



A Coast in Common

an introduction to the
Eastern African Action Plan



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an introduction to the
Eastern African Action Plan

Seychelles Tourist Board



From the scattered islands of the Indian Ocean to the coast of the African mainland, people of diverse and colourful cultures share a common coast with visitors who wish to trade or enjoy the sun.

The Eastern African Action Plan seeks to moderate the pressures imposed by growing human numbers and protect the ecosystems and resources of the marine environment of the Region for people of the present time and in the future.



United Nations

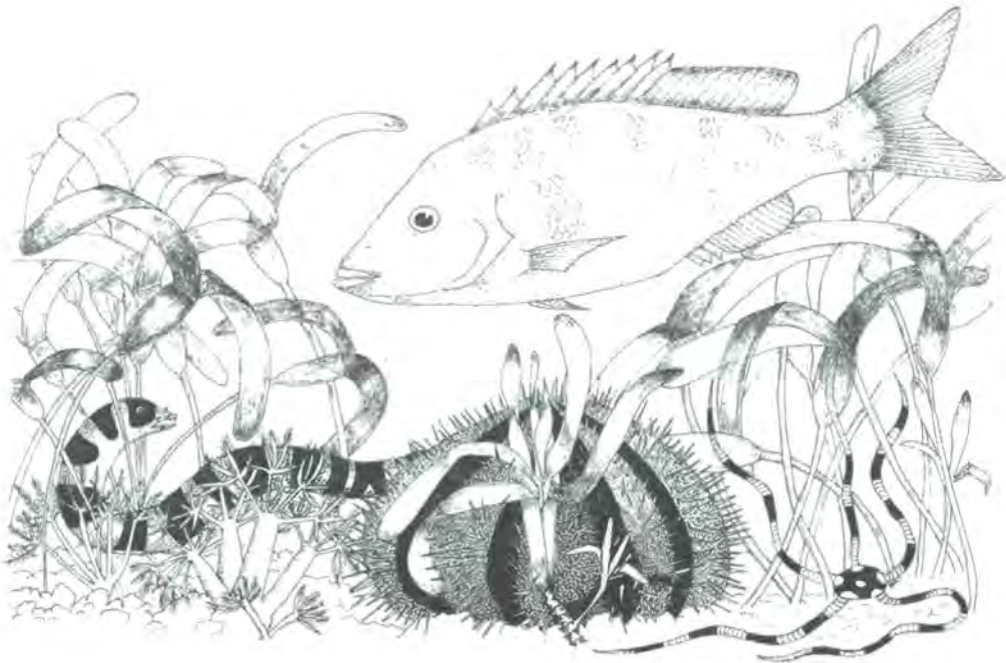


UNEP United Nations Environment Programme



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Many ecosystems of the region are highly productive in their natural state. Here an important food fish, the emperor fish, is seen with other species, a moray eel, a sea urchin and a brittle star which are found in the sea grass beds.

Introduction

The coastline of Eastern Africa is an area of great physical beauty, rich in living resources. Palm fringed beaches of white coral sand lead down to tranquil lagoons enclosed by spectacular coral reefs with their wealth of colourful fish, shells and corals. The area has vast mangrove forests, high coral cliffs, wide stretches of sand dunes, and numerous offshore and oceanic islands.

Yet there are problems in paradise—pollution, habitat destruction, and the pressures of growing populations and tourism.

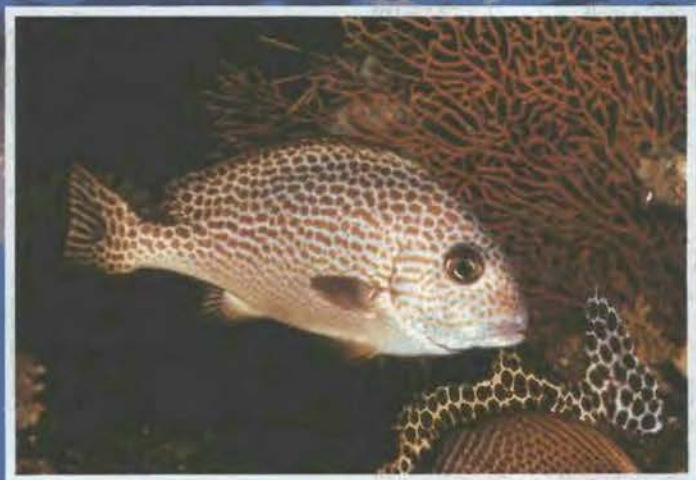
To face these common threats to their marine environment, the nine nations of the region are now working together to manage their shared resources and to find regional solutions to their problems. They are doing this under the auspices of the Eastern African Region, one of the newest of the Regional Seas Programmes initiated by the United Nations Environment Programme.

The region encompasses four mainland countries extending from Somalia in the Horn of Africa, through Kenya and Tanzania to Mozambique in the south, and island nations that include the Seychelles, an archipelago of over 100 islands, the Comoros, Mauritius, Réunion, and the Malagasy Republic. Together, they have 12,000 kilometres of coastline, and a rapidly growing population of about 55 million. This booklet describes their ecosystems and resources and the problems they face, which are the challenges to be faced by the Eastern African Regional Seas Programme.

Fabby K J Neilsen



Through the jagged opening of a coral cave, a fisherman is seen casting his nets. Inshore fishing is one of the main occupations of the region.



Ecosystems

The coral reef

The living coral organism or polyp is a tiny tube-shaped animal that extracts calcium compounds from seawater which it uses to build a protective skeleton. After one polyp establishes itself on a bare rock, it may divide by budding and establish a colony, which, given the correct conditions, may continue to grow at the rate of a few millimetres or centimetres a year. To grow well, corals need the warm temperatures of tropical or subtropical water, a food supply in the form of organic particles which they catch with their mobile tentacles, and light, as many corals live closely with algae which need light for photosynthesis.

A reef forms gradually over a long period as a result of the activities of both corals and algae. Corals growing close together will trap sand and rubble which is held fast by calcareous algae.

The growth of a coral reef creates a new living environment which will give shelter, protection, food and anchorage to a variety of living organisms. The reef itself is a barrier against the force of the sea and the lagoon it protects provides tranquil water and a stable environment for marine organisms. There are many coral species and their different shapes, structures and colours, seen with the myriad of colourful creatures that live around the reef—fish, shellfish, anemones—can be an important food source, a major tourist attraction and a valuable source of scientific information.

In its natural state, a coral reef is one of the most productive of marine ecosystems. Unfortunately nowhere in the Eastern African Region are coral reefs safe. Along the entire length of the region's coast line, from Somalia in the north to Inhaca Island, Mozambique in the south, and around the reef fringed oceanic islands, these ecosystems are continuously disturbed. Deforestation and environmentally destructive agricultural practices inland cause huge quantities of silt to be carried to the sea by the rivers of the region. On reaching the sea, the silt is dumped, smothering the reefs, so that the coral polyps die. The increase in the nutrient content of the water then causes algae to bloom and settle on the smothered reef. This is happening, for example, to reefs around Malindi affected by silt carried from up-country Kenya by the Sabaki River.

In all parts of the region, oil is also a threat to coral reefs, weakening or

FACING PAGE, MAIN PICTURE: At low tide, the surface of the coral reef is exposed. It forms a barrier between the deep sea and the sheltered waters of the lagoon. (SPREP)

FACING PAGE, INSET: Finding shelter and food among the corals are many species of fish. This Gaterin is an important food fish in the region. (SPREP)

smothering the polyps so that neither algae nor tentacles can function. The slow breakdown of the oil releases poisonous substances which also harm sea life. Other threats to coral in many parts of the region, particularly Tanzania, are the use of stone anchors and of dynamite for fishing. Stone anchors have smashed and destroyed large areas of coral whereas explosives kill not only fish, but other organisms, and break the structure of the reef itself.

In parts of the region, coral reefs are also being destroyed by dredging and are being mined for building blocks and burnt to make lime. To make matters worse, corals are collected extensively for tourist trophies and in addition many reefs are threatened by land based pollutants. Even within marine parks, siltation, poaching and unwitting, sometimes wanton, damage by tourists have taken their toll of the ecosystem:

Indeed, not only are the reefs of the region deteriorating, they are dying and the functions they now fulfil—like protecting the coast from erosion, producing fish and other foods and providing a lagoon safe from sharks for visitors and fishermen alike, will soon be lost.

