

Kenya's Experience in Establishing Coastal and Marine Protected Areas

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ABSTRACT. Kenya has long been a leader in nature conservation, and this holds true on the marine side as well as the terrestrial; the country has two marine national parks and two marine national reserves, with the first marine park in tropical Africa established at Malindi-Watamu in 1968. A series of other areas are also proposed for establishment in the future. These areas have a number of attractions and benefits to local people, including tourism and protection of breeding grounds of important species. In addition, the country has also instituted measures to control fishing, regulate shell collection and control pollution.

1. INTRODUCTION

Kenya is one of the most active members in nature conservation in the world today. For instance, Kenya was among the first countries to launch the World Conservation Strategy in early 1980. In addition, Kenya was represented on UNEP's *ad hoc* Expert Group on the Draft World Charter for Nature convened by the UNEP Executive Director in August 1982 in Nairobi and hosted the United Nations University (UNU) Workshop in Mombasa. In practical terms, Kenya boasts 14 national parks and 24 national reserves totalling 43,615 sq km—including 25,396 sq km in parks and 18,075 sq km in reserves—or nearly 7.5% of the total area of Kenya.

The long catalogue of conservation areas includes two Marine National Parks and two Marine National Reserves which are the basis of the topic under discussion: the lessons learned by Kenya in establishing the coastal and marine protected areas.

UNEP (1980) defines "coastal zone" as "the maximum distance to which the influence of certain selected ecological factors extend landward and seaward from

the seashore." In Kenya this zone may be said to extend for about 40 km inland.

The country has a shoreline of about 500 km, stretching from the Somalia border in the north to the Tanzania border in the south. The coastline is simple, without many indentations, a factor that hampers the establishment of harbours; in fact, only a few areas are suitable for harbours, that is, the Lamu archipelago and the Mombasa Island. However, the shoreline is endowed with magnificent beaches coupled with a chain of coral gardens which are the origin of Kenya's marine national parks and reserves (Fig. 1). The four marine national parks and reserves include Kiunga in the north and Kisite Mfunguti in the south; between these two extremes are the Malindi and Watamu national parks and Malindi-Watamu national reserves complex.

1.1. Coastal vegetation

The coastal vegetation is influenced by a long history of human settlement and cultivation dating as far back as the fifteenth century, the Egyptians, Chinese, Greeks, and Portuguese all had trade links with the coast. However, the Arabs had the greatest influence, having settled for several hundred years before the British displaced them at the turn of the nineteenth century. The most characteristic vegetation is the coastal evergreen bushland, consisting of relatively dense stands of evergreen shrubs mixed with scattered trees. It is often interrupted by areas of cultivation. Characteristic woody plants are *Crossopterix febrifuga*, *Piliostigma thomningii*, *Lantana camara*, *Rhus natalensis* and *Grewia glandulosa*. It is not an important habitat for wildlife except for monkeys, birds and rodents.

The coastal palm woodlands are dominated by *Hyphaene* and *Borsassus* palms and occur on open grassland and on groundwater sites. Small but significant palm thickets are located northwest of the Lake Kenyatta Settlement Scheme and on the south coast around Ramisi.

The coastal rain forest is localized and restricted in distribution. It is characterized by such species as *Sterculia*, *Chlorophora* and *Mimocylon*. Drier woodlands at the coast include stands of *Cynometra*, *Manilkara* and *Azelia*, of *Brachylaena* and *Diospyros*, and of *Brachystegia* and *Jubberlandia*. The *Brachystegia* woodland is the northernmost extension of the "miombo" woodlands that form a major biotic community of Tanzania and Zambia and is rapidly disappearing in Kenya.

The mangrove communities are dominated by *Rhizophora mucronata* and a few other species with similar ecology (Moomaw, 1960). The mangroves favour tidal creeks and lagoons and often require fresh water and water-logged mud. Major stands are to be found in the Lamu archipelago including the islands of Patte and Manda and also in the Vanga-Funze complex near the Tanzania border.

Finally, temporary pans of impeded drainage ("Ziwas") are common in the coast province and are characteristic of black cotton soils or where the water table is high. The common grass species here are *Echinochloa haploclada*, *Setaria sphacelata* and *Sorghum verticilliflorum*.

