

# **The Root Causes of Biodiversity Loss in the Eastern African Marine Ecoregion (EAME)**

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This document is the result of research looking into the social, cultural, economic and political root causes that are impacting biodiversity in the Eastern African Marine Ecoregion (EAME). In order to identify these less understood drivers, a Root Causes analysis<sup>1</sup> was conducted for the EAME, focusing on each of the eight globally important priority areas, and including other designated priority areas where feasible. The eight areas are: Lamu Archipelago (Kenya), Mida Creek-Malindi (Kenya), Rufiji-Mafia Complex (Tanzania), Mtwara-Quirimbas Complex (Mozambique), Zambezi Delta System (Mozambique), Bazaruto Archipelago (Mozambique), Maputo Bay-Machangula Complex (Mozambique), Greater St. Lucia Wetland Park (South Africa).

The Root Causes analytical methodology was designed to answer the questions: 1) what are the underlying policies, institutional dynamics, market forces and human actions driving the direct causes which lead to biodiversity loss 2) how are these direct and root causes interlinked 3) which factors are key at local levels, which at regional levels, and which at national or international levels.

The results and recommendations of the Root Causes analysis builds on and informs the results of the vision and reconnaissance reports. The ultimate objective is to use these materials to develop a long term conservation strategy for the Ecoregion and to assess trade-offs and choose appropriate actions for moving forward.

The results of the research from three different country teams exist in three different country studies (Kenya, Tanzania, Mozambique). This document is a summary of similar issues reflected in those three reports (South Africa's was not available). As this document is not a full reflection of all of the issues covered in the country studies, each country document should also be referenced. Below, the proximate/direct causes are described, followed by the root causes. In many cases, each issue is followed by examples from the study countries.

## ***Proximate/Direct Causes***

Degradation of mangrove forests, seagrass beds, coral reefs, wetlands and the species that they support, as well as open ocean communities, is a consequence of a wide range of natural and human causes acting at different intensities and in varying combinations within the EAME. In broad terms, the direct causes can be categorized as:

- Overexploitation of coastal and mangrove forests (conversion: agriculture, salt pans, aquaculture/overexploitation: wood, fuel, construction)
- Destructive fishing practices
- Destructive agricultural practices
- Coral mining
- Over-harvesting of resources (fisheries, dugong, dolphin, turtle, collection of shells and starfish)

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<sup>1</sup> The Root Causes methodology was developed by WWF's Macroeconomics Program Office

- Pressures from increased tourism (pollution, human activities)
- Global climate change, coral bleaching

### **Overexploitation of Coastal and Mangrove Forests**

One of the most pressing issues driving mangrove forest loss in the EAME is due to land conversion. For instances, clearing of mangroves for rice farms, conversion to salt pans, conversion to aquaculture ponds, and clearance for urban and industrial development is occurring in countries throughout the EAME. Other uses include logging for wood/mangrove poles for housing, fuelwood and charcoal production, as well as for boat construction.

In Tanzania's Rufiji Delta, Mangrove areas have been cleared and replaced with solar evaporation pans for the production of salt and mangroves. In some areas of the Rufiji delta, mangroves are used for fuelwood in the salt production process.

In Kenya over-harvesting of mangroves in the Lamu area has resulted in reduced mangrove cover and change in the population structure, e.g. the replacement of high quality mangrove with inferior species.

In Mozambique, mangroves have been decreasing, through harvesting for firewood and house building, but also because of economic activities such as conversion to salt work and aquaculture plans in the Zambezi Delta and Maputo Bay areas. Along Maputo Bay and Incomati River, mangroves suffer from deforestation, by several activities, which include, conversion to a large aquaculture farm for shrimps, conversion to salt works and deforestation for wood.

### **Destructive Fishing Practices**

The use of dynamite or explosives for fishing is the most immediately destructive human activity in much of the marine environment in the EAME. In many countries of the EAME fishermen from the main urban centers own boats, procure dynamite and hire crews to catch fish by dynamiting. Dynamite fishing is a very destructive fishing method used mainly in shallow waters of less than 10m deep. This method destroys the basis for reef fish productivity by indiscriminately killing juveniles and adult fish alike and at the same time reducing the reef to rubble.

Trampling during collection of octopus, shellfish, sea cucumber and seaweed in intertidal or shallow sub-tidal areas are also causing damage throughout the Ecoregion. In particular the reef flat, which provides important habitat for larval and juvenile stages of fish and other organisms, is gradually destroyed and the biodiversity of the area reduced.

