unit and the Environmental Advisory Panel should be involved in the long term monitoring.

operation.
- impact on fisheries, fish migration.
- effects of drawdown regime - erosion, recreation, agriculture, fisheries, wildlife.
- impacts on ground water regime, evaporation from dam.
- induced seismicity, sedimentation, stability, preparation for natural events.
- upstream considerations, land use, erosion, sedimentation, pollution, constructions.
- downstream considerations, changed water flow regime and quality, fisheries, traditional flood plain cultivation, impacts on other water projects, impacts on estuaries and marine biota, salt intrusion from reduced river flows, ground water level changes, effects on wildlife.

28. Among other areas requiring particular attention, independent of any major dam or reservoir construction, are the following:

- The basis for claimed sustainability of the hydrological regime and waterflows in the watersheds of the major river systems affected by the project, and for the sustainability of the proposed additional off-take of water.
- The status of the upper watershed for the springs and rivers with particular attention to the Chyulu Hills and the upper Tsavo River catchment areas. Threats to sustainability and potential future changes and impacts that may be expected.
- The expected primary impacts of project construction, e.g. pipelines, roads, reservoirs and dams, treatment and distribution facilities, including traffic disturbance, noise, injured aesthetics, increased population movements, erosion and pollution.
- The effects on the flora, wildlife and ecology of the area affected by the construction, including new water intake facilities, (including noise effects from new sheet piling installation), new tunnels, tanks, treatment works, houses and camps. Time span and effects of physical and noise disturbance to animals. Hindrance of animal migration. Irreversible changes. Mitigating measures.
- The effects on tourism, including changes in numbers of visitors, negative international publicity, changes in income to the national park and lodges, permanent aesthetical injury, time frame of disturbance.
- The effect of additional water off-take on the downstream river water regime, with particular reference to the sustainability of the riverine ecology and the recharge of the aquifers along the Mzima, Tsavo, Galana and Sabaki rivers. Particular attention should be given to the environmental impacts of changes in the hydrological systems in the area affecting the Baricho water in-take and the well-field area.
- The effects on terrestrial wildlife movement patterns and drinking requirements along the river system at different water flow alternatives. The alternative of providing artificial wildlife watering points along the pipeline. Positive and negative impacts.
- The long-term effects on composition and survival of the aquatic species and habitats involved, particularly hippo, crocodile and fish in the river

systems. Any effects on migratory fish species caused by reduced waterflows, and the potential for increase in water weeds should be considered.

- The relationships between adequate water supplies to tourism developments and population on the coast and the income and protection of the coastal national parks.
- The long term impacts of changes in the location and pattern of human activities caused by the project, including increased erosion, pollution, poaching, economic activities.
- The impacts on human health in the water distribution and coastal area. Particular attention should be paid to water borne diseases.
- Impacts on water discharge regimes to the sea with potential effects on coral reefs, beaches, estuarine and marine life or near-shore habitats. (e.g. changes in sediment loads and pollution).
- The impacts on erosion and siltation in the Tsavo and Galana/Sabaki river systems if the land use practises in the upper Tsavo water catchment area continues without control.
- Identify specific studies which are required to fill in needed information, particularly in terms of the water balance of the study area, Mzima Springs and River sustainability and ecology, providing terms of reference for the studies.

Task 5. Analysis of Alternatives to the Proposed Project:

29. Describe alternatives that were examined in the course of developing the proposed project and identify other alternatives which might have achieved the same objectives. The concept of alternatives extends to other water sources, siting, project design, selection of technologies and operating and maintenance procedures. Alternatives should be compared in terms of potential environmental impacts; estimated capital and operating costs; suitability under local conditions; and likely institutional, training and monitoring requirements. When describing the impacts of the alternative solutions, indicate which are irreversible or unavoidable and which can be mitigated. To the extent possible, quantify the costs and benefits of each alternative. Include the alternative of not carrying out the project, in order to demonstrate environmental and socio-economic conditions without it.

30. In this case, as appropriate, questions deserving special attention may include:

- The alternative recommended as first priority in the Japanese consultant study of alternatives of September 1981, which proposes a raw water tunnel taking floodwater from the Sabaki River and leading this to a large storage reservoir on the Rare river for later treatment and release to the Mombasa/Malindi water system. The reservoir would collect considerable amounts of flood silt from the Sabaki River and would have a large capacity. This project has the significant environmental benefit of reducing the flood silt discharge into the sea which is presently threatening the coral reefs and white sand beaches near Malindi, with potential significant negative effects on tourism to the area.
- The alternative of complementing a limited additional water off-take from

Mzima Springs with the addition of water from other springs in the region, for example the Taveta springs, which could be connected to the Mzima pipeline at Voi within a few years.

- The alternative of developing a production well field based on the likely existence of a subterranean waterflow in the old Sabaki plaeo channel near Baricho. (This alternative is being looked into as part of the regular project study).
- The alternative of desalinization of sea water.

Task 6. Evaluation and Recommendations: Development of Management Plan: Mitigation measures.

31. On the basis of the analysis and evaluation of the potential impacts and alternatives, recommend feasible and cost-effective measures to accomplish the objectives of the project while preventing or reducing significant negative environmental impacts to acceptable levels, if possible. Particular care should be taken to ensure that the rivers, springs, dams, ecology, appearance and wildlife will be kept as unchanged as possible both during the construction period and after the project is implemented.

32. Mitigating measures proposed should seek to reduce the negative environmental impacts of the project both during the construction period and long-term. This would include suggestions for minimizing construction and operation disturbance and damage to wildlife, tourists, aesthetics, noise etc. Operating criteria for all involved companies, firms and contractors should be made to this effect, including criteria for camp locations, the use of machinery and people movements in the national parks.

33. The need for additional or temporary artificially constructed water outlets and dams linked to the new pipeline to cater for local people, livestock and wildlife populations during the construction period should be carefully considered. (Attention must be given to potential environmental problems since artificial water points often result in vegetation damage and soil erosion or become destructive to normal animal behaviour and migratory patterns). Well managed water points can however be a useful temporary tool for the management of people and wildlife movements.

34. Investigate the possibility of incorporating the Chyulu Hills in the Tsavo West National Park, thereby securing the long term protection of the water catchment area and the river systems originating in the area, particularly the many springs and streams feeding the Tsavo and Galana river system, and ultimately Mombasa.

35. Estimate the impacts and costs of all proposed measures, and of the institutional and training requirements to implement them. Consider compensation to affected parties, particularly to the National Park and Wildlife Conservation authorities, for impacts which cannot be mitigated. Prepare a management plan including proposed work programs, budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measures.

Task 9. Assist in Inter-Agency Coordination and Public/NGO Participation:

40. In addition to the evaluation of concerned agencies described in "task 7" and as necessary, the environmental assessment should ascertain the views of all concerned government agencies; ensure participation in the assessment of NGO's and to the degree relevant ascertain the views of any affected groups. At the start of the assessment, the study team should organize an inter-agency meeting to explain the proposed assessment, determine its scope and reach agreement on the role of each agency and procedures to follow. In addition, appropriate meetings should be held to inform local government agencies, tourist hotel managers, NGO's and representatives of the local communities where applicable to ensure their participation, as needed. The traditional system of consultation should be used. Records should be kept of meetings and other communications activities.

Report

41. Prepare the environmental assessment report, organized according to the outline presented in Operational Directive 4.00 Annex A1. The main text of the report should present the findings, analysis, conclusions and recommendations of the environmental assessment. Supporting data should be presented in the appendices. Other agency requirements may be included as long as the following specifications are met:
   - Executive Summary including Analysis and Recommendations.
   - Policy, Legal and Administrative Framework.
   - Project Description and General Setting.
   - Baseline Data.
   - Significant Environmental Impacts.
   - Analysis of Alternatives.
   - Recommendations and Management Plan.
   - Environmental Management and Training.
   - Monitoring Plan.
   - Appendices:
     - List of EA preparers.
     - References - additional supporting data and materials used in study preparation.
     - Record of inter-agency, NGO and other consultations.

Consulting Team

42. (a) **Composition**: * (see footnote)

Hydrologist (team leader)	2 months
Ecologist	2 months
Resource Economist	2 months
Institution Specialist	≥ 1 months
Wildlife Specialist	1

* These consultancies may be covered by the project engineering consultant team with the only addition of the ecologist.

Limnologist

43. (b) **Qualifications:**

(i) **General** - All consultants must hold recognized professional qualifications in their respective fields. The team leader should have at least 10 years relevant work experience and the other team members at least five years.