1.2. Drainage

The main drainage lines of the coast consist of the Tana, Sabaki and Ramisi rivers. There are however a few seasonal rivers and some which flow during the times of heavy flooding.

1.3. Climate

The coast has a humid tropical climate. The rainfall is largely associated with the monsoonal winds in combination with the orographic effects of the coastal hills and convection over the hot, dry hinterland immediately to the west. The south-east monsoon brings the long rains in April, May and June when more than half the annual precipitation usually falls. The long rains end in June in the north (Lamu) and in July in Mombasa (Moomaw, 1960). However, the intensity and reliability of rainfall decreases from the south northwards.

It is important to emphasize that this monsoonal climatic effect gives the coast of Kenya a unique character not repeated anywhere else on the Western Indian Ocean region. For instance, the west coast of Madagascar has a dry savanna climate which is different from that occurring on the Kenya coast due to lack of the monsoonal influence. Conversely, the east coast of Madagascar has a tropical marine climate because of the monsoonal influence. Because of the wider significance of the climatic influence on the Kenya coast, the pro-

TECTED areas should therefore be separated into coastal and marine zones (Fig. 1). Zone 1 includes, from the north, Boni and Dodori National Reserves and in the south the Shimba Hills National Park. Similarly the marine zone comprises of Kiunga, Malindi/Watamu and Kisite/Mpunguti. From the conservation point of view each park or reserve has its own interesting features.

2. THE NEED PERCEIVED IN KENYA FOR COASTAL AND MARINE PROTECTED AREAS

The objective of the Malindi/Watamu National Park was to conserve in the national interest, a representative feature of the coral reefs. Kiunga Marine National Reserve was the last one to be gazetted in 1973. The coastal areas include Boni and Dodori National Reserves and the Shimba Hills National Park.

2.1. Marine zone

Under this zone are three marine parks and reserves:

2.1.1. Malindi/Watamu Park/Reserve comprises a core park surrounded by a marine reserve which together occupy an area of about 240 sq km. The complex represents outstanding examples of coral beaches, tidal pools, coral gardens, fringing reefs and mangrove creeks protected within the boundaries of the park reserve system (see Fig. 1).

2.1.2. Kisite and Mpunguti National Park. This system of parks is situated in the south coast and unlike Malindi and Watamu, functions to conserve marine life, including a group of waterless off-shore islands that are a home for an assemblage of pelagic birds.

2.1.3. Kiunga Marine National Reserve. Kiunga is situated on the northernmost point adjacent to the Dodori National Reserve close to the Somali border. Its function is to safeguard the important large nesting colonies of migratory seabirds on the off-shore islands and the superb and as yet unspoiled coral reefs. In addition, the mangrove thickets fringing the marine reserve harbour a wealth of birds, and the few creeks in the reserve are frequented by the rare dugong. Kiunga is the least developed of the marine parks/reserves.

2.2. Coastal zone

This zone is represented by one national park and two national reserves:

2.2.1. Dodori National Reserve. Dodori National Reserve is named after one of the major creek systems in north-eastern Lamu district. It extends to the Somali border on the northern side, whereas on the eastern

seaward side it is contiguous with the Kiunga Marine Reserve. To the north it adjoins the Boni National Reserve.

Its main function is to conserve a major breeding ground for topi of the east Lamu population and to preserve an area of scenic beauty and important avian wildlife including pelicans and coastal waterfowl. Other than aerial surveys and boundary demarcation, little formal development has taken place but plans are in hand. The reserve has an area of about 850 sq km.

2.2.2. Boni National Reserve. The Boni National Reserve covers 1240 sq km in the north-eastern area of Garissa District adjacent to the Somali border. It is centred on the extensive Boni Forest which is the only ground water forest in Kenya. Boni provides a major sanctuary habitat for the east Lamu and southern Garissa elephant herds. Ecologically it is virtually unexplored; it was possible that *Apalis charrissa*, thought to be extinct, may still survive in this area.

