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Strategic Environmental
Assessment of Mafia Island
FINAL REPORT

**VOLUME I:
EXECUTIVE SUMMARY**



Kilindoni, Mafia District © H. Sosovele (2008)



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Dar es Salaam

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INTRODUCTION

President George W. Bush and President Jakaya Kikwete signed a \$698.1 million Millennium Challenge Compact (MCC) agreement in February 2008. The main purpose of the Compact is to reduce poverty by stimulating economic growth, increasing household incomes, and raising the quality of life through targeted infrastructure investments. The Compact is supporting three main infrastructure projects in *transport, water, and energy*. The upgrading of the airport on Mafia Island is one of the projects within the transport sector the Compact will support in Tanzania.

The objectives of the Millennium Challenge Corporation (MCC) Compact funds in Mafia are to refurbish the runway, apron, and taxiway; establish and secure airport boundaries; refurbish the fire station, terminal building, and its water supply; and install communication facilities. By undertaking these changes, the safety and security of the airport will be enhanced and the airport will be able to handle aircraft such as an ATR 72. The terminal building will be refurbished to handle 100 arriving and departing passengers per hour, and electricity will be provided to allow planes to land and take off at night. However, the target of 100 passengers is still being discussed. One option that the MCC and Government of Tanzania are discussing is a terminal building that can handle 40 arriving and departing passengers per hour. This change would need to match with the capacity of the aircraft, which, in turn, will also influence the size of the airport. On a long-term basis and considering future expansions, controls can be put on arriving and departing passengers whilst the overall designs remain the same to allow for future expansions.

The main means of transport to Mafia is by sea. The seemingly cut-off condition between Mafia and the rest of the districts in Tanzania due to poor transport has resulted in the district's slow development process. Indeed, some government employees who have been posted to Mafia have turned down the offer or not reported due to poor transportation. This has resulted in denying Mafia the critical technical staff that otherwise could have stimulated change. The proposed development of the airport will stimulate significant economic changes in Mafia, which may result in major environmental, social, and cultural negative and positive impacts. This realization has prompted the undertaking of a Strategic Environmental Assessment (SEA) for Mafia Island to determine strategic policy issues and options that will require the attention of decision-makers. This summary is based on the full SEA report that details policy and planning issues that need to be considered by the central and local government in order to ensure development activities in Mafia are sustainable.

BACKGROUND - MAFIA DISTRICT

Mafia is one of the six districts that form the Coast Region of Tanzania. Agricultural crops, such as cashew nut, coconut, paddy, fruits, vegetables, and sweet potatoes, are cultivated; together with fish, some are transported and sold in the Dar es Salaam market through Nyamisati in the Rufiji delta. The majority of the people in Mafia are poor subsistence farmers, primarily influenced by Coastal Swahili culture with strong religious and family ties.

Mafia Island is rich in marine biodiversity, with about 350 species of fish as well as prawns and octopus. Fishing is an important economic activity engaging the majority of local people in Mafia. The decline of fisheries in near-shore areas throughout the Tanzanian mainland has led to an influx of fishermen from other areas into Mafia waters. The influx of fishermen from outside Mafia has caused occasional friction within villages in Mafia. Most of the important fish species, beside the octopus, have been over-exploited almost to the point of exhaustion.

The Mafia Island Marine Park (MIMP) started operation in July 1995 in order to provide for the conservation of marine biodiversity and to promote sustainable utilization of marine resources. The Marine Park is a multiple marine and land-use facility where human settlement is allowed within the park boundaries. Over 50 percent of the population of Mafia lives within the MIMP boundaries.

The natural vegetation of Mafia Island includes coastal forests and thickets, which are part of the once-extensive lowland forest of East Africa. Mangrove forests, the Mlola forest reserve, and the MIMP are the main protected areas in Mafia. The forest resources are also facing pressure from local communities searching for fuelwood and building materials.

