Towards Integrated Management and Sustainable Development of Kenya's Coast

KENYA

Findings And Recommendations For An Action Strategy In The Nyali-Bamburi-Shanzu Area

Prepared by
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Towards Integrated Management and Sustainable Development of Kenya's Coast

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PREFACE

The wise use of Kenya's coastal resources and environment is critical to the nation's development and its people's well-being. Nowhere is this more evident than in the Nyali-Bamburi-Shanzu area, the heart of the North Coast tourism region. Tourism is Kenya's leading foreign exchange earner, with coastal tourism representing 60 to 70 percent of total tourism earnings. North Coast in general, and the Nyali-Bamburi-Shanzu area in particular, are significant contributors to both the local and national economies. Therefore, sustaining and even increasing the benefits of this industry are important.

Tourism development and urbanisation of the Nyali-Bamburi-Shanzu area have led to both increased prosperity, as well as to a number of social, economic and environmental problems that threaten sustainable development and impose constraints on further growth. The systems that support the tourism industry—the natural coastal environment, the area's infrastructure and public services—are under strain. Of equal concern is the increase in conflicts between the tourism industry and other activities. The situation is urgent, requiring immediate attention and action by government agencies, resource users and the private sector if widely acknowledged issues are to be resolved. These issues include:

- The need for improved land use management
- Provisions for adequate infrastructure and public services
- Fresh and coastal water quality degradation
- Declines in the reef fishery and the viability of artisanal fishing as a livelihood
- Degradation of coastal and marine habitats—mangroves, coral reefs, beaches and seagrasses
- Coastal erosion
- Increasing on-water and land use conflicts

This document—an Integrated Coastal Area Management (ICAM) Action Strategy for the Nyali-Bamburi-Shanzu area—is the outcome of a participatory process to reach broad consensus on how to address these critical coastal management issues at the site, as well as gain experience in ICAM for application to other areas of Kenya.

For each issue, Findings of Fact are presented. These provide background information about the topic, focusing on its significance, and the causes and consequences of the problem. Management objectives and implementation strategies are then set forth. Implementation strategies include both short-term actions that can be taken immediately, as well as additional planning tasks that are urgently needed to define in greater detail the infrastructure and policy changes that are required. A local Coastal Management Steering Committee is called for, and was endorsed at the December, 1995, National Workshop on Integrated Coastal Area Management in Mombasa, to oversee ICAM strategy implementation.

The ICAM process that has been initiated in the Nyali-Bamburi-Shanzu area has been facilitated by a multi-agency team including representatives from a number of key government agencies and private sector groups. Stakeholders, government administrators from local, district and national levels, private sector groups, local university and nongovernmental organization experts, as well as international support agencies and experts have all participated in meetings and work sessions to develop and refine this ICAM strategy.

What happens next is in the hands of those who helped launch ICAM in the Nyali-Bamburi-Shanzu area. The road to improved management of the area, while perhaps long and difficult, is clear. Continuing to move forward will not only help sustain today's benefits, but also help create an even brighter future for North Coast residents.

LIST OF ACRONYMS

CBS	Central Bureau of Statistics
CDA	Coast Development Authority
CRC	Coastal Resources Center
CMSC	Coastal Management Steering Committee
DDC	District Development Committee
DEC	District Executive Committee
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
FAO	Food and Agriculture Organization of the United Nations
FD	Fisheries Department
GCD	Government Chemist's Department
GDP	Gross Domestic Product
GNP	Gross National Product
ICAM	Integrated Coastal Area Management
KAHC	Kenya Association of Hotelkeepers and Caterers
KATO	Kenya Association of Tour Operators
KMFRI	Kenya Marine and Fisheries Research Institute
KPA	Kenya Ports Authority
KPTC	Kenya Post and Telecommunications Company
KWS	Kenya Wildlife Service
MCSS	Ministry of Culture and Social Services
MCTA	Mombasa and Coast Tourist Association
ME	Ministry of Education
MENR	Ministry of Environment and Natural Resources
MEP	Monitoring and Evaluation Programme
MLRRWD	Ministry of Land Reclamation, Regional and Water Development
MLS	Ministry of Lands and Settlements
MMC	Mombasa Municipal Council
MOH	Ministry of Health
MPWH	Ministry of Public Works and Housing
MRTTT	Ministry of Research, Technical Training and Technology
MTW	Ministry of Tourism and Wildlife
NEAP	National Environment Action Plan
NES	National Environment Secretariat
NWCPC	National Water Conservation and Pipeline Corporation
NOSRC	National Oil Spill Response Committee
REDSO/ESA	Regional Economic Development Services Office for East and Southern Africa
SA	Statistical Abstract
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Programme
URI	University of Rhode Island
USAID	United States Agency for International Development

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Chapter One

COASTAL MANAGEMENT IN KENYA

1.1 Importance of the Kenya Coast

Kenya's coastal environment and its resources are increasingly under pressure from human settlements and development activities. Important economic activities that depend on good environmental quality range from tourism and trading to food production. Only a healthy environment will be able to sustain these economic uses into the future. To ensure the sustainable use and economic health of coastal areas, an integrated approach to manage the coast and its resources is needed.

The Coast Province supports about nine percent of the national population (*Table 1.1*). The coast population increased significantly from 1979 to 1989, rising from 1.34 million to 1.83 million inhabitants. This represents a 37 percent 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.

Historical and Natural Resources

The Kenya coast has played an important role for over 2,000 years in East Africa (*Map 1.1*), when merchants sailed from Arabia in search of gold, spices, ivory and other goods. Dating back to the seventh century, Arabs settled in 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 in a blend of colourful harmony. The coastal culture has provided the country with its national language—Kiswahili. Many of the earlier trading posts established by the Arabs and Europeans have become important urban centres, including Mombasa, Lamu and Malindi (*Martin, 1973*).

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,

Table 1.1 - Coastal Population in Kenya

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

townships — for 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 fringing 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 parks and six marine reserves, encompassing five percent of Kenya's reef areas.

Mangrove Forests

Kenya's coastline has about 53,000 hectares of mangroves, occurring mostly in creeks, bays and estuaries (*Doute, Ochanda and Epp, 1981*). Some villages still exploit mangroves for their wood both for commercial sale and subsistence use. Depending on the size class, 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 (*FAO, 1991*).

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 Coastal Economy

The coast is vital to the overall economic health of the country. Mombasa alone represents 16 percent of the total wage earnings for the country. The key sectors in the coastal economy include:

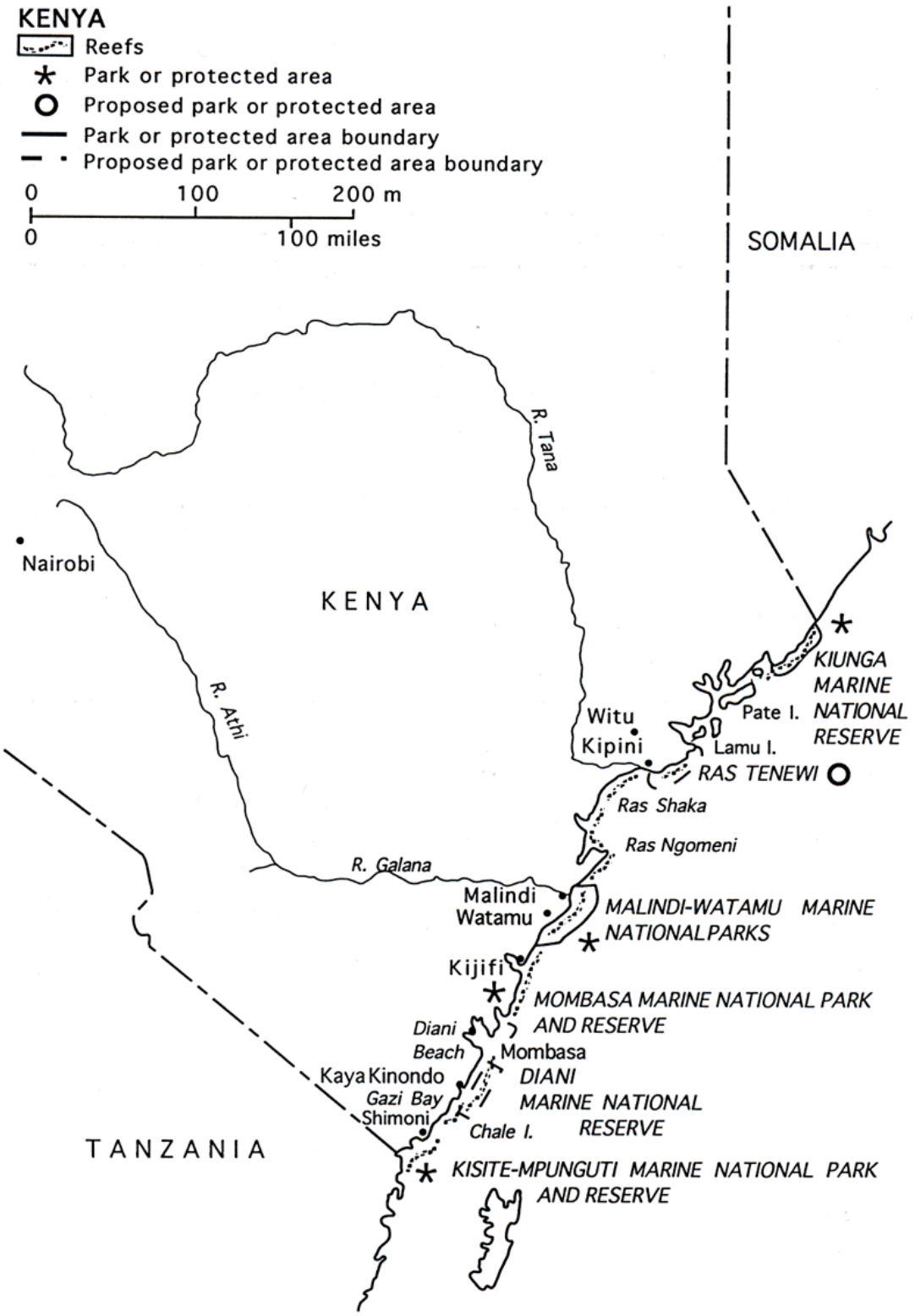
Tourism

This sector is currently the main foreign exchange earner having surpassed the coffee and tea exports. Coastal tourism accounts for 60 to 70 percent of the national tourism industry. Tourism and related sub-sectors generate nine percent of the total employment in the country (*Visser and Schoorl, 1991*). Malindi, for example, is heavily dependent on tourism with about 90 percent of the population estimated to work directly or indirectly in the tourism industry.

Fishing

Marine fisheries are an important source of protein for coastal populations. The main fishery along the Kenya coast is still artisanal and supports approximately 6,500 fishermen. Fishermen use canoes and outrigger boats which may be powered by sails, oars or engines. Most of the fishing is done in creeks, reefs and the shallow inshore waters. The fishing gear used is mostly beach seines, traps (*malema* and *tata* varieties), fishing lines and cast nets. During the past decade the total annual marine fish landings have varied from 5,000 to 8,000 tonnes in an increasing trend (*Sanders, Gichere and Nzioka, 1990*). Approximately 80 percent of the total fish landings come from reef and shallow coastal waters and 18 percent of the annual landings come from offshore trawlers. Inshore reef fisheries are at or near maximum sustainable yields, while offshore areas are considered under-exploited.

Map 1.1 KENYA COASTLINE



Agriculture, Aquaculture and Forestry

The coastal region is important in horticultural production, particularly vegetables and tropical fruits such as citrus, mangoes, bananas and watermelons. The North Coast region also produces other coastal crops, such as coconuts, cashew nuts and bixa. There is also substantial livestock production such as poultry, beef, dairy, goat and sheep in the region. Two large scale aquaculture farms—Mamba Village Crocodile Farm and Baobab Farm Ltd.—have also been developed along the coast. Mangrove forests provide poles, timber and building materials for the construction trade.

Trade

Kenya's coast continues to be a magnet for trade. In fact, Mombasa is the primary port for landlocked East and Central African countries such as Uganda, Rwanda, Burundi and parts of eastern Zaire. Table 1.2 shows the total imports and exports of bulk commodities such as crude oil or agriculture products, and dry cargo, such as cars or equipment, all of which have steadily increased during the last seven years.

1.2 The Need for Integrated Coastal Management in Kenya

The rapid economic growth along the coast has not come without cost. Once pristine, the natural resources of the area are being degraded at an increasing rate. New economic activities create urbanisation and change the way people use resources. More economic activities have resulted not only in increased incomes, but in intensified use conflicts and pressure on the coast's resource base, its public services and infrastructure.

Coastal Management Issues

A number of significant coastal environment and resource use issues detrimental to the management of the Kenya coast will intensify as population and development pressures increase. Broadly stated, the primary national coastal management issues include:

Table 1.2 Mombasa Port Throughput 1986-94 (Million tonnes)

YEAR	DRY CARGO		OIL AND BULK LIQUIDS		TRANSHIPMENT	TOTAL
	Imports	Exports	Imports	Exports		
1986	2.07	1.60	2.84	0.39	0.03	6.93
1987	2.13	1.66	2.75	0.33	0.03	6.90
1988	1.98	1.49	2.89	0.27	0.02	6.65
1989	2.10	1.47	3.10	0.45	0.04	7.16
1990	2.19	1.91	3.00	0.36	0.04	7.50
1991	2.08	1.48	3.23	0.29	0.04	7.12
1992	2.83	1.69	2.98	0.36	0.10	7.96
1993	2.77	2.09	2.37	0.67	0.07	7.97
1994	3.93	1.46	2.68	0.20	0.06	8.33

Source: F.G. Ndua; Personal Communications, 1995

Inadequately Planned and Managed Growth

Development activity in the coastal zone has occurred with only modest planning and organization. The result has too frequently been planned but unsound changes in land use patterns affecting both environmental quality and economic stability for the local community.

Decline in the Importance of the Traditional Natural Resource-based Sectors

Total fish catch rose slightly over the last decade to a reported 8,000 tons in 1990 (*Sanders et al, 1990*). The total fish catch has now stagnated. While inshore reef areas are generally considered overfished, offshore waters offer opportunities for expansion. Other traditional coastal resources such as mangroves have been overharvested. Both of these traditional activities are now overshadowed by coastal tourism and related subsectors. This shift is having significant socioeconomic impacts on local, tradition-based communities.

Declining Water Quality

Water supplies are inadequate and threatened by pollution. Surface waters face increasing degradation from coastal development and associated urban pollution including stormwater, sewage, solid waste and oil spills. Groundwater in urban areas is contaminated from extensive use of septic tank/soakage pit systems in high-density settlements.

Erosion of the Shoreline

Kenya's coast is susceptible to the dynamic shoreline process, resulting in accretion in some areas and erosion in other areas. Attempts to stabilize coastal features through shoreline protection projects alter the shoreline process, and have often made the downstream or the long-term erosion problems worse.

Degradation of Coastal Ecosystems

Coastal resources are threatened by unplanned development and pollution. Mangrove exploitation for fuel and construction material has resulted in many mangrove forests being overharvested. Coral reefs are overexploited and in decline, particularly in the areas outside the marine parks. Areas outside the influence of coastal development remain unspoiled but are under increasing threat from expanding development and human settlement.

Use Conflicts

With increased use of coastal resources throughout the country, there are increased conflicts. In the North Coast the intensive use of land and water space has led to conflicts about access to the sea, land and water use, and cultural standards and values.

Lack of Institutional Mechanisms to Adequately Address the Complex, Multi-sectoral Problems of Coastal Areas

Government in Kenya, as in most nations, is highly sectoral. Coastal problems, however, are multi-sectoral and require an integrated approach for their solution. They also require innovative partnerships between government, resource users and the private sector. Integrated Coastal Area Management (ICAM) provides a multi-sectoral approach to management and can provide the necessary framework to address both national and local coastal management issues.

1.3 The Practice of Integrated Coastal Management in Kenya

Kenya does not have a national ICAM program. Although many institutions play a role in managing coastal areas and uses, there is no overall framework which effectively integrates individual institutions' actions and decisions. In many cases, this lack of coordination makes management problems worse.

WHAT IS INTEGRATED COASTAL AREA MANAGEMENT?

The United Nations Environmental Programme (UNEP) defines integrated coastal and marine areas management as "an adaptive process of resource management for sustainable development in coastal areas. Sustainable development requires that the quantity and quality of coastal resources are safeguarded in order that they not only satisfy the present needs, but provide a sustained yield of economic and environmental services for future generations."

- UNEP: Guidelines for Integrated Management of Coastal and Marine Areas—With Special Reference for the Mediterranean Basin. UNEP Regional Seas Reports and Studies No. 161. Split, Croatia, PAP/RAC (MAP-UNEP), 1995.

As called for by The United Nations Conference on Environment and Development (UNCED), the Earth Summit held in Rio de Janeiro in June, 1992, Kenya has taken steps towards coastal management through national efforts and international agreements. At the national level, Kenya has prepared a National Environmental Action Plan (NEAP). The NEAP is aimed at providing a broad framework for sound management of natural resources and the environment, including coastal environments, thus integrating environmental considerations into socioeconomic planning and implementation at all levels. At the international level, Kenya is signatory to a number of treaties and conventions which provide the basis for the establishment of integrated coastal management. Kenya is a signatory to the Nairobi convention within the Regional Seas Programme of UNEP and has signed the Arusha Resolution (*SAREC, 1994*) which calls for sustainable development and integrated management of coastal areas for the primary benefit of coastal communities.

Kenya is also in the process of preparing a tourism development plan. The document reviews the status of tourism in relation to the national economy, identifies constraints related to further development and recommends long-term strategies for sustainable use which maximize tourist satisfaction. It also addresses the designation of tourism priority zones, which include the North Coast district.