3. PROPOSALS FOR NEW COASTAL AND MARINE RESERVES

In addition to the existing coastal and marine parks, the Wildlife Conservation and Management Department (WCMD) is keen on the protection of some critical areas on the coast before they are completely destroyed. These include:

3.1. The proposed Ras Tenewi Coastal Zone National Park

The present marine parks in Kenya do not protect the terrestrial features adjacent to them. The proposed Ras Tenewi Park (Fig. 1) is therefore intended to bridge this gap by combining a marine component with a terrestrial one. It is situated north of the Tana River delta on a headland south of the Lamu archipelago. The new reserve has an area of about 350 sq km divided into 105 sq km of land and 245 sq km of water. Apart from the extensive coral reefs, the reserve encompasses several rocky islands which are important nesting sites for migratory seabirds primarily terns and gulls. The sooty gull, *Larus hemprichii*, breeds here as well as various terns - the noddy *Anous stolidus*, roseate *Sterna dougalli* and white-checked, *S. repressa* (Von Sömeren, 1951). In addition the area is an important breeding ground for the marine turtles which have become threatened throughout their range in the world, including Kenya. Three species are known to occur, the olive ridley *Lepidochelys olivacea*, the green *Chelonia mydas* and the hawksbill, *Eretmochelys imbricata*. In fact, at the World Conference on Sea Turtles Conservation in 1979, in the only recommendation that referred to the East African coast, the Ras Tenewi area was selected for establishment of a coastal zone marine sanctuary for sea turtles (IUCN,

1979). Dugong, whose presumed distribution along the Kenya coast ranges between Malindi and Kiunga, is supposed to occur in the Tana River estuary close by. Other tourist attractions of the Ras Tenewi area include historic ruins and tomb at Mwana as well as concentrations of elephant and topi *Damaliscus korrigum*.

3.2. The proposed Diani Marine National Park Complex

Comprising of Similani and Kaya Pungu in the north and Chale Island in the south, these are the only areas which would conserve marine caves with their large colonies of bats. The caves are of great cultural and religious significance to the fishermen, as evidenced by sites selected for practising witchcraft.

Similani is particularly famous for its caves, which harbour several thousand bats; the two most important species in terms of biomass and size are the large fruit bat, *Rousettus aegypticus* and the insect eating bat, *Hipposideros commersoni*. All in all, there are about 8-9 species of resident and migrant bats whose periodicity is closely linked with the movement and concentration of insects. For instance, large numbers of bats arrive at the Similani Caves around March April and September October which is the peak breeding season for insects. However, as soon as the insects start to die off or to move out at the onset of the long rains in the intervening months, the bats follow suit.

At the moment the bat populations are free from contamination with toxins because there are no insecticides being used on the Kenya coast. However, their main threat comes from the loss of critical habitat which is being destroyed by the entrepreneurs who buy land from the local people to build beach houses. The Chale islands are well protected and, like Kiunga, are an important nesting site for several species of birds.

4. NATIONAL MONUMENTS AND THREATENED HABITATS

These fall under different types of management, including the Trustees of the National Museums of Kenya, the Forest Department and those areas under the protection of the local people for cultural or religious purposes, but without proper legal status. The Tana River Delta has no protection and is seriously threatened.

4.1. Areas under the Trustees of the National Museum

These are represented by three important museums. The Fort Jesus, Gedi Ruins and Lamu museums are situated at Mombasa, Malindi and Lamu respectively. The three museums are of immense archaeological inter-

est as they contain valuable fossils and other scientific materials of past civilizations.

Other significant historical sites under the National Museum along the coast are located at Kipungani, Matondoni, Mpeketoni, Ndau, Kiwaiyu, Shanga, Tokosa, Siyu, Jumbaba, Mtwana and Muarani. All these monuments are of great tourist attraction.

4.2. Areas under the protection of the Forest Department

Two important nature reserves are located at Sokoke and Witu and require stricter control.

4.3. Areas under the protection of the local people

These comprise of the areas normally known as the "Kayas." The Kayas consist of coral or limestone caves within groups of trees, some of which are considered "sacred groves" and others as refuges from raiders in the long past. As such, the flora has been preserved and recently found to contain several new or little-known species with very limited distribution.