Trawling is an efficient and less destructive fishing method when operated in deep waters. However, commercial and semi-commercial fishing vessels often operate their vessels, at depths of less than 20 m up and down East Africa's coast. This is not only harmful to seagrass beds and soft benthic communities but also disturbance to micro-habitats and sediment structure.

The encroachment of prawn trawlers into shallow areas has created tension between artisanal fishermen and commercial fishermen over fishing territories and rights. Artisanal fishermen complain about the destruction of artisanal fishing gear and the damage to the sea floor by industrial trawlers. Artisanal fishermen blame large-scale commercial fishing vessels for the destruction of their fishing gear, encroachment into their fishing territory and being responsible for over-fishing.

Fishing methods such as beach seines and small mesh size nets are also destructive to the environment in which they are applied, regardless of how limited their operations are.

Many of the local fisherpeople, like those in Tanzania's Rufiji delta use stake traps made from the roots of *Rhizophora mucronata*. With this technique, a large part of small channel is blocked by planting wooden stakes in a V-shape so that fish are stranded during low tide. This process is destructive because it affects the roots of the plant and may kill the entire plant. Also, these traps are woven together so tightly that even juvenile fish are trapped.

In Mozambique's Bazaruto Archipelago, gill nets, normally set in the deep channels for fishing, trap shark for exportation of shark fins. This method is one of the worst fishing methods used in archipelago because endangered species such as dugongs, turtles, and dolphins are also caught and often die.

In Kenya, destructive fishing gear, such as small-mesh-size nets, beach seines and spear guns used by artisanal fishermen in the marine reserve and unprotected areas is not uncommon. Destructive fishing practices include commercial prawn trawling in Ungwana Bay and the use of destructive gear by artisanal fishers in the coral and seagrass marine reserves and unprotected areas. Commercial bottom trawling for shallow-water prawns is conducted in the seagrass habitats in Malindi Bay impacting negatively on their productivity and biodiversity.

### **Destructive Agricultural Practices**

In the EAME, poor agricultural practices contribute to the loss of vegetation, as well as associated problems such as siltation.

In Tanzania shifting cultivation was a major agricultural system in the Rufiji Delta but has become less common as the land shortage has worsened, although it is still a threat. Under shifting cultivation, yields are initially high in newly opened rice field in the mangroves, but decline after the third year, and the field is abandoned due to weed invasion by the seventh year. This practice leads to the clearing of mangroves every time a new field was opened. Shifting cultivation is still a threat today.

In Mozambique's wetlands, local communities develop agriculture for subsistence and it is estimated that 95% of families depend on this activity, growing maize, rice, millet, sorghum, sweet potatoes and cassava.

In Kenya poor agricultural practices along the Sabaki/Tana/Athi River basin complex include cultivation too close to the river banks, and in catchment and marginal areas resulting in enhanced soil erosion, increased levels of suspended sediments in the rivers and the discharge of excessive loads of sediments into the marine environment. Excessive loads of suspended sediments discharged into the Malindi Bay have extended southward into the marine park resulting in shadowing and siltation of corals and seagrass beds. Indeed the disappearance of certain seagrass species in Malindi bay are attributed to excessive siltation.

### **Coral Mining**

Large quantities of living shallow-water corals are mined throughout the EAME for use as construction material and for lime production, produced by burning of the coral rock.

For example, in Tanzania, many people in Mafia Island and other parts of the Mtwara and Lindi are not only dependent upon coral as a source of building material but also as a source of income. Given this level of dependence and the lack of locally available alternative building materials it is likely that coral mining will continue unless a cheaper alternative is found.

### **Over-Harvesting of Resources**

Over-harvesting of resources in the EAME includes fisheries as well as a variety of other marine life. Over-fishing can have grave consequences for fisheries yields, for livelihood and for conservation. As the number of fishermen in a given fishery increases, the catch-per-fishermen inevitably falls. When fishing pressure surpasses the maximum sustainable level, catches decline quickly and the livelihoods of local communities follow. This in turn compels fishermen to resort to more destructive techniques that produce a higher short-term yield, but which quickly have disastrous effect to fisheries productivity and biodiversity.

Over-harvesting of fisheries involves two different aspects, first, harvesting total quantities of resources that are in excess of the sustainable yield and, second, catching juveniles, which reduces the capacity of stocks to regenerate in the future. Over-exploitation of fisheries carried out by commercial and artisanal fishers throughout the EAME in the form of increased fishing effort (number of fishing boats and fishermen, increased man-hours and types of fishing gear) is having a negative impact on the fishing populations.

