

**PHYSICAL ALTERATIONS AND DESTRUCTION OF HABITATS
IN KENYA:
Policies and Institutional Framework**

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EXECUTIVE SUMMARY

In this report a review of national policies and legislation addressing issues of the alteration and destruction of critical coastal and marine habitats, and the institutional arrangements towards alleviating the same is presented. The land-based social and economic activities impacting on the habitats and the extent to which the latter are affected is assessed. Emphasis has been placed on the link between the impacts and tourism or tourism catalysed activities. Other relevant socio-economic activities considered include mangrove harvesting, agriculture, mining, ports, land reclamation and damming of rivers. Case studies of initiatives at alleviating the deteriorating situation are discussed, conclusions drawn and recommendations provided.

The study has revealed that the Kenya coast is endowed with critical habitats rich in biodiversity. These habitats form the resource base upon which the coastal economy led by tourism thrives. This resource base however, under increasing pressure from the rising population and is experiencing alteration and destruction due to the burgeoning socio-economic activities. Tourism led development is largely pointed out to be the driving force behind most of the alterations and destruction of the habitats. Very few initiatives exist to alleviate the situation though some good cases to this effect have been cited.

Adequate policies, legislation and institutional arrangements that can address the issue of the physical alteration and destruction of habitats (PADH) exist, but there is a draw back that is attributed to the lack of integration. The legal regime and institutional arrangements formulated with a sectoral perspective, have failed to address the complex problems of the coastal habitats, which otherwise require an integrated approach to solve. In the current set up there is little delegated authority to grass root institutions to enable quick actions; no arrangements to involve NGOs, CBOs and the private sector and little or no incentives to encourage local communities to participate in conservation efforts. The deficiencies and shortcomings of the legal regime and institutional framework have been recognised and are aptly addressed by the Environmental Management and Co-ordination Act (EMC Act). There is hope that the crosscutting EMCA can adequately address the issue. Unfortunately however, the National Environmental Management Authority (NEMA), the executing arm of EMC Act, is still very thin on the ground.

It is realised that for PADH to be alleviated issue of poverty and equity have to be adequately addressed. This can be accomplished by the provision of alternative means of livelihood, extending support to programs at raising awareness on environmental issues, hastening the review of laws and institutions, and institutionalising stakeholder participation and co-management. This calls for the quick setting-up of NEMA on the ground, extension to the

grass root level and to work out modalities of strengthening the link between the District Focus for Rural Development and Local Government Authorities. There is need for enforcement of the requirement for environmental impact assessment of development projects set in the coastal area with the aim of mitigating against habitat destruction and ensuring sustainable environmental management. In addition, there is need to offer incentives to the private sector to enable it participate in conservation efforts. In particular, the tourism and solar-salt manufacturing industries need to be sensitised to the notion of the inseparability of environmental conservation with sustainable exploitation or development of resources. Finally, there is an urgent need to initiate projects of intervention to rehabilitate the affected areas. The mapping of the affected areas through satellite imagery and aerial photography therefore needs to be undertaken as the first step in evaluating the extent and magnitude of the problem to aid in the design of the projects of intervention.

1.0 INTRODUCTION

Attributes of the Kenya Coast

The Kenya coast has a coastline bordering the Indian Ocean that extends for some 600 km from the Somalia border in the north at 1°41'S to the Tanzanian border in the south at 4°40'S. The climate is tropical with the weather being principally determined by the western Indian Ocean Monsoon winds. The NE Monsoon winds, which blow from November to early March, is a period characterised by dry weather; while the SE Monsoon that sets from May to August is a period of relatively cooler weather. The inter-monsoonal period of April and October normally mark the onset of the wet seasons, with the long rains occurring between end of March and peaking in April/May. This is followed by a gradual decline in the rainfall to a spell of dry weather in August and September, which again gives way to the short rains between October and November. The highest average rainfall is experienced in the southern coast, and generally decreases towards the northern border and in the hinterland. Mean annual rainfall ranges from over 1,016 mm south of Malindi, to a low of 508 mm in the relatively drier northern hinterland (UNEP, 1998). Temperatures range from about 20 °C to 35 °C.

The shoreline types found along the Kenyan coast include sheltered mangrove swamps, creeks and estuaries, tidal and/or mud flats, sea-grass meadows, coral reefs, sand beaches and dunes and rocky shores. These shoreline types are of various economic and ecological value, vulnerability and sensitivity.

A fringing coral reef occurs along the continental shelf south of Mamburi to a depth of about 45 m and a distance of between 500 m and 2 km offshore. Patchy reefs and Atolls are found in Lamu. Reef breaks occur where creeks and river estuaries open into the sea and are found in the Malindi and Ungwana bays where high volumes of freshwater and sediment discharges are received from the Tana and Sabaki Rivers. Highly productive mangrove swamps colonise most of the estuaries and creeks, except for the Sabaki estuary where heavy siltation has prevented this. The mangrove swamps, sea-grass lagoons and coral reefs form an inter-linked ecosystem of great ecological and socio-economic importance to the coastal area.

According to the 1999 Housing and Population census, about 2.4 million people inhabit the coastal districts, with an annual growth rate of 3.1%. This population figure represents about 9% of the national population. It is significant to note that approximately 17 % of the Kenyan coastal population reside along the coastal districts that border the Indian Ocean. This population may directly or indirectly impact the coastal ecosystems and marine habitats through the various socio economic activities that support their livelihoods.

1.1 Important Coastal Habitats

The most important coastal habitats from both the ecological and socio-economic perspective include mangrove forests, coral reefs, seagrass lagoons and estuaries (Fig.1). The ecosystem health of these critical habitats determines not only the productivity of the inshore waters but also those of the continental shelf areas.

Mangrove habitat

Mangrove swamps along the Kenyan coast cover a total area estimated at 52,980 ha (UNEP, 1998), with largest stand (area 34,500 ha) found in the Lamu-Kiunga area (UNEP 1998, WWF 2001), followed by the Vanga-Funzi system (6,980 ha) in the south, and Tana River delta system (4180 ha). There are 9 – 10 species of mangrove trees and shrubs represented in Kenya, with the most common being *Rhizophora mucronata* and *Avicenia marina*. Rich in productivity and biodiversity as a habitat, mangrove forests provide sanctuary to a variety of terrestrial fauna, which include many bird species, large and small mammals (monkeys, pigs, hippos, buffalo), crocodiles and other reptiles. The Tana River delta and Mida creek mangrove systems (part of the Watamu-Malindi marine protected area) exemplify this.

It is understood that a big majority of species found in mangrove areas, dwell there on a permanent basis. In addition, many fish species and crustacea (e.g. prawns) spend their juvenile stages in this habitat. Mangroves forests provide other functions like the protection of the shoreline from erosion and the trapping of excessive sediments from land that may interfere with sensitive nearshore / inshore habitats, especially sea-grass beds and coral reefs.

Estuaries

There are a number of estuaries along the Kenya coast, which include creeks (e.g. Mombasa, Shimo la Tewa, Kilifi, Turtle Bay and Lamu area) and major river estuaries (R. Tana and R. Sabaki). Estuaries are generally sheltered from high-energy waves and receive freshwater and fine-grained sediment from inflowing rivers and surface streams. The exception is the Mida creek where estuarine conditions are maintained almost exclusively by groundwater seepage with the adjacent Arabuko/Sokoke forest as the catchment area. Most estuarine areas are bordered by mangroves, which in turn contribute to their high productivity. Recent studies have shown that the Ungwana bay nearshore areas have the characteristics of an estuary, e.g. high levels of nutrients and high productivity. Though the Sabaki delta has no mangroves fringing its shores because of high silt loads, as stated elsewhere in the report, it nevertheless provides feeding grounds for one of the highest concentrations of bird species, about 37 in all (WWF, 2001). Estuarine systems in the Malindi and Ungwana bay support a high abundance of penaeid prawns. In comparison, the Mida mangrove creek is an important feeding area for

high concentrations of birds (including flamingos) with 13 species exceeding 1 % of the global population.

Sea grass meadows

Sea-grass occurs in muddy and sandy areas and in lagoons between the mangrove and coral reef areas. Though an assessment of the total area covered by seagrass along the Kenya coast is yet to be done, sea-grass areas exhibit high productivity and biodiversity. There are 12 species of sea-grass that have been identified in Kenya, with the most abundant being *Cymodocea ciliata* and *Thalassia hemprichii*, which thrive in sandy areas on rock and old coral substrate.

