SUMMARY OF INTEGRATED COASTAL ZONE MANAGEMENT PLAN OF THE REPUBLIC OF DJIBOUTI

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ABSTRACT

The Republic of Djibouti (23 000 km²; 600 000 inhabitants) located at the crossing of Red Sea and Gulf of Aden, undergoes an arid climate. Diibouti is among the least developed countries with a GDP of 87-94 millions U\$, covered mainly by the tertiary sector(port, banking, transit..), and characterized by a high rate of unemployment, a severe poverty and a high demographic rate and urban expansion. Besides, the National Environmental Action Plan (PANE) points out the particularly difficult situation of the environment in the country. As a consequence, a severe stress on the fragile natural resources and the social and economical development has been identified. In such circumstances the management of the Djiboutian coastal zones delimited by 372 km long coastline, 4567 km² and more than 1000 km² respectively for terrestrial and marine domains, and gathering the most part of the economical activities, appears as a real challenge for the Government.

With the assistance of PERSGA and the financial bodies, the Government of Djibouti through its Ministry of Housing, Urbanism, Environment and Land Planning (MHUEAT) elaborated the National Profile of the Coastal zones and prepared the Integrated Coastal Zone Management Plan (ICZM) to overcome these challenges.

The ICZM of the Republic of Djibouti is a powerful tool to overcome the mentioned difficulties and to manage the coastal zones for a sustainable development. The strategic process focuses on 5 main problems: 1) water pollution. resources. 3) economic 2) development, 4) urban development and 5) conservation of ecosystems, marine and coastal species. Indeed, to deal with this multisectoral strategy an integrated approach is applied allowing the participation of each concerned parties and guided by scientific, capacity building, institutional and legal, social and economic considerations. The ICZM of Djibouti will be initiated with demonstration projects in the four concerned districts. They will develop activities for mangroves, coral reefs ecosystems, fighting against pollution, management of wastes and preservation of species as the dugong, with a particular emphasis on the participation of the local people.

1. INTRODUCTION

The coastal zone of the Republic of Djibouti represents the most important area of the country in relation to the size of its inhabitants, the urbanism developed and the economic activities that covers the largest part of the national GDP mainly based on the services.

Considering the social and economic policies of the Government to fight against poverty, without neglecting the decentralization policies for the other regions, it is most likely expected for the coming years that this coastal space will be subjected to an increase of the urbanism and the economic activities. Up to now the PANE and other sectoral plans diagnosed a critical situation of the natural resources and the environment which is further stressed by the arid climate, the rural depopulation, and other the anthropogenic activities (MHUEAT 2001). To overcome such a situation and in the objective of a sustainable development the Government committed itself to plan the management of its coastal zones with the support of the regional organisation for the Conservation of the Environment of the Red Sea and Gulf of Aden whose acronym is PERSGA. This involvement brought the Government through the Ministry of Housing, Urbanism, Environment and Land Planning (MHUEAT) to establish the National Profile of the coastal zones which has been the necessary platform to build the ICZM plan.

The purpose of the paper is to expose the ICZM plan of the Republic of Djibouti and express how big is the challenge for all the stakeholders involved for its implementation to reach PERSGA and the millennium objectives. An overview of the physical environment of the coastal zones and the main problems are first reminded and the scientific, social and economic data presented. Secondly, Djibouti ICZM strategy and policies are described. The concern of the final part is related to the five demonstration projects selected to support the first steps of the ICZM.

2. PHYSICAL ENVIRONMENT

The country is submitted to an arid climate with an average annual rainfall of 150 mm (BGR 1982). Five climatic areas are distinguished according to the seasonal influences from East to West. The coastal zone has recorded several flood disasters (1989, 1994, and 2004) especially in the capital Djibouti with serious casualties to human beings and damages to the infrastructure.

The physical area considered for the coastal zones is delimited by 15 km from the coast for the terrestrial part and 12 miles towards the sea (MHUEAT 2004). This would represent a total area of 5567 km² (Table 1). 35 km accounts for the island coasts.