Mafia Island is also rich in wildlife resources, both large and small. For example, two species of toad and gecko that occur nowhere else in the world, as well as large fruit bats (flying foxes), are found in Mafia. Other resources in Mafia include land, people, and cultural and archaeological sites. Mafia is becoming an important tourism destination, servicing largely a global tourism market that links Mafia with Zanzibar, Rufiji, Kilwa, and the Selous hunting areas in southern Tanzania with the northern tourism circuit of Ngorongoro, Serengeti, and Kilimanjaro Mountain. The flow of passengers, aircraft movement, and cargo freight to or from Mafia has increased since 1999, and it is expected to rise even further by 2030, to about 1.4 million kilograms (kg) of cargo and about 180,000 passengers. Mafia is also becoming important in the energy industry with gas drilling and exploration at Ndagoni.

The various investments now taking place in Mafia may have positive and negative implications for the overall local economy, the local communities, and the fragile island ecosystem. However, the environmental degradation is also likely to continue even without implementing the airport upgrade programme because of the many pressures that the local population and forces from outside Mafia exert on the resources on the island. Currently, illegal fishing practices, deforestation, and overfishing of specific species are occurring. These pressures are taking place amid an inadequate planning and management framework that should guide sustainable utilization of natural resources in Mafia.

OBJECTIVES OF THIS STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA)

The Ministry of Infrastructure Development, in collaboration with Millennium Challenge Corporation and the Millennium Challenge Account- Tanzania (MCC/MCA-T), initiated this SEA. A Strategic Environmental Assessment is a tool to enable integration of environmental and sustainable development issues into the early stages of development policy and planning, to help design and assess preferred strategic options (i.e., alternatives), and to validate final outcome of the choices. It is a participatory planning process.

The main goal of this SEA process is to provide a long-term planning framework for Mafia Island that will help MCC and the Government of Tanzania address strategic issues that will be triggered by the programme to upgrade the airport and to ensure that the various activities will be compatible with Mafia's environmental conditions. The SEA also suggests a carrying capacity framework that could be adopted for various activities. For example, Mafia is becoming crucial in tourism development; however, without taking into account the carrying capacity of tourism development, tourism growth may lead to the degradation of the resources on which the sector greatly depends.

Extensive participatory approaches were followed in preparing this SEA, involving key stakeholders, focus group discussions, and meetings with government and religious leaders and elders, informed groups, nongovernmental organizations (NGOs), and private sector

stakeholders. Primary and secondary information was collected, analyzed, and integrated in the report.

IDENTIFIED IMPACTS

The various economic activities that may be developed and implemented in Mafia, including the proposed airport upgrading programme, will have implications on the environment, social context, culture, and economy of Mafia and Tanzania in general. Some of the positive impacts and changes include:

- Expanded economic opportunities to the people of Mafia
- Improved mobility of the local people
- Increased markets for local products from fishing, livestock, and farming
- Increased opportunities for income-generating activities
- Increased and improved social services, communication, banking, and information
- Increased opportunity to develop small and medium enterprises (SMEs) and handicraft industries
- Increased revenue generation for local and central government
- Increased opportunities for inclusion and participation of local communities in decision-making, thus raising good governance and building confidence among Mafia's people
- Possible changes in the livelihoods of the local people resulting from improved social services, increased economic opportunities, increased sources of incomes, and capacity development opportunities.

The proposed development could also lead to significant negative impacts that may include the following:

- Forest degradation (i.e., charcoal production, harvesting of building materials from Kilwa and Rufiji, and mangrove clearance)
- Increased loss of biodiversity, both flora and fauna
- Increased generation of solid and liquid waste and pollution of the marine resources and underground water sources
- Coral reef damage (i.e., due to increased visitor traffic) leading to disturbing turtle, dugong, and whale Shark habitat sites
- Depletion of fisheries (i.e., overfishing)
- Destruction of beaches and coastal resources
- Possible increase in migration, leading to disruption of social cohesion, social relationships, and social institutions, and to expanded urbanization.
- Increased pressure on education and health facilities and risk of increasing HIV/AIDS infections
- Increased road transport accidents
- Damage to cultural/heritage sites (physical damage)

- Increased resource-use conflicts between locals and tourists, locals and conservation organizations (e.g., MIMP and District Council), locals and lodge owners, and among locals themselves
- Increased level of noise and traffic accidents
- Increased costs of living (due to increased demand for goods and services)
- Increased pressure on water, land, and energy resources
- Loss of land and access to beaches (i.e., increased sale of land and convention of beach areas for tourism development).