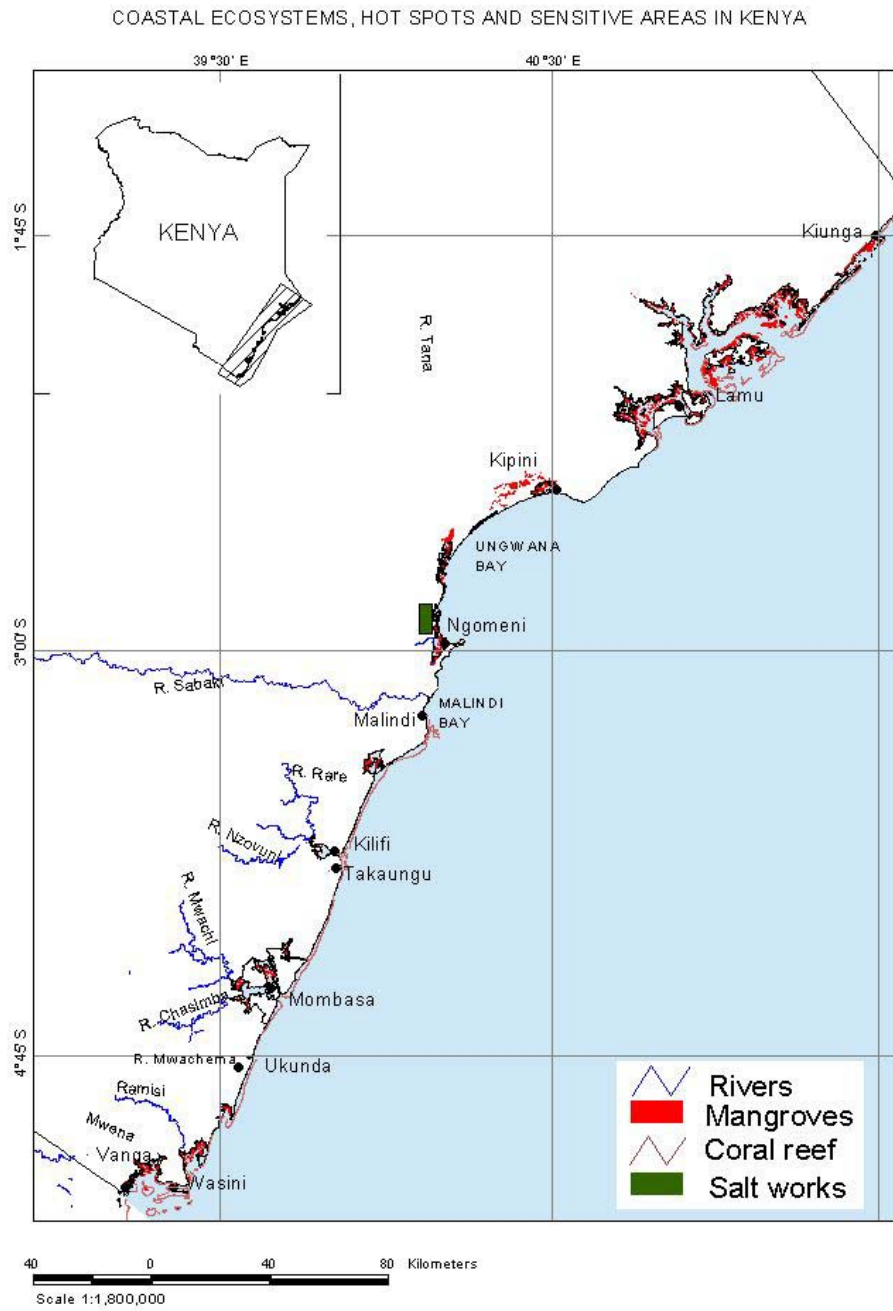
The sea-grass habitat is ecologically important for a great variety of fish. Many fish species of commercial importance dwell in this habitat. Other fish-species use the mangrove areas as nursery ground and the sea-grass habitat as their grow-out area. This makes the habitat critical to the survival of these species. The sea-grass meadows also serve to protect coral reefs by trapping excessive silt and nutrients.

Coral reefs

Coral reefs along the Kenyan coast, which cover an estimated 50,000 ha, are composed of coral flats, lagoons, reef platforms and as fringing reefs (UNEP 1998). The coral reef system is characterised by a fringing reef extending from the Kenyan southern border to Malindi, with patch reefs occurring in Kisite-Mpunguti area in the south and Malindi-Watamu area in the north. Further north in Lamu and Kiunga, the coral system is composed of patch reefs and atolls, offshore reefs and islands.

Most information on the state of the Kenyan coral reefs is based on the protected areas, namely Kisite-Mpunguti, Mombasa and Malindi-Watamu marine parks and reserves, and Kiunga marine reserve, but also include some from non-protected areas, such as Diani reefs (McClanahan & Mutere 1994, McClanahan & Obura 1995). Protected areas act as reservoirs of biodiversity, which eventually filter out into the surrounding reserves and non-protected areas. The Malindi-Watamu Marine National Park and Reserve, a Biosphere reserve of global significance, is characterised by a high biodiversity of corals, fauna and flora. The fauna includes threatened turtle species (green turtle *Chelonia midas*, hawksbill turtle *Eretmochelys imbricata*) and variety of coral fish species and molluscs.

Fig. 1: Map of the Kenya Coastline Showing Important Habitats



1.2 Scope of the Study

This study covers the coastal and marine areas, which include in-shore and near-shore areas, the coastal land and the major river basins that influence coastal and marine habitats. The study addresses land-based socio-economic activities attributed with the physical alteration and destruction of critical habitats (PADH), especially coastal tourism, exploitation of mangrove resources, mining, agriculture, ports and land reclamation and the damming of rivers. The national policies and legislation pertaining to the socio-economic sectors, which include legislation associated with tourism management, urbanisation, fisheries management, forestry, mining, agriculture, marine transport and energy development are reviewed in light of how they address the PADH issue. The institutional arrangements relevant to especially tourism, mangrove exploitation and management, ports and land reclamation and damming of rivers are also reviewed in light of mitigation against habitat alteration and destruction.

1.3 Methodology

The study was carried out largely through a desktop study and conducting interviews with people with expert knowledge on policy, legislation, institutional arrangements and both the scientific and socio-economic aspects relevant to the PADH issue.

The sectoral policies, legislation and institutional arrangements addressing the issue were reviewed. The prevailing sectoral approach and the inherent deficiencies in managing the PADH was recognised and so is the novel concept of integrated approach. The information sources interviewed included policy makers, managers, field officers, communities, NGOs and CBOs.

Efforts to obtain aerial photos that could have indicated the extent of the physical alteration and destruction of the habitats were unfruitful. The study therefore had to rely on expert knowledge and available reports.

2.0 NATIONAL LEGISLATION AND INSTITUTIONAL FRAMEWORK

National Legislation and Institutions Relevant to Tourism, Mangroves and Ports and Land Reclamation and Damming of Rivers

2.1 National Legislation

There are several sectoral policies and national legislation applicable to the alteration and destruction of marine and coastal habitats. The legislation relevant to the economic sectors of concern include the Tourism Act, Forestry Act, Wildlife Conservation and Management Act (Cap 376), Water Act, Agricultural Act, Physical Planning Act, Fisheries Act, Land Planning Act, Town Planning Act, Mining Act, Electric Power Act, KPA Act, CDA Act, TARDA Act and Environmental Management and Coordination Act.

Tourism

There is no legislation dealing with tourism development and its likely impact on the coastal and marine environment in Kenya, but several statues exist, which are relevant to tourism. These are **the Tourist Industry Licensing Act (Cap 381)**, **the Tourist Development Corporation Act (Cap 382)** and **the Wildlife (Conservation and Management) Act**.

The **Wildlife Act** makes provisions for the protection, conservation and management of wildlife in Kenya. It creates the Kenya Wildlife Service and entrusts it with the responsibility of managing all fauna and flora occurring within National Parks, Reserves and Sanctuaries, as well as other wild animals. The Act empowers the Minister for Tourism to declare any type of land with threatened wildlife either as a National Park or Reserve. The Act also provides for the protection of animals and vegetation in areas adjacent to national parks, reserves or sanctuaries. This act can be used to protect areas that do not fall under the jurisdiction of the wildlife and forestry legislation. The Act has elaborate rules regarding access and conduct of persons within national parks and reserves. It makes provisions for various licenses required to facilitate certain activities. Through rules and regulations, this Act has direct effect on tourism and access to marine parks and reserves and hence to the management of the critical coastal and marine habitats.

In its First Schedule, the **Tourist Industry Licensing Act** classifies the tourist enterprises, including "professional hunting" for which the activities are regulated by the Director of the Kenya Wildlife Service.

The **Tourist Development Corporation Act**, which establishes the Kenya Tourist Development Corporation, a parastatal body, has functions with provisions of travel,

facilitation of tours as well as the planning and development, preservation and study of the wild and natural resources, fauna and flora. So, far the Board has paid little attention to its mandates to initiate studies on natural resources and has therefore contributed nothing in addressing the problem of the alteration or degradation of critical habitats.

The above Acts, which are central to tourism management, do not deal with the physical development of tourism infrastructure, which is their major weakness in addressing the issue of alteration and destruction of habitats. Infrastructure development activities are controlled under other sectoral legislation that do not necessarily consider the issue at hand as critical.

Urbanisation

Matters pertaining to land use are addressed by, among others, the Land Planning Act (Cap 303), Town Planning Act (Cap 134) and Physical Planning Act No. 6 of 1996. The Land Planning Act sets out land planning regulations and empowers local authorities to plan developments in their areas of jurisdiction. The Town Planning Act empowers local authorities to plan and provide facilities and services in urban centres. The physical planning Act is the most recent statute designed to supersede the Land Planning Act and Town Planning Act. The Act controls the use of land at both regional and local levels and recognises special planning areas, which provides for certain critical coastal habitats, especially mangrove areas.

Fisheries

There are two statutes that are used to manage the fisheries sector, namely the Fisheries Act (Cap 378) and the Fisheries Protection Act (Cap 379). The Director of Fisheries implements the Fisheries Act in co-operation with other Government departments. The Act provides for the sustainable development and management of fisheries resources and sets regulations for sustainable exploitation of the resources. Significantly, the Act guards against over-exploitation through over-fishing and the use of destructive fishing methods. The Act provides for the protection and conservation of coral reefs, marine mammals and turtles and also the protection of the marine environment against pollution.

The Fisheries Protection Act provides for the control of exploitation and management of certain coastal and marine species, such as the pearl oyster, dugongs and turtles that are threatened by commercial exploitation.