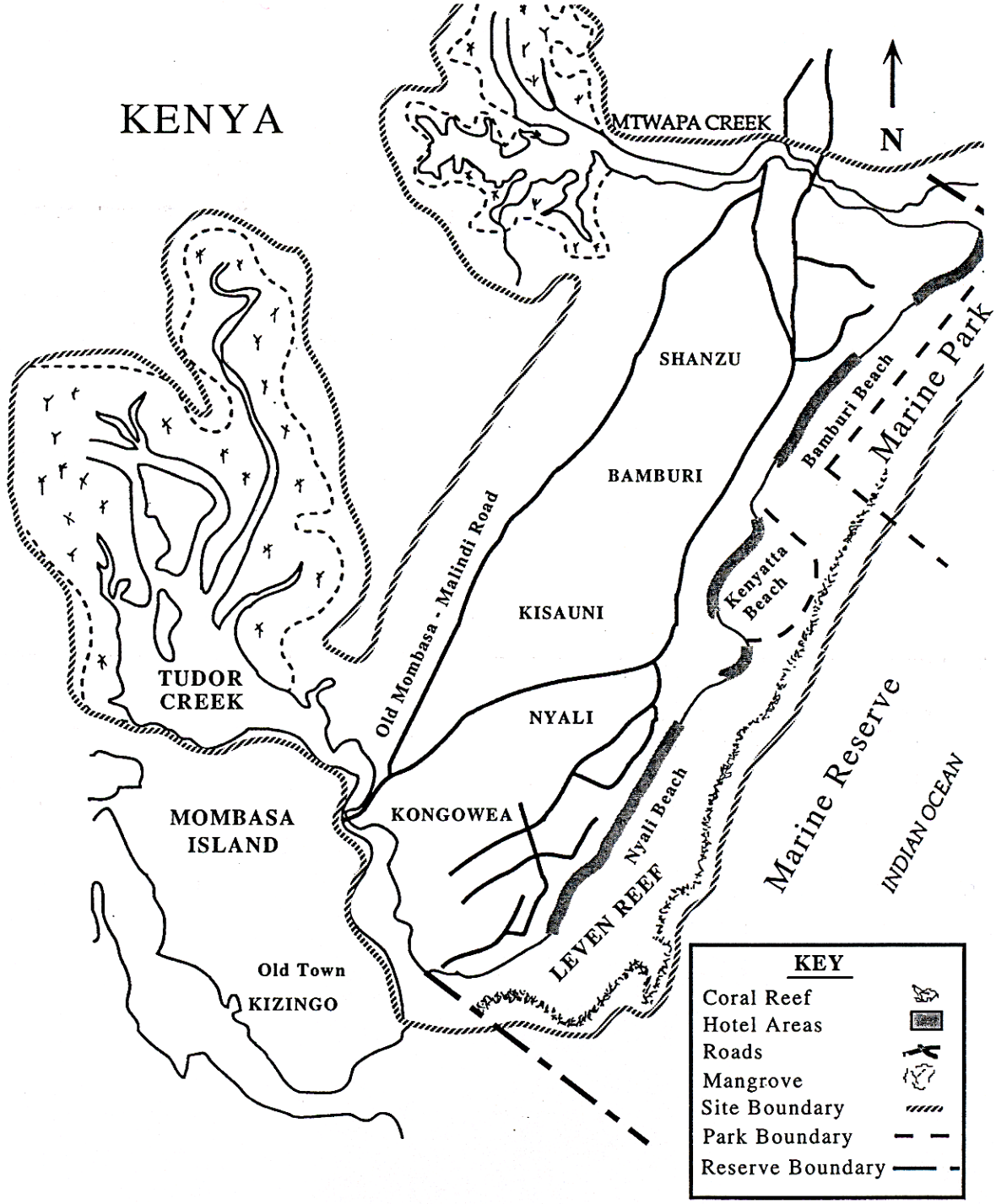
1.4 The Nyali-Bamburi-Shanzu Area

To give tangible expression to the principles set forth in the above documents, Kenya has begun to experiment with the implementation of site-specific ICAM programs. The site along the Kenya coast where ICAM is being applied is in the Nyali-Bamburi-Shanzu area.

The Nyali-Bamburi-Shanzu area encompasses the span from Mtwapa Creek to Tudor Creek, including the mangrove systems of each, extending seaward to the reef crest and inland to include the settlements located immediately to the west of the Old Mombasa-Malindi Road (*Map 1.4.1*)

This area is not a legal definition but a general delineation which is being used for planning purposes.

Map 1.4.1 THE NYALI-BAMBURI-SHANZU AREA



Chapter Two

AN INTEGRATED COASTAL AREA MANAGEMENT ACTION STRATEGY FOR THE NYALI-BAMBURI-SHANZU AREA

2.1 The Nyali-Bamburi-Shanzu Demonstration Area: A Step Towards Integrated Coastal Area Management (ICAM) in Kenya

To build momentum towards a national ICAM approach and develop necessary experience in the practice of ICAM, a coastal management demonstration initiative was started on a small part of Kenya's coast—the strip encompassing the Nyali-Bamburi-Shanzu area. The site was chosen as the demonstration area for the following reasons:

- Its coastal resources are important for tourism at both the local and national level.
- The area is challenged by one of the most critical coastal issues in Kenya—that of incorporating and sustaining an international tourism industry in a manner that is environmentally sound and benefits both the people of the area and the nation as a whole. Hence, management approaches and techniques developed here will likely be useful in other locations.
- There is local demand for the project. One major impetus in the area selection was that local residents recognized that issues exist which require immediate attention.
- Most of the key government agencies and organizations maintain offices in Mombasa, thereby facilitating their participation in a cooperative effort.
- Unlike other areas of the Kenya coast, data about the area, although limited, exist.

The ICAM Planning Process in the Nyali-Bamburi-Shanzu Area

To make progress on ICAM planning in the Nyali-Bamburi-Shanzu area, a multi-agency team was created in October, 1994. The team developed initial strategies to address critical management issues and worked to build support—within government, user groups and the private sector—to move forward in strategy implementation. This team has operated under the leadership of the Coast Development Authority, whose mandate includes planning, coordination and implementation of development projects in the whole of the Coast Province and the Exclusive Economic Zone. Team members include senior officers from other key institutions including the Kenya Marine and Fisheries Research Institute, the Kenya Wildlife Services, the Fisheries Department and the Mombasa Municipal Council. The Hotelkeepers Associations and Moi University have also played an important role in the process. The team has also interacted closely with the Ministry of Land Reclamation, Regional and Water Development; the Ministry of Research, Technical Training and Technology; and the Ministry

of Tourism. The Ministry of Environment and Natural Resources was also involved. This Ministry is developing the National Environment Action Plan, which has made the creation of an ICAM programme for Kenya a priority.

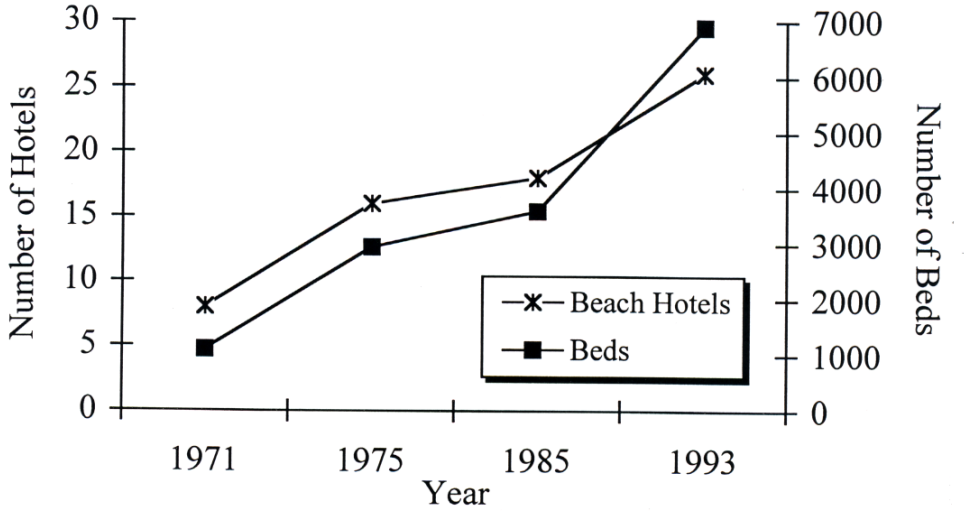
Since the team's inception, it has also been working closely with local stakeholders to clearly describe the coastal issues affecting the area and to outline basic management strategies that can be employed to solve the identified issues. A first draft of this document detailing the area's coastal management issues was prepared in March, 1995. In June, 1995, a two-day National Workshop on ICAM provided a forum for over 80 people to discuss the issues outlined in the draft document and their possible solutions. (*See Annex 1 for a summary of workshop outcomes.*) From this workshop, several working groups were formed to implement small-scale activities. These were identified as early implementation activities that would solve immediate problems and help move the coastal management process forward. (*See Annex 2 for a summary of ongoing demonstration sites.*) Based on input from the June workshop, the document was revised and expanded to include objectives, strategies and initial actions to address each issue. This draft document was reviewed at a workshop at the Mombasa Beach Hotel, December 5-7, 1995. Over 70 participants, representing key government agencies, nongovernmental agencies (NGOs) and the private sector, as well as a number of international participants, carefully reviewed the draft findings and strategies. (*See Annex 3 for a list of participating organisations.*) The workshop's many useful comments and observations have been incorporated in this final document. (*See Annex 4 for a summary of the workshop outcomes.*)

2.2 Tourism in the Nyali-Bamburi-Shanzu Area

Traditionally, the area's economy depended on fisheries and mangrove forests. The fishing villages were located on the seashore and in the mangrove areas. Today, these traditional economic sectors have been overshadowed by tourism, residential and commercial development and industry. Hotels, restaurants, modern settlements and industrial sites now characterise this coastal strip.

The change began in 1946 when Nyali Beach Hotel was built. Tourism remained at a low level until the 1970s, then began to grow dramatically through the early 1990s (*Figure 2.2.1*). The economy of the area, commonly referred to as the North Coast, is now dominated by the tourism trade. Tourism and related sectors are one of the largest employers for the more than 153,000 people who live in or near the Nyali-Bamburi-Shanzu area.

Figure 2.2.1. Number of Beach Hotels and Beds in Study Area



In 1993, the study area accounted for 24 percent of coastal tourism industry earnings. Although precise figures are unavailable, it is estimated that at least 12,700 people are employed in North Coast hotels. In addition to hotel employment, other tourist-dependent trades include curio sellers, safari sellers, massage operators and boat operators, as well as restaurants and other service businesses.

As the tourism economy has grown, important traditional sectors such as fishing, agriculture and mangrove harvesting have increasingly been marginalised. The economic opportunities associated with tourism have attracted more and more people to the coastal strip, resulting in increased urbanisation.

In 1965, foreign visitors accounted for about half of all bed nights in beach hotels. By 1974 this had increased to 80 percent, and in 1993 this number exceeded 95 percent. Between 1989 and 1993, tourist receipts for the North Coast increased by 40 percent, keeping pace with the increase of national tourist receipts.

There is now concern that the growth of North Coast tourism may be slowing and could perhaps be declining. In addition, there is a growing concern that the quality of tourists visiting the study area is decreasing. While complete data for 1994 and 1995 are unavailable, the perception is that the number of visitors and industry profits are declining (*Figures 2.2.2 and 2.2.3*).

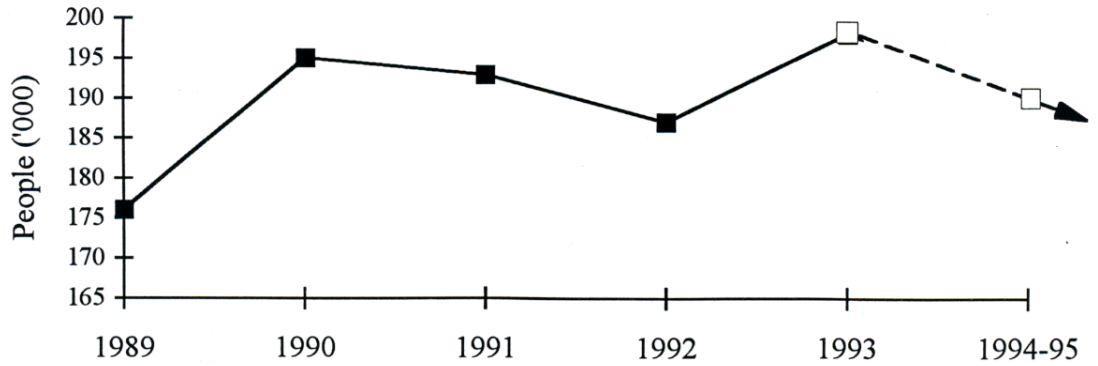
This trend may be attributable to several factors. First, a number of new, less-expensive tourist accommodations (cottages, villas, apartments and guest houses) have been built landward of the beach hotels and may be drawing customers away from the hotels. Second, the North Coast may no longer be competitive with other high-quality destinations in Kenya and elsewhere in East Africa because of a decline in environmental quality. Third, the inability of public services and infrastructure to keep pace with development is resulting in reduced amenity quality. Increasing incidents of crime and harassment against tourists, and congestion from tourism development are detracting from the tourism experience.

Since tourism is one of the largest employers in the area, threats to its long-term economic sustainability are a serious concern. If the North Coast continues to become less attractive to tourists, and the level of tourism activity declines, the area will experience significant economic and social impacts. As shown in Table 2.2.1, tourism causes, and is in turn affected by, all of the coastal management issues described in this document.

Existing Management Framework for Tourism Development and Its Impacts

There are multiple government regulatory agencies and non-governmental organizations

Figure 2.2.2 Annual Visitor Arrivals in the North Coast



Source: CBS in the Economic Review of 1994/pers. comm. Tourism Department.

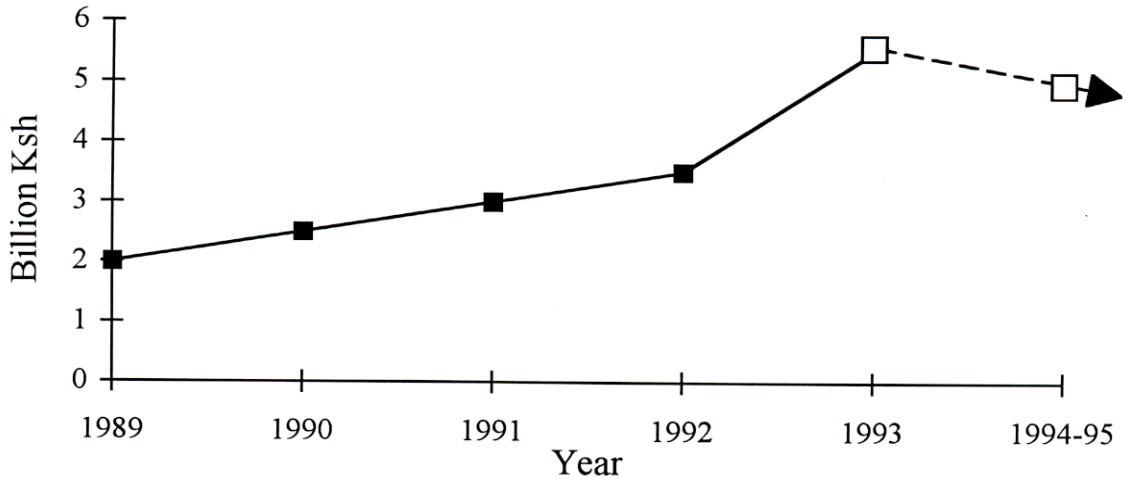
that are involved in managing land use and approving additional development:

- The Tourism Department has the responsibility for licensing and regulating the growth of the tourism industry.
- The District Development Committee must approve new development.
- The Physical Planning Department within the Ministry of Lands and Settlements provides physical plans for new development and housing projects.
- The Kenya Tourism Development Corporation promotes investment in the tourism industry.
- The Kenya Wildlife Service can influence development adjacent to marine park areas by enforcing the legally mandated 100-foot (37.7 m) setback limit along the shoreline. Marine parks are geared to promotetourism.
- The Mombasa Municipal Council is responsible for implementation of the existing land use plan for the area.
- The Coast Development Authority evaluates development alternatives and monitors growth in the area. There are also several associations that represent a wide range of tourism-related interest groups, including the Mombasa and Coast Tourist Association, Kenya Association of Tour Operators and Kenya Association of Hotelkeepers and 1Caterers.

The decision-making process for siting and designing facilities, and the interrelationships among agencies are unclear and often confusing. In addition, local decisions are often overruled. Making the situation worse, none of the agencies have the necessary resources to adequately enforce existing regulations and follow up on complaints and violations.

Similarly, there is no coordinated governance framework for addressing the impacts of growth and tourism. While many agencies have sectoral responsibilities, addressing the impacts through this framework simply has not worked.

Figure 2.2.3 Gross Receipts from Tourism



Source: CBS in the Economic Review of 1994/pers. comm. Tourism Department.

Table 2.2.1 - Coastal Management Issues in the Nyali-Bamburi-Shanzu Area: Potential Causes and Probable Consequences of Mismanagement

Issue: **Inadequate infrastructure and public services**

Cause

- Rapid pace of tourism development and urbanization of the area

Consequences

- Increased demand for constant supply of water and electricity to local businesses and residents

.....

Issue: **Degrading water quality—Groundwater**

Cause

- High density of septic tanks and soakage pits

Consequences

- Contaminated drinking water
- Public health threats

.....

Issue: **Degrading water quality—Marine and coastal**

Causes

- Pollution discharges from industry, business, domestic sewage and solid waste
- Stormwater
- Periodic oil spill from ships
- Siltation from dredge spoils
- Seepage from septic tank and soak pits
- Direct discharge of wastewater from hotels

Consequences

- Degraded fish habitat and declining fish production
- Public health threats from consumption of contaminated seafood and recreational contact
- Poor aesthetics and odours
- Degraded coral reef quality
- Potential public health threats from water contact
- Declining number of tourists and associated revenues

Issue: **Decline in reef fishery**

Causes

- Overfishing
- Destructive and inappropriate fishing practices
- Degraded reef quality from tourism use and pollution

Consequences

- Low income of fishermen
- Reduced fish supply/increased prices for buyers

.....

Issue: **Degraded marine habitats—Mangroves**

Causes

- Overcutting and overharvesting for poles and fuel wood
- Pollution from oil spills
- Pollution from waste dumping
- Increased sediment inputs
- Improper oyster harvesting

Consequences

- Declining supply of fuel wood and mangrove poles for Swahili house construction
- Loss of economic livelihood for mangrove cutters
- Loss of breeding habitat for fisheries and associated impacts of declining fish catch

.....

Issue: **Degraded marine habitats—Coral reefs**

Causes

- Trampling by snorkelers
- Anchor damage from boats
- Degraded water quality
  - oil pollution
  - siltation
  - discharges

Consequences

- Declining tourist visits and associated revenues to businesses and Marine Park
- Decline in livelihood opportunities for tour boat operators, guides, etc.
- Declining fish catch and incomes of fishermen

Issue: **Degraded marine habitat—Seagrasses**

Cause

- Degraded water quality

Consequences

- Erosion protection reduced
- Loss of habitat

.....

Issue: **Degraded marine habitat—Beaches**

Causes

- Erosion
- Construction of seawalls
- Removal of natural beach vegetation

Consequences

- Loss of nesting habitat for turtles
- Loss of scenic and aesthetic qualities for tourism

.....

Issue: **Coastal erosion**

Causes

- Natural shoreline processes
- Human-induced coral reef destruction
- Inappropriate construction of seawalls and revetments
- Accelerated sea-level rise
- Removal of natural beach vegetation

Consequences

- Loss of turtle nesting habitat and scenic and aesthetic values for tourism
- Damage to improperly sited shorefront structures and hotels
- Increased costs to build infrastructure to protect property

.....

Issue: **On-water and land use conflicts**

Causes

- Intensified use of coastal and marina areas
- Inadequate water and land use zoning schemes
- Inadequate conflict resolution mechanisms

Consequences

- Public safety threats
- Negative visitor experience
- Encroachment on existing plots/reduced access
- Decline in visitors, tourism revenue

2.3 Major ICAM Issues in the Nyali-Bamburi-Shanzu Area

The following critical issues have been identified as requiring urgent attention if tourism, the economy and resources in the Nyali-Bamburi-Shanzu area are to be sustained.

Inadequate Infrastructure and Public Services

During the last 20 years, the area has undergone dramatic growth in the tourism industry and the development of residential buildings. This has changed the way in which the land is used and managed. This growth, coupled with a growing resident population, has placed extreme pressure on existing public services and infrastructure. In turn, this inability to provide the necessary services and infrastructure is causing a decrease in the growth rate of tourism.