Islands

Islands are a conspicuous feature of the Eastern African Region and they have played a significant role in the history of this coast by offering defensible sites to Arabs and Portuguese at Mombasa, Lamu and Zanzibar. In Kenya and Tanzania they are important centres of the Swahili culture which is based on the maritime activities of fishing, mangrove cutting and building dhows.

Fabby K J Nielsen



Islands are fragile ecosystems as their land area is small. This is Mwemba Island in Tanzania.

Mauritius, the Seychelles, the Comoros and Réunion are all island nations and the vast island of Madagascar is itself almost a subcontinent. All have either never been in contact with the mainland or were separated long ago in geological time. On these islands, evolution followed a course ordained by the laws of natural selection, producing some remarkable plants and animals.

However, the effect of man on islands can be disastrous as the land area and ecosystems are small and island species often have no fear. Introduced species like rats, dogs and pigs have wrought havoc among indigenous flora and fauna.

Both environment and culture can be destroyed by too great a tourist onslaught, and many islands in the region—particularly those fringed with sandy beaches, lapped by warm seas, and offering exotic cultures—are now developing their tourist industry and attracting significant numbers of visitors. There is also a need to protect island life from the runaway development that is taking place in parts of the Seychelles where useful areas of mangrove are being axed for building projects.

The special features of islands in the region need to be appreciated and valued. They are nesting sites to turtles and birds, home to special flora and fauna, and the site of distinctive habitats and cultures. Their size makes them fragile and vulnerable and all development activities should be given careful consideration.

Mangroves

Mangrove areas are threatened throughout the region by over-exploitation, deforestation for development sites and land based sources of pollution such as agriculture chemicals. Concern over future stocks of marine fish and prawns which use the mangroves as nursery areas is mounting and the need to conserve mangroves has become a cause for international concern.

An important resource in the Eastern African Region, mangroves are tropical coastal trees and shrubs that are specially equipped to grow partially submerged or close to saline water. Seven species are known to occur in Kenya and several others occur elsewhere in the region. They are found in sheltered coastal areas, in bays, creeks and estuaries. The large estuaries of the Zambezi, the Rufiji and the Tana rivers, for example, harbour vast mangrove forests offering a wide array of valuable materials. Their wood, which is both insect and rot proof, provides fuel, poles used in house construction, and timber for boats and dhows. The bark is a rich source of tannins, used in tanning leather. Before the advent of synthetic tannins, export of bark was a significant source of foreign exchange.

Mangrove forests perform another important economic role. In addition to providing a nursery for prawns, their rich waters provide a habitat for the large, edible mangrove crab and several important species of mollusc, nursery grounds for fish and a suitable environment for plankton. A food chain through plankton, larvae and fish is established which often ends in the many species of birds that find shelter among the foliage of the trees.

Mangrove areas are cleared to form evaporation ponds for preparation of sea salt in Kenya, Tanzania and Mozambique and extensive clearing has taken place on the Ngomeni Peninsula, Kenya, for a prawn aquaculture project.

A fringe of mangroves helps to reduce coast erosion, and in some instances, where the waters are laden with silt, the trees actually reclaim land from the sea. The species which occur on the seaward side of the mangrove forest, trap soil, silt and vegetation round their specialised aerial roots. This accumulation of silt makes the area suitable for other species, which in turn change it into a drier and more solid environment.

SPREP



Mangroves are ecosystems that produce wood, crustacea, and are the nursery grounds of prawns and fish.

Living marine resources

Fish and fishing

The size of fish catches along the coast of the Eastern African Region is generally small, as it is in many parts of the Indian Ocean, because nutrient rich areas caused by upwellings of deep ocean currents do not exist. The one exception is the north-east coast of Somalia, one of the richest fishing grounds in the region.

Another factor that contributes to low fishing productivity is the narrowness of the continental shelf throughout the region—a small zone for plant growth means little food for fish.

Diversity of fish species is high, however, with more than 4,000 species reported. Some of the largest and economically most important are tuna, marlin and billfish, of which tuna is a significant source of foreign exchange.

Some smaller pelagic fish are also of economic importance, including the herring-like fishes, and the horse mackerels. Potential regional catches for this group have been estimated at 500,000 to 650,000 tonnes a year, of which half is likely to be caught from the rich upwelling off Somalia.

Trawling the shallow waters of the Sofala Bank in Mozambique brings in sardines and anchovies, as well as barracuda, mackerel and other species.

Fabby K J Nielsen



This dhow off the island of Pemba in Tanzania will use both lines and nets for fishing.

In most countries in the region small boats or canoes are used for fishing by line or net just beyond the edge of the reef, but in many areas, artisanal fishermen do not have the resources to obtain a boat and must therefore rely on the heavily over-fished inshore waters. As a result, there is over exploitation and lowered productivity. The fishermen use a variety of techniques, including the use of spear guns in the lagoon and around the reef. Fishing with nets in shallow water is both difficult for the fishermen wading across the lagoon and destructive to the coral underfoot.

Generally, throughout the region, artisanal fisheries deserve more assistance than they are now receiving. Catch prices could be guaranteed, and transport and marketing methods could be improved, possibly through a system of co-operatives like that on Kenya's south coast.

While the rationale of legislation on mesh size for nets, and the common sense of having closed seasons when the fish spawn, must be explained to local fishermen, they will take note only if they are making a reasonable living. Unless they receive more help to make that living they will continue to destroy, unwittingly or in desperation, their local marine environment.

Fabby K J Nielsen



Two fishermen in their locally made boat, cast their net. Fishing is bringing disappointing returns in many parts of the region as fish stocks decline.

Invertebrate resources

Prawns are a significant resource for many countries in the region yet the importance of mangroves as a vital habitat for these crustaceans is not fully appreciated. Prawns lay their eggs in deep water but the larvae migrate passively in the plankton, moving with ocean currents to the nutrient-rich water around the mangroves to feed and grow. They hide in the decaying leaves and feed on organic detritus to the subadult stage, when they migrate back into deeper water. Loss of mangroves affects prawn productivity, and countries of the region must accord their mangroves full protection if they wish to maximize prawn yields.

Madagascar has the best mangrove habitat for prawn production in the Eastern African Region, followed by Mozambique, which grossed almost US \$20 million from the sale of prawns between 1978 and 1980. The Rufiji delta in Tanzania accounts for half of Tanzania's present output, but its potential is not fully tapped. Trawling for prawns is carried on intensively in Kenya's Ungwana Bay, north of Malindi.

Officials of the Fisheries Department in Mozambique have voiced concern that by reducing the amount of water entering the delta of the Zambezi River, the Cabora Bossa Dam may be responsible for lowering prawn production. This pinpoints the need for ecological assessment of future development projects in the region.

Other commercially important crustaceans are the mangrove crab, important both as a protein-rich food for local people and a gourmet meal in tourist areas, and lobsters and crayfish which are mainly in high demand from tourists.

Mariculture

Very little mariculture goes on in the region but Mauritius is using stone walled enclosures, known locally as barachois, in bays and lagoons to raise young fish to marketable size. The walls of the enclosures are fitted with movable gates to allow water to circulate and to facilitate stocking with juvenile fish from the lagoon. Some barachois are private, and others are owned by the government. About 20 are currently in use, varying in size from half a hectare to over 50 hectares.

The raising of oysters could be an important mariculture technique for Eastern African countries as well as an extra justification for the protection of mangroves. Mariculture of oysters in mangrove creeks at Gazi in Kenya has demonstrated that oysters can be raised to a good size in such areas. Oyster culture can provide jobs, food and cash, all of which are needed in the region.

Seagrasses

Marine plants, algae and seagrasses, which grow in profusion in many ecosystems, are among the most abundant renewable resources of the Eastern African Region.

Lagoons and creeks are characterised by vast meadows of seagrasses, which are closely related to terrestrial flowering plants. There are about nine species in the region including the slender eelgrass, and a large species whose huge, strap-like leaves are found in deep waters. The rhizomes of this species are harvested by people of the Lamu Archipelago in Kenya, who dry and then grind them into a flour for cooking.

Seagrasses are eaten by some herbivorous fishes, while important carnivores like the emperor fish, feed on the molluscs, brittle stars and urchins which are part of the seagrass community.