(ii) **Team Leader (Hydrologist)** African working experience is essential, experience in Kenya would be an advantage. Must be experienced in various aspects of hydrology and field hydrological studies, the hydrological relationship to ecology and vegetation, environmental issues, geomorphology, water utilization and waterworks.

(iii) **Ecologist** - Africa experience mandatory. Must have broad experience in management of natural habitats, riverine ecology, rangeland ecology, development and human impacts on wildlife and vegetation. Must be qualified to deal with both flora and fauna aspects of the ecology, including river ecology and biodiversity.

(iv) **Wildlife Specialist** East African experience mandatory. Must have broad experience in wildlife ecology and management, including range and habitat management, relocation of animals, and development impacts on animal behaviour.

(v) **Resource Economist** - African experience mandatory. Kenyan experience desirable. Should be resource economist experienced in assessing environmental impacts, impacts related to tourism and natural resources, and in assigning economic values and costs where feasible. Should be familiar with establishing costs and benefits of proposed project activities and of measures that may be recommended to protect the environment.

(vi) **Institution Specialist** - experience in Africa mandatory. Work experience in Kenya would be desirable. Must have experience in analyzing and determining the impact of Government policies and institutional design on the relevant sector. Should have experience in dealing with issues arising from natural resources- and environmental policies, legislation and Governmental organizational structure.

(vii) **Limnologist** - experience in tropical limnology. Experience with all aspects of water analysis. Experience with estimation of water habitat changes due to eutrophification, changed oxygen levels, changed chemical composition, silt contents and contamination aspects.

44.(c) **Specific tasks:**

(i) **Teamleader/Hydrologist** - would be responsible for collating the study coordinating the work of other team members and for all aspects of the assessment not assigned to the other team-members, in particular the hydrology of the springs and river systems, including the overall hydrological water balance of the whole study area.

(ii) **The Ecologist** - would be responsible for the overall assessment of the project's impact on the ecology of the study area and for describing all aspects of the environment in the area and environmental changes to be expected; and assess and describe measures needed to protect the environment and safeguard biodiversity and riverine habitats.

(iii) **The Wildlife specialist** - will assess the projects impact on the wildlife population and suggest mitigating measures including habitat management and the feasibility of any temporary management measures for the wildlife population during the construction period.

(iv) **The Resource economist** will deal with all economical aspects relevant for the assessment, in particular assessing project impacts and any proposed environmental remedial measures in terms of environmental costs and benefits. The project's impact on tourism should be included.

(v) **The Institution specialist** will review relevant policy, legislative and policy issues and assess whether these provide adequate environmental protection or identify measures for those purposes and the necessary changes, if required. Institutions affected or involved will be reviewed as to their capacity of supporting the environmental assessments recommendations.

(vi) **The Limnologist** will establish the present water quality baseline data and prepare a long term water quality monitoring program for the springs and rivers in the study area, and assess anticipated changes due to the project, and propose mitigating actions.

45. **Data Sources**

An initial list of reports to consult would be:

Feasibility study on water supply augmentation project of Mombasa - Coastal area-hinterland. Final Report. Ministry of Water Development. 1981.

Mombasa & Coastal water supply project with preference to the immediate implementation of the second Mzima pipeline project. National Water Conservation and Pipeline Corporation. 1991.

World Bank project documents on the Mombasa and Coastal region water supply.

National Water Master Plan. MOWD. 1990.

Environmental profiles and other data in the files of the National Environmental secretariat, Nairobi, kenya.

Relevant reports in the Ministry of Water and in the National Water Conservation and Pipeline Corporation, Nairobi, Kenya.

Reports in the library of the Kenya Wildlife Service. Nairobi.

Materials in libraries of United Nations Environment Programme (UNEP), The International Union for the Conservation of Nature (IUCN), World Wide Fund for Nature (WWF), African Wildlife Foundation (AWF), and Wildlife Conservation International, all in Nairobi.

Reports in the Ministry of Natural Resources and the Environment, and in the Ministry of Tourism, Nairobi.

B.

TERMS OF REFERENCE FOR AN ENVIRONMENTAL IMPACT ASSESSEMENT OF THE PROPOSED SECOND MOMBASA AND COASTAL WATER SUPPLY PROJECT

(with the Mzima Springs alternative)

Introduction

1. The purpose of this terms of reference is to guide and structure the preparation of an environmental impact assessment of the Second Mombasa Water Supply Project with special reference to the alternative of tapping additional water from the Mzima Springs in the Tsavo West National Park, Kenya.

2. The development project to be assessed is at the time of writing this terms of reference not yet specified as to the final technical alternative to be developed. However, the situation leading up to the present project considerations and pre-planning are as follows: The area of the Kenyan coast under review for augmented water supply through the project includes primarily greater Mombasa (island and mainland), the north coast up to Malindi, the major development centres on the immediate South coast, and the hinterland along this coastal strip including development areas along the present Mzima pipeline. This area covers approximately 1000 square kilometres and has presently (1991) an estimated population of nearly 1.7 million inhabitants.

3. The estimated average daily demand for fresh water in this area is around 200,000 cubic meters. The demand from the Mombasa urban centre and surroundings, which is the focus of the present project proposal, counts for nearly 125,000 cubic meters of the above amount. However, the present total average public supply is less than 85,000 cubic meters of water, leaving a deficit that means strict water rationing with consequent restrictions on development and human use. Projections for future water demand in the Mombasa and surrounding area is estimated to almost 200,000 cubic meters daily by the year 2000.

4. The present public supply is provided from four sources;

Mzima Springs in Tsavo National Park	approx	35,000 cu.m
Marere Springs/Pemba River	"	9,000 cu.m
South Coast (Tiwi) boreholes	"	4,000 cu.m
Baricho treatment works on Sabaki River	"	35,000 cu.m

5. The Baricho treatment works operate at 2/3 capacity while the rest work at full capacity. The Baricho treatment works has a very high operating cost while the Mzima Springs Pipeline has very low operating costs. Mzima Springs provides gravity fed clean spring water while Baricho cleans and treat extremely silt-polluted water from the river and pumps it to the consumers.

A solution to the unsatisfactory water situation and provision of adequate fresh water supplies to satisfy the demand in Mombasa and surroundings is considered top political and development priority at the moment.

6. Responsibility for the executing arrangements for the environmental assessment rests with Kenya Government as potential borrower of project funds from the World Bank. The National Water Conservation and Pipeline Corporation (NWCPC) represents the Kenyan Government on technical project matters and will be the contracting partner for the consultant undertaking the impact assessment. The World Bank's guidelines for environmental impact assessments will apply.

Background Information

7. The major components of the proposed project have not yet been agreed upon. The requirements of the assessment may therefore be changed to some degree. This terms of reference describes the alternative of a two-phased coastal water supply project that includes the Mzima II Pipeline in the second project phase as detailed below, assuming additional construction works at the Mzima Springs, but not the construction of any major open water dam or reservoir on the Tsavo or Galana rivers, and no resettlement of people. However, the tasks outlined by the terms of reference include reference to the need for additional studies in the cases that additional works may be likely.

The first phase of the project was initially classified a C-category according to the World Bank's Operational Directive 4.00, while the second phase is a category A, needing full assessment. However, phase 1, part II: Rehabilitation and augmentation works; (see below) is a category B component to be given limited assessment.

8. **FIRST PHASE PROJECT COMPONENTS:**

I **Institutional support/capacity building:**

A. Consultancy and advisory services:

Valuation of fixed assets and assessment of assoc.liabilities.

Improvement of revenue collection.

Improvements of financial system.

Management information system.

Preparation of corporate development plan.

B. Equipment and vehicles:

Computer hardware, vehicles and various equipment.

C. Staff development training.

II. **Rehabilitation and augmentation works:** (needs full assessment)

A. Construction of production wells and wellfield development, including access roads, power supply, pumping equipment and pipeworks.

B. Transmission Main from wellfield to clear water well near existing treatment plant, including river crossing.

C. Improvement/remedial works at the Sabaki Intake Works.
D. Improvement/remedial works at the existing treatment plant.
E. Transmission main Sabaki/Mombasa including booster pumping stations.
F. Rehabilitation/extension of branch lines.
G. Remedial works and expansion of terminal reservoirs, with one additional reservoir.
H. Telecommunications system improvements.
I. Distribution system improvements (Mombasa).
J. Staff housing.
K. Mzima Springs pipeline repair and rehabilitation works.
L. Supply of consumer meters.

III. **Studies and engineering.**

A. **Step 1**

Review and update of existing feasibility studies with special regard to the proposed Mzima Springs Project, including review of population and demand projections, environmental impact studies and preliminary engineering for the selected alternative.