Degraded Water Quality

Groundwater—a major source of drinking water—is contaminated by fecal coliform and represents a significant public health risk. Surface water in the Tudor and Port Reitz Creeks is also threatened by water contamination caused by fecal coliform and industrial discharges. This represents a health risk from water contact during swimming and other recreational activities. It also poses a threat from consumption of contaminated seafood harvested from the area.

Declines in the Reef Fishery

Today, as compared to a decade ago, the fishing area in the site has been reduced by 10 km^2 by the creation of the Mombasa Marine Park. This has had an effect on the trends in fisheries catch and effort in the site. Change in the fishing industry has also been shaped by increased shoreline and water-dependent tourism activities and the development of residential and commercial establishments.

Degraded Marine Habitats

Mangroves - Mangroves in Tudor and Port Reitz Creeks, once a dependable source of income for mangrove cutters, are now overexploited. Mangroves are now only used for selective harvesting. The communities that previously depended on mangrove systems must now depend on other economic sectors for their livelihood.

Coral Reefs - While the coral reef condition in the Mombasa Marine Park and Reserve has improved, localized damage in heavily utilized snorkelling spots is a problem. Coral condition in the Marine Reserve remains poor.

Beaches - Increased development and uses have also affected rare and endangered species of sea turtles which previously used the sandy beaches in the area for nesting.

Seagrasses - Although information is limited, seagrass beds may be threatened by pollution. The seagrass areas in front of the public beach have almost totally disappeared during the last 10 years, probably due to water pollution, trampling, Mtopanga River sedimentation and beach erosion.

Coastal Erosion

Erosion of beach areas is estimated to be as high as two metres per year in some areas of Bamburi Beach, resulting in the need for construction of expensive seawalls to protect property. Seawall construction has affected and reduced sandy beach space, an important recreational zone for sunbathing and strolling. It is also aesthetically unappealing, reducing the scenic quality of the tourism experience.

Increasing On-Water and Land Use Conflicts

User conflicts in the Marine Park and Reserve are increasing with intensified use including fishing, snorkelling, jet-skiing, glass-bottom

boat operations and wind surfing. In addition, local residents and fishermen are finding public access to the shoreline increasingly difficult as shorefront development continues.

The purpose of this document is to provide an action plan to address ICAM issues in the Nyali-Bamburi-Shanzu area. The following sections focus on the critical ICAM issues in the area, and for each issue present Findings of Fact and an Action Plan. Each Action Plan includes both action and planning strategies. The chapters describe who must participate in an ICAM partnership, and how the partnership should be formed and managed. For the first time, this information has been brought together in one document, providing a holistic approach for making progress on solving ICAM issues in the North Coast area.

2.4 Infrastructure and Public Services

FINDINGS OF FACT

During the past 20 years, the Nyali-Bamburi-Shanzu area has seen dramatic growth in the tourism industry and the development of residential buildings. This has changed the way land is used and managed. Rapid growth in population spurred by tourism and other commercial and industrial activities has resulted in urbanisation. This has created additional demands on already inadequate public services and infrastructure components such as water, electricity, roads and sewage systems.

Urbanisation

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 development is 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 (*Map 2.4.1*).

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 degradation 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 placement of new development are not made according to any comprehensive analysis of current supply and future demand for municipal services.

Increasing commercial and residential development, urbanisation pressures and uncontrolled land use changes have placed a significant strain on existing services and infrastructure 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. Existing 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.

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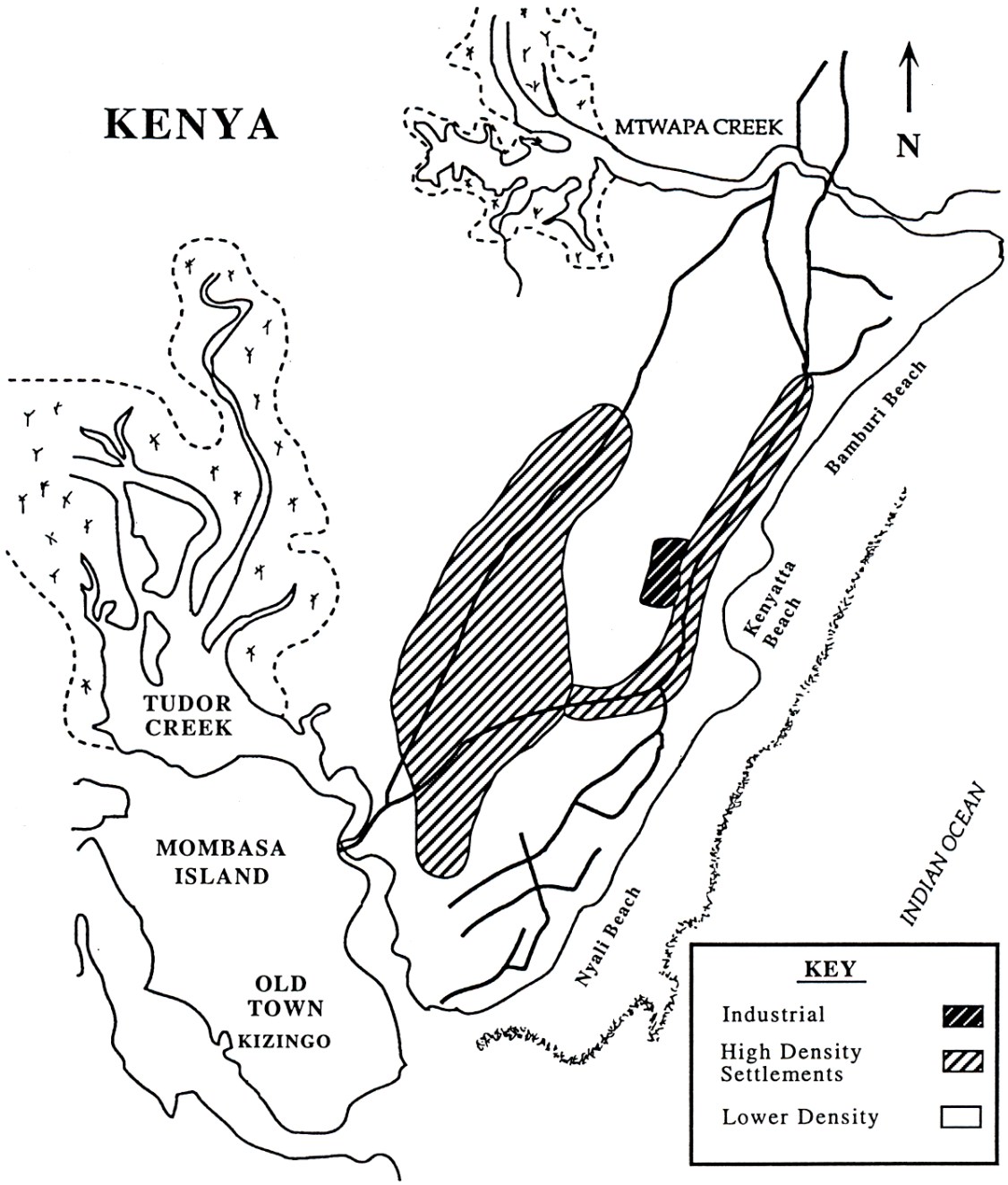
Map 2.4.1 LAND USES



Industrial and Commercial Activity

The Bamburi cement factory is a major source of local employment. The factory is diversifying with reclamation projects and a nature trail–now a popular tourist stop. Arts and crafts and some service enterprises are also growing. Another important feature for the economy of the area is a large wholesale and retail market at Kongowea, which is the distribution centre for Mombasa of food and produce from upcountry and in the coast province. Local people are employed as vendors and in support services for this large municipal market. They also rely on the market for an inexpensive, readily available food supply. Unfortunately, there is no adequate waste treatment or disposal for this sprawling urban and commercial development.

Public Services and Infrastructure

Water

Fresh water is supplied from three sources: the Marere Springs, the Mzima Springs and Sabaki River, from which water is piped and treated for use in and around Mombasa. The study area receives its water supply from the Sabaki line. These supplies are inadequate. The Mombasa and North Coast area receive an intermittent supply of 35,000 cubic meters against an estimated demand of over 70,000 cubic meters per day. There has recently been a move to use local boreholes and water supply tankers to make up the shortfall. The Nyali Beach Hotel is now using a desalination plant.

The rising population is coupled with increasing water requirements associated with urbanisation such as drinking, sanitation, filling swimming pools, watering lawns, washing cars, industrial use and hotel use. The demand for fresh water will continue to increase. Concern is growing about water allocation decisions, and related public health issues resulting from limited water supplies. There is also concern over groundwater contamination, as groundwater is increasingly relied upon as an alternate source for human use. There are two government agencies that regulate both supply and water use: the National Water Conservation and Pipeline Corporation oversees water supplies, while the Ministry of Land Reclamation, Regional and Water Development is responsible for water resources development.

Electricity

The North Coast area experiences voltage fluctuations and frequent power failures which Kenya Power and Lighting Company has associated with inadequate supply, resulting in overloading. Due to unreliable electricity supply, individual hotels and a few other consumers have been forced to install power generators.

Roads

The study area has a fairly good road network. The main Mombasa - Malindi road is designed for single lane traffic in both directions. Sprawling roadside shops and stands are situated very close to the roadway. This often slows traffic and presents significant safety hazards. The Ministry of Public Works is responsible for maintaining the roads in the area. The Mombasa Municipal Council is also responsible for managing the roadway infrastructure development in the area.

Sewage

There is no central sewage system for the area. Septic tank/soakage pits systems are used in all hotels except the Severin Hotel, which has a package sewage treatment plant. Pit latrines are also used for human waste disposal. Increasing density of development and reliance on septic tank/soakage pit and pit latrines for disposal of human waste has resulted in contamination of drinking water supplies by coliform bacteria, and increases the potential for dangerous pathogens such as cholera and typhoid entering the water supply (*Munga et al., 1993*).

Making Progress...
The Mombasa and Coast Tourist Association Environmental Support Package

In 1995, MCTA and its members produced a document which puts forth a set of priority actions, which when implemented, will significantly improve the North Coast area for the community and tourists. These actions include:

- ***Greening the Town***
- ***Eliminating Litter***
- ***Brightening Buildings***
- ***Improving Street Signage and Aesthetics***
- ***Cleaning Up the Port and Beaches***
- ***Beginning a Campaign to Recycle Waste***

ACTION PLAN
FOR INFRASTRUCTURE AND PUBLIC SERVICES

Objectives

Objective 1: Provide and maintain sufficient public services and infrastructure facilities to adequately support an increasing population, sustain an economically viable tourism industry and provide for other commer-cial and residential activities.

Objective 2: Manage growth and development in an economically, socially and environmentally sustainable manner.

Action Strategies

(NOTE: Strategies with a š indicate a current, ongoing demonstration project initiated to test ICAM implementation in the area. For additional details about the ongoing projects see Annex 2.)

Although the land use and infrastructure problems in the area are great and additional planning is necessary, some remedial action should be taken that can be implemented quickly, to make progress on pressing problems. Immediate actions should include:

š 1. Develop and rehabilitate the public facility at Kenyatta Beach. Improvements should include:

- Central kiosk areas for existing vendors and boat operators.
- Fisheries infrastructure support facilities as detailed in Section 2.6, Action Strategy 1, and Section 2.9, Action Strategy 1.
- Public toilets, watering points, parking areas, telephones, sitting benches and other public amenities.

Lead Organisation: CDA
Cooperating Organisations: KWS, hoteliers, fishermen, boat operators, private sector, KPTC, FD, MMC

2. Promote water conservation in the area by establishing demonstration projects for simple, cost-effective water conservation measures for residential and commercial establishments. These could include roof catchments, low volume toilets or low water maintenance landscaping, among others.

Lead Organisation: CDA
Cooperating Organisations: MMC, MLRRWD, NGOs

3. Promote solid waste recycling and composting of organic waste. This can be done by encouraging the use of innovative model recycling programmes, and grading and recycling of waste. This can be accomplished through technical assistance, educational programmes and demonstration projects.

Lead Organisation: MMC
Cooperating Organisations: CDA, NGOs

4. Encourage active participation of local communities in land use decision-making processes and development activities, and ensure that representation to the local District Development Committee is by well-informed officials.

Lead Organisation: Provincial Administration
Cooperating Organisations: CDA, MMC

5. Enforce existing rules and regulations pertaining to land management, including the By-Laws of the Municipal Council of 1968.

Lead Organisation: MMC
Cooperating Organisations: CDA, Provincial Administration

6. Promote utilisation of technical information for decision-making, building on the EAF/14 project, and continue to develop geographic information for the area at a scale useful for area management. Continue to seek UNEP support for equipment, training and technical support.

Lead Organisation: KMFRI
Cooperating Organisations: CDA, FD, KWS, MMC

Planning Strategies

Because of the magnitude of the existing land use and infrastructure problems, and the amount of time and resources needed to adequately solve these problems, additional planning, research and expert consultation on the following is needed:

1. A capital improvement plan for the area that addresses: (1) alternative solid waste collection mechanisms (such as privatisation) and identifies alternative disposal sites to the Kibarani dump area (particularly in the North Coast area); and (2) freshwater supply needs in relation to demand by residents, industry, hotels and other commercial development into the next century, beginning with a reassessment of water supply development plans and demand projections.

   Lead Organisation: MMC
   Cooperating Organisations: CDA, MLRRWD

2. A coordinated approach to land use planning and development decision-making by conducting a review of the existing land use plan and problems of implementation; recommending revisions to the plan and policies; and creating more effective implementing mechanisms. Revisions to the land use plan and implementing mechanisms must address environmental carrying capacity; environmental impacts of development; shoreline protection; public amenities and infrastructure (such as telephones, power lines and water); compatibility of adjacent land uses; and the relationship of sector-specific development with other sectors of the economy.

   Lead Organisation: Provincial Administration
   Cooperating Organisations: CDA, MMC, MLRRWD, MENR

3. An institutional review of how development decisions are made and enforced. Attention must be given to how existing land use policies, plans and regulations; public services and infrastructure; supply and demand; and environmental impacts affect these decisions. Results of the institutional review need to be used to make recommendations for changes.

   Lead Organisation: Provincial Administration
   Cooperating Organisations: CDA, MMC, Attorney General

4. A housing plan that focuses on providing low-income affordable housing in areas where squatters and shanties currently exist, and manages the growth of new residential development between the coast road and the beach hotels.

   Lead Organisation: MMC
   Cooperating Organisations: CDA, NGOs, MPWH

2.5 Water Quality

FINDINGS OF FACT

Groundwater in the area—a major source of drinking water—is contaminated by fecal coliform, representing a significant public health risk. Surface waters in Tudor and Port Reitz Creeks may also be contaminated, representing a public health risk from human contact and consumption of contaminated shellfish and other seafood harvested from the area. Coastal water quality in the Mombasa Marine Park and Reserve is considered good at present. However, increased development and direct discharges from grey water (from kitchens, showers and sinks), sewage discharges, seepage from soak pits and improper disposal of dredge spoil are threats to water quality.

The Importance of Protecting and Maintaining Good Water Quality

Safe drinking water and clean marine water for recreational use and support of marine life are essential for the following reasons:

- **Health**: Safe water for drinking, bathing and recreation guards public health.
- **Environment**: Good quality water is essential to protect aquatic and marine life including seagrasses, fish, algae and corals.
- **Aesthetics**: Good quality water without odours is vital for attractive and pleasant surroundings.
- **Economics**: Maintaining good quality water is easier and cheaper than attempting to restore a polluted source.

Status of Water Quality in the Area

Groundwater

Water quality in wells and boreholes used for drinking water in the study area is declining. Sources of contamination include seawater intrusion, seepage of coliform bacteria and potential human pathogens from the septic tank/soakage pit system (*Table 2.5.1*). The porosity of the lime-

Table 2.5.1 Microbial Contamination of Well and Borehole Water in Mombasa District Inshore Water Sources

Source	No.	Coliform Count Per 100 ml	E. Coli Count Per 100 ml	Potability
Wells	20	25 - 1800+	0 - 1800+	No
Wells	3	0 - 4	0	Yes
*Boreholes	11	17 - 1800+	0 - 5	No
*Boreholes	1	0	0	Yes

Source: Assessment of Land-Based Sources of Marine Pollution along the Kenyan Coast (D. Munga, et al, 1993)

* Borehole water is treated with ultraviolet radiation. Drinking water standards in Kenya are: Coliform count <10/100 ml; there is no E. Coli count.

stone geology of the Bamburi area intensifies the contamination problem. Monitoring public water supply quality is the responsibility of the Mombasa Municipal Council (MMC), and the Ministry of Health (MOH). Sampling is not regular due to human resource and budgetary constraints.

Marine and Coastal Waters

There is no known quantitative information about potential water pollution in the Bamburi reef area. Observations indicate that some hotels discharge grey water directly into the reef area. Because there is no sewer system it is likely that some effluents from human wastes enter the reef waters through seepage from septic tank/soakage pit systems and direct discharge. Limited studies of the mangrove areas indicate that water quality in the creeks is degraded and fecal coliform in some cases exceeds safe limits (*Munga, et al, 1993*). Reports from local observers indicate that many industries and businesses along the edge of the creek discharge wastes directly into Tudor Creek. The Kenya Marine and Fisheries Research Institute, along with the Government Chemist, Kenya Wildlife Service and the Mombasa Municipal Council, has conducted studies from time to time on water quality of the creeks and reef area. However, no regular water quality monitoring program exists.

Sources of Pollution to Marine and Coastal Waters

The main types of contamination to the water systems of the area are sewage, stormwater, solid wastes, industrial effluents and sporadic oil spills.

Sewage: The Mombasa Municipality sewage system services only 17 percent of the population when it is operating (*GoK, 1974*). The MMC is responsible for the design, construction and maintenance of sewers and storm drains. The demonstration site is not sewered and relies primarily on septic tank/soakage pit systems to dispose of human waste. When full, these systems are pumped by commercial haulers and the waste is sometimes illegally disposed of at the Kibarani Dump site. Emptying of septic tank/soakage pit sludge directly into the sea and creeks sometimes occurs under the cover of darkness.

Stormwater: There is one storm water drain in the demonstration area whose outlet is near the Tamarind Hotel. This inadequate drainage allows rainwater to cause flooding and contamination of water sources during the rainy season. There are three stormwater drains into Tudor Creek and three others discharging into the Kilindini Creek from Mombasa Island. Two storm water drains from the north part of the mainland discharge into Tudor Creek. Stormwater introduces nutrients and pollution to surface waters.

Solid Wastes: Total annual solid waste generation in the Mombasa Municipality is 77,000 - 102,000 tonnes per year (*MMC, 1991*). The percentage originating from the study area is unknown. The municipal garbage collection service collects about 55,000 tonnes per year. The rest remains uncollected. Solid wastes, when left uncollected, can be carried by stormwater into marine waters. Solid wastes often include plastics and other non-biodegradable items that threaten marine life. The Mombasa Municipal Council is responsible for collection, transportation and disposal of garbage, and for management of the Kibarani dumping area, which borders directly on Tudor Creek. A number of suggestions have been put forward to consider privatisation of garbage collection, or alternatively, decentralising the current municipal depot system. In addition, efforts are underway to identify a new and appropriate solid waste dump site, but there is little public land remaining in the district which could be designated as a dump site.