Semi industrial and industrial fishing done by external fisherman for commercial purposes and recreational fishing done by tourists are categories of fisher activities carried out in Mozambique's archipelago. Increasing number of fisherman and intensive daily netting of the bay area is having negative impact on the fishing population and at the same time posing a significant reduction of fishing yields.

In Tanzania, increased commercialization of octopus, sea cucumber and seashell harvesting has resulted in a decline of these species in a number of areas. The export of sea cucumbers (beche-de-mer) is one of the more profitable areas of marine resource extraction associated with coral reefs. Overfishing of the triggerfish has resulted in a proliferation of sea urchins, which are known to be bioeroders of reefs.

In Kenya over-exploitation of fisheries, carried out by commercial and artisanal fishers in Mida-Malindi area and Lamu-Kiunga area, is in the form of increased fishing effort (number of fishing boats and fishermen, increased man-hours and types of fishing gear) to maximize catches.

### **Pressures from Increased Tourism**

The impact of tourist activities on the marine environment is three-pronged: visit to marine parks and reserves for diving and snorkeling affect the bottom marine environment (especially without proper instructions on how to behave properly in the marine environment), secondly the demand for ornaments exerts pressure on the marine resources and third the construction of facilities that cater to the tourist industry can cause destruction in terms of land conversion and pollution.

The tourism industry is growing rapidly in Tanzania, particularly in the Southern areas. Most of the tourist hotels are built within the coastal strip within less than 50 meters from the highest watermark. This poses many management challenges including problems related to shoreline stability. The causes of unregulated tourism include, poor land use planning, poor enforcement of legislation/setback lines and lack of coastal management policy. Some of the impacts of unregulated tourism include, deprived public access to beaches, increased waste loads, habitat destruction as tourism operators uproot seagrass and cut down mangroves in search of clear swimming sites, and rapid population growth encouraged by development of tourism industry.

In Kenya's Lamu-Kiunga area, the Island's urbanization areas (Lamu town, Shella, Mpeketoni) are concentrated, raising densities to higher levels. In Lamu town alone, the population densities

range from 800-1400 people per hectare, and 50% of the population resides in new expansion areas. In Lamu, the facilities that support tourism are located next or adjacent to the beach environment. Poorly located hotels exacerbate beach erosion, increase pollution and increase the degradation of habitats, especially damage to seagrass beds and coral reefs through trampling.

Kenya's Malindi and Watamu areas are also important tourist destinations with beach tourism forming the back bone of the economy. Indeed both urban centers owe their development to tourism. Growth in tourism and increasing urbanization has raised the demand for mangrove resources (for hotel construction), and coral reef and seagrass (e.g. seafood). It is noteworthy that both the urban centers and the chain of beach hotels lack sewerage facilities, and wastewater including surface run-off is invariably disposed of in the marine environment, thereby impacting on critical marine habitats. Intensified tourist activities in the Mida-Malindi area particularly in the Marine Park and Reserve, are a direct threat to the marine and coastal habitats. The activities include, boating (anchoring), diving, reef walking and the collection of ornaments, such as shells and corals.

In Mozambique's Maputo Bay and Matutuine, areas of uncontrolled tourism for scuba diving has resulted in intense reef damage, which on average means 69 corals broken every day. The continued exploitation of the islands of the Bazaruto Archipelago by new development poses a threat by leading to population growth, exacerbated by the system of uncontrolled settlement.

### **Global Climate Change/Coral Bleaching**

Extensive coral bleaching occurred throughout the EAME as a result of unprecedented high temperatures due to the *El-Nino* weather phenomenon in 1997-1998, impacting negatively on productivity and biodiversity.

One consequence that occurred was in Lamu and Kiunga in Kenya where coral mortality resulted in decreased coral cover of 10 - 50% of pre-bleaching levels.

### ***Root Causes***

The root causes within the EAME can be generally categorized as:

- **Population and Settlement**
- **Lack of Alternative Materials for Construction/Fuel**
- **Lack of Interest/Capacity to Explore Offshore Resources**
- **Decay of Traditional Management Practices**
- **Poverty and Lack of Economic Alternatives**
- **Open Access Policy/Lack of Ownership**
- **National Economic/Development Policies Lacking in Conservation Objectives**
- **Inadequate Capacity for Enforcement**
- **Legal Issues**
- **Lack of Institutional Coordination**
- **Conflicting Interests**
- **Market Failure**
- **Lack of Private Sector Commitment to Environmental Concerns**
- **Macroeconomic Policies**
- **Foreign Markets and Trade**

## ***LOCAL ROOT CAUSES***

### **Population and Settlement**

Population increases and settlement in the EAME are often linked with degradation associated with increased demand for firewood and charcoal. Demand from increased population as well as settlement has also been identified as driving activities that also threaten coastal forests such as mechanical logging, pit-sawing, charcoal burning, fuel-wood gathering, plantations as well as hunting.