B. **Step 2**

Preparation of studies, detailed engineering designs, bid documents and evaluation of bids for all components of the Second Mombasa and Coastal Water Supply Project main investment project (excluding project supervision), that is for:

the selected alternative for source work development (Mzima Springs?).

water treatment.

transmission mains with all ancillary structures (access roads)

terminal reservoirs

distribution systems in Mombasa and other coastal centres.

ancillary structures (telecom., offices, housing, equipment)

review of existing sewerage, drainage and sanitation systems.

- feasibility studies for long-term water supply source expansion.

C. **Rehabilitation and augmentation works.**

Hydrogeological/geophysical studies for groundwater development near Baricho.

Consultancy services for engineering designs, bid documents and evaluation.

Sabaki Intake Model study.

Total project cost for all the above components is estimated to be US$ 40.00 million.

If the II Mzima Springs Pipeline alternative is selected, the actual

implementation of that component will probably include the construction of the following components (to the cost of an estimated US$ 200.00 million):

9. **POTENTIAL SECOND PHASE PROJECT COMPONENTS:**
(needing full assessment)

A. SOURCE WORKS.
Additional works at the Mzima Springs to accommodate increased water abstraction from the springs to an indicated capacity of 1.2 cu.m/sec. (present abstraction is 0.4 cu.m/sec.). Provision may also be made for construction of offices, chlorine store and dosing building, and project personnel housing.

B. PIPES.
The laying of large diameter pipes from Mzima to Mazeras reservoir. This is a distance of 219 kms. and the pipes must be able to supply 0.8 cu.m/sec. in a gravity system. Line valves, wash-outs, air valves, access chambers, anchor blocks, thrust blocks, fittings and all other relevant pipeline appurtenances and apparata.

C. BREAK PRESSURE TANKS.
Construction of new tanks and the rehabilitation of old tanks are expected.

D. STORAGE RESERVOIRS.
New storage reservoirs and rehabilitation of old ones along the original pipeline alignment and in the vicinity of Mombasa may be done.

E. PIPELINE SERVICE ROAD.
The new pipeline is expected to follow an alignment close to the existing pipeline. It will be necessary to rehabilitate the existing pipeline road to gravel standard.

F. INSTRUMENTATION.
Water level indicators, flow meters, and a pressure measurement system will be installed as required.

G. EXTENSION PIPELINES.
Pipeline extensions will be included to connect:
- Mazeras to Changamwe
- Mazeras to Kaya Bombo
- Mazeras to Nguu Tatu
- New pipeline to Mariakani
- Interconnections between the new and old pipeline.

10. The need for this project and the objectives it is intended to meet appear obvious to anybody familiar with the precarious water situation in the project area. The urgent need for adequate and clean freshwater supplies to the population and for coastal development should be met without unnecessary delays, but the urgency must not lead to hasty and wrong decisions causing or leading to long-term negative or damaging external impacts affecting the sustainability of the natural resource base of the region.

11. The implementing agency is the National Conservation and Pipeline Corporation (NWCPC). The Corporation and its institutional systems and operations are also in need of rehabilitation and strengthening. This is planned as an integral part of the first phase of the project.

12. The project was originally put forward as one of a number of alternatives for consideration elaborated by consultants in the early 1970's. The consultants were at that time investigating additional sources for the augmentation of the "Mombasa Pipeline Board Supplies", seeking alternatives to provide sufficient additional water to meet expanding demands in Mombasa up to 1990. The client later decided to increase the scope of the study to incorporate not only supplies to Mombasa but to the coastal region north of Mombasa as far as Malindi. Three alternative schemes were identified, two of which were based upon development of the Sabaki River while the third was based on further development of the Mzima Springs. (The existing Mzima pipeline dates back to the early 1950's.) One of the Sabaki River alternatives was preferred and implemented, but the project has never reached the capacity originally foreseen for several reasons.

13. A Japanese funded study of 20 identified alternatives for water supply to the coastal region was finalized in 1981. This study concluded in the end that water from the Sabaki River led into a storage reservoir at the Rare River and from there to Mombasa after treatment was the best alternative, with Mzima II and a regulating dam on the lower Tsavo river as the second best alternative.

14. Due to various delays leading to the present critical water supply situation on the coast which gives serious urgency to a solution, the above described Mzima II project together with various rehabilitation works are now being considered as the easiest to realize with the lowest possible operational costs. However, recent discoveries of potentially rich waterbearing layers in the subterranean old plaeo channel of the Sabaki River now gives rise to optimism as to the potential for significant borehole production in the close proximity to Baricho.

15. Current status and timetable of the proposed project. Appraisal of the first rehabilitation and institution building phase together with the engineering credit facility is expected to take place in June/July 1991. The successful negotiation of this component could release funding of the US$ 40.00 million package by early 1992. The Mzima pipeline investment and construction project phase could have a partly overlapping parallel development leading to its possible conclusion by 1995 - 96.

16. There are none associated projects planned or in progress within the region which may compete for the same resources, although private development of local waterworks along the coast is a common result of the present situation. Particularly the large tourist hotels and certain industrial complexes are desperate to get adequate water supplies and are seeking alternative solutions. It is not expected that this will significantly affect the proposed project.

Objectives of the Environmental Impact Assessment.

17. The main focus of the environmental assessment will be on the water producing capacity of the Mzima Springs, and the effects on the downstream vegetation, wildlife and ecology of a reduced waterflow in the river systems

as a result of the project. It will also focus on the disturbance created by project activities on wildlife in the Tsavo National Park and the impacts on tourism and the local population to the extent that may be significant.

18. Most of the activities covered by the first project phase consisting of rehabilitation works and institutional strengthening is likely to have limited or insignificant negative environmental impacts. This has been anticipated by its classification as a C category project. However, since this project phase is likely to lead directly into, or follow parallel to the preparation and design of the main project (second phase), the environmental impact assessment should take place as soon as possible.

Environmental Assessment Requirements

19. The regulations and guidelines which will govern the conduct of the assessment include:
- World Bank Operational Directive 4.00, Annex A: Environmental Assessment, and Annex B: Environmental Policy for Dam and Reservoir Projects, and pertinent Operational Directives, Operational Policy Notes, and Guidelines cited in Annex A2 thereto;
- National laws and/or regulations on environmental reviews and impact assessments.
- Regional, provincial or communal environmental assessment regulations.
- Environmental assessment regulations of any other financing organizations involved in the project.

Study Area

20. The boundaries of the influence area to be studied by the assessment incorporates in broad terms the Chyulu Hills, Tsavo East and Tsavo West National Parks and the area between these parks and the sea, including the immediate off shore area. However, in a stricter sense it includes the Chyulu Hills which are believed to be the main catchment area for the Mzima Springs, the wider area around the Mzima Springs in the Tsavo National Park, the areas along the Mzima River in its full length, the Tsavo River from the confluence with the Mzima River and down to the Galana River, the Galana (Sabaki) river from its confluence with the Tsavo River to the sea, the immediate offshore area near the mouth of the Sabaki River that includes the coral reefs, and the water distribution areas (to a lesser degree). The study area along these rivers, springs and seashore, include the areas used by wild animals that relates to the river ecosystem and water supplies. The study area also includes a broad belt of influence along the pipeline and related roads, reservoirs, camps and activities.

Scope of Work

21. The scope is primarily to analyze the environmental impacts of the project, in particular impacts on the ecology, wildlife and vegetation that depends on the Mzima Springs and Mzima river, but also on the rivers and riverine ecology further downstream and coral reefs off-shore. It will include impacts on tourism, the local population in general terms, and the tourism economy, considering also the impact an inadequate water supply may have on that

industry and the population if the project is not implemented. Attention will also be given to alternative solutions and sources, and to the stability of the upper watershed.

22. Limnology, hydrology and geomorphology with particular attention on the sustainable water production and water quality of the Springs should be investigated, and safe water off-take limits under different climatic seasons should be estimated with specified probability margins. Specialized field studies or modelling activities for the Mzima Springs may have to be carried out to secure their survival and the consultants will be asked to define the specific tasks in more detail for contracting agency review and approval.

CONSULTANT TASKS:

Task 1. Description of the Proposed Project:

23. Provide a full description of the project and its general setting; and as applicable:

The proposed project: general location and layout; size of area involved in total and in the various components (e.g., catchment area, drainage area, pipeline area, reservoirs areas, ponds and dams, camps and settlements, project roads, project related facilities, water distribution areas, other construction activities involved, staff required and new communities and other facilities involved; operation and maintenance; planned public or private off-site investments as a result of the project; life span.