Turtle grass is consumed by the herbivorous green turtle making it a plant of great importance. Several other species of seagrass are food for dugong, once abundant in many parts of the region. Since the demise of the dugong, this enormous biomass of seagrass has been underutilized.

In addition to providing anchorage, food and shelter for various marine organisms, seagrass helps to stabilize the sea bed by holding down sand at times of rough seas and ocean turbulence.

Seaweeds

Algae, often known by their common name seaweeds, are much more diverse than seagrass and a host of species colonise rocks, rock pools, and sandy areas as well as the reef top. They play a significant part in the transfer of energy in the lagoon and are a vital part of many food webs. Some herbivorous fish and a host of invertebrate life forms like grazing molluscs, feed on the algae, the smallest of which are unicellular forms that colonise the leaves of sea grasses and the surface of rocks.

The importance of algae as reef-builders is not fully appreciated by most people. Specialized lime-secreting algae and other branching forms, form a matrix in which sand and rubble are held fast. As the particles are bound together, they form a substratum on which, or in which, other organisms can grow.

Edible species of marine algae that grow in the East African Region could be an important food source of the future. Some red and green algae which grow in the region are cultivated or collected for food in Asian countries and could be exploited in a similar way in the East African countries. Algae could also be used as a source of raw materials for the pharmaceutical industry.

Protected areas and endangered species

While the countries of the Eastern African Region vary in their approach to conservation, they need to collaborate to establish a chain of parks or reserves throughout the region that will protect vital ecosystems and endangered species. With the exception of the Seychelles, the number of coastal and marine protected areas in this part of the world is discouragingly small.

Seychelles Tourist Board



One of the many birds protected in the Seychelles is the Cardinal Bird.

Aldabra Island in the Seychelles is an important sanctuary for the giant tortoise.

David Fisher



Protected areas serve a number of vital functions:

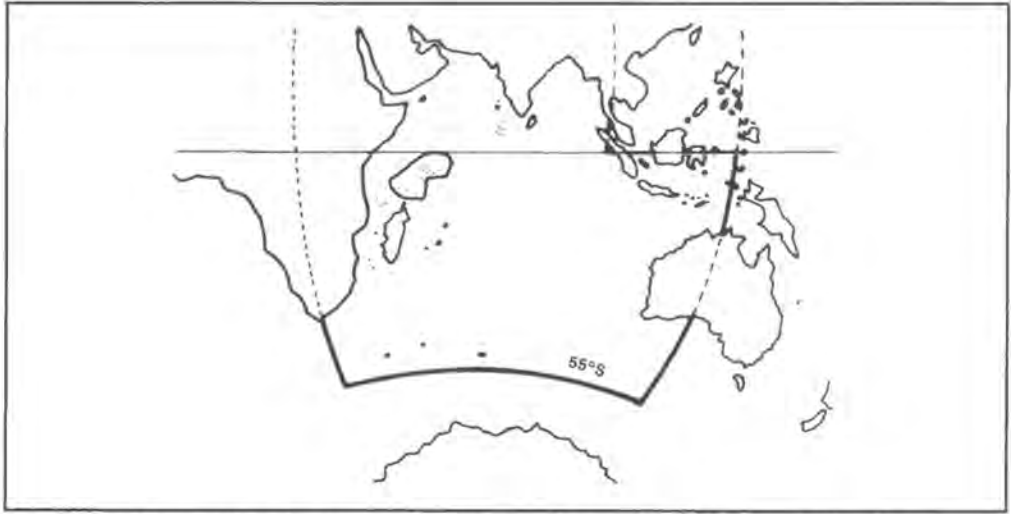
- They can serve to restock areas under exploitation. For example, fish living within a protected area will move to and restock adjacent fishing grounds.
- They can protect critical habitats for feeding and breeding of organisms vulnerable to over-exploitation.
- They serve as a base line against which degradation effects in other areas can be compared.
- They can provide opportunities for research and education without the interference of artisanal exploitation of the area.

One special feature of the region is the immense wealth of biological diversity resulting from the early isolation of oceanic islands from the African mainland. Some islands in the region were never a part of the mainland, and island populations have evolved in isolation to their present unique forms.

Rare and exotic life forms of the region include the elegant lemurs of Madagascar whose survival is increasingly threatened by deforestation. To date fourteen species have become extinct, including the giant lemur, which was almost five feet high and occupied an ecological niche similar to the mainland apes. Among the many species endemic to the Seychelles are the colourful Seychelles fruit pigeon, the Seychelles tiger chameleon, an orange breasted flying fox, and many species of palms and screw pines.

A second unique feature is the presence of two very special protected areas within the region—the Indian Ocean Sanctuary, encompassing the entire mainland coast and island states in the region, and the Aldabra Atoll, which became a World Heritage Site in 1982. Part of but remote from the Republic of the Seychelles, this island has the world's largest population of the giant land tortoise, as well as the largest nesting population of green turtles in the Indian Ocean. In addition, it has many distinct species of birds and many flowering plants found only on Aldabra.

The vast Indian Ocean Sanctuary, which was established on the initiative of the Seychelles government in 1979, is valuable, not only for the species it protects, like bluefin, humpback and sperm whales, but also to show what international co-operation can achieve for conservation. For a period of 3 years, no whaling vessels could operate within the boundaries of the sanctuary and it is hoped that the International Whaling Commission and the countries concerned will continue this achievement, when the status and jurisdiction of the



The Indian Ocean Whale Sanctuary protects Blue, Sperm, Humpback and other large whales.

Sanctuary come up for review in 1992 and that they will consider extending the protection it affords to all marine mammals in the zone, including small cetaceans and dugong.

The Islands of Aride and Cousin in the Seychelles are sanctuaries for birds and turtles and the Praslin National Park, now an important tourist attraction, encompasses the famous Vallée de Mai Nature Reserve whose palm species include the famous coco-de-mer. The park is also a sanctuary for the Praslin black parrot and other birds.

Collection of shells and corals is not allowed in the Seychelles islands, and spear fishing is banned. A visitor's spear gun will be politely confiscated on his arrival and returned to him when he departs.

Outstanding achievements in conservation and protection are not confined to the Seychelles, however. Kenya has gazetted a number of marine national parks and reserves designed mainly to protect inshore ecosystems like coral reefs. In the north, the Kiunga National Reserve is a biosphere reserve under Unesco's Man and the Biosphere (MAB) programme. The extensive Malindi-Watamu National Park protects some fine areas of coral and the Kisite Marine Park in the South encompasses islands, mangrove areas and coral reef. The Dodori National Reserve has both a terrestrial section and a marine area. This is in a wild, remote and beautiful area of Kenya's mainland, north of the island of Lamu, where you can see elephant and coral fish within the same reserve. The recently opened Mombasa Marine Reserve protects an area of the coast which has had a lot of pressure from tourists. Plans are moving to open another protected area at Tenewi, south of Lamu, to protect dugongs, turtles and sea birds.