Oil Pollution: The study area is near the oil tanker route from the Middle East. The high volume of traffic that transits this area increases the threat of a major oil spill. Oil pollution also results from normal oil transportation activities such as ship-to-shore transfer, tank washing and upland tank storage. These routine activities can result in spills of a lesser magnitude, but still have significant environmental consequences (*Figure 2.5.2*). For example, one spill of 5,000 tonnes in

Figure 2.5.2

Recent Oil Spills in Creek and Harbour Area	
1972	*1,500 tonnes*
1973	*2,100 tonnes*
1988	*5,000 tonnes*

Source: NOSRC, 1995

Kipevu killed approximately two hectares of mangroves at Kibarani in 1988. A considerable volume of oil is off-loaded in the harbour and pumped into storage tanks en route to the oil refinery.

The National Oil Spill Response Committee (NOSRC), of which the Kenya Ports Authority (KPA) is a member, is responsible for containing and cleaning up major oil spills. KPA is specifically responsible for cleaning up spills due to the day-to-day shipping activities within the port. The NOSRC has prepared an oil spill contingency plan, conducts training of response personnel and maintains clean-up and containment equipment at the port.

Consequences of Degraded Water Quality

Degraded water quality has impacts on both the environment and economic health of the area. Direct discharge of sewage and grey water onto the reef detracts from the desirability of the area for tourists. These pollutants coupled with others, such as stormwater and oil spills, can kill, weaken or retard growth of coral reefs, mangroves, seagrasses and associated aquatic organisms. As environmental systems degrade, public health problems from contaminated drinking water supplies, contaminated shellfish and contact with such water by recreational users (tourists), are likely to increase. In addition, as marine habitats such as coral reefs, mangroves and seagrasses are degraded, associated fish populations and fisheries production will also decline.

Current Management Framework

No national standards and criteria have been established for the quality of surface waters, including marine and estuary waters, nor have water bodies been classified against specific standards or goals. However, for potable and recreational waters, World Health Organisation standards have been adopted.

The pollution of coastal and marine waters by sewage, stormwater, solid wastes and oil spills could have a negative impact on tourism in the area.

ACTION PLAN
TO IMPROVE WATER QUALITY

Objectives

Objective 1: Restore and protect ground water quality to meet potable standards.

Objective 2: Improve coastal and marine water quality to allow safe harvest of shellfish and seafood, safe swimming and to sustain healthy coral reef and mangrove ecosystems, as well as associated seagrass beds and fish populations.

Objective 3: Protect the local population from health risks from drinking contaminated groundwater.

Action Strategies

Implement measures that will protect public health. Take immediate actions, including:

1. Installation of water purifiers, candle filters and other small filtration units for individual food establishments and residential units relying on ground water.

   Lead Organisation: MMC
   Cooperating Organisations: MOH, NGOs, GCD, MLRRWD, NWCPC

2. Public health education campaigns on health risks in areas which rely on contaminated ground water.

   Lead Organisation: MMC
   Cooperating Organisations: MOH, NGOs, GCD, MLRRWD, NWCPC

3. Increase and diversify sources of supply and reduce demand for existing piped potable water supplies as a means of decreasing reliance on groundwater as a source of drinking water supply. Establish current and future water supply needs as described in Section 2.4, Planning Strategy 1. Reduce demand and extraction rates of groundwater to help prevent and reduce saltwater intrusion and contamination, using measures that encourage rational use of water directed at the users. Actions for reducing demand for piped potable water are described in Section 2.4, Action Strategy 2.

   Lead Organisation: MLRRWD
   Cooperating Organisations: CDA, NGOs, MMC, NWCPC, Kenya Oil Refineries, Kenya Navy

Planning Strategies

Complete a comprehensive water pollution management plan for the area that addresses:

1. The feasibility of constructing a centralised wastewater treatment plant for the Nyali-Bamburi-Shanzu area which would serve the commercial, residential and hotel communities. Special attention should be given to modern technologies for recycling wastewater for irrigation purposes and recharging groundwater supplies, and to deep-well injection of wastewater. In addition, attention needs to be given to alternative means of operation to avoid the problems of the Mombasa Island waste treatment plant, such as parastatal status, private sector management, financing and fee structures, and training of operation and maintenance personnel. Alternatives to centralised sewage treatment such as package treatment plants also need to be explored. The study should outline options for repairing and restoring the existing sewage treatment plant on Mombasa Island.

   Lead Organisation: MMC
   Cooperating Organisations: CDA, MLRRWD, KMFRI, GCD

2. Establishment of a regular monitoring program of groundwater in the area.

   Lead Organisation: MMC
   Cooperating Organisations: MLRRWD, GCD, KMFRI

3. Establishment of a regulatory or non-regulatory water quality management program that sets water quality goals, standards and criteria for marine and coastal waters and incorporates:

   - Water quality monitoring for coastal and marine waters, including monitoring of discharges from establishments on beach fronts and along the creeks.

   - The control of point source discharges, specifically those from ships, hotels and commercial and industrial establishments discharging into the reef area and creeks.

   - The control of nonpoint sources of pollution, specifically from urbanised and developed areas and upland agricultural areas.

   - Storm water catchment and treatment.

   Lead Organisation: MMC
   Cooperating Organisations: KMFRI, GCD, CDA, KPA, FD, KWS

4. Review existing institutional structures and take necessary steps to strengthen, harmonise and reactivate relevant institutions and programs to ensure, establish and maintain a water pollution management plan and monitoring program.

   Lead Organisation: MMC
   Cooperating Organisations: MLRRWD, GCD

2.6 Reef Fisheries

FINDINGS OF FACT

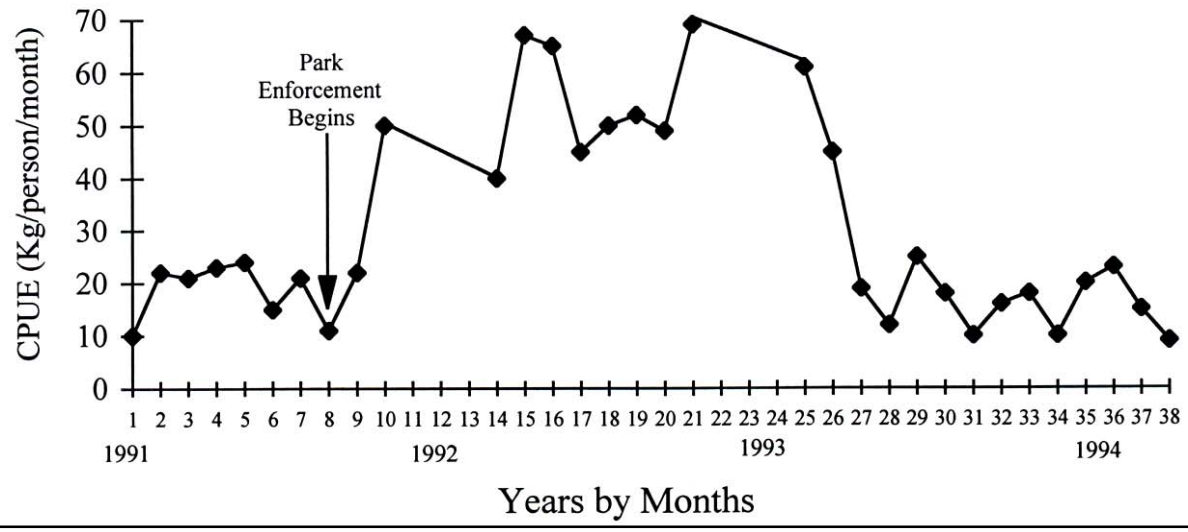
In the past decade, the fishing area in the North Coast area has been reduced by 10 km^2 with the creation of the Mombasa Marine Park and Reserve. This has had an affect on the location of fisheries catch, effort and landings. Changes in the fishing industry have also been shaped by an increase in shoreline and water-dependent tourism activities and the development of residential and commercial establishments.

Trends in Fisheries Catch and Effort

The most accurate data collected on the impact of the Marine Park and trends in the fisheries was done by McClanahan and Kaunda-Arara. These studies focused on the Park's impact on one fishing area adjacent to the Bamburi landing area. Although these findings focus on only one part of the study area, they provide critical insights about the effect of the Park on increasing catch and its impacts on fishing activities. The McClanahan and Kaunda-Arara data show that in 1986, prior to the creation of the Mombasa National Marine Park and Reserve, there were an estimated 200 to 350 fishermen concentrating effort in the approximately 20 km^2 reef area between Tudor and Mtwapa Creeks (*Map 2.6.1*). There are three landing sites for this area: Nyali Beach, Bamburi (Kenyatta Beach) and Mtwapa Creek. The fishing methods used were primarily traps, gill nets, spear guns and pull seines. Reliable data for fish landings for the area prior to the Park and Reserve's establishment are available only for the Bamburi area. Using these data, the total catch/area was estimated at approximately 367 kg/km^2/month. Extrapolating for the entire area, the total catch/area for the fishing grounds between Nyali and Mtwapa Creek was estimated to be 3,495 kg/km^2/month.[1]

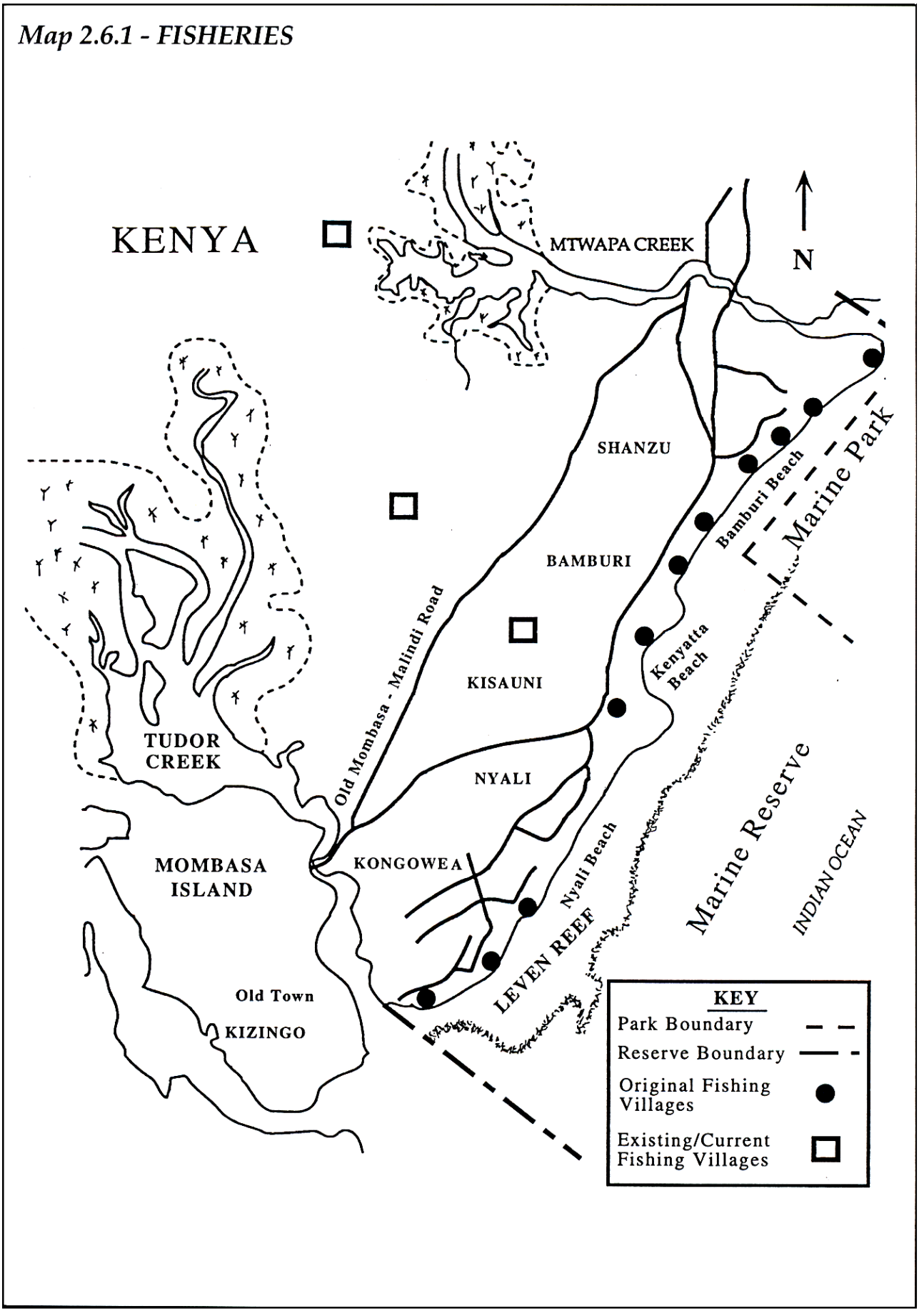
These data are likely an underestimation of actual catches due to inconsistent data collection by the Fisheries Department, and night poaching, which existed at significant levels until 1992. It is likely that some night poaching continues at the present time. To account for this underestimation, figures should be multiplied by a factor of 2.5 (*McClanahan, pers. comm., 1996*). Therefore, total catch in the reef area between Nyali and Mtwapa Creek, prior to the Marine Park and Reserve, is estimated to have been about 8,737 kg/km^2/month.

Figure 2.6.1 Catch Per Unit of Effort (CPUE) for the Bamburi Area, 1991-94



[1] *extrapolation = (total area - Bamburi area) * Bamburi area catch - 20% (as adjustment for fraction of landings made at Nyali and Mtwapa Creek compared to Bamburi.) (McClanahan and Kaunda-Arara, 1995).*

Map 2.6.1 - FISHERIES



In 1986, the northern 10 km^2 of the area was designated a Marine Park, with all fishing excluded. The remaining area was gazetted as a Reserve in which only traditional fishing methods were allowed. However, the Park's rules were not fully enforced until 1992, with a gradual reduction of fishing effort from 1989 to 1992. The estimate for the catch in the Bamburi area in 1993 was 843 kg/km^2/month and for the total area was 16,860 kg/km^2/month (*McClanahan and Kaunda-Arara, in-press*). These figures suggest that catch/area increased after the Park's rules were fully enforced. However, current data for the Bamburi area show that this initial gain has decreased over time (*Figure 2.6.1*). This trend is likely indicative of the entire area.

Other key findings include:

- Catch per fisherman for the Bamburi area fishing briefly increased, showing the Park's potential for supporting a productive fishery, but was not sustained and returned to pre-Park levels.

- To increase catch, fishermen have recently learned that traps put closer to the Park boundary catch more fish, and they have modified their fishing behaviour accordingly. Therefore, the higher density of traps and effort along the border may act as a barrier for fish moving from the Park to the Reserve.

- A comparison of catch per fisherman between the Bamburi and Nyali fishing grounds showed Bamburi landings were significantly higher (approximately 20 percent). They attribute this to the proximity to the Marine Park.

Socioeconomic Trends in the Fisheries

Fishing is an important part of the economy because it provides at least a portion of income and food for fishermen's families (*McClanahan and Kaunda-Arara, in-press*). However, the fishing industry has been significantly affected by the development of residential and commercial establishments and tourism-based economy.

Number of Fishermen

The number of fishermen per km^2 in the area has remained relatively constant (*McClanahan and Kaunda-Arara, in-press*). Fisheries statistics show that there were 260 registered fishermen landing fish at the two sites in the south of the Park, which are being used by the fishermen working in the study area's reef lagoon. Before the park, the fishermen density was 12.7 fishermen/km^2. After the Park's creation, the density was 11.8 fishermen/km^2. This suggests that fishermen exit and enter the fishery depending on catch, and not on available fishing area, maintaining a stable density of registered fishermen. There are observations of additional high numbers of unregistered fishermen who work in the fishery on a part-time basis. They appear to have alternatives to fishing, such as tourism, and use fishing for a supplemental or seasonal income and food source (*McClanahan and Kaunda-Arara, in-press*).

Displacement of the Fishermen

As land was converted for hotel and residential development along the shorefront, traditional fishing villages were displaced. The original fishing villages were moved from the beach front to hinterland locations, some as far as 12 km away, thus disrupting the fishermen's lifestyle and culture. Today, few shorefront fishing villages remain, and fishermen are forced to commute long distances to their boats at greater expense. This has consequences, such as increased incidents of vandalism to fishing boats left unattended (*Map 2.6.1*).

Fishermen Have Lost Access to the Beach

The number of fish-landing sites which fishermen have access to has declined. Developers have fenced off previously used lateral access points to the shoreline. This has also contributed to increasing the number of commutes for the remaining fishermen and has increased the distances between landing sites and traditional fishing grounds. There are eight designated landing

sites in the study area. All except three have already been converted to other uses. Access to designated landing sites has been made even more difficult because the Fisheries Act does not legally delineate access site size and location.

Fishing Has Lost Esteem

The community in general now holds fishing as an occupation in low esteem. Youth consider fishing as a last-choice career and most prefer other occupations. The older generation who continue with full-time fishing remain poor. Many fishermen are retired from other jobs and use fishing to generate subsistence income.

Evolution of the Fish Dealer

The long distance from the beach to the fishing villages has made it difficult for fishermen to sell their fish directly at the market. After returning from the fishing grounds, fishermen are willing to sell their catch to fish dealers at the beach landing points who guarantee an easy market for them at all times. The fish dealers then transport the fish to markets in Mombasa where they are sold for a profit. As the fish dealers sell the fish at higher prices, they can afford to purchase fishing vessels while fishermen themselves can no longer afford to buy their own boats. This has made the fisherman dependent on the fish dealers for the provision of vessels and fishing gear, which the fisherman pays for by surrendering three-fourths of his daily catch. It is significant to note that women participate effectively as dealers in the fishery industry.

Current Management Framework

In the past, traditional fishing was managed by village elders. They made decisions on the utilisation of fishing grounds and seasonality of fishing, as well as demarcating marine *Kayas* (traditional conservation areas) on the reef. Traditional management practices in the area have completely disappeared, although older fishermen still recall their use decades ago. At present, several institutions play important roles in management of the fishery.

The Fisheries Department has a legal mandate that provides for development, management, exploitation, utilisation and conservation of fisheries and connected purposes. The Kenya Wildlife Service has a legal mandate to control use activities, as well as oversee the use of fishing gear and fishing practices within marine parks and reserves.

Building new fish landing sites, or bandas, *is a key action strategy for Kenyatta Public Beach.*

ACTION PLAN
FOR REEF FISHERIES

Objective

Objective 1: Maintain a small, sustainable artisanal fishery which is profitable for the fishermen and of economic benefit to the area.

Action Strategies

(NOTE: Strategies with a š indicate a current, ongoing demonstration project initiated to test ICAM implementation in the area. For additional details about the ongoing projects see Annex 2.)

To stabilise the existing fishing industry, the following actions should be implemented:

š 1. Improve fisheries infrastructure support facilities at Kenyatta Beach by:

- Improving the conditions of existing structures at fish landing sites.

- Building fish *bandas* for boat operators and local fishermen with necessary facilities for ice-holding, a cleaning platform and net/engine storage.

- Building restroom facilities for use by fishermen, boaters, beach operators and the general public that are operated and maintained jointly by the fishermen, boaters, beach operators and municipalities. (*Also see Section 2.4, Action Strategy 1 and Section 2.9, Action Strategy 1*).

Lead Organisation: FD
Cooperating Organisations: Fishermen, fish dealers, boat owners, KWS, KMFRI, CDA

2. Enforce existing KWS conservation and management actions and fisheries regulations, focusing on reducing night poaching in the Marine Park and enforcing existing KWS rules in the Reserve.