MITIGATION MEASURES

This SEA has considered a number of mitigation measures whilst also taking into account the Carrying Capacity and Limits of Acceptable Change frameworks. The main assumption of the Carrying Capacity framework is that a fixed number of people can be supported by the resource limitations found in a particular area over time. This limit can be pushed outward through technology choices and adaptive planning. The core assumption of the Limits of Acceptable Change framework is that any development risks some degree of negative impact on the natural and social systems. The tolerable limits of change are a matter of deliberate policy decisions, with implicit recognition of risks and trade-offs.

The mitigation measures recommended in this SEA are based on the premise that decision-makers must be aware of the risks and trade-offs to the extent possible as a basis of informed decision-making. For example, the decision to expand tourism development in Mafia must take into account the environmental and financial risks and trade-offs. Such a decision must address the issue of the number and type of facilities and the number and type of tourists that could be allowed in Mafia. These decisions will have implications on revenue generation for Tanzania and the investors. Mafia District and central government decision-makers (e.g., Ministry of Natural Resources and Tourism, Ministry of Infrastructure Development, Ministry of Water and Irrigation, and others) must engage in adaptive management planning, based on long-term observations and careful monitoring of social and environmental indicators and adoption of precautionary approaches.

Some of the mitigation measures proposed in this SEA include the following:

- *The Ministry of Natural Resources and Tourism, in collaboration with Mafia District Council (MDC), must prepare a Mafia Tourism Master Plan that is informed by the Carrying Capacity and Limits of Acceptable Change frameworks.* The initial plan is to expand the terminal to be able to handle 100 passengers per hour, a capacity to handle 16 ATR 72 movements in a 12-hour day, or one airplane landing and taking off every 1.5 hours. By 2007, about 40 passengers were arriving in Mafia daily (or 13,240 per annum). Air traffic is projected to increase to 486 passengers per day (177,503 per year) and 56 aircraft movements per day (20,611 per year), including smaller aircraft, by 2030. Although this level of passengers can be accommodated by the upgraded airport, growing tourism arrivals will stimulate demand for tourism-related facilities (lodges and hotels) and services, increase visitor density and circulation on the island, increase economic activity, and promote social interactions (and tension) between local populations, visitors, and potentially migrant workers. Without adequate environmental management, facilities development may result in direct, permanent modification of the physical environment and may cause long-term environmental changes.

There are about 78 rooms in the existing eight lodges, hotels, and guesthouses in Mafia, and plans to construct five more lodges are underway. However, it is important to consider

scaling down the number of visitors in order to reduce pressure on facilities and resources. The environmental implications of having larger numbers of visitors are likely to be significant; ***therefore, a gradual reduction of numbers of visitors to almost half of the projected daily arrivals by 2030 would reduce the pressure significantly.*** The reduction in arrival numbers will have positive environmental benefits and could guarantee long-term revenue generation. The MCC and Government of Tanzania are re-assessing the scale of development to reduce the expected arriving and departing passengers to only 40 per hour. This reduction would entail fresh assessment of the intended aircraft size (i.e., from ATR 72 to something else). However, taking into account future development needs and changes, the expansion of the airport and the facilities could be maintained as planned, whilst controls are set on the numbers of lodges, passengers, and frequency of flights and time. Although such a decision may be viewed as a loss, it will have long-term investment and environmental benefits.