One must be careful however, with these conclusions. In the case of the two Tanzania sites, what emerges is that historically poor management has contributed more significantly to increased depletion of mangroves than population pressure.

In Kenya however, population increases from both natural growth and in migration are seen as putting great pressure on the resources that provide construction materials (mostly mangroves and corals) and food (fish, mammals, turtles, seagrass and seaweeds). Immigration has been caused by a deliberate settlement policy for 6,000 upcountry people into new settlement schemes, tripling the population in past 20 years, and exacerbated by immigrant Somali incursions from war-torn Somalia. Population increases have also driven demand for agricultural land which has led to encroachment into marginal mangrove areas and coastal forests, such as the Arabuko-Sokoke forest, which is a water catchment area for the Mida Creek.

Settlement in Kenya's Lamu-Kiunga area is constrained by the County Council's lack of capacity to carry out effective developmental planning. These have implications to health concerns (arising from unplanned and informal sewage disposal system), to the surrounding waters (old town areas), with consequential impacts to marine life.

Poor economic conditions and lack of alternative employment (industrialization and commercial agriculture) in Mozambique's rural interior areas/ vicinity areas of coastal zones have caused people to immigrate to coastal areas. Development has also resulted in increased population density, which consequently has increase the conflicts and competition over resource use and management.

### **Lack of Alternative Materials for Construction/Fuel**

Lack of alternatives for building materials to replace or substitute mangrove poles tends to exacerbate over-harvesting problems in the EAME. Mangrove poles are most preferred because they are cheap, durable and easily available. However, few opportunities have been sought to address the issue of alternatives for mangrove poles, and policies have failed to set the actual value for the poles, such that, they are regarded to be very cheap.

Coral mining is considered one of the most destructive and unsustainable uses of marine resources within coastal waters. Mined coral provides an essential building material where there are few alternatives and provides a source of income to the local population. The mining of live coral not only destroys valuable breakwaters leading to coastal erosion but also destroys a habitat essential to the maintenance of the local fisheries and the future development of diver tourism (where marine parks are concerned).

Increased demand for firewood and charcoal is often linked to few affordable alternatives for energy that put further pressure on the mangrove forest ecosystems.

In Kenya, more and more people depend directly on natural resources for their survival, and the lack of alternatives and opportunities leads to unsustainable use of the resources. Dwellings are constructed from locally available materials of mangroves, coconut leaves (*makuti*) thatch with mud (mostly) or reinforced walls by coral chipping (becoming increasingly popular), thereby increasing demand for the resources.

In Tanzania, using mangrove poles because of lack of affordable alternatives is compounded by the fact that the Forestry Policy does not address the issue of alternatives for mangrove poles. Few alternatives are sought for coral mining as well. Two forms of coral are used in construction, namely, old fossil coral limestone and living coral. Fossil coral is mined in several areas for use as building blocks and as aggregate. Live coral mining consists of breaking large chunks of coral from the reef using iron bars. Again the blocks can be used directly as building blocks or as an aggregate, or alternatively they are burnt in open kilns for the production of lime. The resulting lime is used as a cement alternative and as a white wash for painting houses.

In Mozambique, mangrove stands suffer direct human impacts from cutting for several reasons including acquisition of building material and firewood and construction of canoes, with most impacts taking place at the northern margin of the Zambezi river.

#### **Lack of Interest/Capacity to Explore Offshore Resources**

Another of the local root causes for destructive fishing habits in the inshore waters of the EAME is poverty, unequal distribution of wealth, and lack of private sector involvement in exploring the offshore resources. This can clearly be seen in the case of dynamite fishing that is often established as teamwork between rich businessmen and poor fishermen. Though the fishermen are paid very little, they accept the arrangement simply because it enables them to survive for the day, which may otherwise be very difficult for them. Other social factors include inadequate awareness amongst resource users and general lack of education as well as demographic changes, particularly migration to coastal urban centers and small towns.

Other issues include lack of resources to invest in inadequate fishing gear and vessels to fish offshore, as well as limited private sector investment in developing off shore fisheries.