Therefore, the Fisheries legislation as a management policy makes strong provision for the protection of coastal and marine habitats for sustainable exploitation of fisheries resources. However, on the other hand the Fisheries Act provides for the promotion and regulating

aquaculture, which previously led to the destruction of mangrove forests to create space for the construction of prawn ponds.

Forestry Act (Cap 385)

The Act provides for the establishment of control and regulation of central forests and other forests. It encourages the conservation of both indigenous and exotic type of vegetation, which include mangroves and other coastal forest resources. The Act also provides for the management and sustainable exploitation of forest resources.

Wildlife Conservation and Management Act (Cap 376)

The Act as elaborated elsewhere provides for the conservation and control of wild fauna and flora, both terrestrial and aquatic. The Act invokes the Kenya Wildlife Service to declare protected areas, including marine parks and reserves. The restricted exploitation of natural resources in protected areas serves to conserve critical coastal and marine habitats. Controlled tourist activities within protected areas, help to promote eco-tourism and sustainable exploitation of resources.

Agriculture Act (Cap 318)

The Agriculture Act provides for the development of arable land in accordance with good land use practices. The Act stresses the need for conservation of soil and its fertility and provides for soil erosion control. In effect the Act provides for the control of the discharge of excessive sediments into sensitive coastal and marine habitats, such as mangrove areas and coral reefs. The Act promotes the sustainable utilisation of land resources, including coastal lands and river basin areas by regulating the use of different categories of land for agricultural purposes.

Mining

The Mining Act (Cap 306) provides for the regulation of the mining industry. It requires the lease of the mine to prevent any form of nuisance and the lessee to pay compensation for interference with other adjoining activities. The lessee is also prohibited from releasing any poisonous materials into waterways. However, the Act does not make any provision for the evaluating the potential environmental impacts of mining ventures and mitigation. This shortcoming is addressed by the Environmental Management and Coordination Act (EMCA) of 2000. The EMCA provides for an Environmental Impact Assessment (EIA) study for all major industries, including mining prior to licensing of the activity, and an Environmental

Action Plan (EAP) to mitigate environmental damage during and after the termination of the project.

Marine Transport

Marine transport and its attendant issues in Kenya are regulated under more than one act. These acts include the Kenya Ports Authority Act, Maritime Zones Act, Continental Shelf Act, and the Territorial Waters Act.

The Kenya Ports Authority (KPA) Act (Cap 391) establishes the Kenya Ports Authority, which is responsible for the development and operations of the country's ports. Other acts like the Merchant Shipping Act, contains pertinent provisions on the discharge of pollutants into marine waters. This act implemented by the Ministry of Transport and Communication in conjunction with other ministries is a mechanism for pollution prevention in Kenya's territorial waters arising from ship-based sources.

By defining Kenya's territorial waters and the Exclusive Economic Zone, the Maritime Zones Act sets a pre-requisite for the exercise of sovereign authority over marine resources within these areas. It can thus exploit and develop the marine resources therein as well as conduct and control research. The Continental Shelf Act, enacted in 1975, gives the government rights in respect of the management and exploitation of natural resources of the continental shelf situated within Kenya's territorial waters. Such rights include, among others, the exploitation of marine resources and the carrying out of research. These rights needless to say confer responsibilities for the protection of these resources. Through these rights, the Kenya Ports Authority leads the effort in containing oil pollution with the port and in Kenyan territorial waters and extends the effort to areas beyond the territorial waters.

These acts do not make direct reference to the protection of the alteration and destruction of critical habitats, but the merchant shipping act by dealing with marine pollution from oil on the Kenya's territorial waters by implication profess for the protection of these habitats.

The Environmental Management and Coordination Act No. 8 of 1999

The Act is the most comprehensive providing for environmental management, protection and conservation. The Act provides for the protection and conservation of the environment and particularly addresses appropriate measures on wetlands, coastal areas, riverbank and lakes, including the critical marine habitats, mangrove and coral reef ecosystems. The Act also provides for the promotion of environmental friendly tourism. It also provides for the necessary regulations, guidelines and procedures for conducting environmental impact assessment on scheduled projects. Significantly, the Act provides for the issuance of

environmental restoration orders, environmental conservation orders and environmental easements, and the prosecution of offenders of environmental regulations.

2.2 Institutional Framework

The institutional arrangement addressing coastal resource protection and management with reference to the alteration and destruction of habitats has been less than integrated, as is the case with the legislation. The approach is mostly sectoral and not only involves government ministries, but also other government agencies, local authorities and non-governmental organisations. It also involves intergovernmental organisations, the business community, community-based organisations and traditional institutions. The institutional framework as concerns addressing the issue of habitat alteration and destruction is summarised in a flow diagram in Fig. 2.

National Institutions

At the national level the Environmental Management and Co-ordination Act No. 8 of 1999 creates both National Environmental Management Authority (NEMA) and the National Environment Council (NEC). NEC has a membership composed of institutions relevant to environmental concerns in Kenya. The NEC is the policy formulating body of NEMA and among its other functions, oversees National Environmental Management Authority, a corporate body charged with the day to day co-ordination of environmental activities in the country.

The NEMA is mandated to “exercise general supervision and coordination over all matters relating to the environment and be the principal instrument of Government in the implementation of all relevant policies”. NEMA has several crosscutting functions to fulfil its mandate, which include: -

- Co-ordinate environmental management activities by lead agencies and promote the integration of environmental considerations in development of policies, plans, programmes and projects to ensure rational and sustainable utilization of resources;
- Examine land use patterns to determine their impact on natural resources;
- Identify development activities including policies for which environmental audit must be conducted;
- Carry out environmental education and public awareness on environmental management as well as enlisting public support; and
- Develop contingency measures for the prevention of accidents, which may cause environmental degradation and mitigation where accidents occur.

The EMC Act establishes the Public Complaints Committee chaired by the Attorney General, and whose membership includes a representative of NGOs as Secretary, and a representative of the business community. The functions of the Public Complaints Committee include investigating allegations or complaints against any persons or NEMA in relation to the condition of the environment, or on its own motion initiate any suspected case of environmental degradation. The Public Complaints Committee reports to the NEC.

The EMC Act also establishes the National Environment Tribunal chaired by a nominee of the Chief Justice, with the rank of a Chief Magistrate to provide the legal recourse for aggrieved parties to challenge or appeal the decisions of NEMA or its Committees.

Regional Institutions

The role of regional institutions is primarily co-ordination and implementation of national policies at the regional level. The Coast Development Authority (CDA) and the Tana and Athi Rivers Development Authority (TARDA), are key agencies in this regard. Established as corporations, these agencies are charged with various responsibilities aimed at realising development objectives.

i) The Coast Development Authority (CDA)

The CDA established under the CDA Act (Cap 449) is mandated with planning, facilitating, coordinating and implementing development activities in the Coast Province and including the EEZ of Kenya.

Its functions include the following: -

- To plan for the development of the coastal area;
- To initiate studies, carry out surveys and assess alternative demands on the natural resources of the coastal area, and to initiate, operate or implement projects in agriculture, forestry, wildlife, tourism, power generation, mining and fishing;
- To avoid the duplication of effort by maintaining liaison with operational agencies of government, the private sector and others; and
- To implement projects with a primary aim of socio-economic development.

The CDA advocates for the effective management of natural resources by encouraging development projects that minimize negative environmental impacts for sustainable development.