Task 2. Baseline Data - Description of the Environment:

24. Assemble, evaluate and present baseline data on the environmental characteristics of the study area, using, as appropriate, maps, aerial photography and satellite imagery. The hydrologic balance of the area should be estimated. Where there are inadequate existing data, a full year of observations (to define a full annual cycle) is required as a minimum, and a multi-year monitoring program established. The baseline data shall be described in a way that they will be useful for long term monitoring and comparison.

Physical Environment:

- Geology and geomorphology, seismicity and stability with particular reference to the Chyulu Hills catchment areas and the Mzima Spring system.
- Topography
- Soils
- Climate and meteorology, trends.
- Surface and groundwater hydrology, trends.

Biological Environment:

- Vegetation and flora with special reference to the riverine ecology.
- Wildlife, terrestrial and riverine fauna.
- Rare or endangered species
- Critical habitats, significant natural sites, etc.
- Estuaries, beaches and coral reefs.

Socio-cultural Environment:

- Population (on the lower stretch of the Sabaki River, along the pipeline, in the water distribution area, and in other areas affected by the project).
- Land use in areas affected by or affecting the project areas.
- Major planned development activities (other than the proposed project).
- Public health, particularly related to the fresh water supplies.
- Community structure, employment and recreation.
- Cultural properties.

Task 3. Legislative and Regulatory Considerations:

25. Describe the pertinent regulations and standards governing environmental quality in Kenya, health and safety, protection of sensitive areas, national parks regulations, protection of endangered species, siting, land use control, etc., at local, regional, national, and if applicable, international levels.

Task 4. Determination of the Potential Impacts of the Proposed Project:

26. Distinguish between significant positive and negative impacts, direct and indirect impacts, and immediate and long term impacts. Identify impacts which are unavoidable or irreversible. Consider cumulative impacts in cases where there are other planned or existing projects with which this project may interact. Wherever possible, describe impacts quantitatively, in terms of environmental costs and benefits. Assign economic values when feasible. Characterize the extent and quality of available data, explaining significant information deficiencies and any uncertainties associated with predictions of impact. Among the areas requiring particular attention are the following:

27. The basis for claimed sustainability of the hydrological regime and waterflow to the Mzima Springs, and for sustainability of the proposed additional off-take of water without significant negative impacts on the Mzima Springs itself.

    The status of the upper watershed for the springs and rivers with particular attention to the Chyulu Hills and the upper Tsavo River catchment areas. Threats and sustainability, potential future changes and impacts.

    The expected primary impacts of project construction, e.g. pipelines, roads, reservoirs and dams, treatment and distribution facilities, including traffic disturbance, noise, injured aesthetics, increased population movements, erosion and pollution.

    The effects on the flora, wildlife and ecology of the Mzima Springs area from the construction of new water intake facilities, (including noise effects from new sheet piling installation), new tunnels, tanks, houses and camps. Time span and effects of physical and noise disturbance to animals. Irreversible changes. Mitigating measures.

    The effects on tourism, including changes in numbers of visitors, negative international publicity, changes in income to the national park and lodges, permanent aesthetical injury, time frame of disturbance.

    The effect of additional water off-take from the springs on the downstream river water regime, with particular reference to the sustainability of the riverine ecology and the recharge of the aquifers along the Mzima, Tsavo, Galana and Sabaki rivers. Particular attention should be given to the environmental

impacts of changes in the hydrological systems in the area affecting the Baricho water in-take and the well-field area.

The effects on terrestrial wildlife movement patterns and drinking requirements along the river system at different water flow alternatives. The alternative of providing artificial wildlife watering points along the pipeline. Positive and negative impacts.

The long-term effects on populations and composition of the aquatic species and habitats involved, particularly hippos, crocodiles and fish in the Mzima Springs and river, but also downstream. Any effects on migratory fish species caused by reduced waterflows, and the potential for increase in water weeds should be considered.

The relationships between adequate water supplies to tourism developments and population on the coast and the income and protection of the Tsavo national parks.

The long term impacts of changes in the location and pattern of human activities caused by the project, including increased erosion, pollution, poaching, economic activities.

The impacts on human health in the water distribution and coastal area. Particular attention should be paid to water borne diseases.

Impacts on water discharge regimes to the sea with potential effects on coral reefs, beaches, estuarine and marine life or near-shore habitats. (e.g. changes in sediment loads and pollution).

The impacts on erosion and siltation in the Tsavo and Galana/Sabaki river systems if the land use practises in the upper Tsavo water catchment area continues without control.

Identify specific studies which are required to fill in needed information, particularly in terms of the water balance of the study area, Mzima Springs and River sustainability and ecology, providing terms of reference for the studies.

Task 5. Analysis of Alternatives to the Proposed Project:

28. Describe alternatives that were examined in the course of developing the proposed project and identify other alternatives which might have achieved the same objectives. The concept of alternatives extends to other water sources, siting, project design, selection of technologies and operating and maintenance procedures. Alternatives should be compared in terms of potential environmental impacts; estimated capital and operating costs; suitability under local conditions; and likely institutional, training and monitoring requirements. When describing the impacts of the alternative solutions, indicate which are irreversible or unavoidable and which can be mitigated. To the extent possible, quantify the costs and benefits of each alternative. Include the alternative of not carrying out the project, in order to demonstrate environmental and socio-economic conditions without it.

29. In this case, as appropriate, questions deserving special attention may include:

- The alternative of just collecting the return flow of approximately 0.7 - 0.8 cu.m./sec. which is presently returned from the sump tunnel to the lower Mzima pond. This would require only a slightly larger additional pipeline from the existing Spring outlet, and could save the whole environmentally disturbing and potentially damaging installation of a completely new intake structure and facilities above and adjacent to the Mzima Springs.
- The alternative of adding water from other spring sources to the Mzima pipeline system, that could complement a limited additional water off-take from Mzima Springs within a few years. One interesting option in this respect could be to connect a side-pipeline from the Taveta springs to the pipeline near Voi.
- The alternative of complementing a limited additional off-take from Mzima with the development of a production well-field based on the likely existence of a subterranean waterflow in the old Sabaki plaeo channel near Baricho. (This alternative is being looked into as part of the regular project study, but without adequate consideration for the second Mzima pipeline).
- The alternative recommended as first priority in the Japanese consultant study of alternatives of September 1981, which proposes a raw water tunnel taking floodwater from the Sabaki River and leading this to a large storage reservoir on the Rare river for later treatment and release to the Mombasa/Malindi water system. The reservoir would collect considerable amounts of flood silt from the Sabaki River and would have a large capacity. This project has the significant environmental benefit of reducing the flood silt discharge into the sea which is presently threatening the coral reefs and white sand beaches near Malindi, with potential significant negative effects on tourism to the area.

Task 6. Evaluation and Recommendations: Development of Management Plan:Mitigation measures.

30. On the basis of the analysis and evaluation of the potential impacts and alternatives, recommend feasible and cost-effective measures to accomplish the objectives of the project while preventing or reducing significant negative environmental impacts to acceptable levels,if possible. Particular care should be taken to ensure that the Mzima Springs, dams, ecology, appearance and wildlife will be kept as unchanged as possible both during the construction period and after the project is implemented.

31. Mitigating measures proposed should seek to reduce the negative environmental impacts of the project both during the construction period and long-term. This would include suggestions for minimizing construction and operation disturbance and damage to wildlife, tourists, aesthetics, noise etc. Operating criteria for all involved companies, firms and contractors should be made to this effect, including criteria for camp locations, the use of machinery and people movements in the national parks.

32. The need for additional or temporary artificially constructed dams linked to the new pipeline to cater for the wildlife populations during the construction period should be carefully considered although this alternative has several weaknesses (Areas around artificial water points easily become over-used

and destructive to normal feeding and migratory patterns). Well managed waterpoints can however be a useful temporary tool for the management of wildlife movements.

33. Investigate the possibility of incorporating the Chyulu Hills in the Tsavo West National Park, thereby securing the long term protection of the water catchment area, not just for the Mzima Springs but also for the many other springs and streams feeding the Tsavo and Galana river system, and ultimately Mombasa.

34. Estimate the impacts and costs of all proposed measures, and of the institutional and training requirements to implement them. Consider compensation to affected parties, particularly to the National Park and Wildlife Conservation authorities, for impacts which cannot be mitigated. Prepare a management plan including proposed work programs, budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measures.