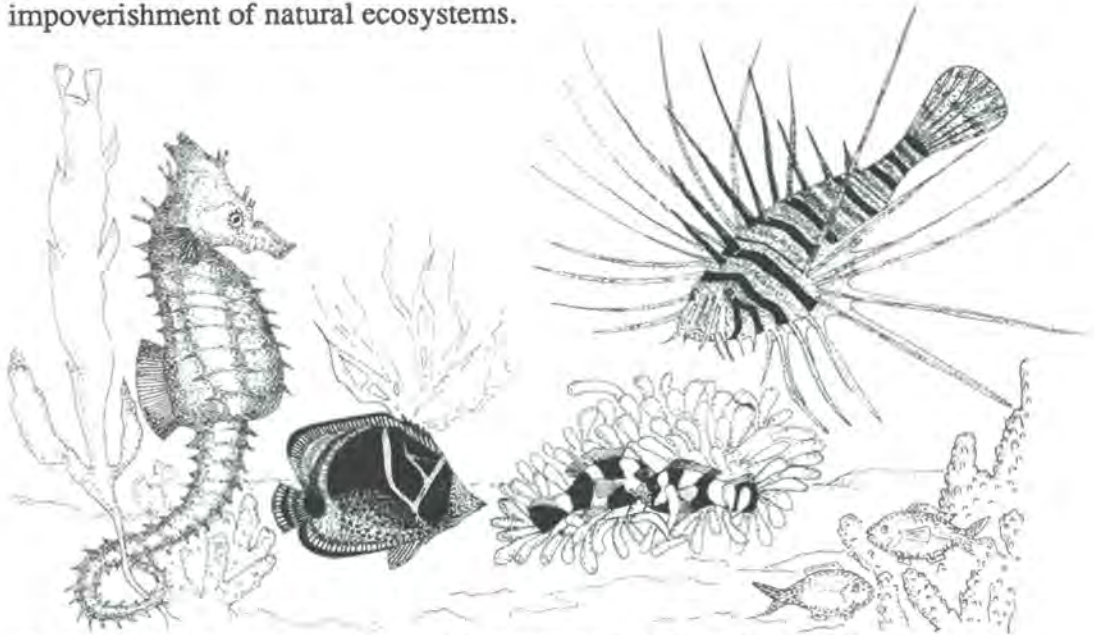
Fish and invertebrates

The capture of small, brightly coloured fish to serve the aquarium trade overseas is rapidly depleting natural populations in lagoons and along reefs in the Eastern African Region. All suitable fish are collected; there are no quotas; many die in transit. Since no information exists on the status of fish populations, it is likely that some species are in danger of extinction as a result of this trade. Fish exporting companies usually operate legally, however, and governments may realise too late that they have allowed one of their special reef attractions to disappear.

The sought-after fish are often brightly-coloured like the members of the wrasse family, or of unusual shape like the box fish, the long-nosed puffer fish, and the clown fish that lives within the tentacles of sea anemones.

Many fish have very specialised feeding habits. Box fish feed on lagoon algae and the long-nosed puffer fish selects small lagoon urchins. How do they fare when offered unnatural aquarium foods? Each species is also adapted to a specific range of salinities, temperatures and oxygen content of water. Can they cope with aquarium conditions? Moreover, each species plays its part in the transfer of energy within the lagoon. It is a link in the complex food relationships of inshore waters. If one link of the chain is removed, the whole ecosystem suffers.

Species suitable for aquarium life should be bred in the countries that have a market for them. This would prevent depletion of natural stocks and the impoverishment of natural ecosystems.



Many brightly-coloured and attractive fish of coral reefs and lagoons are collected and exported for the aquarium trade.

The trophy trade

Fabby K J Nielsen



Shells and other trophies are collected to be sold to tourists. This is degrading ecosystems in many parts of the region.

Most of the trophy trade centres on molluscs which are insufficiently protected through most of the region. People who have no fishing skills collect molluscs along the reef at low tide to supply this trade.

Consequently, the survival of the largest and some of the environmentally most important shells is threatened. The triton shell whose elegant white trumpet may grow to half a metre or more in length is now so rare in Kenya that those for sale there are said to come from neighbouring countries.

This mollusc is one of few predators of the coral-feeding crown-of-thorns starfish, whose plagues have caused severe damage to coral reefs in Australia, Oceania and the Red Sea. No doubt many factors contribute to these unnatural explosions, but the wholesale removal of a natural predator must be significant.

Similarly, many lagoons in Eastern Africa are now marred by plagues of unattractive, stinging, long spined sea urchins which disturb swimmers, snorkellers and fishermen. Doubtless many factors are at work to produce these urchin plagues, but again, the removal of their predators must contribute. The long-spined black urchins are preyed upon by some of the molluscs in high demand for the shell trade, like the red helmet shell, whose heavy shell crushes the urchin's protective spines. Urchins are controlled by these, and other carnivorous molluscs.

Shells are collected at each tide from reefs in many parts of the region but those offered for sale to tourists represent the tip of the iceberg of this trade. The vast majority of shells are shipped directly overseas.

Corals, collected both for local sale and export, are equally threatened in some Eastern African countries. Black corals are allegedly being poached by tourists in Mauritius, where all corals are under threat, while bright red starfish are disembowelled for sale to tourists in Tanzania and Kenya.

All organisms that form part of the trophy trade are thus being prevented from playing their part in contributing to the richness of lagoons and reefs. Corals are food to other organisms, provide shelter and protection or anchorage to others, and contribute to the building of the reef. Starfish provide food for fish and birds, as do shells and urchins. If one type of animal is selectively removed, as happens for the trophy trade, the productivity of inshore ecosystems is impaired, and an ecological imbalance results.

Nor can the trophy trade be justified on humanitarian grounds as the person who does the hard or dangerous work of collecting obtains little reward for his pains. Profits go to the middleman, the shopkeeper or the exporter. The resource-poor fisherman or shell collector gets but a small percentage of the final price.

Turtles

Global populations of sea turtle are plummeting fast not least in the Eastern African Region, where five of the world's seven species occur—the green turtle, the leathery, the hawksbill, the Pacific Ridley and the loggerhead.

All turtle stocks are under ever-increasing pressures from humans seeking food and economically valuable products like shells and leather. Both eggs and hatchlings are eaten in many parts of the region and the adult turtle provides succulent meat and valuable oils. The green turtle is particularly sought after for soup while the Hawksbill's shell is much admired for its beautiful reddish, yellowish and brownish markings. In some parts of the region, such as the Seychelles Islands, whole turtle shells and trinkets such as combs, ornaments, and bracelets of "tortoise shell", are sold to visitors, who may be unable to import these products into their own countries because of stringent international regulations. Unfortunately not even the increasing sophistication of the plastics industry has taken pressure off the Hawksbill turtle as "real" tortoise shell products have continued to stay in vogue.

Other hazards beset this unfortunate reptile. Both wild animals and dogs dig up and eat its eggs. Sea birds and shore crabs catch and eat the hatchlings as they make their perilous journey from the nesting site to the edge of the sea, where again, many will be consumed by predatory fish, like sharks. Despite the

large number of eggs laid (up to 1,000 per female, per season) very few survive to maturity.

Most adult turtles are killed on beaches, as females climb the shore to lay their eggs. This is doubly destructive; it prevents the female from laying her eggs and selectively destroys the biologically important female turtle.

Both adult and juvenile turtles are also caught at sea, by nylon nets which are almost invisible in water. Lost or discarded nets floating around the ocean are an increasingly serious problem for marine species. They trap fish, sea mammals and turtles, until they finally sink through the weight of their tragic load.

Because all young turtles and all the adults in the region except the green turtle feed on jellyfish they can mistakenly ingest floating plastic waste like polythene bags, which look very much like jellyfish in water, with fatal consequences. The leatherback turtle, in particular, selects the jelly fish as its food.

The green turtle is a reptile of immense economic importance. It is utilized for turtle soup, a gourmet delight, and, as a herbivore, it converts seagrasses into palatable meat. Its critical habitats are seagrass meadows for feeding and sandy beaches for egg laying—both abundant in the Eastern African Region. With better management, the green turtle could be a significant economic asset to the area.

Moreover, turtle conservation must be made a regional priority if these valuable reptiles and the resources they offer are not to be lost. And effective conservation must cover all critical habitats, including feeding and nesting grounds, and involve international co-operation as these species migrate to different territories.

Turtles have been a highly successful life form for 90 million years. Are they to be exterminated in our own lifetime?



A Hawksbill turtle—endangered by the demand for its shell.

Birds

The avian history of the East African Region is marred by the extinction of some of the most spectacular birds the world has ever known. In Madagascar and parts of Southern Africa lived the giant ostrich, or elephant bird, a huge three-metre high flightless creature whose 11 known species have long been extinct. Their mummified bodies and gigantic eggs have been found in Madagascar swamps. Their demise was probably caused by man.

Another large, flightless bird, the Dodo, which lived on the island of Mauritius, was wiped out by meat-starved sailors in the seventeenth century.

The threat to birds by humans seeking food—and eggs for collection—continues. In the 1970's the Kenya coast was known to have 8,000 breeding pairs of Roseate terns. A count in 1987 revealed that the population had plummeted to only 3,000 as a result of egg collection.

There are comparable problems on the Seychelles islands. Eggs of sooty and noddy terns are collected on some islands for sale in Mahé and young chicks are taken from the nest before they can fly, to be killed, salted and eaten.