Lead Organisation: KWS
Cooperating Organisations: FD, fishermen, CDA

3. Develop a task force for surveillance and enforcement of existing conservation and management actions.

   Lead Organisation: KWS
   Cooperating Organisations: FD, CDA, fishermen

4. Establish an education program for fishing organisations regarding sustainable use of the resource.

   Lead Organisation: FD
   Cooperating Organisations: Fishermen, fish dealers, boat owners, The Wildlife Conservation Society, KWS, KMFRI, CDA

5. Support reef restoration projects and activities detailed in Section 2.7, Planning Strategy 3.

   Lead Organisation: KWS
   Cooperating Organisations: FD, fishermen, fish dealers, The Wildlife Conservation Society, boat owners, KWS, KMFRI, CDA

Planning Strategies

To make the current fishery profitable and sustainable, a fisheries management plan is required. The goals of the management plan should be to regulate the inshore fisheries to sustainable exploitation limits, and to increase the incomes of the area's fishermen.

The planning effort should:

1. Evaluate the configuration and management of the existing Marine Park and Reserve boundary. Focus on increasing the area-to-edge ratio of the Park and Reserve and develop new co-managed systems through joint decision-making among fishermen, community-based groups and tourism industry representatives with government agencies such as the Fisheries Department and Kenya Wildlife Service.

2. Institute management measures to protect the resources from further degradation and over-exploitation. Measures may include limits on the total number of fishermen, gear restrictions, closed seasons and minimum sizes of fish caught.

3. Prepare amendments to the Fisheries Act so that the landing sites' location, size and status are legally delineated and title deeds issued. (*Also see Section 2.9, Planning Strategy 1.*)

4. Support ongoing and additional research needed to answer questions related to management concerns, including assessment of the status of offshore and inshore stocks, and socioeconomic studies of local fishermen and their communities. This research should be coordinated among key agencies.

5. Include input from fishermen from local villages, marketers, fish dealers, boat owners, the Kenya Wildlife Service, the Fisheries Department and Kenya Marine and Fisheries Research Institute in the planning process.

Lead Organisation: FD
Cooperating Organisations: CDA, fishermen, fish dealers, boat owners, KWS, KMFRI

Future planning strategies for fisheries will focus on the joint management of the Mombasa Marine Park and Reserve.

2.7 Marine Habitats

FINDINGS OF FACT

Important marine habitats in the area include mangroves, coral reefs, turtle nesting beaches and seagrass beds.

Mangroves are threatened by overharvesting and potential pollution from increased port activities. Coral reefs have sustained physical damage from tourists and boats, and are impacted by siltation from dredge spoils dumped at the mouth of Tudor Creek, and overfishing and pollution from direct discharges of wastewater from hotels. Coral condition in the Mombasa Marine Park and Reserve remains poor.

Beaches have been degraded by growing development, and increased uses have caused the loss of turtle nesting sites. Seagrass beds are threatened by potential pollution and adverse impacts from fisheries and shoreline erosion.

Information on marine habitats in the area is scarce. Data about the health of these important systems are limited or unavailable.

Mangroves

Mangroves are terrestrial woody trees or shrubs which are adapted to life in intertidal aquatic habitats that are under the influence of both freshwater and seawater. They are an important tree system.

The Importance of Mangroves

Historically, mangroves supported important economic activities such as mangrove harvesting, woodworking, handicrafts, boat building, charcoal burning, small scale farming, shell collection and honey gathering. In all major mangrove forest areas, commercial cutting activities account for up to 60 percent of the total income for mangrove inhabitants. In minor mangrove forest areas, fishing accounts for about 70 percent of total income and mangrove cutting for 15 percent (*Ruwa, pers. comm*).

Because of their rooting systems, mangroves help protect against erosion of the shore and even encourage seaward build-up of sediments. The canopy of mangroves acts as an efficient wind breaker, and helps in stabilisation of sand dunes.

Mangrove biotopes act both as nursery grounds for the young and feeding grounds for adult or sub-adult fish. Therefore, mangroves enhance fish yields. Studies show that fish landings will decrease from filling, deforestation or over-exploitation of mangrove areas.

Mangroves act as nutrient traps by absorbing nutrients from effluent as it transits mangrove areas. Mangroves also increase biodiversity in estuarine and brackish water intertidal zones.

Mangrove vegetation along the coastline provides important landmarks for coastal and marine migratory birds. It also provides clues to finding watering points, as seepage of fresh water from underground aquifers commonly occurs in mangrove areas.

Status of Mangroves in the Nyali-Bamburi-Shanzu Area

The mangrove areas within the Mombasa Municipality have become peri-urban. (*Map 2.7.1 shows the location of mangrove systems in the study area.*) The mangrove communities and fishing vil-

MANGROVES

The species of mangroves in Kenya are:

Rhizophora mucronata
Sonneratia alba
Bruguiera gymnorrhiza
Ceriops tagal
Xylocarpus granatum
Heritiera littoralis
Lumnitzera racemosa
Avicennia marina
Xylocarpus moluccensis

Rhizophora mucronata (*Mkoko* in Swahili) is the most dominant mangrove species in Kenya.

lages in Tudor and Port Reitz Creek no longer retain their traditional lifestyles or employment. Fishing and mangrove cutting are no longer the mainstay economic activities. This change was brought about by urbanisation, rapid population growth and overexploitation of the resource. Today, mangrove dwellers rely on alternate sources of income such as poultry, market gardening and making pottery for sale to tourists. Newer alternatives such as eco-tourism at Tudor Creek are also starting to emerge.

Uses of Mangroves

Although dependence on the mangrove resources has significantly declined, some villages still exploit mangroves for their wood both for commercial sale and subsistence use. Depending on the size class, mangrove wood can be used for building purposes, firewood or making charcoal. Mangroves are used in clay works as a source of fuel wood. In the Mombasa area, due to overexploitation, the wood that is available is mostly suitable for charcoal or fuel wood, although some wood in the *Fito* or *Pau* classification is suitable for building. Larger categories sold by Mombasa retailers are imported from Lamu and other outside locations (*Tables 2.7.1 and 2.7.2*).

Causes and Consequences of Degraded Mangrove Ecosystems

The most significant impacts on mangroves in the Mombasa area are:

- Dumping of solid organic wastes and non-biodegradable materials, sewage and industrial toxic wastes. These toxic materials kill mangroves and decrease mangrove germination.

- Oil spills from the port area. In 1988 an accidental spill from a punctured tank killed two hectares of healthy mangroves near Kibarani. Natural regeneration and attempts at replanting have failed to result in restoration of this area.

- Clearing of mangrove trees to create access routes to shorelines and pave the way for physical developments. This causes hydrodynamic changes in sea currents and encourages erosion of the shoreline.

- Overcutting of mangroves. This results in:

  - Loss of many arboreal organisms, both in terms of number of organisms and species, due to a breakdown in the food chain.

  - Loss of fisheries breeding grounds.

  - Loss of canopy, which eliminates the existence of some terrestrial organisms (e.g., monkeys, birds, etc.) and shade-preferring benthic species, thus reducing biodiversity.

Table 2.7.1 Categories of Commercial Size Classes of Mangroves

CATEGORY (Swahili local name)	*DIAMETER SIZE CLASS (cm)*
Fito	***2.5 - 3.5***
Pau	***4.0 - 7.5***
Boriti	***8.0 - 11.0***
Nguzo 1	***14.0 - 16.5***
Nguzo 2	***17.0 - 20.0***
Nguzo 3	***20.5 - 30.0***
Banaa	***Over 30.5***

Source: Kenya National Environment Secretariat (KNES)

- Reduction of the litter fall over time, which disrupts the detritus-based food chain that is the basis of the community support system in the mangrove ecosystem.

- Inability to produce poles for the building industry.

- Reduction in number of seeds.

- Soil erosion from subsistence farming activities around the environs of the catchment areas of the rivers draining into the Mtwapa and Tudor Creeks leads to enhanced sediment input in the estuaries. This has resulted in shore accretion, causing high-gradient shore profiles that do not support fringing mangroves.

- Improper oyster harvesting from mangrove areas has led to the death of mangroves through constant cutting of root systems.

Existing Management Framework

Licensing of mangrove cutting is done by the Ministry of Environment and Natural Resources, Forestry Department. However, there is inadequate control and supervision over the exploitation of mangroves. Mangrove wood dealers are licenced, but the individual cutters are not. Licensing of oyster collectors is done by the Fisheries Department.

Coral Reefs

Along its coastline, the area has an extensive fringing reef made of hard corals. The reef extends from the mouth of Tudor Creek to the mouth of Mtwapa Creek. The reef edge extends out approximately one to two kilometres from the shoreline.

Importance of the Fringing Coral Reef Along the Nyali-Bamburi-Shanzu Area

Fringing coral reefs are important to the area for a number of reasons. The fringing coral reef along this coast dissipates wave energy built up over a long fetch, thus it protects the shoreline from erosion. Coral reefs are also a source of sand for local beaches.

Table 2.7.2 Some Uses of Various Species of Mangroves

USE	*SPECIES*
Building wood for craft-making, boats, furniture, etc.	*Ceriops tagal, Rhizophora mucronata, Bruguiera gymnorrhiza, Heriteria littoralis, Xylocarpus granatum*
Firewood and Charcoal	The above species also offer the best firewood, but are more valuable as a source of building wood. *Avicennia marina, Lumniterza racemose* and *Sonneratia alba* offer an inferior wood used mostly forfirewood.
Fodder	*Avicennia marina*
Floats for nets	Breathing roots of *Sonneratia alba*

Map 2.7.1 MARINE HABITATS

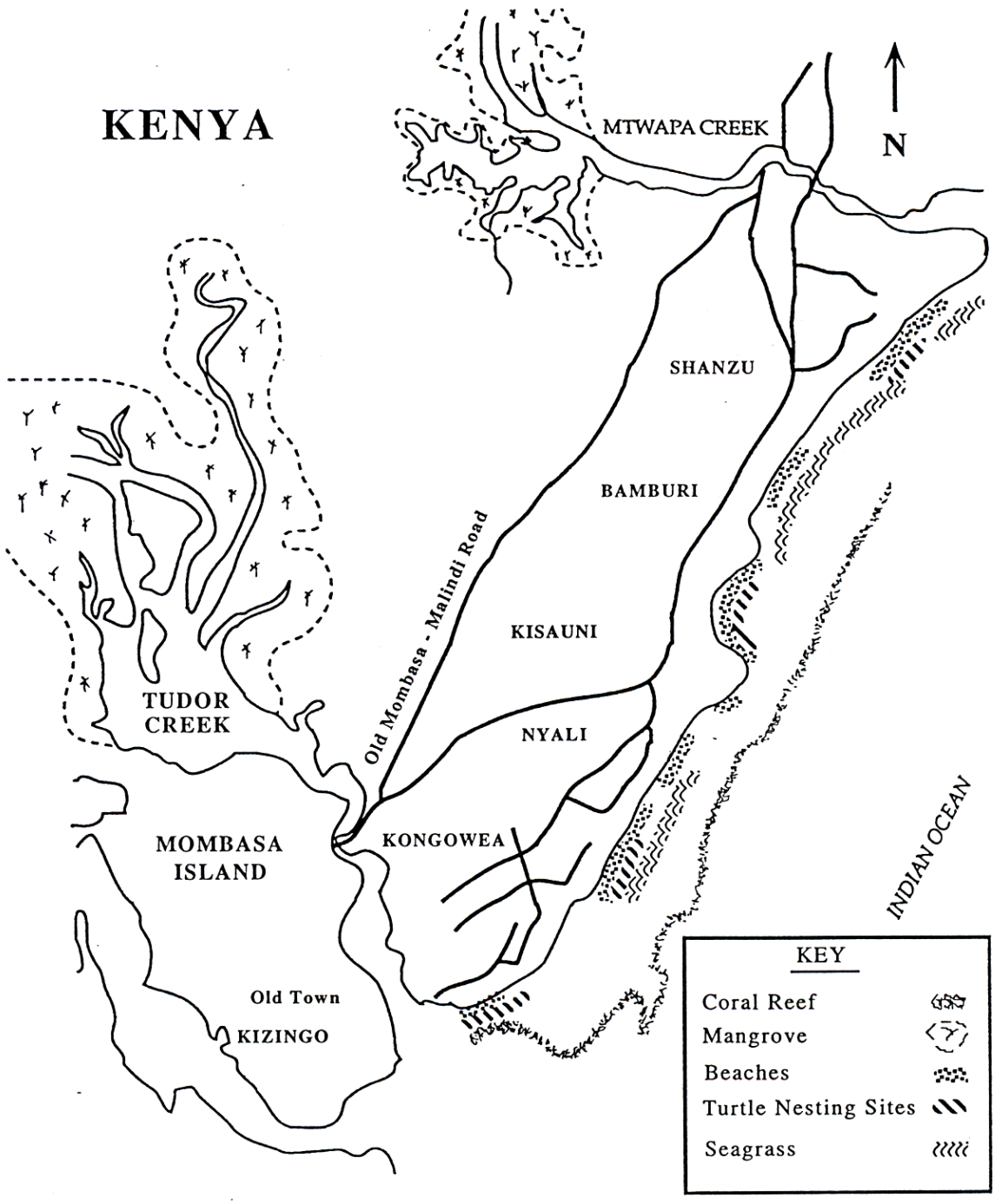
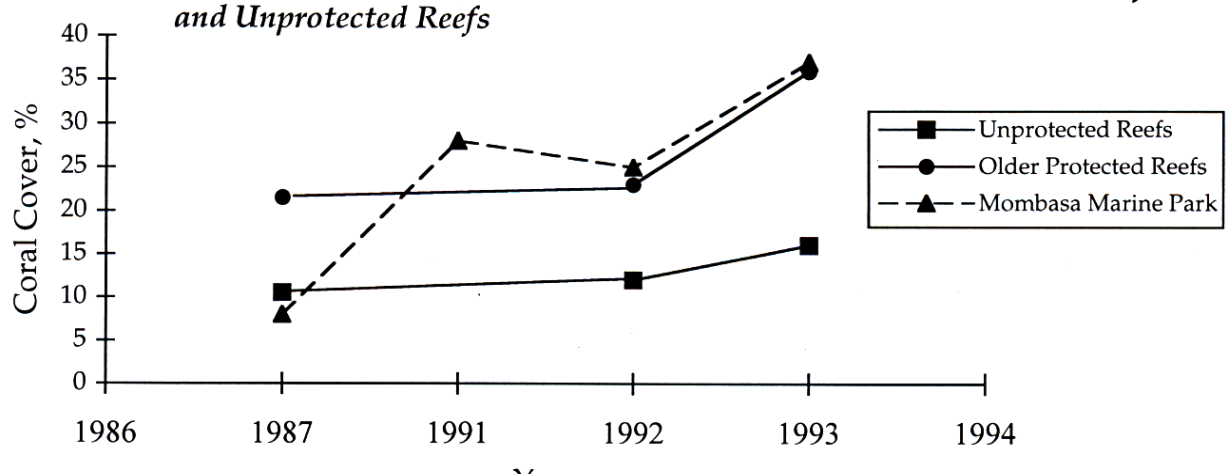


Figure 2.7.1 Percent Coral Cover for Mombasa Marine Park, Older Protected Reefs and Unprotected Reefs



Source: McClanahan and Obura, 1995

Corals attract and allow for a high species diversity of flora and fauna, most conspicuous being fish fauna. Historically, coral reefs support small-scale artisanal fishing.

Coral reefs are economically important. They support tourism-related businesses including boat tours, snorkelling, diving, sport fishing and sightseeing in the Mombasa National Marine Park and Reserve for thousands of foreign and domestic tourists. On a per unit area basis, coral reefs earn a gross income of approximately $25,000 (U.S.) per sq. km. per year if managed as a park, and $10,000 (U.S.) per sq. km. per year if managed for fishing (*McClanahan and Obura, 1995*). Mombasa Marine Park received over 36,000 visitors in 1991 and generated revenues from park fees of over $67,000 (U.S.), well above the average earnings of any other National Marine Park (*McClanahan and Obura, 1995*).

Condition of the Coral Reefs

Reef condition and fish biomass in the Mombasa Marine Park have made rapid and dramatic recoveries since the Park was established. Current coral condition is comparable with the condition seen at some of the older marine parks and is now approximately 45 percent live coral cover (*Figures 2.7.1 and 2.7.2).* However, coral cover in the Marine Reserve remains low at about nine percent coral cover (*McClanahan, pers. comm.*) which is similar to other unprotected areas in Kenya.

Causes of Reef Degradation

The poor condition of coral in the Mombasa Reserve may be due to several factors, including overfishing, excessive sea urchin populations, siltation from dredge spoils and damage from boats and tourists. Land-based sources of pollution such as wastewater discharges from hotels, stormwater runoff and seepage from soak pits also harm the coral. Specific causes include:

- Coral damage by park users, including snorkellers and divers, and by boat anchors.
- Selective removal of predator fish which feed on sea urchins. Resultant high density of sea urchins leads to the weakening of the reef due to burrowing activities of sea urchins and coral cover. This also leads to lower levels of calcium carbonate deposition, an important source of sand along many eroding coastlines.
- Reduction of coral cover and biodiversity due to overfishing of large and predator species of fish.
- Pollution from direct discharges of wastewater from hotels and seepage from soak pits.

- High sediment and silt loads which can kill coral, which needs clean and clear water. Dredge spoils from Port Reitz are dumped near Nyali Beach and the mouth of Tudor Creek. Sediment and silt from the dredge spoil drifts northward over the reef with the prevailing currents. Another source of siltation may come from the Mtopanga River.

- Oil spills which can kill coral reefs. A major oil spill from a tanker enterin Mombasa Port can cause significant damage to the reef and greatly affect the tourism industry, particularly if beaches are also impacted.

- Poor farming methods in the catchment area which can increase nutrient and sediment loads, both of which can be detrimental to coral reefs.

- Reef degradation which may be caused by fish collecting for the aquarium trade.