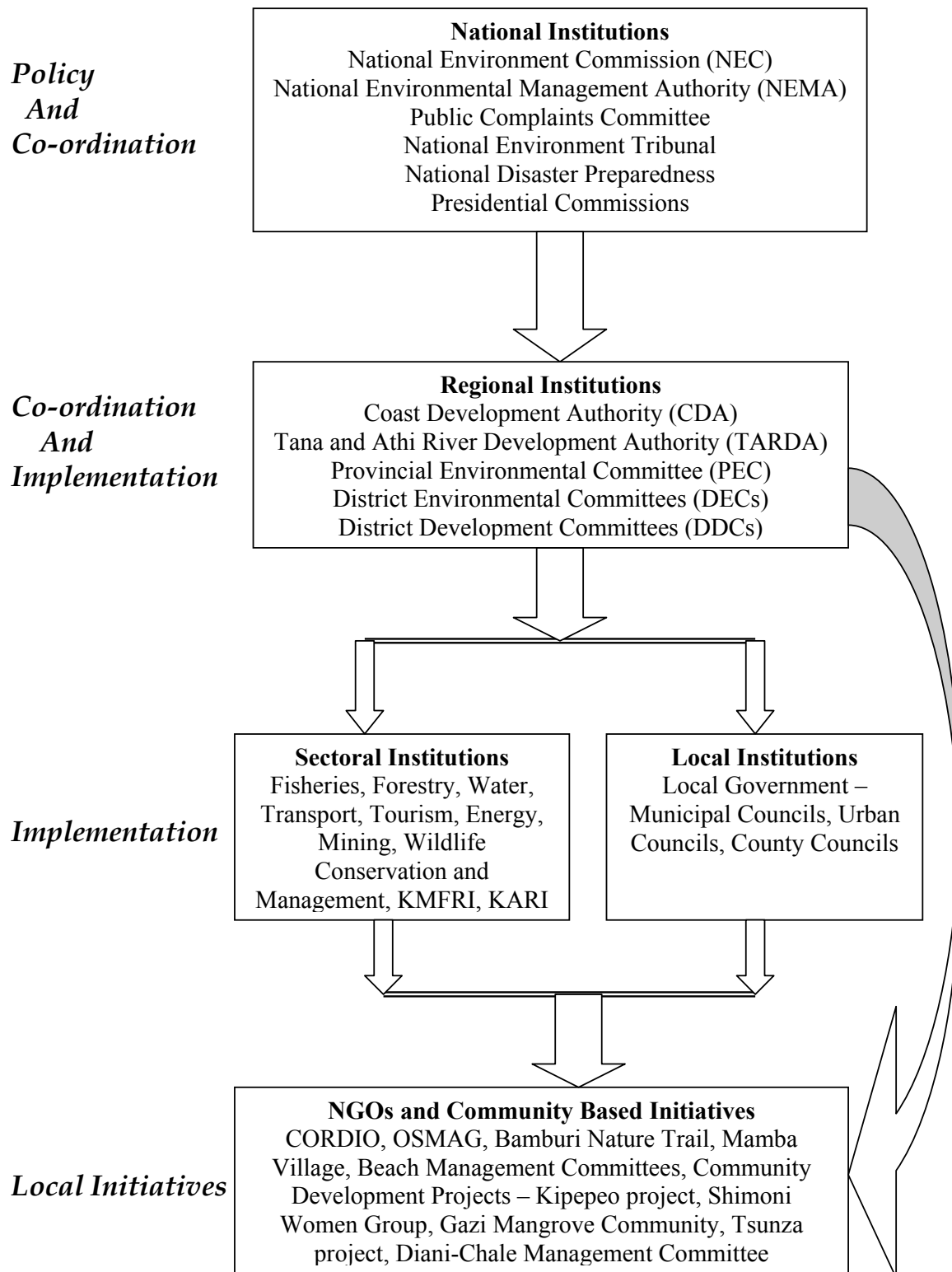


Fig.2. Flow diagram of Institutional Framework addressing the alteration and destruction of marine and coastal habitats.

ii) **The Tana and Athi Rivers Development Authority (TARDA)**

TARDA was established in 1974 to advise on the planning and co-ordination of development projects in the Tana and Athi River Basin and on related matters. Its mandate encompasses the assessment of natural resources and the coordination of their utilisation in its area of jurisdiction. TARDA discharges its mandate in respect of the Tana River Delta, an ecosystem of enormous importance along the Kenyan coast. The role of TARDA is important in light of the increasing siltation of the Indian Ocean at the mouth of the Tana and Sabaki Rivers.

The TARDA is responsible for the development of dams for electric power generation on River Tana, an activity that has caused changes in river flow with potential adverse impacts on coastal habitats.

iii) **Other arrangements**

Also, in place at the provincial level is the **Provincial Environmental Committee (PEC)**, set up by the EMC Act. The Provincial Commissioner chairs the PEC with the Provincial Director of Environment as its Secretary. At the district level the EMC Act establishes the **District Environmental Committee (DEC)**, chaired by the District Commissioner with the District Environment Officer as the Secretary. The PEC and DEC are responsible for environmental management in the province and districts, respectively.

Then there are the **District Development Committees (DDCs)**, which are a product of the Government policy for the decentralisation of development activities to the District level, otherwise referred to as the District Focus for Rural Development. The District Focus for Rural Development process is an integrated strategy based on the premise that causes of rural poverty are multiple and interdependent and they must be addressed simultaneously in all sectors. The District Commissioners chair the DDCs, with a membership drawn from all Government Departments, the local authorities and local Members of Parliament. The functions of the DDCs are to: -

- Monitor progress of development activities;
- Review and endorse project proposals of local authorities, parastatals, regional development authorities, private sector and NGOs operating in the district;
- Establish priorities for future development plans in the five years District Development Plan;
- Establish local development priorities; and
- Endorse the district's annual development proposals submitted to the ministries.

The monitoring and evaluation of development activities provides the DDC with the opportunity to address environmental concerns, which include the degradation of habitats.

Sectoral and Local Institutions

At the local level the implementation of the government policies relevant to resource management and the degradation of habitats is effected through sectoral institutions. The notable institutions are the departments of Tourism, Forestry, Fisheries, Mining, Water, and also research institutions namely Kenya Marine and Fisheries Research Institute, Kenya Agricultural Research Institute and Kenya Forestry Research Institute and other relevant institutions, such as the Kenya Wildlife Service. In each case, the minister in charge is vested with powers to make regulations concerning use and management of the sectoral resources.

The Tourism Department is the lead institution regulating tourism activities and the exploitation and utilisation of related facilities and resources. Presently, the thrust is the promotion of the expansion and diversification of tourism ventures, which tends to increase pressure on coastal habitats. Eco-tourism, whose promotion is spearheaded by the Kenya Wildlife Services and the National Museums of Kenya, favours the conservation of the habitats. The management of forest resources including mangroves falls under the Forest Department. A complete ban on the harvesting of mangroves was imposed in 1987 as a means of conserving the habitat.

i) Local Authorities

The implementation of Government policies at the local level also involves the local authorities, which include Municipal, Urban and/or County Councils. Local authorities are important players in coastal and marine resources management for several reasons. They are the trustees of the people in respect of trust land found in areas within their jurisdiction; they manage waste disposal, regulation of building standards, implementation of local and area plans, and the licensing of business and commercial establishments. This makes them important in natural resources management.

ii) Private Sector, NGO and Community Based Initiatives

There are numerous other stakeholders in coastal management that have a bearing to habitat protection and proper management. Petroleum oil marketing companies for example have teamed up with the Kenya Ports Authority to form Oil Spill Mutual Aid Group. This voluntary Group is in an advanced stage of developing a contingency plan for responding to oil spills along the Kenyan coast. Other examples of private sector initiatives at the coast include the Conservation of Resources through Enterprise (CORE) project, the Bamburi

Nature Trail and Watamu Turtle Watch. While the CORE program is a collaboration of various NGOs and private enterprise, the Bamburi initiative is an entirely private effort by Bamburi Cement manufacturing company to rehabilitate disused quarries. Community based initiatives to protect critical habitats include crab silviculture and the mangrove reforestation program by the Tsunza Community, the Wasini Women ecotourism venture in the mangrove coral garden of Wasini Island and the bee keeping activity in the mangroves of the Mida Creek in Malindi. These efforts serve to reduce pressure on coastal resources and contribute to the conservation of habitats.

2.3 Gaps

Legal regime

Legal backing is crucial for the effectiveness of institutions to which authority over resources has been devolved. The current legislation provides most components of the regulatory framework needed to arrest habitat alteration and destruction effectively to balanced jurisdictional responsibilities of stakeholder interests. The one area where such comprehensive and authoritative legislative framework is lacking is the land tenure. Though other acts, notably the EMC Act and the Physical Planning Act serve to minimise the deficiencies of the Land Act, there is need to review this act to minimise conflicts in the legislation and bring synergy among them. The Land Act lacks adequate water and land zoning provisions, which could be invoked to check the ever-increasing pressure on the mangrove, corals, sea-grass and other critical habitats. The coastal region of Kenya needs conservation as well as development zones so as to relieve pressure from certain areas and direct activities towards areas of unused absorptive capacity. We are yet to see a legislation specific to this. The Forest Bill 2000 has provided an opportunity and hope for improving conservation in Kenya. The Bill for example provides for licensing of non-consumptive uses (such as bee keeping, butterfly farming and eco-tourism) of forest by local communities. Under this regime traditional uses of mangrove for example may be allowed, as the community is planting mangroves elsewhere along the coast. Such benefits to the communities bring in incentives for conservation and a sense of ownership of the resource. To this effect therefore, a co-management arrangement that permits sustainable consumptive and non-consumptive use of critical habitats by local communities is required. The Forest Bill 2000 may provide for resolving the sustainable utilisation of forest products (Ochieng, B. et. al. 2001). However, an appropriate statute is yet to be enacted and implemented to cater for the other critical habitats.

Returning to the land tenure issue as it relates to the provision livelihood and the protection of habitats, a land regime that addresses the squatter problem at the coast to bestow land

ownership rights will see coastal communities invest on the land, protecting its integrity in this process. This will make a significant contribution towards checking the wanton destruction that occurs on the habitats, which is likely to be more prevalent in the areas without defined land ownership rights.

Other issues on the legal regimes negating habitat protection are overlaps in jurisdiction, which undermine effectiveness of legislation, low fines and therefore little deterrence to offenders and general weakness in implementation of the legislation occasioned by inadequate capacity in manpower, equipment and insufficient information among others.

Institutional Issues

It is realised that the roles of the different layers of government, as well as the sectoral agencies and departments, need to be understood in defining responsibilities. As such, integration, which is largely still lacking among the institutions, could probably be achieved through the creation of a lead institution delegated with this responsibility. So far, overlapping jurisdictions of agencies has been cited as the main cause for confusion, lack of enforcement of regulations and co-ordinated action in addressing the problem of habitat alteration and destruction. Institutional capacities need to be strengthened to address the many user conflicts that occur in the critical habitat areas in order to protect the latter. Within the Framework of Kenya's EMC Act, local level management may contribute to a more integrated approach in the protection of habitats, as such, local government institutions need to be empowered to introduce appropriate bylaws, to intervene in cases of habitat alteration and destruction. In line with the new law on environment, several sectoral laws are also undergoing revision, as well as the restructuring of the affected institutions so as to be in line with their new functions. The social change and new opportunities created by the reviewed policies and laws have given birth to the proliferation of new institutions, especially community based organisations that promise to impart synergy to both government and other agencies to encourage public involvement in the protection of habitats.

Memorandums of Understanding (MOU) between institutions though not legal binding, can contribute a lot to the conservation of habitats. MOUs minimise misplaced fears among institutions, introduce confidence and trust among co-operating institutions encouraging collaboration to thrive. The good relationship between CDA, KMFRI and KWS thrive on this principle understanding. Between them, lots of efforts have been invested in the conservation of habitats through the Integrated Coastal Management (ICM) process.