For the purpose of the physical description, the coast has been split up in seven different zones (Table 2; Figure 1). The separation

criteria is based upon geology, geomorphology and the beach type. The geological and geomorphological contexts are controlled by plate tectonics since 30 My. The volcanic series are basalts and rhyolites which form medium to high cliffs plateaus, and mountains. The pleistocene and holocene sediments outcrops are related to alluvial fan deposits. They form narrow shaped or wide sediment plains with relatively high to medium slopes. (CERD 1983-1995). The beaches are found along these sediment plains and are formed of gravel, sand and silt according to the run-off characteristics. In some areas, one can encounter dunes along the beaches.

Districts	Coast (km)	areas (km ²)	
Djibouti	49	176,7	
Arta	90	1329,3	
Ali Sabieh	0	127,2	
Tadjourah	103	1204	
Obock	141	1729,3	
Total	372	4566,6	

Table 1.	Coastal	70000	hv	administrative	Districts
Table 1.	Coastar	zones	Dy	administrative	DISINCIS

The geodynamic conditions of the country are related to the plate tectonic expansion that separates Arabia, Africa and Somalia. In consequence, a regular seismic activity affects the area. The average of maximum magnitudes are around 4 to 5 and located in the Gulf of Tadjourah, the Gulf of Aden and in the rift of Asal. This plate tectonic explains the bathymetry in the Gulf of Tadjourah where depths are more than 1000 meters in the central part.

Limites	Coast (km)	
1. Loyada to Ambouli	30,8	
2. Ambouli to Goumbour	22,8	
3. Goumbour to Sangarti	16,3	
4. Sangarti to Galalefo	95,2	
5. Galalefo to Dalleyi	58,1	
6. Dalleyi to Sadai	22,7	
7. Sadai to Weima	126,1	
TOTAL	372	

Table 2: Coastal zones subdivision



Figure 1: Coastal zones of the Djibouti

3. MAIN PROBLEMS

The National profile of the coastal zones of Djibouti (MHUEAT 2004) inventories the problems encountered in the field. One of the principal usefulness of the ICZM plan is to propose the best possible approach to solve these problems. Within such integrated management approach, indeed it appeared more realistic, at least during the first steps, to consider a selection of main problems identified rather than tackle them all together at once. The selection of the main problems was based according to their relative importance and of course with the participation of the concerned people.

3.1. Water resources

The arid climate causes serious difficulties of water availability, quantity and quality, for the population, livestock and agriculture. More than 98 % of the water supplies depend on groundwater whose recharge is limited because of the hydrogeological characteristics of the country (BGR 1982; CERD 1984-1992). Recharge occurs only in the waddi bed (dry river beds) inferoflux aquifers (0.1 to 0.5 m/s). If water resources seem sufficient for Tadjourah and Obock towns for the next ten years, Djibouti town is already drastically confronted to the water shortages estimated between 5 to 7 millions m3 per year (Figure 2) (Lavalin-Tractebel 1993; Jalludin 1995). The

desalinisation of sea water is therefore foreseen for Djibouti town future water supply. Water supply is generally insufficient in the rural areas of the coastal zones as only few dug wells and drilled wells are available. The consequence of this situation is the high stress on the few water points and the environmental impacts and on the other hand frequent daily movements of people with their livestock is noticed (Jalludin 1999).





Water demand will increase by 55 % to 81 % over the next 20 years in the region of Djibouti town with the increasing concentration of population and the economic development perspectives (Port of Dorale, ...etc.). Then the water demand would be also high in the regions of Tadjourah plain, of Obock and of lake Asal-Ghoubet with its social and economical development project. The region of Arta-Oueah and between Moulhoule and Gahere would have a less important demand of water. This vulnerability for water resources is presented in the figure 3.

Coastal volcanic and sedimentary aquifers are submitted to the sea water intrusion (Houssein and Jalludin 1996). The combined effects of the latter and the limited recharge do not allow efficient exploitation of groundwater but also the soils: saline waters near the coasts, thin fresh water lenses, low pumping rates, depths of water tables, evaporites in the pleistocene sediments.

As for surface waters, the exceptional floods and the related erosion endanger people, their infrastructure and livestock. The hydrographic network is well developed and goes across the main towns and the rural settlements as people settle where fresh water is found, close to the main waddis (Figure 4) (BGR 1982; CERD 1984-1992).