For instance, at Chasinba Kaya are found important tree genera, e.g., *Cola octoloboides*, *Sarcia taleni*, and *Caesalpinia dalei*. Kaya northeast of Mwarua contain the genus *Holmskioldia* and is the type locality of the African Violet *Saintpaula rupicola*. Pangani Kaya represents *Micrococca scariosa* and *Oxystigma msoo* (National Museums, 1982). In addition, the caves harbour great concentrations of different species of bats. However, the invertebrates have not yet been studied.

4.4. Tana River Delta

Virtually unexplored in recent years and endangered due to proposals for agricultural development, the Tana River Delta is the only known locality for the native bird, *Cisticola restricta*. *Apalis chariessa*, preserved at the National Museum and thought to be now extinct, came from Mitoli on the Tana, near Garsen. Two important waterfowl lakes or swamps, Belissa and Shakabobo, are wildfowl sanctuaries and wetlands and require protection under the Ramsar Convention. There are also important heronries in the area, with some 15 species of breeding birds. Small mammals include the local Red duiker *Cephalophus natalensis*, and the Tana squirrel *Paraxerus palliatus tanae*, an important species in this type locality. The snake *Aparallactus guentheri* is only known from this area and Mt. Mbololo. The frog *Hylarana braviana* was first recorded from the Tana River Delta. Important flora include *Rhus quartiniiana*, *Maerua triphilla*, *Commiphora riparia*, *Combretum tanaensis* and *Terminalia brevipes*, all of which are limited or rare in distribution along the coast.

5. PROBLEMS ENCOUNTERED IN COASTAL AND MARINE CONSERVATION

5.1. Fishing

Controlled fishing has little adverse effect on Kenya's marine parks. However, socio-economic pressure has led to the down-grading of certain portions of national parks to reserve status in order to allow fishing, e.g. the Malindi/Watamu Reserve surrounding the Malindi/Watamu National Park area. Similarly, Kiunga, although located on government waters, is accorded reserve status to accommodate fishing. On the other hand, uncontrolled commercial fishing, particularly for prawns, is causing problems to the marine reserves. For instance, trawlers now enter shallow estuaries and lagoons where prawns concentrate and probably damage fish eggs and larvae of the ocean bottom. As a result, breeding may be interfered with because fish larvae spend their first stages of life in these shallow creeks, feeding and developing; in turn the recruitment of coral fishes would be affected.

Fishing for only commercially important fishes may also lead to an ecological imbalance due to unfavourable selection. Similarly, the collection of lobsters creates problems because they are not protected under the Wildlife Act. The majority of lobsters occur outside the marine parks but they need protection because they are slow breeders. Many lobsters that are trapped have been observed to be gravid and it is possible that the reproduction within the population is being interfered with through restriction of genetic diversity. Clearly, a separation must be made between traditional and commercial fishing if the marine parks/reserves are to be safeguarded in the future.

5.3. Shell collection

A recent study has revealed that shell collection within the protected areas is causing concern; the main collectors are probably visitors and their guides. The study revealed that collection took place at Kiunga, Malindi and Shimoni with the favourite shells being those of *Cypaea tigris*, *C. mauritania*, *C. rufa*, *Ovula ovum* and *Lambis lambis*.

5.4. Conflict of uses

Coastal hotels want to adapt the Malindi and Shimoni marine areas for water sports for their visitors. Apart from being aesthetically unacceptable, water skiing would pose danger to goggles, especially if the numbers of skiers increases. The mooring of boats in the corals is damaging the corals, as is snorklers standing on the coral.

5.5. Problem of entrance gates

Coupled with the problem of water skiing is the problem of illegal entry into marine parks and reserves. The major problem to planning is the location of tourist facilities on the shore. The land base of the park and reserve is invariably restricted because the land is owned by the urban and municipal councils. Besides, the visitors have access to the marine parks and reserves at several points and many avoid the entrance gates through ignorance. This may mean that a certain amount of revenue is not collected.

5.6. Lack of skilled manpower and proper training

Wardens and rangers manning the marine parks have either wrong training or no training at all. For instance, the wardens have all trained at the Wildlife College Mweka, Tanzania, where emphasis is on terrestrial parks and reserves with only casual reference to the coastal and marine parks in theoretical work. The lack of interest in these areas is further supported by lack of appropriate titles for the wardens assigned to the marine reserves. This is a serious omission in such an important training institution.