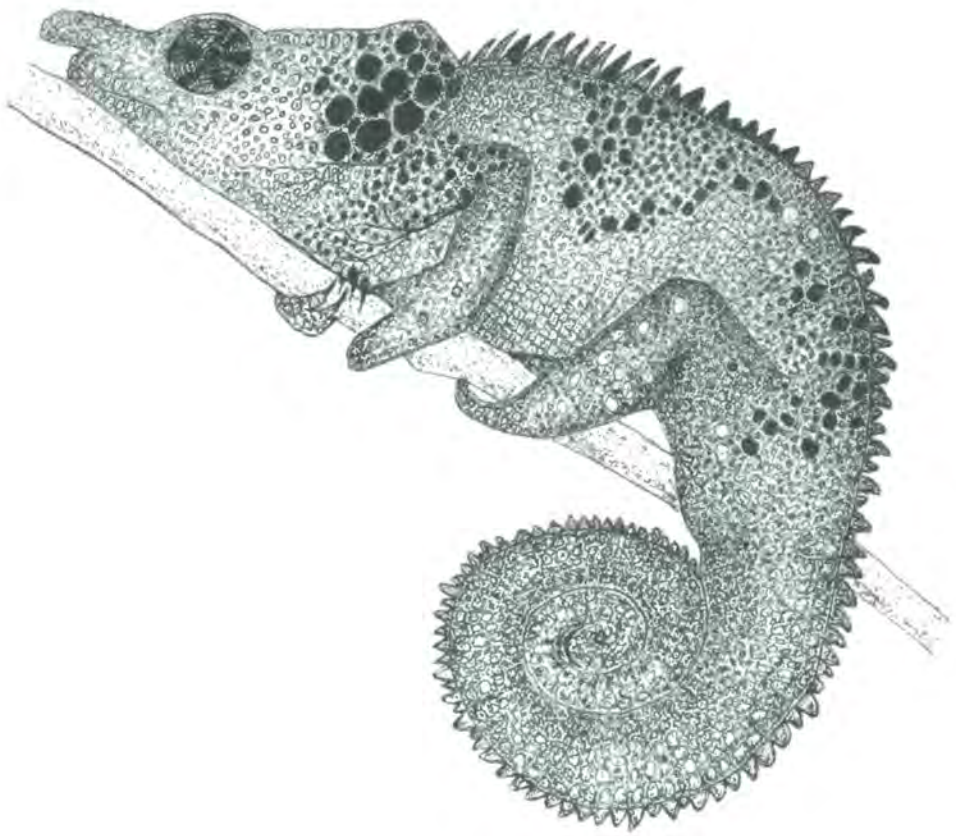
Adult tropic birds and gadfly petrels suffer a similar fate on Round Island, Mauritius. Though legislation exists to protect them it is not enforced, despite the fact that Round Island is classified as a Managed Nature Reserve.

Regional bird populations, particularly on the offshore islands, are affected by other human activities such as clearing forests, removing mangroves, draining swamps, and the proliferation of agricultural chemicals, which destroy or pollute the habitat of both resident and migrant birds.

In the meantime, serious management mistakes must be rectified. One concerns the European barn owl which was introduced to the Seychelles to control rats but found it easier to prey on native birds and now has a price on its head. Another concerns the Indian house crow whose population in Mombasa, Kenya has reached plague proportions, threatening not only indigenous coastal birds, but those of inland areas. The problem should have been dealt with before the population reached its present size and before it started its insidious spread both along the coast and inland.

As with many living resources, it is difficult to assess the economic value of sea birds. However, because of their aesthetic appeal and scientific interest, bird-related tourism, based on ornithological and photographic safaris, coupled with the development of a better tourist infrastructure, would provide an incentive for their protection.

Little information exists about the role of sea birds in recycling nutrients but their contribution must be significant. Mining of nitrogen-rich guano takes place in some of the Seychelles islands both for local use and for export.



Much of the unique fauna of Madagascar is threatened by widespread deforestation. More than half the world's species of chameleon are found in Madagascar including this short horned chameleon. Mammal species, including this tiny tenrec, and the rare lemus, are similarly threatened.

Mammals

While some marine mammals in the Eastern African Region are endangered, small cetaceans such as the Indo-Pacific humpback dolphin and the bottlenosed dolphin are not. Large cetaceans are protected in the region by the legislation of the Indian Ocean Sanctuary, a remarkable conservation initiative which banned all whaling in the Indian Ocean north of latitude 55°S. There is no local tradition of large whale exploitation in the region but the carcasses of beached whales have been utilized occasionally in Somalia, which is known to have a population of humpback whales in the north.

The region has interesting populations of large cetaceans, including the blue whale, the fin whale, the humpback whale, and the sperm whale. There is a humpback breeding ground between Madagascar and the mainland of Mozambique.

Seriously endangered is a unique sea mammal, the dugong, which has been hunted to the brink of extinction throughout the region for its very palatable meat and the rich supplies of fat beneath its skin. It was once very abundant in many parts of the region. Herds of hundreds were described in Somalia in the 1960's, and at the same time, aggregations of 50 or 60 dugongs were regularly sighted off parts of the Kenyan coast.

Though legislation to protect the dugong exists in many countries, it is not enforced. The remaining herds continue to be hunted illegally in most areas and face the additional hazard of being trapped and drowned in fishing nets.

This animal is a unique resource. As the world's only herbivorous mammal that is totally marine, it converts sea grasses into very palatable meat. The Eastern African Region has vast meadows of seagrasses, and suitable critical habitats like sheltered bays and mangrove areas for calving. The potential of this animal as a food source in protein-hungry coastal lands has not been fully appreciated and the insufficient protection it has been accorded is unlikely to prevent its extinction in the near future.

Of the region's terrestrial mammals, several primate species, including the Zanzibar red colobus monkey, and the unique lemurs of Madagascar are threatened by deforestation and habitat destruction, while hunting for food has seriously reduced populations of the flying foxes of Mauritius and Rodrigues.

Kenya Stamp Bureau



The dugong, a highly endangered marine mammal, has been shown on stamps in Kenya and Tanzania

Land use practices

The growth of coastal towns and industries, ecologically unwise farming and livestock rearing practices, together with expanding agriculture and tourism in the area, are having undesirable effects on coastal zone and marine habitats of the Eastern African Region. These effects are becoming more and more apparent as pollution increases and ecosystems deteriorate.

Several capitals, like Victoria, Mahé (Seychelles), Mogadishu (Somalia), Maputo (Mozambique) and Antananarivo (Malagasy Republic), are on the coast, and major ports like Dar es Salaam in Tanzania and Kenya's Mombasa are large centres of population and industry. The recent proposal to transfer the capital of Tanzania from Dar es Salaam to the inland city of Dodoma was an attempt to take pressure off the densely populated coastal region.

Among the area's island nations, building land is in short supply and its availability governs the distribution of population. Agriculture is important but poor cultivation practices cause problems. For example, cultivation of rice on the steep mountain slopes of the Comores Islands is eroding the fragile volcanic soil. In the Seychelles and in the Malagasy Republic up to 300 tonnes of silt per hectare are lost annually to soil erosion. In contrast, the islands of Réunion and Mauritius, which grow sugar cane, a soil conserving crop, on more than half their land, do not have a serious erosion problem.

Livestock husbandry, particularly in Somalia, Tanzania and the Malagasy Republic, where herds are large, is another significant cause of soil erosion in the region.

Sara Ellington



Overgrazing by livestock like goats can destroy vegetation and increase soil erosion.

Siltation

Soil erosion related to deforestation and unwise agricultural practices causes another form of pollution in the region—silt—with serious implications for both the people and the economies of the countries concerned.

In Kenya for example, silt from the Tana river is affecting catches of both fin fish and prawns in Ungwana Bay, and silt carried by the Galana-Sabaki River down to the sea at Malindi is smothering coral reefs and sullyng beaches, with serious consequences for fishing and tourism. Similar problems are evident elsewhere, particularly on the island of Madagascar where one million hectares of soil are lost each year through rampant deforestation and uncontrolled bush fires. Eroded soil carried by rivers to the sea has affected many parts of the coast. Mahajanga Harbour is badly silted and coastal shipping is paralysed, fish catches are down drastically and coral reefs and their associated communities are smothered, as at Toliava (Tuléar) and Antseranana. When the coral polyps cannot clean themselves fast enough, they die.

Siltation is also affecting coral reefs in the Comoros, harbours and estuaries in the Seychelles and in south east Mauritius.