- Mafia District Council, in collaboration with the National Land Use Planning Commission, should develop a *Mafia District Land Use Plan* with clear zonation for various land uses. The existing land-capability assessment is limited to only six villages. A comprehensive plan covering all the villages in Mafia is needed.
- The Ministry of Natural Resources and Tourism and Mafia District Council should develop a strategy to assure local benefits from tourism. Integrating tourism activities in district plans is a key component of that assurance.
- Mafia District Council and the National Environment Management Council (NEMC) should ensure full and participatory Environmental Impact Assessments for all projects that will be implemented in Mafia in line with the Environmental Management Act (Cap. 191) of 2004.
- Mafia District Council should undertake targeted capacity development programmes to increase the capacity of the district staff to discharge their duties effectively as well as the capacity of the local people to be able to employ themselves or be employed. Skills development in handicraft and other activities will be needed.
- Projects and programmes to be implemented in Mafia should adopt technologies that reduce emissions into water bodies and the atmosphere and that comply with national and international environmental standards and laws.
- Ministry of Natural Resources and Tourism (MNRT), in collaboration with the Mafia District Council and Mafia Island Marine Park, should set limits for visitors to areas inside and outside the Marine Park and enforce such policy decisions. While legal measures are enforced, MIMP and the MNRT should develop and implement benefits-sharing schemes that would encourage local people to conserve and protect the Marine Park.
- Mafia District Council should conduct sensitization programmes to raise the awareness of local people about potential opportunities from various economic activities, including the airport upgrading programme; health implications (e.g., HIV/AIDS); and gender relationships and the role of women in development in Mafia.

PROGRAMME/POLICY ALTERNATIVES

Several alternatives have been considered in this SEA. However, the project-based Environmental Impact Assessment for the Mafia airport upgrade project and several EIAs that will be undertaken later must consider project-based alternatives. In this SEA, the alternatives considered focus on strategic policy-related issues. The alternatives considered include the following.

The No-Project alternative

The no-project alternative implies the proposed development activities are not taking place; instead, the status quo remains as it is. This alternative has significant policy and political implications. For example, abandoning an airport upgrading programme will have greater policy implications because, for many years, transport between Mafia Island and mainland Tanzania has relied upon ships, boats, and dhows. Airplanes flew to Mafia only occasionally and mainly during dry season. Sea transport has not been reliable due to poor vessels and lack of a secure docking area or jetty.

Poor and unreliable transport conditions have negatively affected attitudes and perceptions about working in Mafia. Taking the no-project alternative will continue to subject Mafia people to the same hardships as before and perpetuate their underdevelopment. Taking this alternative does not necessarily imply avoiding environmental degradation. Some of the environmental problems may continue, possibly at a slower pace and smaller scale than is the case with the various development activities. More importantly, the no-project alternative conflicts with MKUKUTA policies, tourism policies, and the MCC/MCA-T and Government of Tanzania agreements. Thus, this option is not politically acceptable.

Alternative volume of visitors per day

The proposed airport expansion will increase traffic flows and aircraft movement from 40 passengers a day (or 13,240 per annum) in 2007 to about 486 passengers per day (177,503 per year) and 56 aircraft movements per day (20,611 per year), including smaller aircraft, by 2030. At the initial expansion, with 100 passengers per hour, the airport will handle at least one landing every 1.5 hours. The increased flow of traffic and landings could be handled by the expected airport upgrading.

However, by increasing arrivals, airport expansion will trigger construction of new resorts, hotels, restaurants, and dive centres. It will also stimulate growth of other activities to provide services and support to expanded tourism (e.g., agriculture, livestock, services, etc.). Without adequate environmental management, facilities development may result in long-term environmental changes. Therefore, an alternative scenario based on a gradual reduction of the number of visitors to almost half of the projected daily arrivals by 2030 would reduce the pressure significantly. Although reducing the arrival numbers will negatively affect projected revenue, environmental benefits may have long-term implications and guarantee more long-term revenue generation. Policy decisions will have to be taken to consider this option in the light of the trade-offs. Indeed, MCC and Government of Tanzania are considering scaling down the number of passengers per hour to only 40.