#### **Decay of Traditional Management Practices**

Traditional management within the EAME often includes all the main forms of restrictions practiced by modern fisheries organizations. These include gear restrictions, limited access, time limits, size restrictions, and sacred or protected areas. Many of these practices are done for the purpose of appeasing spirits rather than the increasing fish stocks, but some fishermen acknowledge their value in increasing fish stocks.

There is a reduced ability of these conservation practices to be successful in maintaining pristine coral reefs and seagrass beds in the EAME. Part of the problem stems from the decay of power invested in traditional management and its conflict with national policies.

#### **Poverty and Lack of Economic Alternatives**

The issues of biodiversity loss in the EAME are often closely connected to poverty and general lack of alternative economic activities. Most rural poor coastal peoples rely on natural resources around them for their livelihood. In order for households to survive they engage in actions that rapidly deplete these local resources. There exists a vicious circle between poverty and environmental degradation. Poverty and inequality leaves the disadvantaged members of the community with marginal lands for farming. Combined with bad farming practices, soil erosion is enhanced and this eventually leads to siltation of inshore habitats.

This socio-economic situation presents a major challenge to the prospect of sustainable resource-use. In the face of declining marine resources, rather than switching out of fishing to other forms of livelihood, the narrow income generation base compels resource users to adopt ever more environmentally unfriendly techniques. To make matters worse, education opportunities are very poor in these areas. If sustainable marine resource use is to become a reality, local communities urgently need technical assistance to broaden their income base and develop new sustainable sources of revenue.

In much of the marine Ecoregion, limited commercial infrastructure and high transaction costs for travel (low volumes, poor quality and poor roads and limited processing facilities (freezing)) are considered to contribute to low levels of income and intense resource exploitation.

In Kenya the incidence and depth of poverty and inequality, like in other coastal areas, is very high (absolute poverty is about 40% adult equivalent), putting pressure on resources to meet livelihood needs. Fishing pressure is explained in the paradox of low prevalence of food poverty (at 32% (% of food poor in adult equivalent)) principally because of abundant fishing activities and high fish consumption locally.

In Mozambique areas of high poverty in the EAME do not have many alternatives to building material and firewood, leading to an increased exploitation of mangroves stands located close to the inhabited islands. Poverty exacerbated by isolation and lack of socio-economic infrastructures occurs in inhabited islands at Quirimbas.

In Tanzania the issue of poverty is closely connected to a general lack of alternative economic activities. Most people rely on natural resources around them for their livelihood. In order for the households to survive they engage in actions that rapidly deplete these local resources. A large percentage of the coastal people in Rufiji-Kilwa-Mafia and Mnazi Bay-Ruvuna Estuary are poor compared to most districts in mainland Tanzania. Most of coastal people are fishermen who live a predominantly subsistence, “hand -to-mouth” lifestyle based on exploitation of marine resources, coconut and cashew production and subsistence agriculture.

## ***NATIONAL ROOT CAUSES***

### **Open Access Policy/Lack of Ownership**

Generally there is no specific land tenure system in the countries of the EAME since the sea is regarded as open access in which anybody can use as much as he or she can afford. Furthermore, there are technical difficulties in implementing any such tenure system, if it does exist, due to the absence of clearly defined boundaries in the sea as well as migratory nature of many aquatic species. In this regards, management options such as exclusion, enforcement and monitoring pose special problems to the responsible authorities.

The policy of open access to coastal ecosystems has had a major negative impact on fisheries, mangrove, coastal forest and coral reef biodiversity loss throughout the EAME. The local communities lack the feeling of ownership and stewardship of their surrounding ecosystems and the natural resources they contain, and thus do not have a great deal of motivation for conserving or restoring these ecosystems.

In Mozambique’s Bazaruto Archipelago, there is no limit of the number of licenses that may be issued for artisanal fishing. In addition to this, the law allows fisherman to operate throughout the whole year with open access to all areas. Fisherman from the vicinity of Inhassoro and Vilanculos

move their operations to Bazaruto during their collaborative closed fishing seasons, because the closed season does not apply.

In Kenya, ease of entry into fisheries and harvesting of other marine products due to their open access nature has been one of the factors responsible for the rapid growth of fishing effort and other forms of harvesting.

In Tanzania consequences from the open access regime can be seen in the movement of fishermen. The Tanzanian sea cucumber fishery is on the verge of being wiped out. Consequently, Tanzanian fishermen have moved southwards into Mozambique and approximately half of the sea cucumber now exported from Tanzania probably originated from Mozambique.