Task 7. Identification of Institutional Needs to Implement Environmental Assessment Recommendations:

35. Review the authority and capability of institutions concerned with project implementation and environmental impacts, primarily the National Water Conservation and Pipeline Corporation, but also the National Parks and Wildlife Service at provincial/regional and national levels and recommend steps to strengthen or expand them so that the management and monitoring plans in the environmental assessment can be implemented. The recommendations may extend to new laws and regulations, new agency functions, inter-ministerial and inter-sectoral arrangements, management procedures and training, staffing, operation and maintenance training, budgeting and financial support.

36. Recommend the establishment and composition of an In-House Environmental Unit in the National Water Conservation and Pipeline Corporation with adequate budget and professional staffing strong in expertise relevant to the project. It should be well represented at the project site, and work in conjunction with relevant government agencies. The Unit should be established as early as possible to help ensure that pre-project baseline data are collected and environmental problems anticipated at an early stage. The Unit shall be established through a formal agreement with the Bank, and the Unit should ensure that monitoring, evaluation, and that mitigating measures are implemented.

37. Suggest the establishment and composition of an Advisory Panel of independent, internationally recognized, environmental specialists. The panel should advise the borrower periodically on all environmental aspects of the project, including environmental plans, procedures, budgets, and progress throughout the life of the project; and advise the In-House Environmental Unit's staff on training, functions, and relations with the Ministry of Tourism and Natural Resource, the Kenya Wildlife Service, the National Park authorities, the Environmental Secretariat and other related governmental institutions. Panel reviews should be held twice a year during

preparation and implementation.

Task 8. Development of a Monitoring Plan:

38. Review project monitoring plans and if needed, prepare a plan to gauge the environmental impacts of the project and to monitor implementation of any mitigating measures that may be recommended. This is particularly important in terms of the impact of additional water off-take from the Mzima Springs on the springs, river flow patterns and riverine ecology, and consequently the sustainability and long term viability of the project. Include in the plan an estimate of operating costs and a description of other inputs (such as training and institutional strengthening) needed to carry it out. The In-House Environmental unit and the Environmental Advisory Panel should be involved in the long term monitoring.

Task 9. Assist in Inter-Agency Coordination and Public/NGO Participation:

39. In addition to the evaluation of concerned agencies described in "task 7" and as necessary, the environmental assessment should ascertain the views of all concerned government agencies; ensure participation in the assessment of NGO's and to the degree relevant ascertain the views of any affected groups. At the start of the assessment, the study team should organize an inter-agency meeting to explain the proposed assessment, determine its scope and reach agreement on the role of each agency and procedures to follow. In addition, appropriate meetings should be held to inform local government agencies, tourist hotel managers, NGO's and representatives of the local communities where applicable, to ensure their participation as needed. The traditional system of consultation should be used. Records should be kept of meetings and other communications activities.

Report

40. Prepare the environmental assessment report, organized according to the outline presented in Operational Directive 4.00 Annex A1. The main text of the report should present the findings, analysis, conclusions and recommendations of the environmental assessment. Supporting data should be presented in the appendices. Other agency requirements may be included as long as the following specifications are met:
    - Executive Summary including Analysis and Recommendations.
    - Policy, Legal and Administrative Framework.
    - Project Description and General Setting.
    - Baseline Data.
    - Significant Environmental Impacts.
    - Analysis of Alternatives.
    - Recommendations and Management Plan.
    - Environmental Management and Training.
    - Monitoring Plan.
    - Appendices:
        - List of EA preparers.
        - References - additional supporting data and materials used in study preparation.

- Record of inter-agency, NGO and other consultations.

Consulting Team

41. (a) **Composition:** * (see footnote)

Hydrologist (team leader)	2 months
Ecologist	2 months
Resource Economist	2 months
Institution Specialist	1 months

42.(b) **Qualifications:**

(i) **General** - All consultants must hold recognized professional qualifications in their respective fields. The team leader should have at least 10 years relevant work experience and the other team members at least five years.

(ii) **Team Leader (Hydrologist)** - African working experience is essential, experience in Kenya would be an advantage. Must be experienced in various aspects of hydrology and field hydrological studies, the hydrological relationship to ecology and vegetation, environmental issues, geomorphology, water utilization and waterworks.

(iii) **Ecologist** - Africa experience mandatory. Must have broad experience in management of natural habitats, riverine ecology, rangeland ecology, development and human impacts on wildlife and vegetation. Must be qualified to deal with both flora and fauna aspects of the ecology, including river ecology and biodiversity.

(iv) **Wildlife Specialist** - East African experience mandatory. Must have broad experience in wildlife ecology and management including range and habitat management, relocation of animals, and development impacts on animal behaviour.

(v) **Resource Economist** - African experience mandatory. Kenyan experience desirable. Should be resource economist experienced in assessing environmental impacts, impacts related to tourism and natural resources, and in assigning economic values and costs where feasible. Should be familiar with establishing costs and benefits of proposed project activities or of measures that may be recommended to protect the environment.

(vi) **Institution Specialist** - experience in Africa mandatory. Work experience in Kenya would be desirable. Must have experience in analyzing and determining the impact of Government policies and institutional design on the relevant sector. Should have experience in dealing with issues arising from natural resources and environmental policies, legislation and Governmental organizational structure.

(vii) **Limnologist** - experience in tropical limnology. Experience with all aspects of water analysis. Experience with estimation of water habitat changes due to eutrophification, changed oxygen levels, changed chemical composition, silt contents and contamination aspects.

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* These consultancies may be covered by the project engineering consultant team with the only addition of the ecologist.

preparation and implementation.

Task 8. Development of a Monitoring Plan:

38. Review project monitoring plans and if needed, prepare a plan to gauge the environmental impacts of the project and to monitor implementation of any mitigating measures that may be recommended. This is particularly important in terms of the impact of additional water off-take from the Mzima Springs on the springs, river flow patterns and riverine ecology, and consequently the sustainability and long term viability of the project. Include in the plan an estimate of operating costs and a description of other inputs (such as training and institutional strengthening) needed to carry it out. The In-House Environmental unit and the Environmental Advisory Panel should be involved in the long term monitoring.

Task 9. Assist in Inter-Agency Coordination and Public/NGO Participation:

39. In addition to the evaluation of concerned agencies described in "task 7" and as necessary, the environmental assessment should ascertain the views of all concerned government agencies; ensure participation in the assessment of NGO's and to the degree relevant ascertain the views of any affected groups. At the start of the assessment, the study team should organize an inter-agency meeting to explain the proposed assessment, determine its scope and reach agreement on the role of each agency and procedures to follow. In addition, appropriate meetings should be held to inform local government agencies, tourist hotel managers, NGO's and representatives of the local communities where applicable, to ensure their participation as needed. The traditional system of consultation should be used. Records should be kept of meetings and other communications activities.

Report

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    - Executive Summary including Analysis and Recommendations.
    - Policy, Legal and Administrative Framework.
    - Project Description and General Setting.
    - Baseline Data.
    - Significant Environmental Impacts.
    - Analysis of Alternatives.
    - Recommendations and Management Plan.
    - Environmental Management and Training.
    - Monitoring Plan.
    - Appendices:
        - List of EA preparers.
        - References - additional supporting data and materials used in study preparation.

- Record of inter-agency, NGO and other consultations.

Consulting Team

41. (a) **Composition:** * (see footnote)

Hydrologist (team leader)	2 months
Ecologist	2 months
Resource Economist	2 months
Institution Specialist	1 months

42.(b) **Qualifications:**

(i) **General** - All consultants must hold recognized professional qualifications in their respective fields. The team leader should have at least 10 years relevant work experience and the other team members at least five years.

(ii) **Team Leader (Hydrologist)** - African working experience is essential, experience in Kenya would be an advantage. Must be experienced in various aspects of hydrology and field hydrological studies, the hydrological relationship to ecology and vegetation, environmental issues, geomorphology, water utilization and waterworks.

(iii) **Ecologist** - Africa experience mandatory. Must have broad experience in management of natural habitats, riverine ecology, rangeland ecology, development and human impacts on wildlife and vegetation. Must be qualified to deal with both flora and fauna aspects of the ecology, including river ecology and biodiversity.

(iv) **Wildlife Specialist** - East African experience mandatory. Must have broad experience in wildlife ecology and management including range and habitat management, relocation of animals, and development impacts on animal behaviour.

(v) **Resource Economist** - African experience mandatory. Kenyan experience desirable. Should be resource economist experienced in assessing environmental impacts, impacts related to tourism and natural resources, and in assigning economic values and costs where feasible. Should be familiar with establishing costs and benefits of proposed project activities or of measures that may be recommended to protect the environment.