It is noted similarly that the protection of habitats requires that co-ordination be decentralised to the lowest level possible. On this note, the District Focus for Rural Development Policy becomes handy. This policy provides the framework for decentralisation and public

participation at the lowest level and policy should be energised through legislation if possible to provide a link with the emerging sectoral and inter-sectoral legislation, including appropriate arrangements to achieve accommodation between the different stakeholders.

One of the drawbacks in habitat protection lies in the lack of monitoring, feedback and provision of information through research. This calls for the various research institutions to improve their outreach mechanisms for sharing the information among themselves and other organisations.

Finally, this thesis reveals that habitat alteration and destruction will not necessarily be eliminated through legislation, tight controls through strict enforcement of regulations, or the induction of additional personnel to patrol affected areas. On the contrary, it is suggested that with greater reliance placed on social control mechanisms, awareness creation and co-management arrangements will see greater success in habitat protection.

2.4 Legal and Institutional Issues in PADH

Legal provisions for promoting the arrest of PADH exist in various sectoral and other legislations. The legislations are adequate enough to address the issue at hand, but capacities for enforcing them are inadequate. Neither the deployment of more personnel and equipment nor enactment of more policies and laws may resolve the issue. Rather, it is suggested, greater reliance should be placed on social control mechanisms, awareness creation and co-management arrangements. To address the PADH issue, it may be necessary to enhance capacities of NGOs and local institutions to play a more active role in curtailing the problem. There is also need to create incentives so that the private sector can invest in addressing the problem. NGOs and CBOs can play an important role in awareness creation, while local groups can be empowered through co-management arrangements. To be successful in addressing the problem through legislation and institutional arrangements, the widest possible range of stakeholders should be involved in the pursuit of minimizing the problem. This will help legitimize the initiatives, thus helping to increase compliance and reduce the costs of enforcement.

Without decentralized systems of governance, no meaningful participation can take place. While acknowledging that, in practice governmental and non-governmental structures must be in place at national, regional, district and village levels. Centralized systems guarantee little autonomy, power, responsibility and authority at local levels. On the other hand, decentralization promotes responsiveness to local needs, early response, more local awareness and support to local innovation. Fortunately for the country, the District Focus for Rural Development (DFRD) provides such an avenue for decentralizing the governance for

coastal management, promoting public involvement and local participation. It allows for the institutionalization of participatory approaches within the existing structures. A disadvantage of the DFRD is the weak link it provides with the local authorities at district level. This weakness can be eliminated if the DFRD arrangement works hand in hand with the elaborate institutional structures of the EMC Act.

In summary, laws and institutions to facilitate addressing the problem of PADH exist. The main problem lies in effective implementation of the laws and policies and operationalizing the institutions. In certain cases the law does not adequately address conflicts arising from activities that are perceived to be detrimental to marine and coastal habitats. For example, trawling for prawns is destructive to sea-grass beds and the benthic environment. However, the activity is encouraged because of the economic benefits in terms of foreign exchange earnings. Beaches are destroyed as a result of the construction of sea walls and other structures to protect property without any sound scientific advice of how such structures interfere with the wave dynamics along the coastline. Such cases have proven to be difficult to resolve even in court. Fortunately, all these issues could now be resolved by applying the Environmental Management and Coordination Act, which provides *locus standi* for concerned citizens to protect and enhance environment health. This could be the panacea in addressing the PADH through the legislation and expanded institutional arrangements.

2.5 Case Studies on Best Practices of Legal and Institutional Issues in PADH

The EMC Act and ICM in Kenya

Perhaps the best case study on best practices as it relates to legal and institutional arrangements to address the issue of PADH is to be found in Kenya's framework legislation on the Environment, the EMC Act. By recognizing the mandates of sectoral institutions and acknowledging their lead status in addressing the various and complex multi-use issue of habitats in their areas of competence this Act has created the atmosphere conducive for integration among the sectors. In applying this legislation, sector legislation that conflicted in issues of environmental conservation, have been subordinated by the former legislation. This has afforded a framework for resolving environmental problems amicably, minimizing conflicts among institutions and giving a boost to addressing the PADH problem. As a result of this legislation, it has been possible to bring together various institutions with mandates and interest on coastal and marine resources through the Integrated Coastal Management tool, to protect the resources for sustainable livelihoods of the communities. Thus, there is continuous dialogue on governance issues on resources, consensus on the need for an integrated approach in the endeavour to arrest the physical destruction of habitats, mostly occasioned by socio-economic activities be it in tourism ventures or salt extraction. It is now

common practice to consider tools like Environmental Impact Assessment of new projects, the principles of caution and carrying capacity of the environment for a proposed activity and environmental auditing as mandatory tools in development ventures. It is now common to see institutions consulting, recognizing individual mandates and the induction of a culture of complementing each others efforts, rather than competition. The sharing of resources is an encouraging emerging practice. Through the recognition and respect for the mandates of individual institutions, integration is in the process of being a reality.

The EMC Act, thus, strengthens the role of NEMA in coordination with regional and district level institutions. The raising of awareness and involvement of the public has become a hallmark of projects designed for implementation in an integrated fashion. Thus in this case study, the PADH issue is addressed collectively by various stakeholders through the EMC Act and the ICM tool.

Enhanced Community Participation in Mangrove Forest Management

Enhanced community participation in mangrove management as a case of best practice in both legal and institutional arrangement in addressing the PADH issue is exemplified by the community mangrove reforestation initiative at the Gazi Bay in the south coast of Kenya.

Gazi Bay is located approximately 50 km south of Mombasa and has a vegetation cover of mangrove forest spanning some 615 ha. A community project was initiated in January 1994 with the objective of rehabilitating degraded and deforested areas of the forest (Kairo 1995). The project involved the transplanting of mangrove propagules or saplings of *Rhizophora mucronata*, *Ceriops tagal*, *Bruguiera gymnorrhiza*, *Avecinia marina* and *Sonneratia alba*. A survival rate of between 10-70 % was reported 9 months after transplanting.

Though the immediate objective of this project was to rehabilitate degraded and deforested areas of the Gazi Bay mangrove forest, the overriding aim of the project was to enhance community participation in forest management and influence forestry policy and legislation towards sustainable use of forest resources by local people. This effort was effected to lobby against the ban on mangrove forest by the government and to give impetus that communities can manage their traditional resources. The ban on harvesting mangrove products denied the local population their natural right to the use of mangrove resources without alternatives to their livelihood considered. The promotion of community management of the mangroves and its resources, the project proponents considered would inculcate a sense of ownership of the resource and therefore enhance its sustainable utilization.

This effort was followed by a mangrove awareness workshop organized by the Kenya Marine and Fisheries Research Institute in March 2003, bringing together stakeholders and

government on mangrove legislation and sustainable utilization and the role of co-management of the resource. Here the role of local communities came out prominently. This act was directed at influencing the Forest Bill 2000, a regime under which, traditional ways of exploiting mangrove forest by local people, the so-called forest adjacent dwellers, may be allowed.

3.0 THE COASTAL ECONOMY

Review of Social and Economic Issues Relevant to Tourism, Mangroves and Ports and Land Reclamation and Damming of Rivers

A significant proportion of the coastal economy is linked to the direct or indirect exploitation of marine resources. The large urban centres, especially Mombasa and Malindi, thrive on maritime commerce, large industries and services. Whereas, in rural areas the community basically depends on primary production for their livelihood. Economic activities that are perceived to exert pressure on marine resources include tourism, exploitation of mangrove resources, agriculture, mining and port development

3.1 National Overview of Tourism

Nationally, the tourism industry is the second highest foreign exchange earner, only surpassed by tea and coffee. Indeed, in the early 1990's the industry surpassed the traditional cash crops, tea and coffee, contributing 22 % to foreign exchange earnings and 12.5 % of the GDP. Its earnings in foreign exchange now stand at 18%, contributing 9.2% to the GDP. Earnings from tourism have been showing signs of picking up after a slump between 1992 and 2001 occasioned by political related disturbances.

At least 60 % of the industry depends on coastal tourism. The primary attractions are the warm climate, the beautiful coastal scenery and clean sandy beaches. Thus, tourism infrastructure and related facilities have developed along the beach areas. The largest tourist resorts are located at Diani and Tiwi in the south coast, Nyali, Bamburi and Shanzu beaches in Mombasa, Watamu, Malindi and Mambrui in the north coast. Other important tourist resorts continue to develop at Kikambala, Kilifi and Lamu in the north.