5.7. The problem of irrigation schemes and the hydro-electric dams

Kenya has constructed a series of dams along the Tana River for producing electricity, aimed at making the country self-sufficient in energy requirements. The method used is called "cascade development of the river", based on a system of power stations. Large dams along the Tana River are located at Masinga, Kamburu and Kitaru. Unfortunately, poor land husbandry on the slopes of Mt. Kenya is causing serious soil erosion, leading to siltation of the dams which may reduce their lifespan. The silt load is estimated by the Tana River Development Authority (TRDA) as between 9.2 and 14.3 million ton/year, which is affecting the proposed Ras Tenewi Reserve. Similarly, siltation emanating from the Sabaki River in the south is affecting Malindi National Park. In addition, no study made to assess the impact of the dams on fauna and flora, and particularly the fish. A case in point are two species of eels, *Anguilla* spp., which travel from the ocean upstream to spawn in the cold streams on Mt. Kenya. In the absence of fish-ladders to facilitate eel migration, it is not yet known what the long-term effect will be. Similarly, fish, *Labeo* spp., go in the reverse direction to the ocean along the Tana and Sabaki Rivers.

5.8. The problem of endangered species

Two marine animals, turtles and dugong, are endangered in Kenya. The marine turtles are unfortunate in that they do not enjoy adequate protection outside the present sanctuaries. Thus, the fishermen and the other people at the coast are at liberty to catch the turtles unhindered. At the moment, the Wildlife Conservation and Management Department does not have enough marine scouts to patrol the shores beyond the marine parks and reserves.

Dugong only enjoys token protection around Kiunga and Malindi Watamu areas. However, its critical range, like that for the marine turtles, is outside the protected areas, being situated around the mouth of the Tana River.

5.9. Exploitation of timber and charcoal burning

In the Shimba Hills, cutting of timber by the Forest Department and the burning of charcoal, intensive cultivation and uncontrolled bush-fires are destroying the national reserve. The problem of the Shimba Hills is further complicated by the forest and game management, which do not seem to be in harmony with each other. For instance, whereas the game department advocates strict conservation and non-interference of the natural resources, the forest department allows timber exploitation and massive re-forestation. This type of dual management of a common resource can only be harmful to the resource's future.

The mangrove forests are cut to supply poles to an existing market in the Middle East a factor that may have adverse effects in the future.

6. SOLUTIONS PRESCRIBED

6.1. Control of fishing

As a deliberate way of safeguarding marine parks and reserves, the Fisheries Department has supported the Wildlife Department, which is the custodian of marine parks, by introducing regulations to control subsistence fishing within the marine parks. First, a buffer zone-reserve was established around the parks for subsistence fishing. In addition, only certain methods are allowed, such as setting correct size of nets and outlawing of spear-fishing and harpooning. The use of explosives or water-rifles are prohibited.

6.2. Limitation on shell collection

Shell collection is regulated through a licensing system which establishes quotas; collection is allowed on des-

ignated areas only. Occasionally, a ban on shell-collection may be imposed as a conservation measure.

6.3. Safe-guarding of rare or endangered species

With regard to the endangered marine species the Government has given them complete protection and, by ratifying CITES, has ensured their protection on an international scale. The list at the moment includes all the marine turtles and the dugong. The status of other marine species is reviewed regularly with a view to extending this protection.

The ban on hunting and the sale of wildlife trophies was aimed at further safe-guarding these species.

6.4. Role of research

The Government encourages research with the view to enhancing the understanding of marine ecosystems for better conservation. For instance, the protection and care of nesting sites for marine turtles at Malindi by the Warden is aimed at ensuring better success of the hatchlings.

6.5. Control of pollution

The municipal councils governing the coastal cities are being encouraged to properly plan their sewage systems as a way of minimizing the discharge of effluents into the ocean to reduce the pollution of the parks and reserves. Further afield, the Ministry of Agriculture is involved in education campaigns for better soil conservation through proper methods of land husbandry, in line with the World Conservation Strategy. This would have a beneficial effect on the parks. It is further hoped that the Law of the Sea will have a beneficial effect once it becomes functional.