Figure 3: Vulnerability of water resources

3.2. Pollution

In general, the coastal zone is distinctly affected by pollution. It represents a serious problem for urban and suburban sites (MHUEAT 2000). The source of pollution pertains to three main categories: sewage, solid wastes and, hydrocarbons and heavy metals (Figure 5).

Raw sewage in coastal urban zones is the principal source of pollution. Sewage pollutes the sea. Although there are no studies to quantify such a pollution, the effects are however visible: eutrophication of coastal waters noticed by the proliferation of fleshy algae and massive deaths of fishes and crabs. Solid wastes affect the urban zones and the ecosystems located close to them as mangroves, Acacia trees, grass and corals. The available infrastructure and means do not allow the establishment of an efficient waste collection system. Wastes accumulate in towns and the suburban areas. Such accumulation represents a source of bacteriological

development. Solid wastes disposal is another source of pollution for groundwater. Some municipal disposal sites are located in upstream zone of pumping stations or in waddi beds like at Sagalou and Tadjourah respectively.

The increasing sea traffic, underground leaking pipes, and the storage of hydrocarbon products are the principal causes of hydrocarbon pollution on the coast of Djibouti town and beaches. These pollutions are related to the cleaning out of tankers in addition to the leakages of the buried pipelines in the port. Other pollution sources are the discharge of used oils mainly in Djibouti town area and on the road traffic the discharge by accident of heavy metals and chemical products.

3.3. Economic development

The economical activities are unevenly distributed in the coastal zones. Djibouti town is gathering the most part of these activities. The other towns as Tadjourah, Arta-Oueah and Obock have small scale economical activities but relatively limited. In the rural zones, the economical activities are practically inexistent (Figure 6).

In spite of some infrastructures, the fishing sector is still to be developed. Infrastructures. coordination and sensitisation are not efficiently completed to allow an adequate exploitation of marine resources (MAEPH 1996-1). The fishing port of Djibouti is not yet fully operational because of the lack of a sanitary laboratory. Breeding is an historical and traditional way of life of the people. It accounts for 1 100 000 animals but submitted to the arid climate, droughts and diseases that caused 25 % loss over the last century (MAEPH 1999). Agriculture is mainly concentrated in the coastal zones and has recorded an interesting progression during the last 20 years but, it remains insufficient to be significant for food security. Only 10 % of the arable lands are irrigated (MAEPH 1996-2). Droughts, desertification, floods-erosion, over grazing and colonisation by invasive plants represent other difficulties for agriculture. Few potential opportunities exist in the coastal zones with tourism, local handicrafts industry and other category industries. Unfortunately, these activities have still of marginal importance. In general, these sector lack of structuring, diversification and means to develop commercially the resources and the possibilities.



Figure 4: Flood risk zones

Besides, two important projects are expected to boost the economy in the country. The first one concern the construction of a new port in Dorale near Djibouti town and it has been already initiated (PM 2002). The objectives are to trigger mainly the transport and the industrial sectors, thus contributing to fight against poverty (MPATEC 1995). The second project expects to create an economical development pole close to lake Asal and Ghoubet with several aspects like fishing, ore deposit exploitation, tourism...etc.

3.4. Urban development

The Djiboutian coastal zone is submitted to an intensive and unevenly distributed urbanization. Being in favourable geostrategic position, Djibouti, the capital, concentrates the largest part of the economical activities and 65 % of the population (MFEPP 2000). Even if the national average density of population is 25 pers/km², the difference is very important between Djibouti town and the rest of the country. In the coastal zone, this contrast is remarkable between Djibouti, the other towns and the rural zones. The coastal population represents 94 % of the total national population.

The coastal zone is more and more appreciated for its beauty and for leisure. Therefore there is a high stress for land property demands and to safeguard the natural sites. There is particular difficulty to enforce the documents of urban planning as the Master Plan of Urban Planning (SDAU) (MTPUL 1997). This concentrations of populations and economical activities in the urban zones have severe impacts on the ecosystems (pollution), the economy (unemployment) and on the social plan (poverty), and this situation is accompanied by illegal occupation of the lands.