### **National Economic/Development Policies Lacking in Conservation Objectives**

The Governments of countries in the EAME have taken on, in one form or another, programs for economic and social reforms in order to stabilize their countries financially, and launch the economy in a sustainable way through reduction of inflation and macro-economic disequilibria. Measures often include the reduction of state interventions in the economy of the country and increasing participation of the private sector. Often such measures are taken without consideration or integration of environmental components.

The economic policies of the Kenyan government provides a glimpse at the potential ways that such policies can have a negative impact on the environment and consequently on long term development and sustainability.

The objectives of the Kenyan government with regard to the fisheries sector are to: increase per capita fish consumption, generate employment, improve the living conditions of the fishing community, and maximize fish export and foreign exchange earnings. The government has instituted a subsidy to the fish processing firming in the form of a 5-year tax holiday. This policy appears to have been motivated by an interest in maximizing foreign exchange earning from fish export. This can however, have enormous economic and environmental costs to sustainable fishery development, employment creation, food security, and welfare of fishers.

Government subsidies for fish processing firms has widened the disparity between private and social costs and made it more profitable for the firms to mine the marine resources. The failure of the government to control the amount of the fish exported and rationalize the use of fish in the animal feeds industry, despite its objective of increasing per capita fish consumption, suggests that the government may be unaware of the trade offs between these particular policies. In addition, the government has pursued a policy of rationalization of the tariff structure on imports of fish processing machinery and inputs as a way of encouraging fish exports. This has reduced the capital/labor cost ratio with adverse consequences for employment and the rate of exploitation of fisheries.

Since the early 1990's, Kenya has been pursuing a liberal exchange rate regime that saw substantial depreciation of the local currency and raised the price of fish and other exports relative to non-tradable goods. This led to increased harvesting of marine resources and increased impact on biodiversity.

### **Inadequate Capacity for Enforcement**

Another major issue in the EAME is the lack of capacity to enforce rules and regulations. Many of the country policies have emphasized the issue of control and prohibitions albeit without the

means and capability to carry these out. Retrenchments of government staff involved in enforcement of regulations and policing marine resource has been one of the key factors in reduced monitoring and enforcement.

Effective monitoring and enforcement work requires a good communication system. Often the distribution of revenues from natural resources is uneven between the central government and the districts where the resources are to be found.

Tanzania's Rufiji delta for example has only two staff assigned to its supervision.

Another factor is the current efforts toward decentralization in Tanzania, Mozambique and Kenya. In practice, often the policies remain centrally planned and directed. In Tanzania, local governments, which are supposed to finance some of their own activities, are facing financial and leadership problems. The District Councils do not have funds for recurrent expenditures such as fuel and field allowances for the officers who are sent to do monitoring.

In Kenya, the bottleneck is the lack of enforcement of the forestry and fisheries regulations as stipulated in the Forestry Act. Cap. 385, and the Fish Industry Act. Cap. 378, of the Laws of Kenya. For example, the Fish Industry Act, Cap 378 is designed to promote sustainable exploitation of the resource, while minimizing environmental damage. However, the legislation has been rendered less effective in managing and regulating the fisheries sector and in the protection of the environment because of lack of or inadequate resources (financial, human and equipment) and technical capacity to monitor the resources and enforce the regulations.

Inadequate budgetary allocation to the Fisheries Department by the Government makes it difficult for the department to provide adequate fish storage and/or preservation facilities at the landing beaches. In addition penalties provided for by the law are inadequate and are a poor deterrence; for example low fines imposed for use of outlawed destructive fishing gear (about US \$ 25).

In Mozambique, the process of administrative reform has been initiated, but the country lacks the human and material resources for a better law enforcement and control of illegal activities. Despite the initiation of the decentralization of the administrative process, most impacts on the use of resources take place at the level of administrative post, while managing and law enforcement capacity is only represented at the central, provincial and district levels. All these levels of government face serious logistic constraints, reducing their capacity to enforce law and control illegal activities. There are references to a range of violations to laws and regulations which did not find a prompt response from the responsible state entities at Zambezi Delta.

### **Legal Issues**

Most of the countries in the EAME have legal provisions for the management of almost every natural resource, and several authorities which are responsible for the implementation, and enforcement of the rules. Oftentimes, however, legislation may be weak with accompanying lack of political will to prioritize the environment.

In Mozambique, despite an interest by the government to develop and adopt legislation and policies for the environment, it is still a secondary topic and the sustainable use of environment is still not seen as an important component in country development. The emphasis on conservation of marine natural resources has not yet become a priority, except for few resources, such as shrimp, which have commercial importance and contribute to the generation of foreign currency.