Alternative type of tourist – Combining quality products and high-value tourism

The airport upgrading may stimulate an increase in tourist arrivals; however, to reduce the impact of bigger numbers and to minimize demand for more lodges, policies that ensure *high-value, low-volume tourism* for Mafia can be developed and implemented to accommodate only a certain type of clientele. This policy option is compatible with the overall tourism development strategy in Tanzania that is discouraging mass tourism. To be able to do this, programmes to diversify and improve tourism products in Mafia must be implemented. Advance bookings to visit Mafia can be introduced as a control measure. The net effect of such a programme is increased revenue from fewer tourists and less environmental degradation. The main cost is in terms of improving and diversifying products and promotional activities that will target the high-end tourist.

Improve existing facilities and limit development of more lodges and hotels

Currently, Mafia has eight tourist facilities that include four high-cost lodges at Utende and Chole and some middle- and budget-level tourism hotels in Kilindoni. These facilities vary in terms of quality of services and structures. Plans are underway to build five new facilities along the seashore, and some investors are targeting the small islands that serve as marine breeding sites. As a measure to address the effect of constructing more lodges, thus exacerbating pollution and land-use problems, direct policy options should be adopted to ensure that existing facilities are improved and classified to a level that meets international standards before new facilities are built. This initiative will have to be implemented in tandem with the proposal to encourage high-value tourism. The government may consider economic incentives as policy options that could motivate hotel owners to improve their facilities and services so that the environment and tourist resources are protected and utilized in sustainable ways. This alternative, however, does not address the impact of general construction that may be stimulated by several economic activities. The District must ensure it has a comprehensive Land Use Plan and Urban Master Plan to guide future development and construction works that may take place in Mafia.

Alternative source of energy

Reliable energy supply will be critical in the tourism development in Mafia. Currently, diesel generators that serve Mafia with electricity are constantly interrupted by lack of diesel or breakdown of the generators. The proposed airport and other potential economic activities, such as copra industries, fish processing, SMEs, and lodges and hotels, will require a reliable energy supply. Therefore, it is important to consider, at the policy level, energy options that will be sustainable and reliable. Two of these options are solar power and undersea cables to connect Mafia with the national electricity grid.

The solar energy option could be developed in Mafia targeting specific service areas as well as local communities to reduce the use of generators. In addition, the airport facilities could run on solar power provided better systems are obtained. This could be considered as a short-term measure while the more reliable option of undersea cables is considered. Connecting Mafia with the national grid will improve livelihoods; guarantee power to industries, SME, and tourism development; and provide local communities with reliable energy in line with national policies. The environmental, social, and political gains arising from this alternative are very significant.

Alternative transport system

In the discussion with the stakeholders in Mafia, it was apparent that their priority is the development of the seaport and not the airport upgrade. Most of the people in Mafia use sea transport and the improvement of the jetty would be a priority. Most of the people prefer the seaport because it is cheap, and they can carry more luggage than on planes. Currently, there are no cargo flights to Mafia. The cost of a return air ticket from Dar es Salaam to Mafia is about Tshs. 187,000 (about US\$161) while the cost of a return boat trip to Nyamisati and bus fare to Dar es Salaam is about Tshs. 30,000 (US\$26). Adopting this alternative may conflict with the MCC/MCA-T and Government of Tanzania agreements and would entail re-designing the compact for Mafia. Therefore, instead of abandoning the proposed activity, this SEA is proposing to include the development of an integrated jetty programme linking Mafia with Kilwa, Rufiji, and Mkuranga district. The overall implication of an improved and expanded transport sector is greater economic and social development on Mafia and other districts, provided environmental issues are internalized in the plans.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This SEA work concludes that the intended airport upgrade programme in Mafia and the various potential economic activities will have both positive and negative impacts on Mafia Island. Upgrading of the airport will attract economic activities and population growth, which may stimulate the growth of Mafia. Accommodating new activities and economic growth will be a challenge for the Mafia District Council (MDC) and the people of Mafia.