Figure 5: Pollution situation



Figure 6: Economical activities today and perspectives

3.5. Ecosystems and coastal species

Damages of ecosystems and threat of the biodiversity are the principal problems. The causes of such diagnostic are essentially the unaware people and authorities, and the lack of management and tools. The National Inventory of Biodiversity describes in detail the multiple problems that threatens ecosystems and species (MHUEAT 2000). The mangroves are threatened by the over grazing of camels, the intensive cutting-down of trees, the backfilling to enlarge urban areas, the pollution by wastes, waste-waters and hydrocarbons, and urbanism. In some mangrove sites sand banks have invaded the water channels (Figure 7).

Coral reefs are threatened essentially by anthropogenic activities: tourism, coastal constructions as ports, pollution by waste waters, wastes, hydrocarbon and chemical products, backfilling and deforestation.

Certain species are particularly threatened as sea cucumbers, turtles, sharks, dauphins, manta skates and dugongs. Threat comes essentially from accidental fishing, over exploitation and illegal commerce of some byproducts like carapaces, fins and livers of sharks.

4. DJIBOUTIAN ICZM STRATEGY

The National Profile of the Coastal Zones of the Republic of Djibouti and the identification of the main problems draw a clear image of the critical situation of the coastal zones on the environmental, social, economical, legal and institutional levels. An essential point comes out from the analysis of the coastal zone situation that must be considered in the ICZM. The environmental problems, the social aspects, the economical features are unevenly distributed in the area of the coastal zone. A positive scenario where all the measures would be applied successfully and another scenario several factors where as financing, coordination, legislation or lack of participation would delay or complicate the application of the needed actions, were compared. This reflection revealed how important and urgent it is to elaborate a specific strategy and undertake the measures according to an organized Therefore, planning. serious problems as water supply, waste water management, solid waste management, the different forms of pollution by hydrocarbons damaging coastal ecosystems, land planning, impacts on human health, contamination of

food chain and the preservation of the species must be integrated in the ICZM.

The difficult social and economical situation of the Republic of Djibouti is stated in the DSRP (PM 2002) and explains how much the commitment of the Government to go forward with the important economical development projects, is justified to overcome poverty. Such programmes, by their extent, introduce necessarily environmental risks and more stress on natural resources and biodiversity. The risks and the impacts must be remedied on a compromise base and according to a rigorous integrated management involving all the actors of the coastal zone.



Figure 7: Ecosystems vulnerability

Besides, the integrated management of the coastal zones must also take into consideration the impacts that would be produced by the climate changes on the long term. The Initial National Communication on climate change of the Republic of Djibouti assesses the vulnerability of the natural resources under the arid climate and points out the severe difficulties for water resources and sea water elevation for example (MHUEAT 2001). The global goal is to settle a sustainable development in the coastal zone being aware

that the economical development is an absolute must with respect to the population welfare and the environment preservation. The scope of the Integrated Coastal Zone

Management of the Republic of Djibouti is

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centred around several components. First, the ICZM is solidly established upon five main goals respectively to the five main problems identified according to the results of the national workshops and the national profile of the coastal zones. Sensitisation, information and education of the local people, the NGOs, the authorities and the other partners is another important component. For а constructive and efficient acceptation and application of the ICZM, proposals are outlined for the institutional and legal, and for the coordination and partnership frameworks. Finally, it has been commonly assumed that demonstration small scale projects would represent а decisive asset for the implementation of the ICZM.

4.1. Main goals of the ICZM

4.1.1. Goal 1: Improvement of the water resources management. The National Commission for Water Resources (CNRE) has established the Master Plan for Water Resources (MAEPAH 2000). It has to be noticed that the Master Plan already include many actions in the coastal zones. The objectives and actions programmed by the ICZM is faithfully respecting the orientations of this Master Plan for Water Resources and is taking into account the coastal zones specificities. The objectives and their respective actions might be considered therefore as complementary to the Master Plan:

- Objective 1: Insure an adequate water supply
- Objective 2: Sustainable management of water resources

4.1.2. Goal 2: Control of the economical development in the coastal zone. The coastal zone and in particular the capital, Djibouti, concentrates the most part of the population and the economical activities. That is the area where the economical development will the most important. The challenge for ICZM will be to promote this economical development with respect to the preservation of the environment within the different sectors of the coastal zone: big infrastructures, transport, industry, agriculture and breeding, fishing and tourism. The objectives are presented hereunder:

• Objective 1: Integration of the ICZM within the programmes of large infrastructures realisation (ports, roads, industries,...etc.)