(vi) **Institution Specialist** - experience in Africa mandatory. Work experience in Kenya would be desirable. Must have experience in analyzing and determining the impact of Government policies and institutional design on the relevant sector. Should have experience in dealing with issues arising from natural resources and environmental policies, legislation and Governmental organizational structure.

(vii) **Limnologist** - experience in tropical limnology. Experience with all aspects of water analysis. Experience with estimation of water habitat changes due to eutrophification, changed oxygen levels, changed chemical composition, silt contents and contamination aspects.

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* These consultancies may be covered by the project engineering consultant team with the only addition of the ecologist.

43.(c) **Specific tasks:**

(i) **Teamleader/hydrologist** - would be responsible for collating the study coordinating the work of other team members and for all aspects of the assessment not assigned to the other team-members, in particular the hydrology of the springs and river systems, including the overall hydrological water balance of the whole study area.

(ii) **The ecologist** - would be responsible for the overall assessment of the project's impact on the ecology of the study area and for describing all aspects of the environment in the area and environmental changes to be expected; and assess and describe measures needed to protect the environment and safeguard biodiversity and riverine habitats.

(iii) **The wildlife specialist** - will assess the projects impact on the wildlife population and suggest mitigating measures including habitat management, including any necessary temporary management measures for the Mzima Springs and Mzima River wildlife population during the construction period.

(iv) **The Resource economist** - will deal with all economical aspects, in particular assessing project impacts and any proposed environmental remedial measures in terms of environmental costs and benefits. The Mzima Springs economic importance for tourism should be included.

(v) **The institution specialist** - will review relevant policy, legislative and policy issues and assess whether these provide adequate environmental protection or identify measures for those purposes and the necessary changes, if required. Institutions affected or involved will be reviewed as to their capacity of supporting the environmental assessments recommendations.

(vi) **The Limnologist** - will establish the present water quality baseline data and prepare a long term water quality monitoring program for Mzima springs and river, and assess and project anticipated changes due to the project, and propose mitigating actions.

44. **Data Sources**

An initial list of reports to consult would be:

Feasibility study on water supply augmentation project of Mombasa - Coastal area-hinterland. Final Report. Ministry of Water Development. 1981.

Mombasa & Coastal water supply project with preference to the immediate implementation of the second Mzima pipeline project. National Water Conservation and Pipeline Corporation. 1991.

World Bank project documents on the Mombasa and Coastal region water supply.

National Water Master Plan. MOWD. 1990.

Environmental profiles and other data in the files of the National Environmental secretariat, Nairobi, kenya.

Relevant reports in the Ministry of Water and in the National Water

Conservation and Pipeline Corporation, Nairobi, Kenya.

Reports in the library of the Kenya Wildlife Service. Nairobi.

Materials in libraries of United Nations Environment Programme (UNEP), The International Union for the Conservation of Nature (IUCN), World Wide Fund for Nature (WWF), African Wildlife Foundation (AWF), and Wildlife Conservation International, all in Nairobi.

Reports in the Ministry of Natural Resources and the Environment, and in the Ministry of Tourism, Nairobi.

C.

DRAFT TERMS OF REFERENCE FOR A LIMITED ENVIRONMENTAL ASSESSMENT OF THE SECOND MOMBASA AND COASTAL WATER SUPPLY ENGINEERING AND REHABILITATION PROJECT

Introduction

1. The purpose of this terms of reference is to guide and structure the preparation of a limited environmental analysis of the Second Mombasa and Coastal Water Supply Engineering and Rehabilitation Project.

2. The proposed Second Mombasa and Coastal Water Supply Project will provide for:

(a) institutional support for the National Water Conservation and Pipeline Corporation (NWCPC), the implementing agency;

(b) preinvestment studies and engineering for a follow-on main investment project (including source works development and improvement/extension to the distribution systems); and

(c) rehabilitation/augmentation of existing facilities to improve the water supply in the near term.

3. The Mombasa and Coastal Water Supply Scheme is a large regional water supply system. The service area includes Mombasa municipality and its environs, the coastal strip north of Mombasa up to Malindi, the south coast area, Kwale town and an about 10 km wide strip of occupied land along the Mzima-pipeline and the Mombasa-Nairobi road and railway line between Voi and Marere. The last extension of the system took place in 1972-79 under the first Mombasa and Coastal Water Supply Project, with the construction of a surface water intake on the Sabaki river near Baricho, water treatment plant, and transmission mains to Mombasa and other urban centers in the coast region. The project did not fulfill the expectations. Except a short initial period, the source works did not operate at design capacity, and due to cost overrun some of the originally planned project components (telemetry and communication system, one of the booster pumping stations, storage tanks, etc.) were not implemented and many components of the system are in a serious state of disrepair. The proposed project would provide, inter alia, for the rehabilitation/ augmentation of this bulk water supply system.

4. The present water demand for Mombasa and the coastal region is estimated at 160,000 to 170,000 m3/day, versus the available supply of about 95,000 m/day from all existing sources.

5. The theoretical output (design capacity) of the Sabaki/Baricho system is 55,000 m3/day. This amount, however, cannot be obtained at present, due to problems of siltation within the intake and due to limitations in pumping capacity. The present average production from this source is about 41,000 m3/day.

6. Extensive hydrogeological investigations have been carried (under KfW financing) in the last 5 years near Baricho for possible groundwater sources to augment the output of the system, principally to improve the water supply in Malindi. The investigation identified the old paleo-channel of the Sabaki river as a potential source; two large diameter wells are presently under construction, with an expected yield of 10,000 m3/day each.

7. The proposed project will provide for the continuation/extension of the hydrogeological investigations. Based on the available data, it is expected that with the construction of a new wellfield on the left-bank (flood plain) of the Sabaki river, an additional 40,000 m3/day can be made available from this source.

Environmental Impact Assessment (EIA)

8. The project component for which this terms of reference apply, is the augmentation rehabilitation of the existing Sabaki/Baricho bulk supply system. This component is classified as B-category (in accordance with the World Bank's Operational Directive 4.00) needing limited environmental impact assessment. While the responsibility for carrying out this assessment rests with NWCPC, it will be carried out on behalf of NWCPC by the consultants employed for the hydrogeological investigations and engineering designs of the rehabilitation/augmentation works.

Objectives of the Environmental Impact Assessment

9. The main focus of the environmental assessment will be to quantify in ecological, economic and social terms any negative environmental impacts caused by the well-field development, access roads, pipelines, reservoirs and associated works. The water catchment area will be considered along with the effects on the downstream vegetation, wildlife, ecology, aquifer recharge, subterranean river discharge, estuaries, possible salt intrusion and impacts on nearby marine environments, and mitigating measures suggested.

Environmental Assessment Requirements

11. The regulations and guidelines which will govern the conduct of the assessment include:

- World Bank Operational Directive 4.00, Annex A: Environmental Assessment, and Annex B: Environmental Policy for Dam and Reservoir Projects, and pertinent Operational Directives, Operational Policy Notes, and Guidelines.
- National laws and/or regulations on environmental reviews and impact assessments.
- Regional, provincial or communal environmental assessment regulations.
- Environmental assessment regulations of any other financing organizations involved in the project.

Study Area

11. The boundaries of the influence area to be studied by the assessment incorporates in broad terms an area that includes both sides of the Sabaki River from some kilometers above Baricho, to the sea, and the immediate offshore area near the mouth of the Sabaki River that includes the coral reefs. The study area does also include any areas used by wild animals that relates to the river ecosystems and water supplies. The study area further includes a broad belt of influence along pipelines and construction areas, related roads and transportation corridors, dams, reservoirs and impoundments, treatment plants and facilities, distribution facilities, camps and housing, and related works.

Scope of Work

12. The scope is primarily to analyze the environmental impacts of the project, in particular impacts on the riverine ecology, impacts on estuaries, beaches and coral reefs offshore. It will include impacts on tourism, the local population in general terms, and the tourism economy.

13. Hydrology and geomorphology with particular attention on the sustainable water production, water quality and water balance of the lower Sabaki area and Malindi with surroundings should be investigated, and safe water off-take limits under different climatic seasons should be estimated.

14. The indirect effects, particularly the influx of population caused or facilitated by roads and project-related facilities, and the activities of that population including settlement, agriculture, poaching, pollution, and fuel gathering, may be more significant than the direct effects of the project. Specialized field studies or modelling activities may have to be carried out and the consultants are required to define the specific tasks in more detail in their proposals.