6.6. Discipline of settlement schemes

An effort is being made to encourage new settlement schemes to use other forms of fuel such as cow dung and gas to safeguard trees. If this effort is successful, it should be possible to safeguard the mangrove forest and the Tana River Delta including the coastal rain forests.

7. MANAGEMENT PLANNING

The Wildlife Department established a Wildlife Planning Unit in 1978 with the objective of preparing management plans for all of Kenya's parks and reserves. The management plans will help the Department in allocating funds and manpower to each park. In addition, the

Research Division is providing scientific information relevant to planning, such as numbers and distribution of various animal species. In addition, sociological studies are being encouraged to ascertain the visitor perception of the marine parks for better planning to enhance visitor enjoyment. The introduction of tourist facilities, e.g. underwater trails and visitor centres, are subjected to research before arriving at decisions. Thus, research is complementary to planning.

8. ROLE OF MARINE PARKS WITHIN THE PARK SYSTEM

The coastal and marine protected areas of Kenya fulfill an important role of protecting unique and delicate habitats, such as coastal rain forests, saline grasslands, sand dunes, coral reefs and some of the off-shore islands. A system plan under preparation has identified gaps in the protection of Kenya's natural regions, particularly in the coastal region, e.g. the Ras Tenewi and Diani areas.

9. ECONOMIC IMPORTANCE OF MARINE PARKS

Of about 500,000 visitors coming to Kenya each year, only 5% visit the marine parks. Thus the marine parks are not a prime attraction. They also employ few people. Despite this weak base, coastal hotels are primarily based on tourism, and the tourist industry employs many people directly involved in hotels and transportation. Indirectly, it adds to the economy through interlocking activities involving tourist spending.

10. RELATING KENYA'S EXPERIENCE TO UNEP'S EAST AFRICAN SEAS PROGRAMME

Kenya's conservation programme for the coastal and marine protected areas is primarily concerned with the protection of marine ecosystems. Priority is given to fragile habitats such as the mangrove thickets and coral reefs and to the rare and endangered fauna, e.g. turtles and dugong.

Protection is also extended to representative biotic communities such as the palm woodlands, alkaline grasslands, beaches and dunes.

Kenya's guidelines for establishing parks and reserves, safeguarding of marine ecosystems and preservation of rare species are identical to the UNEP's Action Plan for the East African Regional Seas Programme. The country recognizes major threats to marine resources as being associated with urban developments taking place in Mombasa, Lamu and Malindi.

11. CONCLUSIONS AND RECOMMENDATIONS

Coastal and marine protected areas have positive and negative aspects. On the positive side, they conserve rare or fragile ecosystems including habitats of threatened fauna and flora. These areas may also serve as a baseline for observing ecological changes in other unprotected areas. Economically, these areas are important as they support tourism which is second to agriculture in contributing to the Gross National Product of Kenya.

But these areas can also have a negative impact. For instance, the coastal reserves of Boni, Dodori and Shiraa Hills harbour the deadly tsetse fly that transmit a fatal disease to domestic livestock. This is a major stumbling block to agricultural development. In addition, control of fires within the parks has interfered with the natural course of events necessary for the elimination of the vegetation that harbours the fly.

Conflict also exists between park and traditional rights of fishing and shell collection.

On another scale, there is a growing land problem associated with the development of tourist hotels. Because the beach plots for erecting lodges and other tourist facilities such as night spots and casinos are scarce, the local people are enticed by entrepreneurs to sell land for purposes of tourist development. Further inland, the local people are laying more emphasis on cash crops

rather than subsistence crops in order to supply to the expanding tourist industry. This shift away from subsistence cultivation may in time contribute to food shortage and famine, particularly during severe drought.

However, the advantages of having the coastal and marine protected areas far outweigh their disadvantages. The land under parks is more secure than that under other forms of use, such as agriculture which is exploitative in nature. Today, the marine parks and reserves face several challenges. For example, lack of qualified manpower is a major drawback. Realising this shortcoming Kenya is establishing a Wildlife and Fisheries Training Institute with help from the World Bank which will train wardens in techniques of managing both the terrestrial and marine reserves.