Existing Management Framework

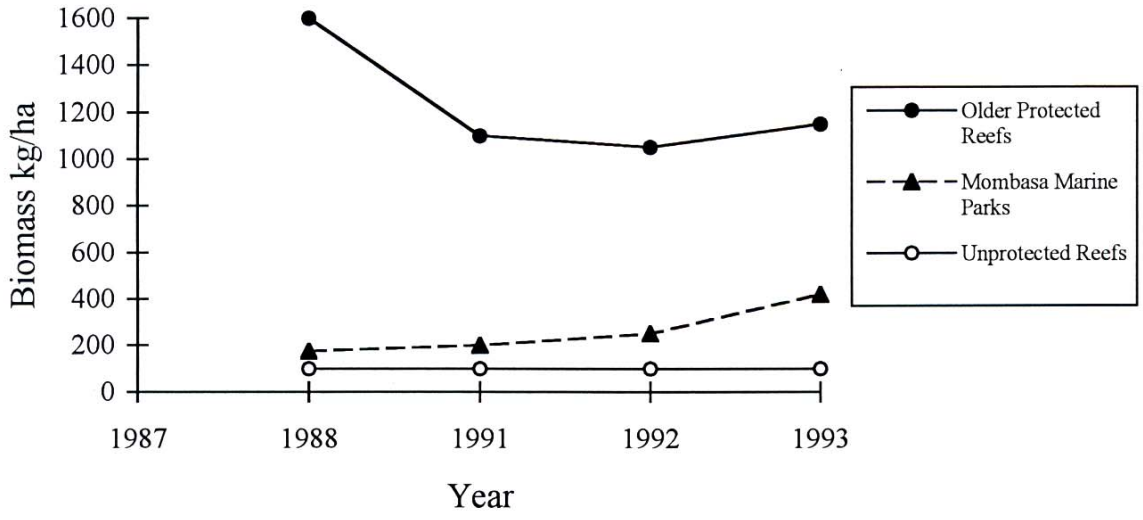
At the moment, there are no local regulations for controlling the number of glass-bottom boats and/or tourists using the reef. Two mooring buoy systems have been installed by the Kenya Wildlife Service (KWS) to reduce damage to corals from anchors. Marine Park management plans are continually updated by KWS, but do not yet adequately address intensified use of the Park and Reserve and the associated impacts. In addition, increased development on land which impacts the Park is beyond the jurisdiction of KWS. The Service has limited authority for managing uses in the Marine Reserve. The Fisheries Department has a Fisheries Act which forbids collection of coral heads, both live and dead.

Beaches and Sea Turtles

Status and Trends in Sea Turtle Nesting in the Bamburi Area

The Bamburi area contains many sandy beaches that make them an ideal habitat for turtle nesting. Historically, turtle nesting sites existed in the study area but the frequency of sightings has been declining. Sea turtles can be an

Figure 2.7.2 Total Biomass for Fish in Mombasa Marine Park, Older Marine Parks and Unprotected Reefs



Source: McClanahan and Obura, 1995

important tourist attraction if they are protected from harassment while nesting. Two varieties of endangered species, which nest in the English Point, Mackenzie, Nyali, Bamburi and Serena areas are the green turtle (*Chelonia mydas*) and hawksbill turtle (*Eretmochelys imbricata*) (*IUCN, 1994*).

Causes of the Decline in Sea Turtle Nesting

Increased human settlement and development of the areas adjacent to sea turtle nesting beaches have caused the poaching of eggs for human consumption. While sea turtle egg collection is illegal, enforcement by local authorities is difficult and local residents are often unaware that sea turtles are endangered and in need of greater protection.

Lights from hotels, residential houses and street lights confuse turtle hatchlings. Lighting near nesting sites causes the turtles to move in the wrong direction, inland towards the lights, rather than towards the sea and safety from predators.

Construction within previous nesting areas has further impacted turtle populations. Seawalls present a barrier which prevents female turtles from climbing to nesting sites and reduces the availability of sandy shoreline on which they can nest. Increased on-the-water recreational activities, such as personal water craft use, may also be disturbing the turtles.

Current Efforts and Regulations to Protect Sea Turtles

The Baobab Trust sea turtle conservation project pays fishermen and other people to protect nest sites. This program has had a positive effect on the frequency of nesting and quantity of hatchlings which return to the sea along the North Coast. The program is based on an economic incentive which makes it more profitable to protect nesting sites and hatchlings than to poach eggs for sale in markets. Unfortunately, while this program is having a positive impact on reducing poaching, the problems of loss of nesting habitat and evening lighting remain unaddressed. A multi-agency marine turtle committee composed of government institutions, beachfront property owners and fishermen has further complemented the work by Baobab Trust.

Laws Governing Sea Turtle Protection

Egg poaching and killing of turtles for human consumption or other purposes is illegal. There are no guidelines or regulations concerning viewing or beachfront lighting systems. The Mombasa Municipal Council has a 100-foot (37.7 m) development setback along the shoreline of the marine parks which protects nesting habitat, however there are several seawalls constructed along Mombasa Marine Park beaches which are in violation of this regulation.

Seagrasses

Seagrasses are an important part of coral reef and estuarine ecosystems. They provide fish habitat, breeding space and nursery grounds for important commercial and reef fishes. Healthy seagrass beds help to grip sediments together by the action of their root systems thus helping to curb erosion of the sediments. The leafy species provide fodder for herbivorous fish, marine turtles and dugongs. These species also carry epiphytic marine algae, some of which are of economic importance (e.g., the agar-producing phodophytes). Various faunal species find suitable sanctuary among the roots, or in firm sediments stabilised by the seagrasses, thus enhancing biodiversity. Shell collecting by local community members, especially for the large gastropods, occurs in the seagrass beds where many types of mollusk reside. The shells are sold commercially as curios in the tourist trade.

Healthy seagrass beds are found on Leven Reef. The extent of seagrasses on the reef and in Tudor Creek is unknown. Nutrient loading in Tudor Creek is high and may be a threat to seagrass communities in the estuary. Seagrasses can be impacted from high nutrient loading that can cause plankton blooms in the water which block light needed by the seagrasses.

Seagrasses seasonally deposit dead leaves onto the beaches in the Bamburi area as a naturally occurring phenomenon. However, hoteliers often see the seagrass that washes ashore as a nuisance because they perceive that clean, white sand beaches are preferred by tourists.

Existing Management Framework

There is no specific management regime to protect seagrass beds from exploitation and pollution. Seagrass is regulated under the general framework of the Fisheries Act on biological resources.

Local children learn about Kenya's marine biodiversity at an early age.

ACTION PLAN
FOR MARINE HABITATS

Objectives

Objective 1: Establish the sustainable use and conservation of coral reef, seagrasses and mangrove habitats.

Objective 2: Restore degraded marine habitats to levels that can support sustained use.

Objective 3: Enhance the protection and management of turtle nesting sites.

Action Strategies

(NOTE: Strategies with a š indicate a current, ongoing demonstration project initiated to test ICAM implementation in the area. For additional details about the ongoing projects see Annex 2.)

Mitigate and, where possible, eliminate activities that damage the marine habitat.

1. Initiate small-scale projects that will protect marine habitats and demonstrate ICAM concepts.

   • Establish mooring buoys and manage them cooperatively with the private sector.
   •Utilize low-level lighting at beach structures during nesting season.
   •Install signs to educate the public about the importance of turtles.

   Lead Organisation: KWS
   Cooperating Organisations: CDA, KMFRI, NGOs, FD

2. Establish a comprehensive environmental education and awareness program for different target groups to enhance public awareness of the value of marine habitats, and to foster public support of initiatives to protect habitats for a sustainable balance of uses.

   Specific education and awareness activities may include:

   •Develop and distribute educational posters for mangroves, coral reefs, seagrasses and turtle nesting sites, and distribute in cooperation with other agencies, NGOs and the private sector.

- Create apprentice programs for older mangrove cutters who teach new cutters their special knowledge for sustainable harvesting.

- Educate mangrove cutters on size and spacing of cutting; monitoring of cutting and enforcement of the Forest Act as it pertains to mangroves.

Lead Organisation: CDA
Cooperating Organisations: KMFRI, KWS, Forestry Dept., FD, NGOs

Planning Strategies

Existing and new initiatives need to complement one another so that the individual habitats—seagrass, beaches, corals and mangroves—are managed as a connected ecosystem. This will ensure that the health of the habitats and the economy which is dependent on them is maintained. To make progress on this strategy, the following should be initiated:

1. Develop a cooperative program between the Departments of Forestry and Fisheries, and Kenya Wildlife Service to share boats, personnel, etc., to help one another implement conservation and enforcement activities for reefs, mangroves, seagrass beds and turtle nesting sites.

   Lead Organisation: CDA
   Cooperating Organisations: Forestry Dept., FD, KWS, trawler operators/owners

2. Establish a specific monitoring scheme for each habitat that includes consistent monitoring parameters, protocols and mechanisms for implementation.

   Lead Organisation: KMFRI
   Cooperating Organisations: Forestry Dept., FD, KWS

3. Establish projects that will make immediate progress towards restoring marine habitats. Suggested projects are: mangrove rehabilitation at Kibarani, Jomvu and Miritini; snorkelling and free diving sites in the marine park; and sanctuaries for turtles at Serena (Shanzu).

   Lead Organisation: KWS
   Cooperating Organisations: CDA, KWS, KMFRI, Forestry

Dept., FD

4. Promote multidisciplinary research on natural forces of habitat degradation (including pests, diseases, abuse, etc.) in order to devise effective strategies for restoration. Translate research findings into simple management recommendations and actions that can be understood and applied in the field by various stakeholders and practitioners. For each habitat, develop management measures in cooperation with user groups (e.g., mangrove cutters, hoteliers, boat operators) which address:

Mangroves:

- Licence mangrove cutters to legalise their activities.
- Produce guidelines on allowable size and spacing of cutting.
- Create alternatives to wild oyster harvesting that prevent mangrove root-cutting, in order to stop the loss of mangroves and maintain substrate for oyster settlement.

Coral Reefs and Seagrass Beds:

- Control fishing efforts in Nyali Reserve to ensure a sustainable fishery. (*See Section 2.6, Planning Strategies*).
- Create use zones for reefs and grass beds. (*See Section 2.9, Planning Strategy 2*).

Turtle Nesting Sites (Beaches):

- Develop seasonal sanctuary sites at active nesting sites (*See Section 2.9, Planning Strategy 2*).

General:

- Incorporate measures to reduce nutrient, sediment and other pollution loading into and on marine and coastal habitats as part of a comprehensive water pollution management program for the area. (*See Section 2.5, Planning Strategy 3*.)

Lead Organisation: Forestry Dept.
Cooperating Organisations: FD, KMFRI, CDA, KWS, NGOs

5. Develop accurate habitat maps which include relevant user information that can be employed for management purposes.

Lead Organisation: KMFRI
Cooperating Organisations: CDA, KWS, Ministry of Water, FD, Forestry Dept.

2.8 Coastal Erosion

FINDINGS OF FACT

Many locations along the beaches of the Nyali-Bamburi-Shanzu area show signs of erosion which is beginning to impact existing coastal structures. A number of hotels have constructed seawalls at great expense to combat this problem. The aesthetic qualities of the shorefront, which are an important tourism asset, are being degraded by such works. There is limited information about long-term erosion rates and inshore reef coastal processes to adequately plan and guide shoreline protection efforts.

Extent and Location of the Problem

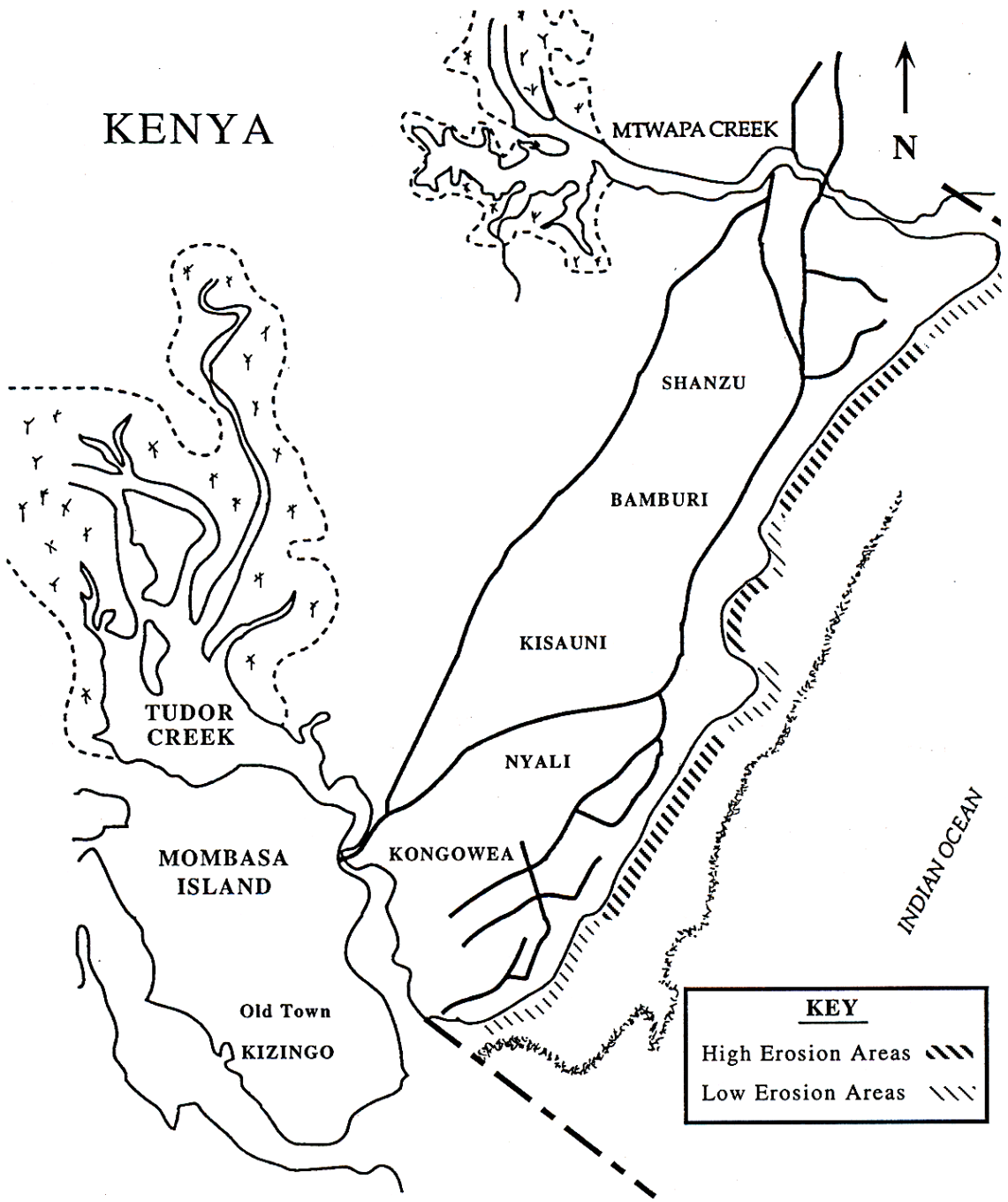
Bamburi and Kenyatta beaches are experiencing erosion which is directly impacting coastal development, especially construction of hotels. Coastal erosion is not a new phenomenon. However its importance as an issue has increased recently as hotels and other structures that were built in erosion-prone areas are being threatened by the gradual retreat of the shoreline. It has been estimated that the rate of erosion in the area ranges between 2.5 cm/year (in Shanzu) to 20 cm/year on Mombasa Island (*Abuodha, pers. comm.*). Specific data on long-term historic erosion rates in the Nyali-Bamburi-Shanzu area are not available. However, observation shows that erosion is occurring. Some areas along Bamburi beach are estimated to be eroding at a rate of two metres per year (*Map 2.8.1*). Some seawalls constructed along Bamburi beach and Nyali beach are poorly designed and in danger of collapse. Structures built on collapsing cliffs in Nyali and Leven are in imminent danger of falling (*Abuodha, 1992*).

Causes of Erosion

Erosion is caused by both natural and man-made forces. In the Bamburi area, the long fringing reef serves as natural protection for the shoreline. As reefs become damaged from anchoring and trampling by tourists, they afford the beaches less protection from wave action. Improperly designed shoreline protection works, sweeping of beaches and removal of beach vegetation can also increase erosion rates. Often, erosion is a

Cultural and historic sites such as this old mosque at Kisiti face probelms growing from coastal erosion.

Map 2.8.1 COASTAL EROSION



seasonal phenomenon. During times of strong wind and waves, such as from the southeast monsoons, beaches may erode as sand and sediment are shifted along the shore. During calmer periods in northeast monsoon season, the beaches may build up again. Accelerated sea level rise resulting from global warming is expected to increase erosion rates. Siting of any development project needs to take into account this natural, short- and long-term fluctuation of the shoreline and stability of the shore-forming material.

A major source of sediment and sand in the area is from updrift and biogenic sources—dead and crushed coral and calcareous algae from the reefs. Therefore, healthy coral reefs provide an important source of sand nourishment to the beaches to replace sand removed by currents and wave action over time. Additional sources of sand to the beaches, but less significant in the Nyali-Bamburi-Shanzu area, are sediments washed in from the Tudor and Mtwapa Creeks and natural stormwater channels which discharge onto the reef flats and lagoon.

Impacts of Erosion

To protect coastal developments from erosion, significant investments in shoreline protection measures, such as seawalls, have been made. Man-made coastal protection structures are costly to build and maintain. One hotel reported that protection costs exceed one million Kenya shillings annually (*Severin Hotel representative, pers. comm*). If not planned properly, man-made structures can exacerbate the erosion problem or transfer the problem to an adjoining location along the beach. As the number of seawalls increases, aesthetic qualities of the beaches are lost and beach front area for tourist activities such as sunbathing and strolling is reduced. Seawalls present a physical barrier to the beach, detracting from the inherent aesthetic value of an unrestricted scenic beach view. Seawalls also result in the loss of the natural beach profile, restricting the ability of sea turtles to access nesting areas. Construction and design of shoreline protection works require careful study of beach dynamics.

Current Management Framework

Regulations to deal specifically with coastal erosion do not exist in Kenya. At the study area, mitigation efforts are made on a case-by-case basis by the private sector. A 100-foot (37.7m) setback from the highest water mark is required by the Mombasa Municipal Council. Although this setback currently exists in the study area, it is not enforced. It is not clear how much development has conformed to this setback standard, including recent construction of seawalls. Usually, Kenya Wildlife Service also requires coastal structures be set back 100-feet (37.7 m) from the beachline in their Park and Reserve areas. However, it is unclear if the 100-foot (37.7 m) setback requirement was incorporated into the Mombasa Marine Park and Reserve's regulations when it was established in 1986.

The University of Nairobi's Geology Department and Kenya Marine and Fisheries Research Institute have conducted several studies in the area and have extensive knowledge and expertise on understanding the underlying causes of erosion and relative merits of alternative protection measures. It is unclear how this available information is incorporated by the Ministry of Lands and Settlements, the Mombasa Municipal Council or the District Development Committee in planning and approving shoreline protection works or on the siting of structures during the approval process of development projects.

ACTION PLAN
FOR COASTAL EROSION

Objectives

Objective 1: Protect the beach and existing properties from shoreline erosion, where practical, using a coordinated approach.

Objective 2: Site development properly, taking into account coastal erosion and environmental degradation.

Objective 3: Minimise activities and development that contribute to shoreline erosion along the coast.

Action Strategies

To address the erosion problem in the short term, enforcement, emergency mitigation and education activities are necessary. These activities should:

1. Develop an Environmental Impact Assessment protocol based on data available locally, and on expertise from similar environments in the world.

   Lead Organisation: NES
   Cooperating Organisations: KMFRI, MENR, MMC

2. Compile best management practices that reduce coastal erosion and focus on the consequences of poorly designed and sited structures and development projects, and the impacts of activities which destroy features that protect the beach, such as coral reefs, mangroves and beach vegetation.

   Lead Organisation: Provincial Administration
   Cooperating Organisations: KWS, KMFRI, NGOs, FD, MCTA, Forestry Dept.

3. Increase public awareness about the best management practices developed in Action Strategy 2.

   Lead Organisation: CDA
   Cooperating Organisations: KWS, KMFRI, NGOs, FD, media, ME, Provincial Administration, KAHC, WCK, Forestry Dept.

4. Enforce the 100-ft. (37.7 m) setback regulation adjacent to the Marine Park and consider extending setback regulations along the beachfront adjacent to the Marine Reserve.