Consultant Tasks

Task 1. Description of the proposed Project

15. Provide a full description of the project and its general setting, as applicable:

- The proposed project: general location and layout; size of area involved in total and in the various components (e.g., catchment area, drainage area, pipeline area, reservoirs areas, ponds and dams, camps and settlements, project roads, project related facilities, water distribution areas, other construction activities involved, staff required and new communities and other facilities involved; operation and maintenance; planned public or private off-site investments as a result of the project; life span.

Task 2. Baseline Data - Description of the Environment

16. Assemble, evaluate and present baseline data on the environmental characteristics of the study area. The hydrologic balance of the lower Sabaki river and delta area should be estimated. Where there are inadequate existing data, a multi-year monitoring program must

be established. The baseline data shall be described in a way so as to be useful for long term monitoring and comparison.

Physical environment:

- Geology, geomorphology and stability of the area;
- topography;
- soils and soil stability;
- climate and meteorology;
- surface and groundwater hydrology, trends.

Biological environment:

- Riverine ecology, vegetation and flora;
- wildlife, terrestrial and riverine fauna;
- rare or endangered species;
- critical habitats, significant natural sites, etc;
- estuaries, coral reefs and beaches.

Socio-cultural environment:

- Population in the project and water distribution area;
- land use in areas affected by or affecting the project areas;
- planned major public development activities (other than the proposed project);
- public health, particularly related to the fresh water supplies;
- community structure, employment and recreation.;
- cultural properties.

Task 3. Legislative and Regulatory Considerations

17. Describe the pertinent laws, regulations and standards governing environmental quality in Kenya, health and safety, protection of sensitive areas, protection of endangered species, silting, land use control, etc., at local, regional, national, and if applicable, international levels.

Task 4. Determination of the Potential Impacts of the Proposed Project

18. Distinguish between significant positive and negative impacts, direct and indirect impacts, and immediate and long term impacts. Identify impacts which are unavoidable or irreversible. Consider cumulative impacts in cases where there are other planned or existing projects with which this project may interact. Wherever possible, describe impacts quantatively, in terms of environmental costs and benefits. Assign economic values when feasible. Characterize the extent and quality of available data, explaining significant information deficiencies and any uncertainties associated with predictions of impact.

19. Among potential impacts that require particular attention in this case are the following:

- direct effects on people caused by the project - the need for involuntary resettlement (covered by separate World Bank Operational Directive) - unplanned people movement and settlements in the well-

field area. The long term impacts of changes in the location and pattern of human activities caused by the project, including increased erosion, pollution, poaching, economic activities.

- the sustainability of the proposed additional off-take of water through the well system. Threats to sustainability and potential future changes and impacts that may be expected.

- the expected primary impacts of project construction, e.g. pipelines, roads, reservoirs and dams, treatment and distribution facilities, including traffic disturbance, noise, injured esthetics, increased population movements, erosion and pollution.

- human health problems, water quality, pollution, the impacts on human health in the water distribution and coastal area. Particular attention should be paid to water borne diseases.

- the effects of the flora, wildlife, ecology, biodiversity, and wildlife habitat in the area affected by the project. Time span and effects of physical disturbance. Irreversible changes. Mitigating measures.

- the effect of additional subterranean water off-take on the ground water regime, lowering of ground water levels, downstream river water regime with particular reference to the sustainability of the riverine ecology and the recharge of the aquifers, salt intrusion from the sea due to reduced outflow.

- impact on fisheries, fish migration, estuaries and marine biota, shellfish and mollusks, water weeds.

- effects on soils and riverbanks, erosion, land loss, effects caused by the loss of agricultural lands, changes in traditional flood plain cultivation, salt-intrusion, sedimentation, stability, preparation for natural events.

- upstream considerations, land use, pollution, constructions.

- impacts on other water using projects in the Baricho - Malindi area, including water using industries, hospitals, schools, tourism and tourist hotels. Particular attention must be given to water-borehole uses downstream of the well-field.

- impacts on water discharge regimes to the sea with potential effects on beaches, coral reefs, estuarine and marine life or short and near-shore habitats.

- identify specific studies which are required to fill in needed information, particularly in terms of the water balance of the study area, and its ecology, population and present uses, providing terms of reference for the studies.

Task 5. Analysis of Alternatives to the Proposed Project

20. Describe alternatives that were examined in the course of developing the proposed project and identify other alternatives which might have achieved the same objectives. The concept of alternatives extends to other water sources, silting, project design, selection of technologies and operating and maintenance procedures. Alternatives should be compared in terms of potential environmental impacts; estimated capital and operating costs; suitability under local conditions; and likely institutional, training and monitoring requirements. When describing the impacts of the alternative solutions, indicate which are irreversible or unavoidable and which can be mitigated. To the extent possible, quantify the costs and benefits of each alternative. Include the alternative of not carrying out the project, in order to demonstrate environmental and socio-economic conditions without it.

Tasks 6. Evaluation and Recommendations; Development of Management Plan; Mitigation measures

21. On the basis of the analysis and evaluation of the potential impacts and alternatives, recommend feasible and cost-effective measures to accomplish the objectives of the project while preventing or reducing significant negative environmental impacts to acceptable levels, if possible. Particular care should be taken to ensure that the down-stream (of the well-field) rivers, ecology, appearance and wildlife will be kept as unchanged as possible both during the construction period and after the project is implemented.

22. Mitigating measures proposed should seek to reduce the negative environmental impacts of the project both during the construction period and long-term. This would include suggestions for minimizing construction and operation disturbance and damage to the local population, tourism, esthetics, wildlife, noise etc. Operating criteria for all involved companies, firms and contractors should be made to this effect, including criteria for camp locations and the use of machinery and people.

23. Estimate the impacts and costs of all proposed measures, and of the institutional and training requirements to implement them. Consider compensation to affected parties, particularly to the local population for impacts which cannot be mitigated. Prepare a management plan including proposed work programs, budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measures.

Task 7. Identification of Institutional Needs to Implement Environmental Assessment Recommendations:

24. Review the authority and capability of institutions concerned with project implementation and environmental impacts, primarily the National Water Conservation and Pipeline Corporation, but also the Provincial and District Administrations and recommend steps to strengthen or expand them so that the management and monitoring plans in the environmental assessment can be implemented. The recommendations may extend to new laws and regulations, new agency functions, interministerial and intersectoral arrangements, management procedures and training, staffing, operation and maintenance training, budgeting and financial support.

25. Recommend, if appropriate, the establishment and composition of an in-house Environmental Unit in the National Water Conservation and Pipeline Corporation with adequate budget and professional staffing strong in expertise relevant to the project. It should

be well represented at the project site, and work in conjunction with existing government agencies. The Unit should be established as early as possible to help ensure that pre-project baseline data are collected and environmental problems anticipated at an early stage. The Unit shall be established through a formal agreement with the Bank, and the Unit should ensure that monitoring, evaluation and that mitigating measures are implemented.

26. Review project monitoring plans and if needed, prepare a plan to evaluate the impacts of the project and to monitor implementation of any mitigating measures that may be recommended. This is particularly important in terms of the impact of additional water off-take from the subterranean rivers and ground water reservoirs in the study area, particularly in respect to the long-term sustainability of the well-field and riverine ecology, aquifer recharge and consequently the sustainability and long term viability of the project. Include in the plan an estimate of operating costs and a description of other inputs (such as training and institutional strengthening) needed to carry it out. The in-house Environmental Unit should be involved in the long term monitoring.

Task 9. Assist in Inter-Agency Coordination and Public/NGO Participation.

27. In addition to the evaluation of concerned agencies described in "Task 7" and as necessary, the environmental assessment should ascertain the views of all concerned government agencies; in collaboration with NWCPC, ensure participation in the assessment of relevant NGO's and ascertain the views of any affected groups. At the start of the assessment, the study team should organize inter-agency meetings in Nairobi and Mombasa to explain the proposed assessment, determine its scope and reach agreement on the role of each agency and procedures to follow. In addition, appropriate meetings should be held in Malindi and other project-affected centers to inform local government agencies, tourist hotel managers, NGO's and representatives of the local communities where applicable to ensure their participation, as needed. The traditional system of consultation should be used. Records should be kept of meetings and other communications activities.

Reports

28. Prepare the environmental assessment report, organized according to the outline presented in Operational Directive 4.00 Annex A1. The main text of the report should present the findings, analysis, conclusions and recommendations of the environmental assessment. Supporting data should be presented in the appendices. Other agency requirements may be included as long as the following specifications are met:

- Executive Summary including Analysis and Recommendations.
- Policy, legal and administrative Framework.
- Project Description and General Setting.
- Baseline Data.
- Significant Environmental Impacts.
- Analysis of Alternatives.
- Recommendations and Management Plan.
- Environmental Management and Training.
- Monitoring Plan.
- Appendices:
    - List of EA preparers.
    - References - additional supporting data and materials used

in study preparation.
- Record of inter-agency, NGO and other consultations.