The Mafia District Council lacks the capacity to effectively prepare integrated plans and to implement them effectively. Some of the limiting factors include inadequate labour and the lack of capacity to coordinate and mainstream environmental issues in the district's plans. Other limiting factors are poor harmonization of plans between local and central government and poverty, which is the driver for some unsustainable utilization of natural resources, particularly in fisheries and land. Demand for more fish resources to meet livelihood needs has resulted in clashes with the Marine Park authorities over the issue of conservation and adherence to prescribed fishing laws. Other economic activities, such as agriculture and livestock, are not doing well. The old copra industry, a booming business in the last century, is no longer viable. Tourism is emerging as an alternative economic activity in Mafia.

Underwater experiences and cultural tourism attract most of the tourists to Mafia. However, local people have not benefited much from tourism development because the sector is not fully integrated into the district economy, such that few commodities produced locally find their way into the tourist markets. For example, most of Mafia's excess milk production is wasted due to lack of means to produce and preserve different milk products for local markets and for export. Increased sale of land to lodge developers has resulted in complaints about irregular land acquisition involving local leaders and intermediaries.

The airport upgrade and associated economic activities may also trigger negative impacts, such as increasing pollution and increasing pressure on water, fish, land, and other natural resources (including building materials from Kilwa, Mkuranga, and Rufiji). Other impacts include degradation of the coral reefs, competition for resources, social tension, and resource-use and access conflicts. Other possible effects include risks of increasing HIV/AIDS infections and stress to social services and energy capacities. Impacts on livelihoods, especially for vulnerable groups, may increase. Livelihood strategies could be improved and diversified if the mitigation measures put in place are implemented effectively. In the long term, such changes could influence positive livelihood outcomes. In the light of the insufficient capacity to provide the necessary coordination and guidance for development in Mafia, the socio-economic and ecological sustainability of the development is highly questionable without heavy investment by the central government in supporting key planning initiatives and activities. The central government therefore must prioritize and technically and financially support the following recommendations.

Recommendations

Improve governance issues.

The management of the impacts associated with the potential economic activities in Mafia, as well as the proposed airport upgrade programme, requires improvement in governance issues. The Mafia District Council must ensure effective management of the duties and responsibilities in collaboration with local communities and enhance accountability and transparency in decision-making and promoting the rule of law. Specific to the issue of governance, the District Council must undertake the following measures:

- Establish and strengthen the District Environmental Management Coordination Office and the mechanism to coordinate and mainstream environmental issues in the District plans, and between the District and Central Government,
- Undertake targeted Capacity Development programmes (e.g., to the District Planning Department, Finance Committee, and Finance Department) to prepare and manage integrated plans and resources effectively,
- Establish mechanisms that will ensure greater participation of local people in planning and decision-making on issues that affect their livelihoods,
- Sensitize communities, in collaboration with NGOs (such as Haki Ardhi), and prepare them to take advantage of the opportunities the airport upgrading programme and subsequent potential economic activities provide to them. Social, cultural, institutional, and financial barriers must be addressed to allow Mafians to be part of the changing process.

Undertake long-term planning processes and adopt planning tools.