- Objective 2: Better control the sector of transports in order to reduce the environmental risks
- Objective 3: Promote the industrial development with respect to environment
- Objective 4: Insure a sustainable agriculture in the coastal zone
- Objective 5: Improve breeding in the coastal zone
- Objective 6: Insure a sustainable fishing sector
- Objective 7: Encourage the development of tourism with respect to environment

4.1.3. Goal 3: Management of urbanisation.

The control of the urbanisation development is an another important challenge of the ICZM. Effectively, the urbanisation development through its multiple aspects as space utilisation, pollutions, transports, generates direct impacts on the environment. Three objectives have been fixed:

- Objective 1: Protection of the littoral
- Objective 2: Insure a regular urbanisation development of Djibouti town
- Objective 3: Insure a regular urbanisation development of the other coastal towns

4.1.4. Goal 4: Improvement of the wastes

management and fight again pollution. Pollutions are the consequence of the demography with a high growth rate and the economical activities development. This situation shows the difficulties of the towns to implement an adequate waste management. A new strategy for the management of the waste waters and solid wastes is under preparation and might be applied soon. This strategy is based upon the institutional and legal frameworks, and the building of new infrastructures.

The principal objectives of the ICZM is to reduce the impacts of the pollutions:

- Objective 1: Reduction of the impact of waste waters
- Objective 2: Reduction of elimination of the impact of solid wastes
- Objective 3: Control and reduce the impacts of hydrocarbons and heavy metals

4.1.5. Goal 5: Preservation of ecosystems and species. If the process of degradation continues, the damages to the ecosystems and their related biodiversity would have a severe impact on the economical and social levels, considering mainly the fishing and the tourism sectors. The National Environmental Plan of

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Actions (PANE) and the National Action Plan for the Conservation of the Biological Diversity (PANDB) reflect the awareness of such situation of the ecosystems and the species. These documents outlined the orientations and identified the priority actions for the preservation of marine resources, the ecosystems and the threatened species. In parallel, PERSGA has elaborated the Strategic Actions Plan (PAS) and four Regional Actions Plan (PAR). It has also implemented programmes as the creation of protected marine area. The objectives of ICZM are:

- Conservation of marine and coastal ecosystems
- Protection of marine and coastal species in danger

4.2. Sensitisation, information and education

The Integrated Coastal Zone Management is obviously a relevant multi-disciplinary and multi-actor global programme and needs as such all our vigilance and care for its implementation throughout the large coastal zone area characterized by specific problems. The complexity of the problems to be addressed in the ICZM oblige one to have a particular glance on how to proceed to get the actors well aware and committed to involve themselves into a large partnership. Hence, the ICZM will have to entrust the local communities. policy makers, NGOs communication agents, technical and scientific skills, and the population in general to a successful management in the coastal zone.

Sensitisation, information and education panel represents an essential component of the ICZM. The actions of sensitisation must be ran on the national level via the medias, on the local level with sensitisation workshops and on the sector level to emphasize on the problems encountered and the related actions.

In order to improve the partnership and the involvement of the different actors it is deemed necessary to allow those concerned parties to have access to an updated and reliable information on the coastal zone. Information will therefore be a key tool to ease the decisions to be taken and to contribute to sensitisation as the ICZM will be on progress. The implementation of a database on the coastal zones is a main activity to help to diffuse the information.

A particular attention has also been devoted to the education of youths and scientists. Educate young people from the school is important to make them more responsible and aware as future actors. The high level education is necessary to deal with the tough problems in the coastal zones. The Ministry of Education, the University Pole of Djibouti (PUD) and the Centre of Studies and Researches of Djibouti (CERD) will be partners to implement such programmes.

4.3. Institutional and legal features

The execution of the ICZM and its success are tightly bound to an appropriate institutional and legal frameworks. As stated upper, the ICZM is multi-disciplinary and multi-actors а programme that need absolutely to be adequately coordinated and led according to a clear legislation. At the present time, those institutional and legal frameworks are missing specifically for the coastal zones. Regarding the environmental sectors, significant progress has been made by the Government to address environmental issues since 1995. Today, the Direction of Environment and Land Planning (DATE) exists and is operational within the Ministry of Housing, Urbanism, Environment and Land Planning (MHUEAT). Through this institutional framework many major tasks were finalised and give general and sometimes accurate orientations for the environmental sectors.