Consulting Team

29. (a) Composition 1/

Hydrologist (team leader)	2 months
Ecologist	2 months
Resource Economist	2 months
Institution Specialist	1 months

(b) Qualifications

(i) General. All consultants must hold recognized professional qualifications in their respective fields. The team leader should have at least 10 years relevant work experience and the other team members at least five years.

(ii) Team Leader (Hydrologist). African working experience is essential, experience in Kenya would be an advantage. Must be experienced in various aspects of hydrology and field hydrological studies, the hydrological relationship to ecology and vegetation, environmental issues, geomorphology, borehole production, water utilization and waterworks.

(iii) Ecologist. Africa experience mandatory. Must have broad experience in riverine ecology, coastal environments, and development impacts on the environment. Must be qualified to deal with all aspects of tropical flora and fauna, including river, estaurine and coastal species.

(iv) Resource Economist. African experience mandatory. Kenyan experience desirable. Should be resource economist experienced in assessing environmental impacts, impacts related to water, natural resources and tourism, and in assigning economic values and costs where feasible. Should be familiar with establishing costs and benefits of proposed project activities and of measures that may be recommended to protect the environment.

(v) Institution Specialist. Experience in Africa mandatory. Work experience in Kenya would be desirable. Must have experience in analyzing and determining the impact of Government policies and institutional design on the relevant sector. Should have experience in dealing with issues arising

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1/ The personnel may be covered by the project engineering consultant team with the addition of the ecologist.

KILIFI DISTRICT 1989 Population data.

1989 KENYA POPULATION CENSUS

Table 1: Population by Sex; Number of Households, Area and Population Densities for all Administrative Areas

AREA	MALE	FEMALE	TOTAL	HHs	SK.m	Den
KWALE	185,945	197,108	383,053	67,442	8,260	46
KINANGO	58,751	67,471	126,222	19,726	3,950	32
KINANGO	10,000	11,616	21,616	3,703	301	72
KINANGO	2,442	2,619	5,061	987	38	133
GANDINI	3,360	3,930	7,290	1,170	104	70
DUMBULE	1,934	2,348	4,282	745	68	63
KIBANDAONGO	2,264	2,719	4,983	801	91	55
NDAVAYA	4,304	4,930	9,234	1,534	451	20
GULANZE	1,322	1,511	2,833	464	70	40
NDAVAYA	1,229	1,408	2,637	427	64	41
MWANDIMU	1,753	2,011	3,764	643	317	12
PUMA	8,773	9,550	18,323	2,848	967	19
KIGURUNGANI	2,816	3,101	5,917	914	320	18
MAZOLA	1,675	1,866	3,541	518	133	27
KIFYONZO	2,463	2,749	5,212	796	115	45
BUSA	1,819	1,834	3,653	620	399	9
MTAA	3,259	3,989	7,248	1,011	129	56
BOFU	1,758	2,203	3,961	539	55	72
MTAA	1,501	1,786	3,287	472	74	44
MWAVUMBO	9,037	10,826	19,863	2,761	274	72
KALALANI	3,161	3,645	6,806	1,024	61	112
MWABILA	1,611	1,980	3,591	482	105	34

MWATATE	3,216	3,994	7,210	994	44	176
MATUMBI	1,049	1,207	2,256	324	67	34
KASEMENI	6,500	7,695	14,195	2,153	78	182
MWAMDUDU	766	831	1,597	250	18	89
MAZERAS	2,122	2,369	4,491	698	13	345
MUNYENZENI	3,612	4,495	8,107	1,205	47	172
CHENGONI	3,721	4,407	8,128	1,250	317	26
CHENGONI	1,481	1,725	3,206	398	103	31
MAJI YA CHUMVI	768	822	1,590	277	89	16
SILALONI	1,472	1,860	3,332	575	125	27
TARU	5,000	4,913	9,913	1,719	764	13
MACKNON RD	2,438	2,415	4,853	787	296	16
DUPHARO	1,871	1,794	3,665	738	317	12
KILIBASI	691	704	1,395	194	151	9

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1989 KENYA POPULATION CENSUS

Table 1. Population by Sex, Number of Households, Area and Population Densities for all Administrative Areas

AREA	MALE	FEMALE	TOTAL	HHs	SK.m	Den
SAMBURU	8,157	9,545	17,702	2,747	669	26
MATOBE	2,439	2,748	5,187	889	130	40
KINAGONI	2,465	2,923	5,388	810	244	22
MAKAMINI	1,673	1,952	3,625	495	149	24
VINYUNDUNI	1,580	1,922	3,502	553	146	24
MATUGA	29,846	30,347	60,193	11,010	358	168
NGOMBENI	8,544	8,524	17,068	3,057	107	160
PUNGU	1,453	1,420	2,873	547	7	410
UTEJE	1,578	1,572	3,150	602	26	121
MBUGUNI	1,251	1,337	2,588	472	51	51
NGOMBENI	4,262	4,195	8,457	1,436	23	368
WAA	5,848	6,078	11,926	2,191	65	183
MATUGA	2,686	3,038	5,724	1,041	36	159
MTIVO	1,883	1,649	3,532	689	16	221
KOMBANI	1,279	1,391	2,670	461	13	205
TIWI	7,115	7,152	14,267	2,659	52	274
SIMKUMBE	3,983	4,026	8,009	1,466	34	236
MUOYO	3,132	3,126	6,258	1,193	18	348
TSHIMBA	8,339	8,593	16,932	3,103	134	126
GOLINI	3,999	3,926	7,925	1,561	52	152
KUNDUTSI	4,340	4,667	9,007	1,542	82	110
KUBO	19,021	20,217	39,238	6,434	685	57

LUKURE	2,401	2,397	4,798	858	64	75
MAJIMBONI	2,593	2,447	5,040	928	79	64
MWALUPHAMBA	6,587	7,546	14,133	2,202	143	99
KIZIBE	3,255	3,634	6,889	1,067	85	81
MULAFYENI	3,332	3,912	7,244	1,135	58	125
MKONGANI	7,367	7,793	15,160	2,417	178	85
MANGAWANI	2,688	2,688	5,321	841	57	93
TIRIBE	4,729	5,110	9,839	1,576	121	81
SHIMBA HILLS N. RESERVE	73	34	107	29	221	0

1989 KENYA POPULATION CENSUS

Table 1. Population by Sex, Number of Households, Area and Population Densities for all Administrative Areas

AREA	MALE	FEMALE	TOTAL	HHs	SK.m	Den
MSAMBWENI	78,327	79,073	157,400	30,272	3,267	48
MSAMBWENI	13,130	13,657	26,787	5,414	188	142
SHIRAZI	1,986	1,979	3,965	980	37	107
KINGWEDE	1,561	1,586	3,147	648	11	286
FUNZI	242	225	467	108	10	47
VINGUTINI	3,886	4,204	8,090	1,558	11	735
MILALANI	5,455	5,663	11,118	2,120	119	93
PONGWE/ KIDIMU	4,558	4,555	9,113	1,900	155	59
SHIMONI	814	732	1,546	365	18	86
WASINI	470	472	942	172	4	236
KIDIMU	1,523	1,525	3,048	665	76	40
MAJORENI	1,751	1,826	3,577	698	57	63
KIKUNENI	14,878	16,383	31,261	5,001	321	97
BUMBANI	5,671	6,078	11,749	2,203	126	93
MALABA	9,207	10,305	19,512	2,798	195	100
DIANI	17,014	14,952	31,966	7,363	87	367
GOMBATO	14,039	11,878	25,917	6,210	45	576
BONGWE	2,975	3,074	6,049	1,153	42	144
KINUNDU	6,712	6,494	13,206	2,639	169	78
KINONDO	4,995	4,895	9,890	1,840	105	94
GAZI	1,717	1,599	3,316	799	64	52

MWERENI	10,887	11,924	22,811	3,711	1,764	13
KILIMANGODO	5,733	6,081	11,814	1,777	1,622	7
MWENA	5,154	5,843	10,997	1,934	142	77
VANGA/LUNGA LUNGA	11,148	11,108	22,256	4,244	583	38
KIWEGU	1,552	1,543	3,095	584	80	39
SEGA	5,058	5,077	10,135	1,822	141	72
KASEMANI	1,453	1,288	2,741	532	308	9
JEGO	1,760	1,876	3,636	658	41	89
VANGA	1,325	1,324	2,649	648	13	204