Pollution caused by agriculture

Fabby K J Nielsen



Unwise agricultural practices on smallholdings in Madagascar are resulting in massive soil erosion and siltation of marine ecosystems there.

Agriculture, in which 90 per cent of the population of the East African Region is engaged, is an economic priority. All countries in the region are striving for self sufficiency in food crops and for increased productivity in cash crops like cotton, sugar, tea and coffee. As a result, pesticides and fertilizers are being used increasingly but their deployment has not been accompanied by sufficient environmental awareness.

Many areas of intensive agriculture are inland, and most pollutants from this source are carried by rivers down to the sea, thereby affecting highly productive and fragile coastal waters. Ecologically harmful organic pesticides that are used throughout the region include DDT, dieldrin, lindane and toxophene.

Herbicides, like 2,4-D and 2,4,5-T, which contain the highly toxic compound dioxin are used to spray sugar plantations in Mauritius, Kenya and the Malagasy Republic, and poisonous mercury compounds, now banned in Europe, are still used as fungicides in the region.

DDT is also used in all the mainland countries as an aerial spray to control tse-tse fly, and tourist beaches in the Seychelles are regularly sprayed with the insecticide Diazinon.

The effects of pesticide pollution on marine life are now becoming apparent in Mauritius, whose Ministry of Agriculture attributes the current fish decline to pesticide runoff, and in Mozambique, where fish have been found dead in the Limpopo River after aerial spraying with parathion.

In general, pesticides are not biodegradable; they persist for a long time in the environment, are absorbed into living organisms and accumulate along food chains. The health of humans is threatened by these toxins reaching them through the fish and shellfish they eat.

For its part, fertilizer runoff transported to the ocean by rivers increases the supply of nutrients in lagoons and estuaries, causing algae to bloom artificially, die off and decay, using up oxygen needed by fish and other organisms.

Urban pollution

Very little effort is made to deal with the problem of urban trash in coastal towns, where about one twentieth of the region's population lives. This is augmented by an influx of tourists in some areas. Domestic rubbish from the city of Mombasa, for example, is dumped at a site at the edge of one of the inland creeks. The town of Lamu deposits its urban trash at the edge of the sea where donkeys and marabou storks feed on it. Occasional attempts to burn it have little effect, and most is dispersed by the tides.



Urban trash is dumped on shore for dispersal by the sea in many parts of the region. This scene at Lamu in Kenya is typical of many coast towns.

Primary sewage treatment facilities are few in the region. Most sewage is discharged raw and untreated into streams and rivers or directly into the sea, for dilution and dispersion. Generally, the marine outfalls are not distant enough from the coast or sufficiently submerged to prevent pollution of some beaches and swimming areas. There is partial treatment of sewage in Mombasa, Dar es Salaam and at Victoria on the island of Mahé, in the Seychelles.

While sewage is currently a local pollution problem, it could pose a serious threat to human health if it were to contaminate marine food sources like fish and shellfish, and spread to recreational areas.

When the antiquated sewage system of Dar es Salaam, Tanzania, collapsed some years ago a master plan for the town's sewage and sanitation system was developed which was designed to be completed in phases until the year 2010. If implemented it will do much to improve the disposal of liquid and solid waste in Dar es Salaam.

Industrial pollution

Industrialization of the countries of the Eastern African Region is increasing, and with it, the rate of increase of pollution from industrial sources.

Industries tend to be concentrated along the coast at particular sites. Mombasa is a major industrial site on the Kenya coast, while Dar es Salaam houses most of Tanzania's industries. Most of Mozambique's industries are located in Maputo and Beira.

Some industries are common to several countries, particularly those which produce important materials for local use, like textile mills, slaughter houses, sawmills and breweries.

Agriculture and livestock breeding, the mainstay of the region, are an important source of raw materials for local industries that fashion farm products into marketable items. The region has both primary processing industries like milk pasteurization and meat production, and secondary industries such as soap, leather and textiles.

Both the disposal of organic waste, and of noxious oils and chemicals after processing, can be sources of serious local pollution. Dar es Salaam harbour, for example, is badly polluted and Maputo Bay can no longer be used for swimming or fishing.

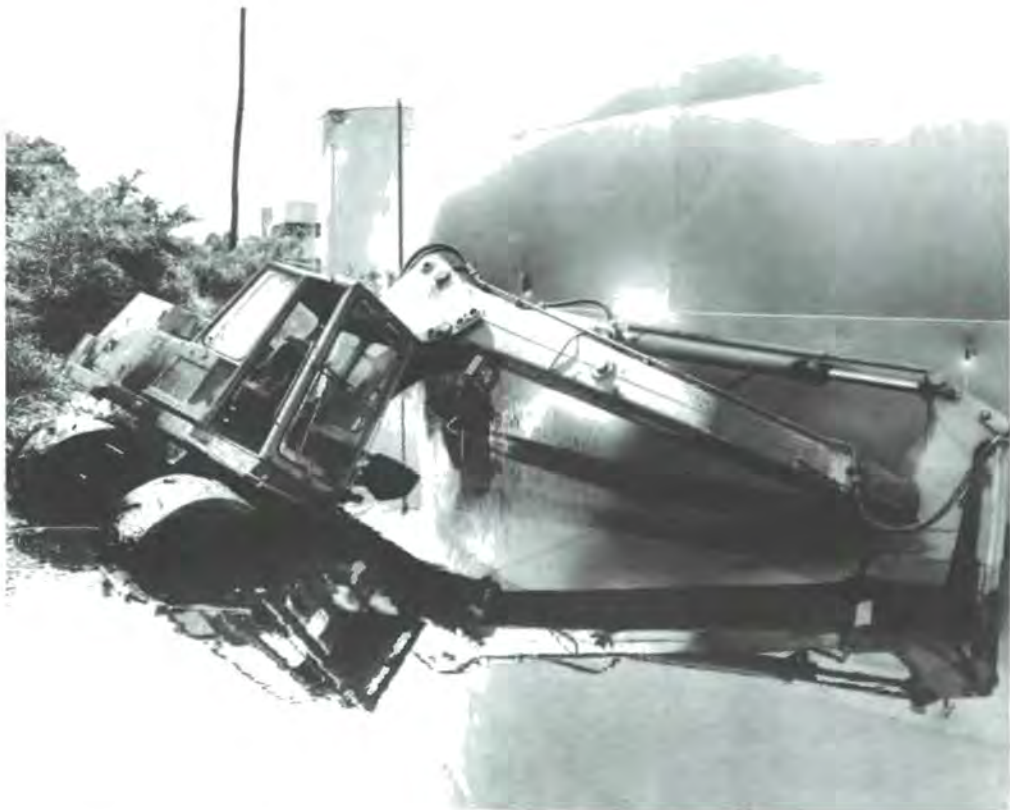
Textile mills use caustic soda and other chemicals such as acids, dyes, detergents and starch. Treatment involves passing the effluent into sedimentation tanks from which sludge is removed and burnt. Generally, the treatment is ineffective and better techniques of disposal need to be devised if environmental pollution is to be avoided.

Slaughter houses, in particular, are a cause for concern. They are often sited close to the sea, and blood, offal and scraps of meat, which are supposed to collect in tanks, tend to overflow, forming stagnant pools of foul smelling organic materials close to shore. This in turn attracts sharks, which in the area of Mogadishu, Somalia, have been the cause of a number of tragic incidents at swimming beaches.

Not only is this situation environmentally and socially undesirable, it is also wasteful. Organic materials from slaughter houses could be collected and processed into animal foods thus solving the disposal problem while producing a valuable commodity.

Sawmills, for their part, should stop using arsenic compounds for wood processing, as these highly toxic substances are likely to be discharged into the sea with other effluents,

In general, a lot more thought needs to be given to environmentally sound disposal of industrial effluents, and to appropriate siting of industries.



ABOVE: The accidental puncturing of this oil tank by a crane caused serious oil pollution at Mombasa in 1988.

BELOW: Most of the worlds oil is shipped through the East African Region. This map shows oil transport routes in 1980.