### **Lack of Institutional Coordination**

At the national level throughout the EAME, conflicting objectives among government ministries and departments, be it land for salt making or tourism, forestry and fisheries, have also contributed to the loss of biodiversity and continue to pose threats.

In Tanzania, the Forestry Policy and hence the Forestry Department, encourages sustainable management of forests. At the same time the Department of Fisheries, under the same Ministry of Natural Resources and Tourism (MNRT), sanctions a prawn farming project in the Rufiji delta, aimed at economic growth. In such cases inconsistency in policies and mandates occur, such that maximization of one objective threatens the mere existence of the other.

In Mozambique's Bazaruto Archipelago, the National Park is managed at the national level, by the National directorate of protected areas at the Ministry of Tourism. The Ministry of Fishers continues to be responsibly for the development of the fishery sector. Licenses, monitoring and enforcement for artisanal fishing are done at the local level by the maritime delegation. Semi-industrial and industrial fishing are managed at the National level by the Natural directorate of Fishers. The archipelago is also under the jurisdiction of Imhabane Province and two districts (Vilanculos and Inhassoro). All of these institutions make decisions and undertake their activities separately, without consulting the park authorities.

The recent shift of environmental matters to the Vice President's Office (VPO) has not produced significant changes in the management of natural resources. Recent developments concerning the Rufiji prawn farming project proposal have revealed the hopeless position NEMC occupies. One would like to look upon it as the watchdog for environmental protection matters with some clout in influencing environmentally correct behavior among various stakeholders. Instead it is just a "toothless dog", with only the advisory role without necessarily its advice being taken seriously. Technical opinions are still yet to be given their fair share in influencing decisions.

### **Conflicting Interests**

Lack of effective management of conflicting or competing interests of the various institutions within the EAME involved in the management of the natural resources exacerbates the problems associated with institutional coordination.

For instance in the mangrove area in Tanzania, there are several institutions involved, including those responsible for mining (mineral prospecting and salt making), land use (Ministry of lands), forestry (Ministry of Natural Resources and Tourism), environment (Vice President's Office) and local governments (represented by the newly established Ministry of Local Governments). The interplay of activities influenced by policies and regulations from these institutions often conflict with each other due to different immediate objectives and lack of harmonization of policies in order to achieve a much wider objective of sustainability.

In addition, no overall authority exists which coordinates institutional mandates such as the issuing of licenses (for fishing, harvesting of mangroves and salt making) and land titles. Such issues may concern the Division of Forestry, the Division of Lands, the Division of Fisheries, the Ministry of Water and the Ministry of Energy and Minerals simultaneously. The National Environmental Management Council (NEMC) which was established in 1983 is charged with among others, the duty of coordination. However, inadequate personnel, equipment, funds as well as the tendency by some departments or ministries to protect their areas of interest have prevented NEMC to perform its duties effectively.

In Mozambique, there has been an overlap of competencies between the government bodies on the area of marine resource management. For instance the Ministry of Fisheries and the Ministry of Transport and Communications (through Services for Maritime Administration and Inspection –SAFMAR) share the control of activities within coastal areas. In addition, the Ministries of

Tourism and of Agriculture and Rural Development also have a strong authority for development of marine areas. This creates a situation where different institutions are involved in law enforcement, resulting in conflicts.

### **Market Failure**

In all of the countries in the EAME, investment, particularly foreign investment, is looked upon as important in facilitating economic growth through transfer of modern technology for efficient production, which would otherwise not be available to the country due to shortage of capital. Today, foreign investments are more important due to the fact that they have networking advantage to the world market.

For those countries in the EAME, their position in the world market has, like most developing countries, been weak for most of the time. Well-functioning markets are efficient mechanisms for allocating scarce resources among competing uses over time. However, many markets do not function well. Much of the mismanagement and inefficient use of natural resources, biodiversity and the wider environment is attributable to malfunctioning and distortion of their markets, and also the mere lack of market in some cases.

Market failure has contributed significantly to the decline of many of the marine and coastal biodiversity resources by leading to over-fishing and over-harvesting of mangroves, that in turn, have contributed to the ecological disruption. The prices at which the fisheries and mangrove products are sold at the export and national markets are low, as the environmental and social costs of harvesting the marine resources are ignored. Only private costs (capital, labour, materials and management) are considered as factors of production. With low costs of production and increasing output prices, due to high demand, profitability is generated even when catches are low and exploitable material is scarce in the ecosystem. The low price stimulates excessive demand for fish and other marine products, which in turn stimulates over-harvesting, processing and distribution and undermines sustainable exploitation of the marine resources.