The proposed economic activities are likely to cause significant changes in the way resources will be utilized in Mafia. It is therefore important to undertake comprehensive planning processes in order to determine various resource uses and to ensure their conservation. The following plans to be developed in participatory ways are recommended:

- **The District Council should prepare a *Comprehensive Land Use Plan for Mafia*.**
 - (I) Prepare a land use plan based on land capabilities and carrying capacity analyses indicating areas suitable for specific development, as well as scales of such development, and ensure compliance of the plans,
 - (II) Establish a special tribunal, specifically for Mafia, to investigate and provide recommendations on the present land use conflict cases, and to set up clear guidelines for protecting both community rights and investors' interests and rights in land transactions on the island,
 - (III) Prohibit direct purchase of land by investors from customary or statutory landowners. All investors should obtain land through the Tanzania Investment Centre (TIC),
 - (IV) Discourage and prohibit locals from selling land; instead, encourage them to go into joint ventures using their land as their contribution to the investment. This approach will implement MKURABITA policies in Tanzania,
 - (V) Design and negotiate a benefit-sharing structure that allows the community to receive, as a right, adequate benefits from tourism and investments in the island. The Chole model of self-management can be refined and applied as an alternative approach on partnerships for benefit sharing and for poverty reduction.

- **The Ministry of Natural Resources and Tourism in collaboration with the Mafia District Council should prepare and implement an *Integrated Tourist Master Plan for Mafia*.**
 - (I) The plan should be based on the analysis of the carrying capacity of the island, the Integrated Coastal Management Strategy, and the Tourist Master Plan of Tanzania.
 - (II) A Tourist Master Plan must provide details about management objectives with the associated indicators and standards/thresholds developed. It should define the type of tourism that will be developed in Mafia and linkages between tourism and the district and national economy.
 - (III) The plan should identify categories of tourist needs/nature of activities and the services that have to be provided to meet such numbers and types of tourists (e.g., tour guiding, scuba diving, nature tourism, cultural tourism, language needs in English, French, and Italian, etc.) that should be met locally from vocational training schools.
 - (IV) The plan should guide developers in terms of type, size, and number of facilities (lodges), boats, and divers in each particular area over time. It must be noted that given Mafia's fragility, large lodges will not be sustained.
- **The Ministry of Infrastructure Development, in collaboration with Tanzania Port Authority and Mafia District Council, should develop an *Integrated Jetty Development Plan*** (to include Kilwa, Rufiji, Mkuranga, and Mafia). The infrastructure will link key economic and growth centres and increase the growth of Kilindoni Sea Port in Mafia, whose development has already been formalized. All districts visited (Kilwa, Mafia, Rufiji, and Zanzibar) have plans to develop jetties, and these plans should be harmonized so that benefits are maximized.
- **The Mafia District Council should develop a Waste Management Plan**
 - (I) The Plan should cover the identification of sites for waste disposal and define waste treatment and handling procedures including incentives to encourage waste minimization.
 - (II) The Plan should articulate need for sensitization of communities to adopt appropriate practices with respect to waste generation, treatment and management.
- **The Mafia District Council should *adopt Environmental Assessment and other tools for assessment of projects and programmes that will be developed in Mafia***. In order to achieve this goal, capacity development for the district staff is necessary.

Undertake measures to address environmental implications of development activities.

The proposed development will trigger various environmental changes that must be addressed in order to ensure the desired development does not adversely affect the environment. The following specific recommendations are offered for consideration.

- **Water availability**
 - (I) Ministry of Water and Irrigation, in collaboration with MDC, should conduct a groundwater survey to determine available sources and quality before large-

scale development takes place in Mafia. Water is critical in determining limits of acceptable use for lodges and industries in Mafia.

- (II) MDC and Ministry of Water and Irrigation should require new development to introduce and apply water efficiency measures, including rainwater harvesting techniques, in all their facilities to reduce pressure on the resource.
- (III) MDC and Ministry of Water and Irrigation must enforce a system of payments for environmental services (e.g., for drawing water) and use the proceeds to improve water conservation programmes.
- (IV) MDC must ensure that safe and clean water is distributed to the people through an improved water distribution system and network. Special consideration must be given to small islands that do not have reliable sources. Rainwater harvesting techniques must be considered.