   Lead Organisation: MMC
   Cooperating Organisations: KWS, MLS, CDA, FD, KAHC, MCTA, Forestry Dept.

5. Design criteria for emergency shoreline protection in cases where imminent loss of existing structures, residences, hotels or public works will result without shoreline protection.

Lead Organisation: CDA
Cooperating Organisations: Provincial Administration, MMC, FD, KAHC, KMFRI, Tourism, MPWH, MLS

Planning Strategies

To increase understanding of the site-specific shoreline hydrodynamics and mitigation measures, and to develop a program that addresses the issue holistically, additional research and planning is necessary. The process should include:

1. Research on shoreline hydrodynamics and coastal processes, and types of ideal shoreline structures that minimise shoreline erosion. Use this to determine where such structures could be placed without exacerbating the erosion problem along adjacent sections of the beach with a view to developing long-term guidelines for shorefront management. Research findings and their implications need to be disseminated to those concerned with coastal development. Specifically, review the 100-foot (37.7m) setback and make appropriate recommendations.

   Lead Organisation: KMFRI
   Cooperating Organisations: University of Nairobi, Moi University, CDA, KWS, MMC, MENR, MLS

2. Review of institutional arrangements for approving coastal development projects as well as the Environmental Impact Assessment, which should be a prerequisite for any development. Recommend an institution or institutions to be given authority to develop a management scheme for mitigating erosion.

   The program should specifically consider:

   - Banning construction of additional shoreline protection structures which can exacerbate shoreline erosion, except in emergency situations.

   - Using soft engineering measures such as shoreline vegetation as a natural buffer to mitigate erosion and promoting measures that protect coral reef and mangrove habitats which act as natural buffers against waves, wind and erosion (*Section 2.7, Action Strategy 2*). Examples of potential measures include: (1) protecting and increasing dune vegetation on public and private lands; (2) designing boards/trails as access points to prevent trampling and destruction of dune vegetation throughout the shoreline; and (3) maintaining of a natural buffer between development structures and the coastal strip.

   Lead Organisation: CDA
   Cooperating Organisations: KMFRI, MMC, KWS, KPA, Attorney General, MENR, MLS, KAHC

2.9 On-Water and Land Use Conflicts

FINDINGS OF FACT

During the last 30 years the number, intensity and variety of marine and beach users has increased. This has resulted in conflicts among recreational users, fishermen and other local residents. Many previous shoreline access points used by fishermen and the general public have been blocked. Areas that were once used for fishing are now used for recreational activities. On-water conflicts have increased as beach hotels provide a wide range of recreational activities for their clients such as glass-bottom boating, use of personal water craft, snorkelling and sailing. Harassment of tourists on the beaches has become a problem as competition among various providers of tourist services increases.

Traditional Versus Non-traditional Use

A Shrinking Fishing Area

The establishment of the Mombasa Marine Park and Reserve reduced fishing area by 10 km^2 thus forcing various fishing groups to share a smaller fishing area. At the Bamburi fish-landing site, the number of fishermen has been reduced by two-thirds since 1986, from approximately 100 to 30 fishermen (*McClanahan and Arara, in-press*). Today, the fishing area that is now the Marine Park is used solely for recreational uses such as snorkelling, swimming and boating. The Park also provides a protected area for fish species, which helps with the replenishment of local fishing stocks and the coral reef.

Since fishermen are now limited to a smaller fishing area, they are using alternate fishing techniques to increase the catch. These techniques are often destructive or occupy large areas of the reef flat competing for space with recreational users. The fish trap *uzio*, for example, occupies a large area of shallow water space at hotel beachfronts which is also good walking ground for tourists at low tides. Seine nets used by some fishermen destroy the coral habitat cover that is necessary for fish reproduction and survival. Migratory fishermen with more effective gear have also added to the competition.

According to the fishermen, the Park boundaries were created with minimal consultation of them. Some fishermen feel that the Park boundary should be reviewed with a consideration for opening up more area for fishing.

Cultural Conflicts

Tourism activities, as practised in the study area, do not conform to the religious and cultural practices of the local communities. The major disagreement is the mode of dress and the types of activities that should be allowed to occur on the beach. For example, local fishermen and local leaders have expressed concern over the style of bathing suits worn by tourists on the beach. Regulations to deter behaviours considered unacceptable by local residents from occurring on the beach are not enforced, nor are there campaigns to educate the tourists on the issue.

Access to the Shoreline

Most of the access points to walk to the beach that existed at one time for the local residents and fishermen have been reduced to only three. The following locations provide public access: Kenyatta Beach, Nyali Beach and Shanzu (*Map 2.9.1*). The others have been displaced or blocked by shorefront development and hotels. In some cases, public shoreline access routes exist on maps, but cannot be used because of physical barriers. In addition, fishermen have complained about the loss of traditional fish-landing sites which now makes the commute to their boats from home longer and more expensive. It also requires longer distances to travel on the water to reach their fishing areas.

Local beach users have limited access to clean and operable public sanitary facilities. The only existing public sanitary facility, located at Kenyatta Public Beach, is not well maintained. Currently, no water is available in the area for waste disposal and vandals have removed toilet

fixtures. The Mombasa Municipal Council is responsible for maintenance of this facility and is aware of the situation but does not have funding to correct the problems or the human resources to manage the facility if it were fixed. Community participation in management of the sanitary and drinking water facilities has not yet been enlisted.

Beach areas also contain illegal structures erected by curio sellers and other beach operators. These unregulated and illegal structures detract from the aesthetic value of the beach and cause conflict with other beach users, such as sunbathers.

As recreational activities have intensified, the number of conflicts between fishing activities and recreational uses has increased. For example, fishermen interviewed stated that their fishing nets are often damaged by personal watercraft and other boats operating in fishing areas.

Conflicts Among Recreational Activities

Increased Competition for Tourist Clients

There are a large number of beach operators that provide services to tourists. These include curio/souvenirs traders, safari sellers, hair dressers, money changers, masseurs and those offering other miscellaneous services. Because the number of beach operators is high in comparison to the number of tourists using the beach, some operators use sales tactics that result in tourists being harassed and made to feel uncomfortable while on the beach. This detracts from the image of the tourist industry in the study area. Currently, there is a licensing mechanism for these operators, however it has not been effective at enforcing a business code of conduct or an effective means of managing beach operators.

A similar conflict exists between the two types of boat operators: hotel-based and non-hotel-based. Hotel-based boat operators have direct access to the clients in that they have booking desks at hotel receptions and the hotel beach fronts are reserved for their exclusive use. Hotel-based boat operators can afford insurance and licences for their boats (the designated cost of a licence is 6,000 Kenya shillings per year) which non-hotel based operators cannot afford. In many cases, non-hotel-based operators' boats could not pass the vessel inspection for sea worthiness, which is necessary before insurance can be issued. Although the non-hotel based boat operators are organised into an umbrella association—the Mombasa Boat Owners Association—they have been ineffective at increasing their share of the tourist market.

Making Progress... The Beach Operator Task Force

To reduce the harassment of tourists, a Task Force on Beach Operators has been established and is working diligently on attempting to solve the issues of crime and tourist harassment. The Task Force, in operation since 1994, has provided an important forum to discuss this critical issue and work towards amiable solutions that benefit the local community and tourists.

Members of the Task Force include: MCTA (Current Chair), KWS, KHAC, Provincial Administration, MTW, Police, FD, MMC and local hoteliers

This situation has created a conflict between the two types of boat operators as the number of boats has increased. This situation also exists between sellers inside the hotels and those independent curio sellers outside the hotels.

Water Use Conflicts

The number and diversity of on-the-water recreational activities in the marine park are increasing. In the past, swimming, snorkelling and free-diving were the primary recreational activities. Today the reef area is used by several, often incompatible users. (*Figure 2.9.1.*)

- Personal watercraft, also known as jet skis, use the reef flat and lagoon at high tide for relatively high-speed manoeuvres, often by inexperienced operators. Jet-skis operate in the same areas as swimmers, sailboats and snorkellers. This poses a significant danger of collision.

- The number of boats ferrying snorkellers to the lagoon during peak times of the day is estimated to be 30. Currently, there are only two mooring buoys for boats to use. This results in up to seven boats using one mooring buoy at once. As these boats leave or approach the buoy, they must avoid snorkellers in the water, creating a dangerous situation. There are no regulations for separating boat traffic from snorkellers or the number of boats allowed to use the mooring buoy at any one time.

Current Management Framework

Controlling and Regulating On-water Use

The Kenya Wildlife Service polices the Marine Park and Reserve and has the authority to regulate the location, extent and number of users and uses in that area, such as regulations on snorkelling areas, number of glass-bottom boat operators, mooring buoy rules, personal water craft, etc. Park boundaries have been set by a legislative act and any changes in Park boundaries would require a legislative mandate.

Public Access and Facilities

The Mombasa Municipal Council is responsible for the maintenance of public facilities and public access points. The Fisheries Department has traditionally dealt with planning and development of shore facilities for fishermen at fish landing sites. The Mombasa Municipal Council and the Provincial Administration are responsible for prohibiting unauthorised structures on the beach.

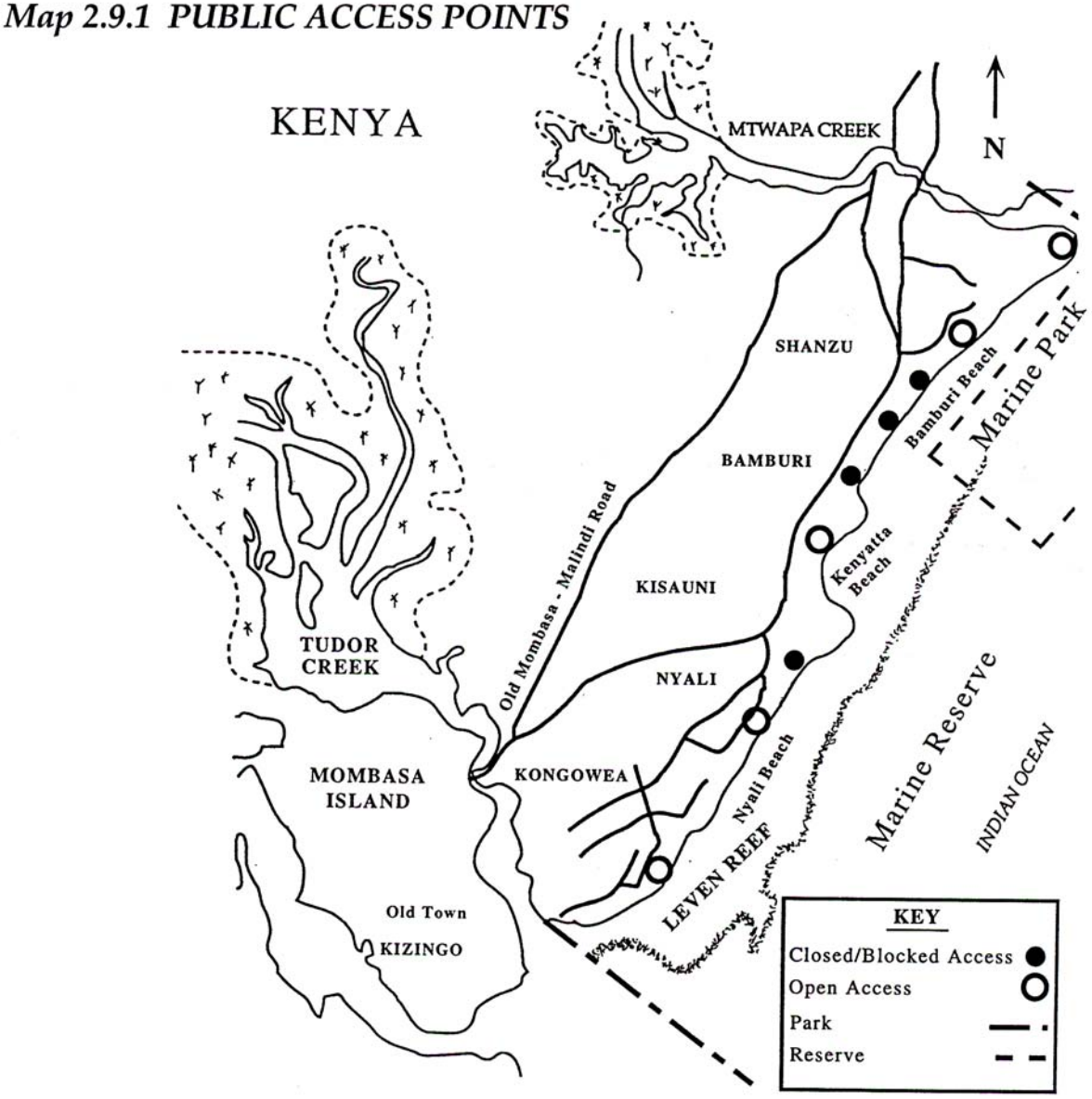
Figure 2.9.1 - Existing Use Conflicts in the Nyali-Bamburi-Shanzu Area

TRADITIONAL VS. NON-TRADITIONAL USE		
Traditional Use	***Non-Traditional Use***	***Conflict***
Fishing	Marine Park	Disagreement about dress code and allowable activities on beach
Fishing/Recreation	Tourism Development	Limited access to shore
Fishing	Recreational Activities	Damaged nets
CONFLICTS IN RECREATIONAL USES		
Competition for tourists and clients	Tourists desire quiet beach experience	Harassing of tourists and safety concerns
Boating	Snorkeling on the reef	Safety

Making Progress... The Beach Management Program

To control activities in the Park and Reserve Area, the Beach Management Program has been established by Kenya Wildlife Service in cooperation with local hoteliers. Through this program, tourists are charged a fee of $ .50 (U.S.) per day, allowing them limitless access to the Park and Reserve during the day. In return, Kenya Wildlife Service provides beach patrols to monitor beach activities and remove non-biodegradable litter from the area.

Map 2.9.1 PUBLIC ACCESS POINTS



ACTION PLAN
FOR ON-WATER AND LAND-USE CONFLICTS

Objectives

Objective 1: Increase public access to the shoreline and improve public access facilities and infrastructure.

Objective 2: Maintain a safe and pleasant environment for local communities, tourists and other users.

Objective 3: Reduce conflicts on land and on the water between and among traditional users and recreational users.

Objective 4: Enforce and regularly review the physical plans for beach development, management and operation.

Action Strategies

(NOTE: Strategies with a š indicates an ongoing demonstration project initiated to test ICAM implementation in the area. For additional details about the ongoing projects see Annex 2.)

Immediate action which can be easily implemented and sustained should be completed:

š 1. Enhance and improve the existing three public access points and related facilities and infrastructure. This should include the facilities necessary to accommodate fishing activities (*Section 2.4 Action Strategy 1 and Section 2.6, Action Strategy 1*) and drinking water for beach users. Form local action groups (including users) to help maintain and upgrade access roads and public beach facilities.

Lead Organisation: MMC
Cooperating Organisations: Boat owners, Fishermen's Association, FD

2. Support the ongoing activities of the task force on beach operators.

- Vet and limit the number of beach operators and assign them to specific beachfronts.

- Promote reasonable licence fees for boat operators and other beach-based trades.

- Identify support for establishing tourist market centres away from the beach.

Lead Organisation: Beach Task Force
Cooperating Organisations: CDA, MMC, Police, KWS

3. Clearly demarcate all existing and new access roads and points by means of sign boards and maps.

Lead Organisation: Provincial Administration
Cooperating Organisations: FD, MMC, KWS

4. Carry out a public awareness campaign that focuses on reducing cultural conflict between the local population and foreign visitors. This would allow joint enjoyment of the coastal area by: (1) informing tourists of the cultural sensitivities of local people regarding dress and behaviour; (2) controlling noise levels from entertainment in the beach hotels and other beach establishments.

Lead Organisation: Tourism Dept.
Cooperating Organisations: Tourist Association, MMC

5. Enforce regulations for setbacks and design of beach development and structures, particularly in relation to other beach developments, to maintain and improve lateral access along the beach in coordination with Section 2.8, Planning Strategy 2.

Lead Organisation: Provincial Administration
Cooperating Organisations: KPA, MMC, MLS

6. Address complaints about the shrinking fishing area by enhancing public awareness of the value of the park.

Lead Organisation: KWS
Cooperating Organisations: FD, KMFRI

7. Provide a market centre for beach operators away from the beach area.

Lead Organisation: Provincial Administration
Cooperating Organisations: KMFRI, KWS, CDA, MCTA, KAHC, KATO, local hoteliers, WCK

Planning Strategies

Initiate a management plan that satisfactorily resolves the increasing number and intensity of use conflicts in the area. Planning activities should:

1. Increase the number of public access points from the three currently available by completing an inventory of existing access points. Once the inventory is

completed, identify the location of blocked public access points and apply local government by-laws to reopen such access roads and points and apply the 1989 Fisheries Act to keep fish landing sites open for public use as suggested in Section 2.6, Planning Strategy 3. The inventory should also determine potential locations for new access points which could be acquired.

Lead Organisation: MMC
Cooperating Organisations: MLS, KWS, FD, KMFRI, Tourism Dept.

2. Develop a zoning scheme and rules for on-water use activities in the Mombasa Marine Park and Reserve area that incorporates the input from the Fishermen's Association, Kenya Wildlife Service, Fisheries Department, the Boat Owners Association and representatives of the hoteliers offering water sports facilities. It should also consult the predominant users—tourists—through frequent interviews and surveys of their perspectives and concerns.

   The zoning scheme and rules for on-the-water use should consider the following potential actions:

   - Establish additional mooring buoy sites in the Park and Reserve to reduce congestion of snorkellers and glass-bottom boats.

   - Limit the number of glass-bottom boats allowed in the Park and Reserve through a licencing/permit scheme.

   - Limit the number of boats which can tie up to a mooring buoy at any one time.

   - Establish rules of the road concerning approach and departure from mooring buoys and restricting snorkellers to areas outside these lanes.

   - Zone specific water areas and set times for exclusive use (i.e. fishing, swimming, snorkelling, glass-bottom boat viewing, low tide reef and reef flat walks) and/or multiple use (i.e. sailing, wind surfing, jet-skis, etc.).

   - Demarcate zones with buoys and flags.

   - Establish signs, brochures, videos for hotel rooms and other public education methods to inform foreign and local tourists, providers of on-water recreational activities and other users of the zoning scheme and regulations.

   Lead Organisation: KWS
   Cooperating Organisations: FD, Kenya Navy, boat owners

Chapter Three

IMPLEMENTATION FRAMEWORK FOR INTEGRATED MANAGEMENT AND SUSTAINABLE DEVELOPMENT IN THE NYALI-BAMBURI-SHANZU AREA

3.1 Integrated Coastal Area Management (ICAM)

No single institution in Kenya currently has the mandate to adequately address coastal management issues in an integrated manner. Progress towards an integrated coastal area management (ICAM) plan and programs in Kenya will require close cooperation and collaboration of many national agencies with local government and appropriate research institutions, private stakeholders and NGOs. A number of ICAM-related projects are being initiated and planned within the country. The projects, along with the Nyali-Bamburi-Shanzu ICAM strategy, are gaining experience and providing lessons on how to effectively coordinate local action. They are also helping define needs for national policy development and coordination.