In the major tourist centers various facilities and services have been developed to meet the demands of the tourist industry. Such services include tour operators, banking and recreation services. Indeed, the rapid growth of Ukunda near Diani resort, Malindi and Watamu are directly attributed to the development of tourist facilities. In Malindi and Watamu the main

activity driving the local economy is tourism, which accounts for approximately 60 % of business. Local populations depend heavily on tourism and tourism catalyzed activities through employment in tourist hotels, and also through provision of services and the supply of commodities such as agricultural products, seafood and building materials. Thus, tourism plays a major role in the coastal economy. In fact, one of the reasons for increased poverty in the coastal region is related to the decline or change in the business pattern of the tourism industry

3.2 National Overview of Mangroves

Mangrove Harvesting

Coastal communities have traditionally exploited mangrove resources for a variety of socio-economic reasons. Mangrove trees have been exploited for use in house construction with *Rhizophora mucronata* being the preferred species for building poles, with *Lumnitzera racemosa* and *Ceriops tagal* as the substitutes. Some of the mangrove species are preferred for boat building namely *Avecinia marina*, *Heritiera littoralis*, and *Sonneratia alba* and *Xylocarpus granatum*. Most of the mangroves are sources of tannin and dyes with *Bruguiera gymnorrhiza* producing more than 50 % of the tannin. Most of the mangrove species produce high quality firewood and charcoal for domestic and industrial use, such as in brick and calcium (lime) manufacturing. Products from a few species possess medicinal properties (*A. marina* and *X. granatum*) and/or have been used as human and animal food (*S. alba*). The high quality mangrove wood has been utilized for making various domestic utility items (e.g. drums, beds etc.) and fishing gear (e.g. traps, etc.). Mangrove poles are the preferred building materials in all rural settings and most of the coastal urban centers and Mombasa suburbs. There has also been a demand for mangrove poles for construction of tourist facilities, such as hotels and sheds. The pressure on mangroves was considerably higher towards the last millennium when the export of mangroves from Lamu thrived. Mangrove poles were being exported to Middle Eastern markets until a ban was effected in 1987. Introducing or putting in place incentives to encourage the importation of the commodity from neighbouring countries, and thereby easing the pressure on mangroves ensured the availability of alternative wood material. Thus, it is patently evident that the exploitation of mangrove resources forms a very important activity in the socio-economic wellbeing of the coastal communities.

Agricultural Activities

Farming is by far the most important economic activity at the coast; 87% of the coastal land is classified as agricultural (GOK 1999, quoted from Ochieng, B. et.al. 2001), while 70% of

the labour force in the area is engaged in agriculture (GOK 1996). Agriculture is thus the main source of livelihood for the rural people of the coast. Crops include maize, coconut, cassava, mangoes, citrus fruits, cashewnuts and bixa. Except for Tana River, livestock production, mainly beef cattle, goats and poultry is of lesser importance.

Farming activities along the coastal areas and river basins – irrigation schemes is very important for food production. But due to poor farming methods, the activity in these areas is responsible for huge volumes of suspended sediments in the river, which is discharged into the ocean with catastrophic consequences to marine habitats.

The great desire for food security has caused an ever-growing demand for agricultural land that has resulted in encroachment into coastal forests, including mangrove areas. A case in point is encroachment into the Arabuko-Sokoke coastal forest, which is the catchment area for the supply of freshwater to the Mida mangrove creek. The destruction of the water catchment area is thus a potential threat to the health and existence of the mangrove ecosystem.

Salt Mining

Solar-salt manufacturing is a significant industry in Kenya's coastal area. Salt is mined both for domestic use and for export, particularly to Tanzania and other land locked countries of Eastern and Central Africa. The salt is mined in the Ngomeni and Gongoni areas north of Malindi. The area covered by the salt pans exceeds 6,500 ha with an increasing trend. The salt manufacturers are now extending northwards towards Lamu, another rich mangrove area.

3.3 National Overview of Ports, Land Reclamation and Damming of Rivers

Port Development

Historically seaports have played a major role in the economic development of the Kenya coast and eventually influenced a hinterland extending into East and Central Africa. Ports that are operational in Kenya are Mombasa, Lamu, Malindi, Kipini, Kilifi, Mtwapa, Gazi and Shimoni under the jurisdiction of the Kenya Ports Authority. Mombasa is the largest port handling liquid and solid bulk cargo destined to Kenya, Uganda, Rwanda, Burundi and parts of Congo, Sudan and Ethiopia. The port is also the main gateway for agricultural exports and other commodities from the hinterland. The other ports are generally smaller, mainly serving small craft transporting consumer goods and fishing boats.

In recent years port development has been concentrated in Mombasa. Dredging for maintenance of the main channels and berths is carried out regularly. The dredged material is usually dumped at a deepwater site off the entrance into the Mombasa harbour. Still to be decided is the location of the loading facility for titanium to be mined in Kwale. Two sites have been proposed namely Shimoni in Kwale District and a site within the Mombasa harbour area at Dongo Kundu. The setting of such a facility will inevitably entail major works for the development of port facilities.

Land Reclamation

Limited land reclamation has been undertaken around the Makupa creek in Mombasa. The reclaimed land includes the abandoned Kibarani municipal solid waste dumpsite. However, the dumping exercise was not performed properly, but in a haphazard or uncontrolled manner, which created environmental problems. Consequently, the dumpsite became a source of pollution to the marine environment, due to among others, leaching of toxic heavy metals (Kamau 2001). The dumping site has since been relocated elsewhere.

Damming of River

There are a number of perennial and seasonal rivers along the Kenya coast that discharge into the Indian Ocean. The Tana River and Athi-Galana-Sabaki River are the largest and discharge into the Ungwana and Malindi Bays, respectively. The Tana is the longest river at 850 km with a catchment area of 95,000 km², extending into the Mt. Kenya region. The Tana discharges about 4,000 million m³ of freshwater and 3 million tonnes of sediments annually through an expansive delta into the Ungwana Bay. The Athi-Galana-Sabaki R. complex is 650 km long with a catchment area of 70,000 km² extending into the Nyandarua mountain range. It discharges about 2,000 million m³ of freshwater and 2 million tonnes of sediments annually into the Malindi Bay.

The Tana is the most dammed river in Kenya with 5 major hydroelectric power schemes. The dams on the Tana R. include Masinga, Kamburu, Gitaru, Kindaruma and Kiambere.

The high volumes of freshwater discharged carry with it nutrients, which maintain the high productivity of the Ungwana and Malindi Bays. Consequently, estuarine conditions, as indicated by a high productivity, prevail within the Ungwana and Malindi bays. The Ungwana and Malindi bay complexes form the richest fishing ground for artisanal fishers, semi-industrial fishers and prawn trawler operators.

It is clear that the reduction of river flow and the discharge of freshwater into the Ungwana and Malindi bays can result in far reaching changes in the ecosystem, impinging on the socio-economic well-being of the community.

3.4 Social and Economic Issues

National Dimension of PADH

The significance of the coastal resources to the national economy cannot be gainsaid. It is recognized that more than 60 % of the Kenyan tourism industry is coastal based, where the warm weather, sandy beaches and clear coral lagoons are the main objects of attraction. The promotion of mass tourism is a result of the Government policy of spurring economic growth and creation of employment opportunities by exploitation of coastal and marine resources. Marine resources are exploited for the export market for foreign exchange earnings, e.g. prawn trawling and extensive solar-salt manufacturing. The rising population nationally and along the coastal area has increased the demand for food security leading to intensified agriculture in irrigation schemes along the major river basins. Further, the demand for agricultural land has driven the people to encroach into marginal lands and water catchment areas with disastrous effects that eventually impact on coastal and marine habitats. Such intensified exploitation of resources for economic gains more often causes the alteration and/or destruction of habitats. Measures at conservation of critical habitats and protection from PADH have great significance for the sustainable exploitation of the resources, for example for the tourism industry and socio-economic well being of the coastal communities. The marine protected areas that are endowed with coral systems with high biodiversity and productivity represent conservation efforts that not only ensure sustainable productivity of the inshore/nearshore areas for continued livelihood of artisanal fishers but also for the recreation activities of the coastal tourist.

3.5 Social and Economic Importance and Impacts of PADH

On socio-economic grounds, PADH has reduced the capacity of the habitats to support the basic human needs of food, fuel and shelter for thousands of coastal dwellers. The alteration and destruction has also led to reduced fish catches, loss of aesthetic value and reduced income from tourism. This has caused changes/loss in employment opportunities for local communities as well as in changes in the social structures and conflicts in resource use.

In some areas, there is evidence of loss of cultural heritage. At Gongoni and Ngomeni, mangrove swamps have been cleared to give way for saltpans, while at Gazi Bay, uncontrolled harvesting has led to loss of land through erosion of the shoreline. Once altered

and destroyed, ecosystems are costly to restore and it takes very long to achieve the restoration.

Mangrove wetlands provide significant flood and storm control functions, protecting coastal infrastructure and settlements. Alteration and destruction of the mangrove ecosystem has resulted in the damage to coastal infrastructure and settlements as exemplified by the some beach areas in Diani, where property owners have been forced to put up defense structures to protect their investments from coastal erosion. If the alteration and destruction of mangroves and other coastal wetlands continues, re-establishment and maintenance expenditures for protecting coastal infrastructures and settlements would be high indeed.

Prawn trawling in the Ungwana Bay has been going on since the 1970's bringing in vital foreign currency, but it has also resulted in habitat and community modification with the destruction of other fisheries and loss of income for subsistence fishermen. Prawn trawling has also resulted in conflicts between the trawler operators and the artisanal fishermen, leading to concerns on issues of inter and intra-generational equity.

Traditionally, the coastal communities have depended on fisheries and mangrove exploitation. At the moment, the Kenyan reef fishery shows signs of over-exploitation. It is evident that fish catches have been declining over the years with a decline in aggregate fishery revenues, while the fishing effort has remained high especially in the artisanal sector. Thus, over-exploitation of the reef for fisheries and other living resources has caused reduced amounts of available protein for human consumption. This contributes to the reported cases of increased malnutrition in the Coastal region.

There is documented evidence of a decline of sea turtles and marine mammal populations in Kenya's waters attributed to the loss of their sea-grass habitat and intensive hunting primarily for their meat and oil. Since turtles are endangered/threatened species, the loss of the sea-grass habitat and such over-exploitation/indiscriminate killing may result in their extinction and loss of our cultural heritage.