However, the Integrated Coastal Zones Management is rather specific and call therefore for specific institutional arrangements to facilitate the intervention of several different public institutions, the private sectors, the local communities and the civil society. For that purpose and, as the Direction of Environment and Land Planning has initiated the coastal zones process in the Republic of Djibouti with the assistance of PERSGA, it is duly proposed to designate DATE, through MHUEAT, to become the leading and coordinating national institution for ICZM.

To start practically with the ICZM, DATE will have to designate a person who will be in charge of the hole process in the coastal zones. During such period, it will be deemed necessary to strengthen the capacity of DATE by human resources and equipment support. On this institutional level, it is obvious that at medium term a more stronger and recognized structure might be implemented. The suggestion supports the idea to create a specific department in the organisation chart of DATE, with full responsibility to deal with the management of the coastal zones.

To go forward with the coordination features a National Committee for the ICZM will be established. The members will be the

representatives of public institutions, private sectors, civil society and research centres. This structure will be under the presidency of a representative from the Prime Minister Department. The vice-presidency will be under the General Secretary of MHUEAT. DATE will be the secretariat for this Committee. The National Committee for the ICZM itself will remain under the authority of the National Commission for Sustainable Development (CNDD).

Regarding the legal features, many efforts were invested and the environmental legislation is more stronger and coherent with the following official texts for example: outline law for environment, law for protected areas, order in council for environmental impact studies, order in council for biodiversity, order for transport of dangerous council products...etc. However, those official texts do not cover specifically the coastal zones and it has been proposed therefore to officialize the coastal zone management by either a law or an order of council in application of the outline law for environment.

4.4. Monitoring programme

A monitoring programme have been included in the ICZM to follow up step by step the achievements. Of course, for such a complex programme, it will be important to check the progression and find out the weaknesses in order to adapt the objectives and their respective applications or even review the orientations of the ICZM. For such monitoring, qualitative and quantitative indicators for each sectors were determined.

5. DEMONSTRATION PROJECTS

The main target of the demonstration projects is to show the benefit of the integrated coastal zone management ICZM by applying it to the identified major problems of the coastal zone. The execution of the demonstration projects will also represent a period of experience for the different components of the ICZM mainly from the coordination and partnership point of views. It is also expected that this practical implementation for the ICZM will significantly contribute to appropriation of the strategy by the different actors.

Four field projets are programmed:

- Assistance to the development of ecotourism in the coastal zone of Obock
- Assistance to the integrated management of the coastal zone of Tadjourah (solid wastes

management, preservation of coral reefs of Sable Blanc, elaboration of a charter for the littoral of Tadjourah)

- Assistance to the integrated management of the coastal zone of Arta (preservation of the coral reef of Arta beach and protection of dugongs in Loyada)
- Assistance for the monitoring of sea water pollution near Djibouti town and for the improvement of the beaches quality

6. CONCLUSION

The strategy of the integrated management of the coastal zones of the Republic of Djibouti is an instrument for an harmonious and sustainable development of the coastal zones. rich in potentialities but also threatened. It is expected that the implementation of this strategy will boost the economical development of the coastal zone while ensuring a certain social equity and preservation of natural resources. This will be facilitated by the development of actions as sensitisation, information and education which purposes are to explain the strategy and to favour enriching of new knowledge on the coastal zone.

The strategy for the integrated management of the coastal zones can be used to support the decentralisation policy of the Government that has initiated number of orientations and opportunities for the regional development, and reinforcing partnership structures. It can also offer an additional background to favour the local communities participation while contributing to their economical development. In some respects, the demonstration projects in each administrative districts located on the coasts, can be used to measure the interest given to the ICZM.

This strategy in the coastal zones fits perfectly into the PERSGA sub-regional efforts for the conservation of the environment in the Red Sea and Gulf of Aden. There appears a new field for the sub-regional cooperation. At the scale of the continent, this strategy fits also into the general patterns of NEPAD with the support of UNEP, concerning the environmental actions plan for the marine and coastal zones.

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