To make progress in solving problems in the Nyali-Bamburi-Shanzu area and to gain nationally relevant ICAM experience, continued planning and implementation actions, as outlined in this strategy document, are essential. This requires continued support, commitment and involvement of national and local agencies, stakeholder groups and NGOs. Stakeholder involvement needs to go beyond consultation, and reach full partnership and shared responsibility for implementation alongside government. This can mean commitments of individuals' time or, in some cases, financial and other resource commitments. In addition, implementation requires an institutional framework to promote and foster coordinated actions among various government agencies, the private sector and voluntary groups to achieve the common set of objectives, strategies and actions formulated through consensus from the participatory planning process. This chapter outlines a management framework for implementing the strategies outlined in Chapter Two of this document.

3.2 Implementation Framework for the Nyali-Bamburi-Shanzu Area

To oversee the implementation of the strategies proposed in this document and give direction and clear vision to ICAM, a Coastal Management Steering Committee (CMSC) should be established which builds on the team of institutions initially assembled to develop this strategy, along with other agencies, the private sector, NGO representatives and other representatives as may be appropriate. This committee should be small enough to effectively direct the implementation of the strategies. The CMSC, with the assistance of a secretariat and appointed working groups will be responsible for completing the planning and action strategies outlined in this document. The working groups are designed to allow for maximum input and participation to the process without unduly increasing the size of the CMSC.

The CMSC will be convened and initially chaired by the director of the Kenya Marine and Fisheries Research Institute. The existing ICAM Planning Team, coordinated and housed by the Coast Development Authority will continue to house the secretariat. The chair is responsible for organizing committee meetings, establishing working groups as required and ensuring that necessary actions are being completed in a satisfactory and timely manner. The secretariat will

provide support to the CMSC. Support will include the coordination of meetings and technical assistance to the CMSC and appointed working groups. The CMSC should appoint working groups as follows to complete planning and action strategies:

Public Services
Water Quality
Reef Fisheries
Marine Habitats
Coastal Erosion
Mangrove Forests

Use conflict issues will be addressed through the working groups and full committee. Working groups should be drawn from lead and cooperating agencies assigned to each designated key issue. It should also draw from other public and private groups that were represented in the ICAM Stakeholders' Workshop, as well as other interested parties.

Recommended Members for the Coastal Management Steering Committee

Coast Development Authority

Kenya Wildlife Service

Kenya Marine and Fisheries Research Institute

Fisheries Department

Mombasa Municipal Council

Provincial Administration

National Environmental Secretariat

Tourism Department

Baobab Trust

East Africa Wildlife Society

Kenya Power and Lighting Company

National Water Conservation and Pipeline Corporation

Kenya Port Authority

Kenya Post Office and Telecommunications Company

Representative of the Boat Owners Association

Representative of the Fishermen's Association

Representative of the Mombasa and Coast Tourist Association

Forestry Department

3.3 Action Agenda for Implementation

The Coastal Management Steering Committee (CMSC)

Once the CMSC is established, the following action agenda is proposed:

Activity 1

Complete the ongoing demonstration projects identified in Chapter Two within the next six months to one year. The CMSC will provide logistical and technical support to the volunteer groups during the implementation of the demonstration projects. Volunteer groups were formed during the first stakeholders workshop to implement demonstration activities in the area. (*For additional details of the projects see Annex 2.)*

Demonstration projects currently underway include:

- Developing and rehabilitating the facilities at Kenyatta Public Beach.
- Demonstrating water conservation measures in hotels.
- Installing new mooring buoys in the Mombasa Marine Park.
- Producing a brochure and posters on coral reefs and mangroves.

Activity 2

Continue to build public support for ICAM and implementation of the strategy for the study area. This will be done within the initial year after the formation of the CMSC. It will be the responsibility of the CMSC to:

- Circulate extensively the final area strategy document among national government, private sector and NGO groups.
- Pursue TV and radio programmes and newspaper articles, to highlight coastal management issues in the area and actions being taken to solve them.
- Publicise the strategy document through presentations at national and international workshops, seminars and other international forums.
- Conduct public awareness meetings for various user groups.
- Organise drama and songs in schools to highlight ICAM management issues.
- Distribute promotional items—banners, posters, brochures, T-shirts, bags, pens, etc.—on specific study area issues and other general ICAM issues. Solicit private sector contributions to produce the promotional items which acknowledge their support.

Activity 3

Initiate the formation of working groups as required.

Activity 4

Monitor implementation of the strategy and periodically report back to stakeholders on progress being made.

Activity 5

Solicit and secure resources for the successful implementation of this strategy and the implementation of ICAM. Resources may range from voluntary actions to financial commitments.

Activity 6

The CMSC will ensure that activities of the working groups are coordinated, overlaps are identified and linked, and management actions are considered in order to form an integrated approach to coastal management in the area.

Activity 7

At the conclusion of one year, the CMSC will develop and circulate a report on the implementation experience in the area and disseminate the lessons learned.

Activity 8

The CMSC will advocate for the development of a national ICAM policy by working, in cooperation with others, to explore mechanisms for and participate in the development of a national ICAM policy and the institutional arrangements for its implementation.

Working Groups

Once the working groups are established, the following action agenda is proposed:

Activity 1

Prioritise the list of Action Strategies outlined in the section of Chapter Two for which the working group is responsible, and complete detailed work plans and budgets for each. The CMSC will ensure that the working groups are completing action strategies as detailed in the specific work plans. The CMSC, in cooperation with the working groups, will actively seek support for voluntary action and financial commitments for implementation.

Activity 2

Prioritise the list of Planning Strategies outlined in the section of Chapter Two for which the working group is responsible, and take the necessary steps to complete a detailed work plan and budget for each.

Activity 3

As resources become available, begin implementation of the strategies as detailed in the work plans.

Integrated coastal area management can help resolve conflicting coastal uses in the Nyali-Bamburi-Shanzu area.

Annex 1

ICAM Stakeholder's Workshop Programme

Bandari College, Mombasa, Kenya; 21 - 22 June, 1995

Participants: Fishermen, conservation groups, (KWS, Baobab Trust, WCS), Forestry Department, KPA, NOSRC, trawl operators, sport fishermen, aquarium representatives, mangrove dealers and cutters, local representative of NEAP, boat operators, Tourism Department, CDA, KMFRI, MMC, MCTA, Ministry of Lands and Settlements, DC, Boat Operators Association, Beach Operators Association, representative of the Bamburi Cement Company, police, hoteliers, MLRRWD, National Water and Pipeline Corporation, MPWH, KPLC, Fisheries Department, Kenya Navy and the Kenya Post and Telecommunications Company.

Purpose

- Receive feedback from key stakeholders on the facts, objectives and actions stated in the draft management strategy.
- Suggest additional management measures/action.
- Reach consensus on key management issues (findings, objectives and actions).
- Build support for the management strategy.
- Identify areas of disagreement.
    - Document why disagreement exists.
    - Recommend actions for solving disagreements.

Workshop Outputs

As a result of each day's efforts, the following outputs were generated:

1. Revised list of issues, by workshop theme, that combined the participants' list and the ICAM team's list.
2. Suggested management strategies for identified issues. (*Because of time constraints, most groups were unable to discuss management strategies for every issue identified*).
3. A detailed outline of tasks for several management actions the group identified as being easy to implement and pertinent to the problem.
4. Seven volunteer groups were assembled around the management actions that the group identified as easy to implement and pertinent to the problem. Three of the seven volunteer groups met at the end of the workshop to identify a chair and select a next meeting time and agenda. The purpose of these volunteer groups was to encourage public and private stakeholders to work together toward progress on coastal management issues in the area.

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Annex 2
Ongoing Demonstration Project Summary

Demonstration projects are designed to test ICAM implementation at a site, thus providing practitioners with critical experience. Demonstration projects also provide a symbol to the local community, showing the commitment of the ICAM process to action on the ground.

Demonstration projects were selected and designed in consultation with stakeholder groups. The ICAM stakeholders held a workshop in June, 1995. From this workshop emerged several volunteer groups who were charged with the responsibility of carrying forward the selected demonstration projects with technical and logistical support from the ICAM team.

Ongoing Demonstration Projects

1. Develop and Rehabilitate the Facilities at Kenyatta Public Beach
(Section 2.4, Action Strategy 1, Section 2.6, Action Strategy 1, and Section 2.9, Action Strategy 1)

The participants at the ICAM Stakeholders Workshop clearly identified the improvement of the fish-landing site at Kenyatta Beach as a priority. Currently, there is no fish-landing *banda* (fish- landing facility) or properly operating sanitary facilities (restrooms and water facilities) for the fishermen and other beach users. The group of stakeholders has offered to work, through this project, with the appropriate officials to install the proper facilities and then maintain them for their use. Some facilities, such as watering points, would benefit the entire public that uses the beach.

The working group proposed the following preliminary activities, in order of priority:

(1) Install at the fish-landing site a source of potable water, for use by fishermen, boat operators and beach users for cleaning fish, drinking and washing.

(2) Rehabilitate toilet facilities for fishermen, boat operators and beach users.

(3) Construct a banda that includes a fish-cleaning platform, ice holding pans for temporary storage and a display table for selling fish.

(4) Provide a secure storage room for engines and gear within a repair yard for boat operators and fishermen.

Core funding for these activities is provided by FAO and USAID/REDSO-ESA and is augmented by contributions from the Mombasa Municipal Council, local businesses and community groups. The working group formed to implement this project has accepted the responsibility for maintaining the new structures and ensuring they are used properly. It is expected that a formal agreement between the volunteer group and the Mombasa Municipal Council will be created that allows the group to charge a nominal fee for use of the facilities during weekends. This money will be used to cover maintenance costs.

Working Group: MMC, FD, hoteliers, beach operators, fishermen, vendors, KWS, CDA, KPTC, Baobob Trust

2. Install Mooring Buoys in Marine Park and Establish Management Partnership
(Section 2.7, Action Strategy 1)

Coral reef ecosystems need protection from direct physical damage caused by human activities such as anchor damage, grounding of boats and trampling of corals by tourists. Installing a mooring buoy for boat operators to use will lessen the problem. This activity is being carried out for the mutual benefit of the boat operators, hoteliers, tourists and Kenya Wildlife Service. Therefore, each of these stakeholders should have an equal role in installing a new mooring system and maintaining it into the future.

Working Group: KWS, Fisheries Department, fishermen, boat operators, hoteliers, Kenya Navy

3. Demonstrate Water Conservation Measures in Hotels ***(Section 2.4, Action Strategy 2)***

This project will:

(1) Demonstrate model water conservation measures that can be used by hotels.

(2) Highlight these activities and encourage other hotels and other water users to implement similar measures.

By recycling wastewater and installing and using water conservation measures, effective utilization of a scarce resource can be achieved. Activities to be highlighted include a wastewater treatment/recycling plant, and educational materials that hotels are using to inform their guests about the problem. New technologies for on-site wastewater recycling and its successful use on the site and elsewhere will be described in a fact sheet for hotel operators and discussed during organized tours of the model hotel(s).

Working Group: CDA, hoteliers, Wildlife Clubs of Kenya

4. Mangrove Poster and Coral Reef Brochure ***(Section 2.7, Action Strategy 2)***

This demonstration project will provide an educational message to the resource users. The mangrove poster will convey important messages: (1) mangroves are in need of protection from threats of pollution and other human activities; this damage can be easily prevented if care and actions are taken; and, this is what *you* can do to help; and (2) village elders can teach resource management actions, such as selected harvesting, to younger mangrove cutters.

The Coral Reef Brochure will highlight the importance of the ecosystems–which include seagrasses–as important recreational assets supporting tourism and fisheries. It will discuss how coral reefs are threatened from pollution and direct physical damage caused by human activities such as anchor damage, grounding of boats and trampling of corals by tourists. It will stress that damage can be easily prevented if certain care and actions are taken. The primary message of the brochure is to tell the resource user, "this is what you can do to help ..." The KWS/Netherlands Wetlands Conservation Project has provided significant support to this activity.

Working Group: KMFRI, KWS/Netherlands Project, CDA, Wildlife Clubs of Kenya, Forestry Dept., mangrove cutters

Annex 3

Organisations Participating in the Project's Planning Process

GOVERNMENT AGENCIES AND MAIN COASTAL MANAGEMENT FUNCTION(S)

Coast Development Authority: Coastal planning and coordination of development

Kenya Marine and Fisheries Research Institute: Research fisheries and critical habitats

Kenya Wildlife Service: Conservation of flora and fauna

Fisheries Department: Fisheries licensing, monitoring and policing

Municipal Council of Mombasa: Approval of structures and delivery of services, such as waste management

Kenya Navy: Military surveillance in territorial waters

Forestry Department: Licensing, reforestation and policing use of forest products

Kenya Ports Authority: Ports management and administration of maritime traffic

National Museums of Kenya: Conservation of national monuments and reserves

National Environment Secretariat: National advisory; coordination of environmental policies

Physical Planning Department: Provides physical plans, but does not execute the plans

Water Department: National planning for both surface and groundwater

Water Conservation and Pipeline Corporation: Water reticulation and servicing

Tourism Department: Tourism planning, licensing and promotion

Kenya Police: General security, including beach security

Government Chemists Department: Quality control as a service to government and private sector

Cooperative Department: Facilitating self-help and income-generating community groups

District Development Committee: Clearing house for development projects in the District

INCOME-GENERATING COMMUNITY GROUPS

Fishermen's Association: Common bargaining, facilitation of members and lobbying forum

Safari Sellers Association: Common bargaining, facilitation of members and lobbying forum

Mangrove Cutters: Common bargaining

Mangrove Licensees: Owners of mangrove-cutting licences

HOTEL AND TOURIST INDUSTRY

Kenya Association of Hotelkeepers and Caterers: Hotel marketing, quality control and bargaining at national and regional level

African Safari Club: Major chain of hotels in study area, but not a member of existing associations

Mombasa Boat Operators Association: Common bargaining, facilitation of members and lobbying forum

Mombasa and Coast Tourist Association: Coast hotel and tour operators' marketing group and forum

NGOs

Wildlife Clubs of Kenya: Youth conservation education affiliation

Society for Protection of Environment/Kenya: Conservation lobbying group

Baobab Trust/Kenya: Environmental conservation and education

OTHERS

National Oil Spill Response Committee: Oil spill response (composed of government and oil marketing companies)

Turtle Conservation Committee: Turtle conservation and education

Beach Management Task Force: Organization of beach trade

Friends of the Mangroves: Public awareness and revegetation of mangrove systems

Annex 4

National Workshop on Integrated Coastal Area Management (ICAM) in Mombasa

Mombasa Beach Hotel; 5 - 7 December, 1995

Participants: The workshop brought together national and regional coastal managers and practitioners; relevant government agencies; university lecturers; and policymakers. They met to deliberate on how the ICAM tool could assist in managing coastal resources in a sustainable, issue-driven manner.

Purpose

- Demonstrate the need for ICAM to a wide array of Kenya coastal stakeholders and constituents.
- Share the experience gained at the Mombasa ICAM demonstration area with national policymakers and stakeholders.
- Receive feedback from key stakeholders on the facts, objectives and actions stated in the draft management strategy.
- Define the framework for implementation of ICAM in the area.

Workshop Outputs

1. Feedback on the Overall Document

Participants made the following recommendations on the draft document:

- Use consistent terminologies, more maps and a matrix presentation to give practical overview of activities, effects and actions.
- Emphasize that the proposed strategies are "local" only. The CDA should work towards a national strategy. Strategies should be implemented by the collaborating institutions. Overall coordination should be the responsibility of CDA because of the their key role in initiating the process to develop this draft document.
- Tourism should have been addressed as a separate issue. However, the ICAM team explained that the impacts of tourism are addressed throughout the document.

- Local stakeholders such as chiefs and the District Development Committee should havebeen involved during the preparation of the draft document. The team responded that this was the case. (*See the ICAM Stakeholders Workshop, p. 63*).

The situation about coastline erosion was appreciated by the participants. It was noted that KMFRI is already involved in sea level rise studies to gain more understanding of this phenomena.

2. Feedback on Chapter Two

After presentation of Chapter Two of the document, the participants were broken into six discussion groups. The following summarizes the remarks of each of the discussion groups.

Land Use and Provision of Public Infrastructure

The group recognised the economic importance of tourism and hence the need for planning of resource use. It was agreed that jurisdiction exists both at Municipal Council and National level to coordinate land use planning. However, there is a need to develop a land use master plan that addresses environmental and socio-economic factors.

There is a need to provide the various user groups with sufficient infrastructure and to find space for beach operators away from the beach.

Fisheries Management

The findings of fact required more input of fisheries statistics. The group revised the planning strategies to include review of the Park/Reserve boundaries, and formulation of a fisheries management plan. It was also proposed that a task force should be developed to address night poaching.

Night poaching was thought to be the highest priority issue requiring action. Other issues needing action included, in order: improvement to fisheries infrastructure, education programmes on sustainable use of resources and reef restoration.

The group suggested more private organizations/NGOs be involved in these efforts.

More map illustrations were also suggested.

Managing Water Quality

Findings of fact, objectives and strategies were accepted without alterations. It was recommended that actions under strategy one include: (1) public health education on safe drinking water; (2) constant ground water monitoring; (3) rational use of water; (4) conducting a water demand survey; and (5) development of revised, reactivated, strengthened and harmonised institutional quality management programmes.

Lead institutions and cooperators should include Government Chemist, Ministry of Land Reclamation Regional and Water Development and National Water Conservation and Pipeline Corporation, Provincial Commissioner, Kenya Oil Refineries and Kenya Navy.

The document was found to be generally acceptable and well prepared but should more clearly emphasize the urgent issues.

The objectives were revised to include diversification of existing water supply sources thus increasing the quality of water supplied and reducing pressure on groundwater. However, this is addressed in the land use section.

Managing an Eroding Shoreline

The findings of fact were agreeable to the group.

Objectives were amended to reflect the need for a coordinated approach and practicable forms of addressing shoreline erosion and siting of new development along the shorefront. The action strategies were revised to include a form of EIA, coordinated mitigation measures, a code of conduct and research data collection. A number of lead and collaborating institutions were amended or added to the original list.

Managing Use Conflicts

The group largely accepted the objectives set out to address conflicts arising from use of resources. The group felt that beach operators should be limited to specific beachfronts. Establishing the task force on beach operators was seen as the high priority action.

The group felt that the lead institutions for each action should provide overall coordination for that activity.

Managing Marine Habitats

The group added the following findings of fact:

- Insufficient capacity for control of mangrove exploitation.
- Coral damage due to aquarium trade.
- Boat traffic impacting on sea turtle migrations.
- Insufficient integration of management activities in the study area.

The group suggested that strategies be organised into a plan of action which would include establishing projects for degraded habitats. The group suggested that the document be clearly linked with NEAP and the Tourism Master Plan, and also have adequate maps.

3. Feedback on Implementation Framework for ICAM in the Area

The formation of the Coastal Management Steering Committee (CMSC) was formally endorsed during the workshop. Consensus was also reached on the following mechanisms:

- Create a multidisciplinary coastal management steering committee guided by terms of reference.
- Form task forces (working groups) with short- and long-term objectives.
- Set proper policies and implement action from local level extending to regional level.
- With support from collaborating institutions, establish a steering committee to develop proposals for funding ICAM activities and develop networks of coastal area management practitioners.
- Consider the ICAM process as a Kenyan investment to be supported locally before foreign funding is sought.

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