- **Energy requirements**

- (I) Ministry of Natural Resources and Tourism should require new tourism development projects to use at least 50 percent of their energy from renewable sources (e.g., solar and wind).
- (II) Treasury should provide incentives to investors who adopt renewable energy technologies in the form of targeted and short-term tax breaks.
- (III) As a long-term measure, Ministry of Energy and Minerals should connect Mafia District to the national power grid through underwater cables.

- **Waste management issues**

- (I) EIAs should be enforced for all new development in which the issue of waste is clearly articulated to include measures for sanitation and for waste disposal.
- (II) MDC should ensure waste collection, sorting, and treatment is done properly. MDC can subcontract in the private sector to undertake this activity with fees paid by customers.
- (III) MDC should undertake sensitization and education programmes to local communities about waste management issues.

- **Circulation and visit to tourist sites**

- (I) Ministry of Natural Resources and Tourism should set limits on the number of visitors to particular sites (cultural areas, marine areas for diving) according to a Tourism Master Plan for Mafia and as informed by the Limits of Acceptable Change.
- (II) MDC, in collaboration with TANROAD and Ministry of Infrastructure, should develop internal roads linking various parts of Mafia and also develop sea transport linking the Mafia main island and the small islands.

- **Undertake measures to implement activities aimed at enhancing economic benefits.**

The proposed development could stimulate growth of economic activities; however, for the Mafians to benefit, the following recommendations are provided:

- (I) MDC should sensitize communities to take advantage of opportunities and improve agriculture, livestock, and fisheries production.
- (II) MDC, in collaboration with the Ministry of Education and Vocational Training, must mobilize resources and build a Vocational Training Centre in

Mafia that would train local people in various skills that could be needed in Mafia (e.g., masonry, electrical services, plumber, painting, mechanical, carpentry, tailoring, tour guiding, languages, etc.).

- (III) MDC, in collaboration with Ministry of Industries, Trade and Marketing, should encourage value-added processing of agricultural production.
- (IV) MDC, in collaboration with banks, should encourage establishment of credit schemes to benefit small entrepreneurs.
- (V) MDC, in collaboration with Ministry of Industries, Trade and Marketing, should promote SMEs, including women and youth groups.
- (VI) MDC should help revitalize coconut farms and the copra industry to provide more income to the farmers.

- **Undertake measures to implement activities aimed at reducing social effects.**

The proposed development and the ancillary activities could have negative effects on the social systems and relationships in Mafia. The following recommendations are provided to address the social implications of the proposed development.

- (I) MDC should sensitize local communities about cultural issues and tourism.
- (II) MDC, in collaboration with the Ministry of Natural Resources and Tourism and lodge owners, should develop and enforce a *code of conduct* for tourists.
- (III) MDC should mobilize resources to build more secondary schools and provide them with modern communication facilities (computers), and ensure girls complete secondary education.
- (IV) MDC and Ministry of Health should provide a mobile sea boat clinic.
- (V) Prime Minister's Office Regional Administration and Local Government should provide more staff and equipment to meet expected demand.
- (VI) MDC and Ministry of Health should support existing NGOs and District HIV/AIDS programmes, outreach, mobile testing, expansion of treatment, and information centres.
- (VII) Ministry of Health should provide voluntary counselling and testing (VCT) facilities and curb stigmas against HIV/AIDS victims.
- (VIII) MDC and Ministry of Health should provide sensitization and education on HIV/AIDS pathways.

Recommendations regarding development of plans or strategies may start as soon as possible and as resources permit. These plans and strategies will enable MDC to make appropriate decisions regarding specific measures that need guidance from the plans. The preparation of the plans or strategies can be undertaken while the airport upgrading is taking place, provided the land-use plan is prioritized first because this will provide the basis for future land use. In addition, the activities targeting the airport upgrade programme could continue, provided mitigation measures that have been suggested in the project EIA as well as from this SEA are fully integrated into the designs. The Government of Tanzania, MCC, and MDC should seriously consider the issue of resource (labour and finance) mobilization that would enable the Mafia District Council and its partners to develop the plans and strategies in a relatively shorter period.