What is needed is to balance these costs and benefits by doing a well-rounded analysis, which integrates all sectors and stakeholders to be able to determine the social, economic and environmental costs and benefits before any major decision is made. Such a decision can be assisted by well executed Environmental Impact Assessment (EIA). However, the EIA processes in the countries of the EAME have are limited in their formalization if they exist at all.

### **Lack of private sector commitment to environmental concerns**

At the moment there is little private sector commitment to environmental concerns, and also lack of incentives to treat natural resources in a sustainable way.

The tourism industry is a large expanding sector in most of Tanzania's coastal areas. Mangroves are often cleared to create sandy beaches and untreated effluents poured from the hotels into the ocean, destabilizing the ecological balance and endangering the sustainability of their. Likewise the prawn-farming project in Rufiji poses the same potential costs for various actors and stakeholders.

In Kenya extensive salt works from five salt production companies that have been established at the Gongoni – Fundi Island area and Kurawa, operate with little regard to environmental concerns. Problems of salination and salt intrusion into wetlands are not addressed. The area dedicated to salt production is over 5,000 ha of former mangrove vegetation cleared without compensatory efforts or supporting rehabilitation programs such as reforestation. Solar-salt production is presently extending to sites in the Lamu-Kiunga area. In Malindi Bay there is a

tendency to discharge raw wastewater from tourist beach hotels into adjacent lagoons, disregarding potential impacts to the inshore habitats.

### ***INTERNATIONAL ROOT CAUSES***

#### **Macro Economic Policies of the International Financial Institutions**

The World Bank and the IMF are among the international financial institutions influencing economic activities in countries of the EAME. The economic recovery programs of these Institutions have been aimed at stimulating economic growth through the use of various economic instruments and are often aimed at the use of the country's natural resource base.

Macroeconomic reforms include Structural Adjustment Programs which prescribe reduction in the size of the public sector. This has resulted in mass retrenchment of public sector employees with adverse impacts on monitoring and enforcement of existing policies. In many of the EAME countries this has adversely affected the Fisheries and Forest Departments, often disrupting their delivery of services.

In Tanzania, the Natural Resource Ministries, the department of Forestry and Bee-keeping and the Ministry of Natural Resources and Tourism among others have seen reduced capacity through staff reductions. This has led to severe shortages of manpower and expenditure funds for existing mangrove management projects. Resources are often lacking for boat fuel, limiting the ability for enforcement, thus creating a conducive environment for the illegal harvesting of mangroves for charcoal making in Bagamoyo and poles in Rufiji.

Mozambique is one country that has accumulated a very high foreign debt, which had to be negotiated with all bilateral and multilateral partners. As a result the country looks to expanded agriculture production and exploitation of other natural resources to generate revenues through exports and services. Mozambique's main exports at this time consist of fish and crustaceans, timber, cotton, electricity and minerals.

In Kenya Structural Adjustment Programs have resulted in sharp reductions of protections to national industry, and simultaneous stimulation of increased trade through the lifting of quotas and administrative controls, reduction in tariff rates and narrowing dispersion in rates. These policies have resulted in the collapse of many manufacturing/processing firms, as they are unable to withstand the fierce competition from external competitors. This has worsened the unemployment problem with consequent increase in poverty and declining living standards. More people in turn have become more involved in the direct exploitation of marine resources e.g. fisheries and mangroves for their livelihood.

#### **Foreign Markets and International Trade**

The demand of fish and crustaceans for Spain, Japan and South African markets and in the past to Soviet Union has resulted in an intense exploitation of fishing resources in the EAME. Japan and the European Union have negotiated with the governments of Kenya, Tanzania and Mozambique for the exploitation of further fisheries resources, in exchange for economic assistance for research in the fishing sector.

In Mozambique some other marine resources such as shells, shark fins and sea cucumbers face international market demand. The market for shells is located in Europe (Portugal and Holland), while the market for shark fins and sea comes from South Africa and Tanzania, which in turn export these products to Asian markets, where they are viewed as delicacies.

In Kenya ready markets for mangrove timber (construction and fuel), fishery products and marine mammals, turtles and dugongs exist in Lamu. Some of these products are directly exported to the Arabian Peninsula, mangroves for example, are exploited for poles for house construction but also for the export market in the Middle East. Consumption behavior among tourists, increases demand for seafood (e.g., prawns). Increased fishing activities in order to meet rising consumption demands, is putting increased pressure on marine resources leading to over-exploitation and degradation.