Oil pollution - the reality and the threat

It has been calculated that, on any one day, about 225 tankers move through the waters of the Eastern African Region, one of the busiest oil tanker routes in the world. There are two main transport patterns: one route, served mainly by medium sized tankers of 20,000 - 100,000 tonnes, is from the Middle East to the oil refineries of Eastern and Southern Africa, providing them with a total of 22 million tons of crude oil annually. A few tankers travel to the Comoros, the Seychelles and Mauritius, which import refined oil from the Middle East. After the tankers deliver their oil, they return to the Middle East in ballast, and it is likely that their tanks are cleaned out on the return journey.

The second route is via the Cape of Good Hope to Europe and America, using very large crude carriers of more than 200,000 tonnes. This trade is over 500 million tonnes a year.

The possibility of an oil spill from one of these huge tankers is the biggest single threat to the marine environment of the Eastern African Region. Spills also occur accidentally during loading or discharging operations in a port, as happened at Dar es Salaam in January 1981, when up to 100 tonnes of crude oil destroyed an area of mangrove forest, and at Mombasa in July 1988, when 4,800 tonnes of heavy fuel were lost when a fuel tank was accidentally pierced by a crane close to the Mombasa Oil Refinery.

Oil threatens the marine environment in many ways. Oil slicks can poison marine mammals, turtles and fish, and smother bottom-living corals and other organisms. As oil breaks down, its chemical components, like aromatic hydrocarbons, affect feeding and reproduction of many organisms, including crustacea, molluscs and fish. Chemical dispersants, used to break down oil slicks, can create another form of pollution.

Liquid oil is found on Comoran beaches every day, probably discharged as ballast or through tank washing activities. But tar balls on beaches are the most visible form of oil pollution in the area. Though they vary in size, most balls weigh about one kilogram.

Oil refineries also contribute to pollution. Of the five in the region—at Mogadishu, Mombasa, Dar es Salaam, Matola near Maputo, and Tanatave (Malagasy)—the largest, at Mombasa, handles about three million tonnes of crude oil a year and Matala processes one million.

Commercial deposits of gas have already been discovered at Songo Songo Island off the Tanzanian coast, and exploration for oil continues in many countries of the region. If some is discovered, a likelihood in the near future, pollution from oil drilling machinery, and possible spills from wells will pose an additional hazard to the marine environment.

Accidental pollution

Steve Jackson



The accidental break up of the Ariadne at Mogadishu, Somalia, could have caused serious pollution to the marine environment. Notice the containers in the foreground.

To areas close to a marine highway, there is the ever-present threat of accidental pollution. Such a problem arose in August 1985, in Mogadishu, Somalia, when a cargo vessel, the 16,000 tonne MV Ariadne ran aground close to Mogadishu harbour. The Ariadne was carrying about 650 tonnes of hazardous chemicals in a mixed cargo of 650 containers. Of these, a consignment of seven containers of tetraethyl lead (TEL) and sodium pentachlorophenate (SPCP), both very toxic to marine life, caused most concern. Malathion, sodium sulphide, hexane and DDT were among other hazardous chemicals on the vessel.

Had a large quantity of this dangerous cargo leaked into the harbour, the consequences for the marine environment could have been catastrophic. As it happened, through the concerted efforts of the Somali government, various United Nations agencies, experts from embassies and professional salvage companies, most of the cargo was successfully salvaged before it could cause serious contamination.

Huge cargoes of hazardous materials being transported large distances by sea continue to pose a very real threat to marine life and ecosystems, and the incident highlighted the need for a plan - for management guidelines to assist in such cases of emergency.

Other problems confronting the marine environment

Health problems

Malnutrition of children and adults is one of several conspicuous health problems in the Eastern African Region. It is found where unemployment is high, where land resources are inadequate and where the fish catch is too small to sustain fishing families. A clinic in Kilifi town, Kenya, deals with over 50 cases per day of protein deficiency in infants. These children are from the local fishing community, where the head of the family has to sell his small catch of protein-rich fish or octopus for cash to purchase enough of a low-protein staple like cassava to feed his family.

Among other regional afflictions are the mosquito-borne diseases such as malaria, which causes a heavy loss of life, particularly among children. All species of the malarial parasite are becoming increasingly resistant to the available drugs. Filariasis (elephantiasis) is particularly prevalent in low-lying and swampy areas like the north Kenya coast; and dengue, or breakbone fever, was recently brought to Eastern Africa from the Far East.

Measles is one of the major killers of children in the region, as are the diarrhoeal diseases which can be spread by houseflies or by contaminated food and water.

Whereas in the urban areas of the coastal zone, about four-fifths of the population have access to water of reasonable purity, in the rural areas, two-thirds of the population lack potable water, and cholera, associated with impure water supplies, is widespread. As noted earlier, raw sewage is discharged directly into the sea in many areas, with consequent contamination of seafood and occasional outbreaks of typhoid and paratyphoid.

Arthropod-borne diseases are another feature of the Eastern African Region, with tick-borne East Coast fever and sleeping sickness, transmitted by the tse-tse fly, both affecting cattle.

High levels of methylmercury have been found in many fishing populations around the world and a long-term project is underway in the Seychelles, where fish consumption is very high. There is a child development study which aims to determine the possible effect of methylmercury on the development of

the foetal brain and to prepare guidelines for the monitoring of child growth and development.

Methylmercury occurs naturally in fish, and is most concentrated in large predatory species at the end of the aquatic food chain. Ingestion of high doses of methylmercury from fish during pregnancy can lead to motor and neural abnormalities in newly born children, i.e mental and physical retardation, and epilepsy.

Methylmercury levels in the Seychellois population are being monitored by analysis of hair samples from pregnant women, and from newly born babies and their mothers.

As many island and coastal nations of the region are investing in the fishing industry and the consumption of large predatory fish is likely to increase, it is important that the risks from methylmercury in seafood be properly assessed so that correct measures can be taken to deal with the problem. These will include advice on dietary intake, establishment of maximum limits for mercury in sea-food, and a restriction on the size of fish allowed for consumption.

Over-exploitation of marine resources

Fish, shells, coral, bêche-de-mer, dugongs and turtles—all are subject to over-exploitation on a massive scale in many parts of Eastern Africa, where agricultural land is in short supply and food is scarce.

This over-exploitation is due in part to burgeoning human numbers coupled with a shortage of land-based jobs. Kenya's population of 23 million for example, said to be the fastest growing in the world, is increasing at unprecedented rate of 4.3 per cent annually, and is expected to double around the turn of the century, with a consequent increase in demand for land, food, housing, water and social services. A similar situation prevails in other parts of the region, straining both terrestrial and marine ecosystems to breaking point.

The shortage of land-based jobs in many parts of the region is attributable not only to rising human numbers but also to degradation of existing lands and widespread use of plantation crops.

Each year, the fishing population increases in size because the young men are unable to find a meaningful livelihood in farming or in other occupations. For those without land or capital, education or training, or for school leavers who have failed to find jobs, there is no alternative to fishing or collecting in the inshore waters, and therefore no respite for deteriorating ecosystems.

Solutions need to be found to this resource depletion/poverty cycle which escalates as populations grow. A place to start would be by giving increased support to artisanal fisheries through better marketing and transport, and by promoting fisheries based on under-utilised species like sharks. In some



Most marine resources are over-exploited at the present time. Starfish are collected by, or sold to, tourists.

countries the solution may lie in the promotion of employment possibilities that are not dependent on the sea, using resources that are not being fully utilised.

Coconut plantations cover vast areas of the Kenya coast, for example, and the establishment of local industries based on the many products that can be prepared from the coconut tree could do much to improve the lot of coastal communities. Mauritius, for example has recently concentrated on textile production to create jobs while boosting export earnings. Such land-based employment opportunities would take pressure off inshore ecosystems and at the same time, offer a better life to the people involved.

Legislation to protect the marine environment exists in most countries of the region but is rarely adequately enforced. For example, the Fisheries Act of Tanzania specifically bans the use of explosives for fishing yet the law is broken on a daily basis, even within earshot of urban centres, like Tanga. Dynamiting for fish can be found all along the Tanzanian coast and it tragically destroys both marine life and the structure of the reef itself.

For laws to be effective, however, a country requires the resources to enforce them—to maintain patrol boats, for example, and to employ trained, dedicated staff who will not be corrupted. Above all, laws will only be effective where local people are able to obtain sufficient for their daily needs.

Tourism

Jane Mackinnon



Tourists can cause damage without realizing it, by walking on corals or breaking them with flippers.