Due to farming along river basins and poor agricultural practices, river discharge and surface run-off bring in large volumes of sediments into the marine environment resulting in high levels of suspended solids, in the water. The sediment affects sea-grass and coral reefs. It also revises the character of the shoreline. The sediments input thus result in reduced tourism/recreational opportunities as it interferes with the aesthetic value of beaches, coral reefs and mangroves. Malindi Bay and Malindi/Watamu Marine Park and Biosphere Reserve are the most impacted by suspended solids. As a result, some tourist hotels have lost their beach frontage with consequent loss of tourism business and increase in unemployment to many hotel employees.

Suspended solids have caused increase in water treatment costs with adverse impacts on the coastal dwellers. Water treatment, particularly the coagulation element has become too costly considering the high sediment loads brought in by the river. A decrease in number of some locally extant sea-grass species has been reported in Malindi Bay, an area experiencing heavy siltation.

From time to time dredging of the navigational channel in the Mombasa inshore water areas is necessary to maintain the depth required for shipping activities. The costs of dredging indicate the significance of the impacts of suspended solids on the Kenyan coastal waters.

Case Studies on Best Practices

Sustainable utilization of Coral and Mangrove resources: Wasini Women Boardwalk Project

The Wasini Women Mangrove Boardwalk, is a success story of a group of women in Kenya's South coast who are turning to tourism to change their fortunes. Wasini is an Island located in Kenya's south coast close to the border with Tanzania. The women came up with the idea of putting up a boardwalk in the mangrove colonized coral garden on the Island for tourists to be able to take photographs without damaging the habitat. Long before the boardwalk was constructed, some young men would charge visitors to bring them here. The women group wondered why they could not take up that opportunity? So, they came up with the idea of constructing the boardwalk, and their male counterparts supported it. The problem was now how to raise funds to initiate the work. Fortunately, existing within the vicinity is the Kisite Mpunguti Marine Protected Areas and the administration of this establishment, the Kenya Wildlife Services (KWS), were willing to lend a hand to such a noble community proposal. The KWS and IUCN provided technical support to the project while the Dutch and German governments were approached to provide the funds for the construction activities.

The Wasini boardwalk, officially opened to the public in July 2001, is an example of the various income-generating opportunities that exist by involving community involvement in the management of coastal and marine resources in the MPA. The project is also evidence of how far MPA management has come since the early days, when relations between MPA managers and the community were characterized by conflicts. Increasingly, MPA managers are realising that without community support, the challenges to the management of the MPA would remain a non-diminishing obstacle to biodiversity conservation as well as socio-economic stability in the area.

In the first month the boardwalk venture made over US\$875. The women's group is responsible for collecting the required fees and guiding the visitors through the walkway, as well as ensuring the boardwalk is properly maintained. The income generated from the boardwalk is banked and then re-allocated to different activities, mostly school fees for the children, and the maintenance of the boardwalk. To manage the boardwalk effectively, guidelines for its management have been developed and some of the community members have been trained in bookkeeping to help manage the finances.

Bee-keeping in the Mida mangrove forest

The bee-keeping project in the mangrove forest of Mida Creek in Malindi, is an offshoot of the Kipepeo butterfly farming in the Arabuko-Sokoke forest supported by the European Union through the National Museums of Kenya. When the butterfly project was started, it was observed that the local community in Malindi, used to harvest honey both in the Arabuko-Sokoke Forest and in the Mangrove Forests of Mida, albeit at a small scale. This activity promised to be a very lucrative business if well developed. At the same time, the communities harvested mangrove and the other forest products directly as another source of income. The direct harvesting of the forest products was considered to be occurring at a rate that was unsustainable. A balance had therefore to be found that could improve income without necessarily destroying the forest. The bee-keeping project was conceived and promoted. Today, the proceeds from honey gathering are high enough to make up for the lost income from the sale of mangrove poles now long lost due to the ban on mangrove poles harvesting.

Having realized the potential of the indirect use of the forest, the communities living adjacent to the forest formed themselves into an association that protect the forest and are organized to make the best use of their newly found source of income. One of the challenges the association faces is the lack of market for their honey. In addition, the production techniques of the honey are considered primitive and not meeting international standards. Therefore, considerable support is required for the project to adopt modern methods of honey production and processing in order to attract those markets that demand higher specification standards. If this last hurdle is resolved, the project will be a standing example of best practices in the conservation of important coastal habitats, while providing sustainable means of livelihood for the communities residing in these areas.

4.0 IMPACT OF ECONOMIC ACTIVITIES ON MARINE AND COASTAL HABITATS

Assessment of Land-Based Sectoral Activities Responsible for Physical Alteration and Destruction of Habitats

In the endeavour to attain higher economic development along the coastal area sensitive marine habitats experience pressure, most often relentless. The relatively faster population growth along the coast increases the demand and hence pressure on marine resources. Intensified activities in the tourism sector, mining, agriculture and other economic sectors may increase pressure on marine resources resulting in over-exploitation and habitat alterations and/or destruction.

4.1 Impact of tourism on marine and coastal habitats

National Overview

The direct impact of the tourism industry on coastal resources may be categorized as

- Increased demand for building materials for the development of tourism infrastructure. Specifically, demand for mangrove poles and coral blocks for construction of hotels, resulting in increased pressure on mangroves.
- Development of inappropriate beach protection structures which has tended to aggravate beach erosion, posing a serious threat to tourist infrastructure, such as beach hotels.

The most commonly used shoreline protection structure along the coast is seawalls. Normally a breaking wave gradually loses power as it flows up the beach, followed by a weak backflush. However, seawalls tend to change the dynamics of the breaking wave, such that the reflected wave retains sufficient energy to aggravate beach erosion, resulting in loss of tourist amenities. Along the Kenya coast beach erosion prevails with the exception of the Malindi and Ungwana bays which receive net supply of sediments/silt from the major rivers resulting in beach accretion. Beach walls are the preferred method of beach protection in tourist resorts in Mombasa and beaches south of Malindi, and Ngomeni area. Most tourist beach hotels use septic tank / soak pit systems for wastewater and sewage disposal. However, often raw sullage (wastewater) and chlorinated water from the swimming pools is allowed to flow into the adjacent coral reef lagoons. The resultant low salinity environment and high nutrients are hostile to the survival of corals and may lead to coral mortalities.

The coastal tourist is a direct consumer of marine resources in terms of recreation and food. Tourist activities in the coral reefs, consisting of uncontrolled reef walking, boating, diving

and boat anchoring can damage coral heads. On the other hand, the increasing demand for seafood by the tourists encourages over-fishing and use of destructive fishing gear in inshore areas by artisanal fishers leading to habitat alteration and destruction. For example, over-fishing in the Diani coral reefs was attributed with the disruption of the ecological balance, whereby the reef damaging sea urchin proliferated in response to the over-exploitation of the predator fish (Muthiga & McClanahan 1987). Tourism encouraged the collection of ornaments from coral reefs, such as shells, and ornamental fish, leading to interference with the community structure and alteration of the habitat.

Development of the tourism industry has contributed in the growth of urban centres in the vicinity of tourist resorts. In particular, Malindi, Watamu and Ukunda/Diani developed primarily as service centres for the industry. The development of urban centres has increased the demand for mangrove poles and coral blocks, sand and cement for house construction. In all the urban centres near tourist resorts, the disposal of sewage and solid waste is a problem, and most often ends in the marine environment.

4.2 Mangroves

National Overview

Impact of over-exploitation of mangrove resources

While small scale harvesting of mangroves is carried out practically along the entire coastline, commercial exploitation has been most intense in the Lamu areas. Until it was banned in the late 1980's export of mangroves to the Middle East and Gulf countries was a thriving business in Lamu. Commercial harvesting often involves indiscriminate clear felling of mangroves and terrestrial forests. In contrast, subsistence harvesting is usually need-driven and selective. Over-harvesting resulted in decreased mangrove cover (which is yet to documented) decreased size of mangrove poles, and replacement of high quality mangroves with inferior species (WWF 2001). An indication of over-harvesting was revealed by Doute et al. (1981) who reported a decrease of nearly 10 % of mangrove cover at the Gazi creek between 1950 and 1980. About 60 ha of mangroves was cleared at Gazi which exposed part of the shoreline to erosion. Over-harvesting was also reported in Mida creek resulting in change in community structure (Kairo & Gwada 1998). The Lamu and Tana delta mangrove systems are attributed with providing nursery grounds for, among other commercial species, shrimps that form one of the most lucrative fisheries in Ungwana Bay.

Impact of mining activities

The construction of solar saltpans in the Ngomeni and Gongoni area north of Malindi is a growing cause of massive destruction of mangroves. The area covered by saltpans exceeded 6,500 ha by the year 2000, and has been increasing. Salt manufacturers are extending northwards towards Lamu. Further destruction of the mangrove swamps will definitely deny commercially important fish species nursery grounds, thereby adversely affecting recruitment into the Ungwana bay.

Impact of agricultural activities

Bad cultivation practices in marginal areas, and the keeping of large herds of livestock in some areas have resulted in loss of vegetation, exposing the soils to erosion. The unprecedented heavy precipitation attributed to the el-Nino weather on bare land resulted in enhanced soil erosion and siltation in mangrove areas killing a large area of this vegetation. Similarly, bad farming practises along the Sabaki/Tana/Athi river basin complex including cultivation too close to the river banks, and in catchment and marginal areas has resulted in enhanced soil erosion. This has resulted in increased levels of suspended sediments in the rivers and the discharge of excessive loads of sediment into the marine environment. The sediment loads discharged into the Malindi Bay have extended south into the marine park resulting in the shadowing and siltation of corals and sea grass beds. As a result of excessive siltation Wakibia (1995) reported the disappearance of certain sea grass species.