All these problems underscore the need for scientific research and planning. UNEP, IUCN, WWF, Unesco, UNDP and FAO can assist the East African countries by providing the necessary technical assistance to solve some of the problems outlined above.

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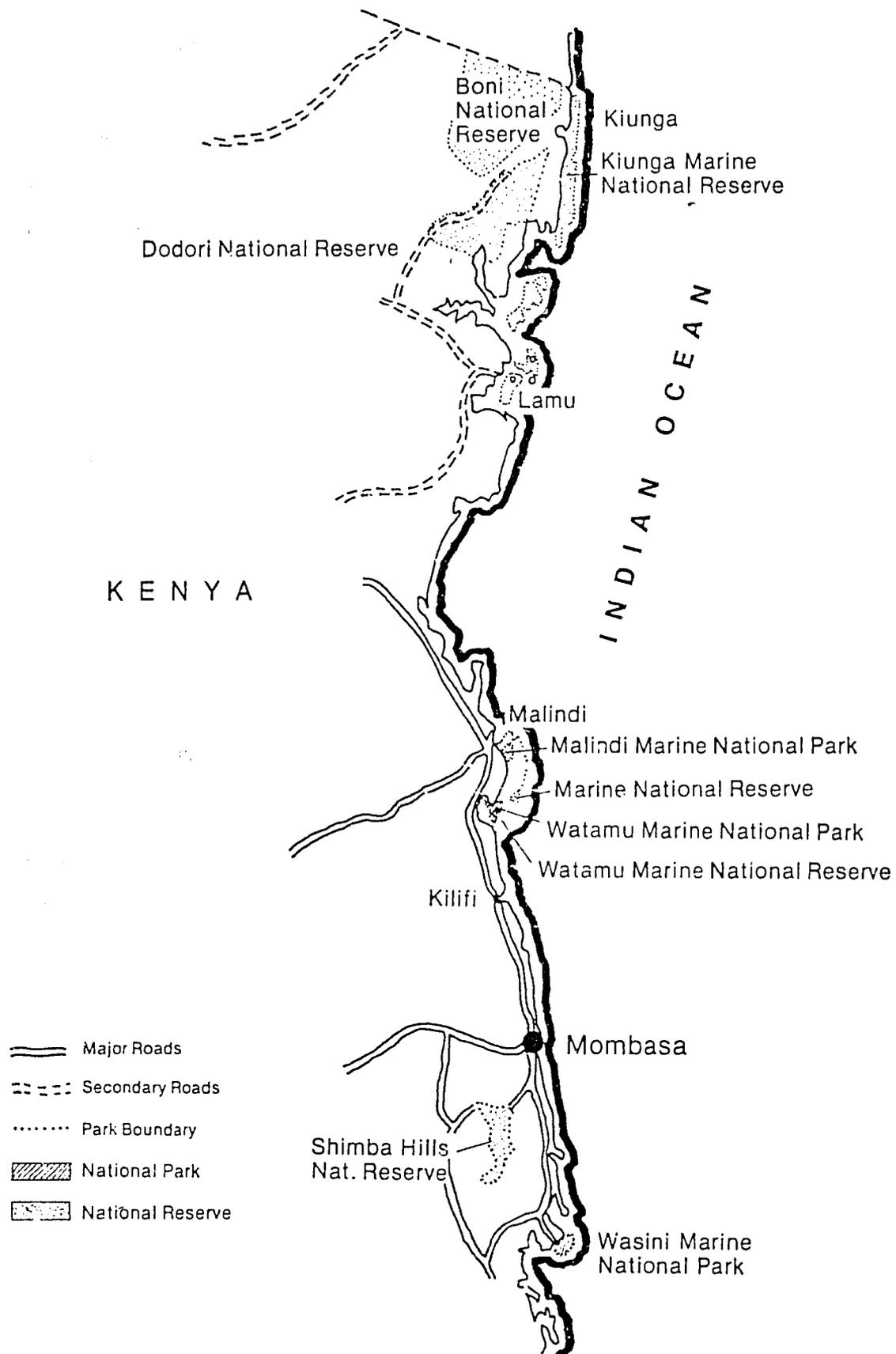


Figure 1. Coastal and marine parks of Kenya.