Most countries in the region have developed, or are in the process of developing, a tourist industry. From Somalia, whose tourist industry is in its infancy, to Kenya with its vast tourist infrastructure, the goals are the same—to bring in foreign exchange, generate employment, and oil the wheels of the economy. But there is a price to pay.

Tourism can change the traditional cultural values of an area and influence young people in particular. It can contribute to depletion of resources, as is happening in Kenya where tourist demand for lobster has led to an over-exploitation of marine crayfish, and it can destroy ecosystems as in the Seychelles, where mangroves are being cleared for tourist-related development projects.

In many parts of the region, tourist activities such as snorkelling, walking the reefs and collecting souvenirs are damaging coral and lagoons.

Linked to the tourist industry is the growth of the trophy trade in marine organisms. Tourists should be encouraged to purchase items that are not destructive, like fabrics, baskets or carvings, as souvenirs of their holiday.

An action plan for the Eastern African Region

Marine problems neither start nor end at national boundaries. Neighbouring countries which share a common sea often face the same marine problems, and it makes sense for them to pool their financial and manpower resources to approach and tackle these common problems on a regional basis.

This is the basis of UNEP's work with oceans. Setting out to address marine problems in a regional way, UNEP initiated the Regional Seas Programme in 1974 and has since established programmes in 10 different areas. These regional programmes concentrate particularly in developing parts of the world.

A plan for the Eastern African Region was developed during the early 1980's and in 1985, the Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region was adopted by the representatives of Comoros, France, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia and Tanzania.

Fabby K J Nielsen



The training of local scientists and the strengthening of institutions are priorities of the Action Plan. Above, plankton is being researched at the Kenya Marine and Fisheries Research Institute, Mombasa, by a senior research officer.

A convention providing the legal framework for the Action plan was signed the same year, together with two protocols: one concerning protected areas and wild fauna and flora in the region, the other concerning co-operation in combating marine pollution in cases of emergency.

The Eastern African Action Plan provides a framework for regional co-operation on problems that beset the region. The region's key environmental problem is the inadequate planning for environmentally sound sustainable socio-economic development and the rational utilization of natural resources. Therefore, among the main objectives of the Action Plan is the provision for better planning so that the Eastern African region may look to a healthier future for its marine and coastal environment, its ecosystems, its resources and its people.

The Action Plan has nine major projects of which three are priorities: coastal management, pollution monitoring, and a contingency plan to combat oil pollution.

The top priority is to promote the protection and environmentally sound development of marine and coastal ecosystems in the region. This is to be accomplished through the establishment of a regional network of institutions or organisations that will co-operate and co-ordinate their activities. The members of this network will carry out a survey of coastal and marine ecosystems and produce information on species, habitats and ecosystems. This will involve on-site ground surveys, aerial surveys and remote sensing techniques. Based on this information, particular coastal or marine areas which require the development of specific management plans will be identified. After a period of training, management plans will be drafted to conform with the Protocol Concerning Protected Areas and Wild Flora and Fauna in the Eastern African Region. At the same time a multimedia public awareness programme will be set up to enlighten the people of the region about their role in the management plan.

The second priority is to monitor pollutants, their sources, levels and effects in the region. This co-ordinated research and training programme will assist national institutions to monitor and combat pollution. A mission to all research centres in the region has already identified suitable laboratories to be involved with pollution monitoring. Monitoring equipment for the participating laboratories has been purchased and is shortly to be installed.

The third priority is to assist countries to respond to maritime emergencies or marine pollution incidents which threaten the environment or the local people.

The Protocol Concerning Co-operation in Combating Marine Pollution in Cases of Emergency in the Eastern African Region is a legal agreement by the contracting parties to co-operate to protect the regions' marine environment from marine pollution. Through the development of national contingency plans, a regional contingency plan will be developed. States will then know in what ways they can best co-operate in the event of such incidents.



The countries of the East African Region.

Other parts of the Action Plan aim at controlling pollution caused by dumping from ships, land based sources, airborne pollution, and damage from engineering and seabed activities. In addition, environmental impact assessments should be carried out. Law will be enforced relating both to liability and compensation for damage resulting from pollution within the Convention area.

The preparation of **national action plans** within the Eastern African Region Action Plan is an essential component of the plan. In 1984, for example, the government of Somalia requested UNEP's assistance in assessing the coastal and marine environmental problems of the country and in drawing up a national action plan for the protection, management and development of its marine and coastal environment.

In response to this request, UNEP organized, with the collaboration of other international organizations and the national authorities, a multidisciplinary mission to work in Somalia in 1986. The outcome of this mission and of the meetings that arose from it was an action plan for the country's marine environment. In addition, substantial documents have been prepared on marine pollution, marine oil and chemical spills, living marine resources, marine protected areas and reserves, coastal area development and management, and marine environmental legislation. The recommendations that arose from this initiative will enable the government of Somalia to identify and act upon that country's marine environment problems.

Similarly after a detailed survey of the Tanzanian coast and its problems, a national action plan is now being prepared for Tanzania.

Within the general framework of the regional Action Plan a report on the environmental effects of coral sand extraction has been prepared for Mauritius. At the same time a contingency plan for maritime emergencies is also being drawn up.

In Mozambique, a proposal for a management plan for Inhaca Island is receiving outside support as a contribution to the Action Plan.

Support to the Action Plan and the Convention is provided by UNEP, in co-operation with a number of international and regional organizations. This support includes the co-ordination of specific activities which governments have agreed should be carried out, and the provision of training and equipment to national institutions participating in the Plan. In addition, technical and intergovernmental meetings are being organized, as is the management of the Plan's financial resources. In the initial phase, UNEP is providing the main financial support to the Plan, although the Plan is gradually expected to become self-supporting through a special Trust Fund set by the Eastern African Governments

It is hoped that by working together within the framework of the Plan, the countries of the Region will reach a better understanding of their common problems and make progress in the management of their marine resources.

Goals and objectives

The general goals and objectives of the Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region are:

- a) To promote the sustainable development and sound management of regional marine and coastal resources by:
 - Enhancing consultations and technical co-operation among the States of the region;
 - Emphasizing the economic and social importance of the resources of the marine and coastal environment;
 - Establishing a regional network of co-operation on concrete subjects/projects of mutual interest for the whole region;
- b) To establish general policies and objectives and to promote appropriate legislation for the protection and development of the marine and coastal environment on a national and regional level;
- c) To prevent pollution of the marine and coastal environment within the region originating from activities within the States of the region or from operations primarily subject to the jurisdiction of extra-regional States;
- d) To provide for the protection and rational development of the living resources of the region, which are a natural heritage with important economic and social values and potential, through the preservation of habitats, the protection of species, and the careful planning and management of human activities that affect them.
- e) To strengthen and encourage, through increased regional collaboration, the activities of institutions within the region involved in the study of marine and coastal resources and systems;
- f) To improve training and assistance at all levels and in all fields relating to the protection and development of the marine and coastal environment; and
- g) To stimulate the growth of public awareness, at all levels of society, of the value, interest and vulnerability of the region's marine and coastal environment.

The activities of the action plan are expected to result in:

- a) Assessment and evaluation of the causes, magnitude and consequences of the environmental problems, in particular assessment of marine pollution and study of coastal and marine activities and social and economic factors that may influence, or be influenced by, environmental degradation;
- b) Promotion of methods and practices for the management of socio-economic development and activities that safeguard environmental quality and utilize resources wisely and on a sustainable basis;
- d) Establishment of institutional machinery and adoption of financial arrangements required for the successful implementation of the Action Plan.

NB The goals and objectives contain quotes from the Action Plan adopted by the Governments of the Eastern Africa region in 1985. For more details about the Action Plan contact: Oceans and Coastal Areas Programme Activity Centre, UNEP, P.O Box 30552, Nairobi, Kenya.

Fabby K J Nielsen



The massive growth of tourism in some parts of the region, like Diani Beach in Kenya, is imposing a great strain on the natural ecosystems of the region. Will the pressure prove to be too great?

This book was written and illustrated by Beryl Kendall for the Oceans and Coastal Areas Programme Activity Centre (OCA/PAC) of the United Nations Environment Programme (UNEP).

Prepared by the Information and Public Affairs Branch of UNEP.

DTP by Leslie Duckworth.

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SHELL COLLECTING WRECKS REEFS