4.3 Ports, Land Reclamation and Damming of Rivers

National Overview

Impact of dredging activities

Dredging for port development and maintenance of the port of Mombasa and other lesser seaports, has the effect of increasing the intensity of suspended materials in the water, damages the benthic habitat and organisms, and has the potential of mobilising toxic heavy metals and organic contaminants in the water column. The subsequent dumping of dredged material in the sea increases turbidity resulting in shadowing and/or smothering of benthic organisms. This may further mobilise toxic inorganic and organic contaminants in the dumping area. The dumping of dredged material in mangrove areas resulting in habitat destruction was reported to have occurred in Lamu.

Impact of River Damming of Rivers

The construction of dams for storage of water and for harnessing hydroelectric power has had a negative impact on the coastal and marine environment. The alteration of the flow regime of the rivers means alluvial sediments are trapped, resulting in impoverishment of sediment supply at river mouths and deltas. The effect is the recession of the shoreline and the disruption of the spawning and growth cycles of marine fish and prawns. An interesting case is the construction of the Bellazoni canal on the Tana River linking it to Ozi River. The local residents dammed the canal for irrigation purposes resulting in reduced freshwater flows into the delta. Consequently, there is evidence of saltwater intrusion upstream, a situation that has provided for mangrove establishment, while other riverine trees such as *Ficus Sycomorus* have died off (Robertson and Luke, 1997 quoted from Ochieng, B. et.al. 2001).

4.4 The Impact of PADH

National Dimensions

Habitat degradation due to Tourism

The coastline of Diani is suffering heavy mining of coral limestone to meet the demand for building blocks occasioned by the rapid urbanisation of the area promoted by tourism. The coastline also has some areas suffering from the dumping of huge amounts of garbage resulting in pollution problems. Poor citing of hotel establishments near the beachfront, disregarding the regulation set-back line, and not realising that beaches are dynamic and the developments tend to interfere with the sand budget and accelerate erosion. In response, developers have resorted to the construction of wall defence structures to protect the establishments. Constructed without any scientific advice, these defence structures have exacerbated the problem.

Habitat degradation due to Salt Works

The Ngomeni and Gongoni areas have suffered the loss of considerable areas mangrove cover due to clear-cutting of the vegetation to give way to salt pans. Unfortunately, not much pictorial evidence is available, as a monitoring tool, to highlight this problem. Efforts are needed in this direction, so that the extent of the problem is understood.

Habitat degradation due to clear cutting of coastal forests

The Gazi Bay and Tsunza Bay have suffered massive siltation due to the clear felling of mangroves and other coastal vegetation. The problem was further compounded by the El-

Nino rains of 1997-8 during which massive siltation of mangrove areas occurred. Significant efforts have been made and studies done in the case of Gazi, while awareness to the Tsunza problem has been brought to the fore. Little documentation however exists to highlight the problem to the wider stakeholder.

Habitat degradation due to sediment movement

The Malindi Bay is heavily impacted by sediment discharges from the River Sabaki affecting the Marine Parks around this area very significantly. The extent of this problem is yet to be fully determined, though projects of interventions to address the problem have been suggested through the African Process program.

Habitat degradation due to damming of rivers

The Bellazoni canal in Tana River has an area colonized by mangroves due to saltwater intrusion and the loss of the riverine tree *Ficus Sycomorus*, which has died due to the saltwater intrusion. The impact of structural transformation brought about by this change is yet to be studied in detail.

4.5 Case Studies of the Impacts of PADH

Sediment Movement

Suspended solids have resulted in reduced tourism/recreational opportunities as it interferes with the aesthetic value of beaches, coral reefs and mangroves. The sites along the Kenya coast most affected by sediment movement are the Malindi Bay and the Malindi/Watamu Marine Park and Biosphere Reserve. The Malindi town, which is located in the Malindi Bay, developed primarily as a tourist resort town. Currently some tourist hotels have lost their beach frontage due to beach accretion with the consequent loss of tourism business. This has resulted in the loss of employment to many local employees.

Clear cutting of mangroves and other coastal forest

Gazi bay is one living example of a degraded area due to the clear cutting of mangrove vegetation. The uncontrolled cutting of mangroves has led to loss of land due to erosion of the de-vegetated shoreline. The degradation of the shoreline prompted the community mangrove planting rehabilitation project reported elsewhere in this report.

Salt works

Due to salt mining, it is known that large expanses of mangrove cover have been lost in Ngomeni and Gongoni. At least 6,500 ha of mangrove cover has been lost due to this activity. Unfortunately no photographic or satellite imagery exist as evidence for this destruction.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The Kenya coastline comprises an inter-linked ecosystem of great ecological and economic value to the area, but very vulnerable and sensitive to human impacts. Biodiversity and productivity found in the coastal ecosystem support all sectors of the coastal economy. Increasing pressure of the rising coastal population and their socio-economic activities in search of livelihood bears negatively on the various ecosystems.

The various sectors of the economy are governed by **sectoral legislation**. Tourism, urbanisation, fisheries, forestry activities, agriculture, mining, port and energy development the main economic sectors in the coast are guided by separate individual pieces of legislation and in some cases, more than one statute govern a single sector. These pieces of legislation operating in the same geographic space independent of the other have created confusion and weakness in enforcement with disastrous effects to environmental conservation. The EMC Act comes close to remedying the shortcoming of the sectoral legislation. However, having been crafted to supersede the sectoral legislation, as far as environmental matters are concerned, this Act will become effective only if the on-going review of the sectoral legislation is completed in good time to effect harmonisation of the law.

The **institutional arrangements** created by the individual sectoral legislation are no exception. Fisheries are managed differently from forestry, so is wildlife conservation from tourism and agriculture from urbanisation. Thus, activities, which have a symbiotic relationship with each other, are managed individually and separately. This has created an institutional weakness in the management of the activities that cause the alteration and destruction of critical habitats.

The **gaps in legislation and institutional** arrangements associated with the alteration and destruction of habitats are not significant. If the on-going legal and institutional reforms are effected to include the element of integration, recognise the roles of NGOs, CBOs and the local community and co-management arrangements the gap in addressing the problem will have been alleviated.

The PADH is an issue of both **social and economic** importance in Kenya. The components of the coastal ecosystem, is a national heritage for Kenya. The ecosystem supports tourism and fisheries among other important coastal economic activities. The alteration and destruction of these habitats is undermining the prosperity of both activities. In the endeavour to alleviating the problem, the country finds itself in an unenviable situation of balancing the policies of conservation against rapid development. The government policy is driving towards industrialisation, food security, the expansion of tourism and the creation of employment opportunities. These activities are undertaken in the same land/water space, where the

physical alteration and destruction is to be minimised. Only a balance and the use of both economic and environmental tools will minimise the impacts.

The **social and economic impacts of PADH** identified by the study include:

- The decline in reef and near-shore fishing and therefore, loss of protein and income for coastal dwellers and fishermen;
- Declining aesthetic value of coastal ecosystems, leading to loss of income opportunities from tourism and loss of employment and conflict in resource use;
- The loss of mangrove cover due to the various socio-economic activities has in some cases led to coastal erosion, forcing property owners to construct expensive defence structures to protect them, while in some cases this has led to the loss of nursery/breeding grounds for juvenile fish;
- The impact of siltation on sea grass caused by poor farming methods and the destruction of mangrove forests has seen the decline in the population of sea turtles as their grazing grounds are destroyed. Siltation has also impacted on the tourism and recreational opportunities in the Malindi Bay and the nearby Malindi and Watamu Marine Park and Reserves;
- The high volumes of suspended solids in, especially River Sabaki have resulted in high costs of water treatment with adverse effects to the economy of coastal dwellers; and
- The damming of rivers has resulted in reduced flows of freshwater into the marine environment, with the consequences of saltwater intrusion upstream and the colonisation of these areas by mangrove vegetation as it replaces other freshwater vegetation causing changes in the community structure.

The coastal economic activities responsible for the cited impacts include tourism, over-exploitation of the coastal habitats, salt mining, poor agricultural practices, dredging activities at the ports and the damming of rivers.

To alleviate the alteration and destruction of habitats, the following **recommendations** are made: -

- Address poverty and equity issues as far as access to coastal resources are concerned by establishing viable means of livelihood;
- Enhance awareness campaign and education programs that promote the sustainable use of coastal resources;
- Strengthen enforcement of laws and institutions through the harmonisation of policies, regulations and the institutions charged with the management of the coastal resources and environment;

- Involve the private sector, particularly the salt manufacturers in habitat conservation through incentives for compliance to environmental legislation;
- Address the problems of siltation caused by bad farming methods through poverty alleviation programs and harmonisation of policies in agriculture, and forestry.
- Promote collaboration and integration between sectors to build common trust in the implementation and monitoring of development activities;
- Promote co-management of coastal resources with various stakeholders, including the recognition of the role of local communities and traditional knowledge in resource conservation;
- Intervene to alleviate pressure on coral reefs and sea grass beds due to over-exploitation of fisheries and other living resources and destructive fishing methods by encouraging tourist establishment's to invest in the provision of alternative means of livelihood to communities dwelling in their vicinity, e.g. ecotourism to enable the communities share the successes of the industry;
- Promote offshore fishing to reduce pressure on the reefs and the shallow mangrove areas by empowering local fishermen with equipment and resources to enable them to do so;
- Lobby the international community and stakeholders to provide assistance to programs that are geared towards biodiversity conservation. To accomplish this efforts must be made to carry out surveys to map out the affected areas through aerial photography and satellite imagery to determine the extent of the problem.

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