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ACKNOWLEDGEMENTS

This document was prepared in the framework of the MAP Coastal Area Management Programme “Fuka-Matrouh” Project. It was based on a number of sectoral studies, and particularly “A Framework for Integrated Coastal Area Management Plan Fuka-Matrouh (Egypt)” prepared by the national team of experts from the University of Alexandria led by Prof. Mohamed El-Raey.

EXECUTIVE SUMMARY

The concern for the coastal resources has increasingly risen during the last two decades mainly because of the great pressure of human actions – urban expansion, industry, tourism and recreation, fisheries and aquaculture, ports and marinas, energy production and transportation, infrastructure, etc. – but also due to ineffective policies, planning and management tools in controlling or regulating human actions and natural processes (natural risks and hazards) in such sensitive environments as coastal zones. As a result of the uncontrolled human presence and extensive exploitation of the marine resources, destruction of historic and architectural heritage, loss of public access to the coast, pollution and congestion, especially in the Mediterranean basin – where the harmful impacts of these actions are visible all over the region – a worldwide concern has developed regarding how to deal with conflicts over land use policies, how to apply the principles of sustainable development, and how to introduce an integrated coastal and marine areas planning and management.

Within this concern, the Government of Egypt and the Mediterranean Action Plan (MAP) signed, in September 1993, an "Agreement on the Implementation of the Coastal Area Management Programme for the Area of Fuka – Egypt". The ICAM Planning Study preparation is the most important component of the CAMP, and will be drawing upon the results of all the previous sectoral studies. The area covered by the ICAM Planning Study is the section of the coast between the village of Fuka and the town of Marsa-Matrouh, approximately 70 km wide.

According to the above agreement, the consultants' job, through two missions in Egypt, was to analyse and compile information from different agencies and sectoral activities and to provide planning and management proposals and solutions for the sustainable development of the study area. The final product of the activity is the ICAM Planning Study providing strategies and management guidelines as a framework for a more detailed coastal management and land use planning to be undertaken in a second phase.

This document – the ICAM Planning Study and Strategy – is the result of the first phase, based on a participatory process as well as on sectoral reports and research findings, facilitated by a multi-agency and consultancy team including two national teams at Alexandria and Marsa-Matrouh, and a number of agencies and experts.

This ICAM Planning Study process initiated in the Fuka-Matrouh coastal area has been based on the MAP/PAP guidelines, and has built a co-ordination mechanism which is going to translate **project activities** in the Fuka-Matrouh area and the **policy objectives** (national, regional and local) into specific tasks and responsibilities within the decision-making authorities structures, which will provide the necessary **links** of the various activities to support each other towards **effective** and **continuous** co-ordination/co-operation.

Accordingly, the **principal goal** of this document is to provide a safe ground for the whole process of cutting across sectoral boundaries (authorities, agencies and activities), and incorporating the interactions between the coastal natural resources, and those of socio-economic influences affecting the coastal environment.

It is the need for **integration** – an issue which has been addressed from the beginning of the ICAM process – that the **analysis of the coastal profile** has been covered in detail during the preparation of the ICAM Planning Study in which **the identification of the main environmental problems**, the examination of the way that the **whole system of resources**

of the project area is developed, and especially the land uses of the sensitive coastal environment, as well as the evaluation of the **limitations** (organisational, legal, traditional ways of behaving) involved in the system we are considering in this plan will be dealt with.

The structure of the report is moving through the following steps of the context, goals and objectives; methodology; the area profile, constraint and opportunities; proposed alternative scenarios; and certain conclusions addressing strategic EIA, Carrying Capacity Assessment proposals for a structure plan, as well as planning and management tools and guidelines.

Accordingly, the principle aim of this document is to apply the **first step of the ICAM** Planning Study and programme, which is approached mainly through the synchronisation of the necessary planning of multiple issues in the coastal areas under consideration of overlapping interest, while during the second phase it is expected to be approached in a more detailed way through the collection of more accurate data, maps and information needed, as well as more public involvement and results of some task force actions.

Finally it would be useful to mention in advance that **environmental aspects** have been the **focus motive** for the proposed alternative scenarios and of the selected one for handling the coastal area's main problems and issues. The proposed harmonious framework of this northern Mediterranean Egyptian region of mixed land use types of development demands an **urgent action** for implementation, not only of the main findings of this report, which can be in any case tested in practice, but also of the main components of the next phase of the ICAM Planning Study and Strategy, since the expectations are great and the future perspectives for the study area, are very challenging.

1. INTRODUCTION

The need for **integration of planning and management actions and processes in sensitive coastal areas** is now widely accepted and of course well documented in many activities already undertaken in several cases. This ICAM Planning Study for Fuka-Matrouh is a similar job, designed to response to this need and also to stress the urgency of an action to mobilise all the **actors** concerned with the future of the Mediterranean coast.

However, we are all aware at the fact that this kind of operations are quite often diverse and originate from many actors both in the public and private sectors. In most cases, as in this we are examining here, these are not considered or co-ordinated enough. A conscious effort to introduce **integrated planning** and **management process** is now seen as one means of **securing balance, sustainable development** and **conservation planning**, especially in the coastal zone.

Meanwhile this ICAM Planning Study should be seen also within the framework of the global efforts, including that of the favourable reception that it has already received from various organisations such as the UN and the EU, on the **common interests of environmental protection,** and move specifically with the future of the coastal resources. In this evaluation, we are going to examine the impact (effect) at certain policies in relation to key mankind actions in the process of the exploitation of natural resources with which they are correlated (Figure 1).

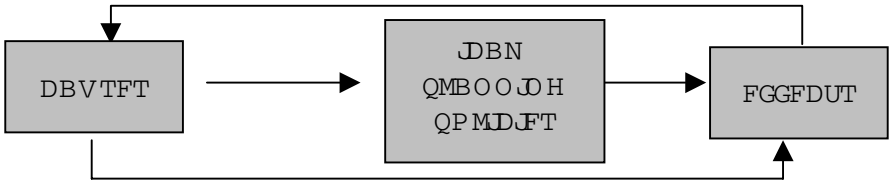

Figure 1: The Impact Policy Effect System

Therefore the **principal aim** of this document is to assist the initial discussion of the main theme which comprises the previous work (CAMP reports), and also to address a key mechanism to improve the whole process. Accordingly, the role of this mechanism will be to achieve:

a) Co-ordination of human actions (public, private, etc.);

b) integration of management and planning;

c) balance of competing views; and

d) sustainable use of coastal resources.

In spite of the fact that these **roles** are not always common to planning and management process – there is long history of the use of the meaning of **"balance"** for example – nevertheless they should be seen as roles converting **consensus** and **positive actions** into policy, while avoiding the consequences of failure to resolve rather contending positions which, as we are all aware, always exist in planning and management activities.

However, it is important to mention here the fact that **most of the necessary information**, data, plans and documents, concerning the present as well as the future status of land use

planning policy and development of the area, as well as that of the adjacent area/region, are all very crucial documents in examining the **future trends, dynamics** and the forces affecting the area's environment. However, most are still not available in a detailed way, and accordingly, this ICAM Planning Study should be seen rather as an attempt towards a more fully document in a better future shape.

The Marsa Matrouh – Fuka area is located within the Governorate of Matrouh and occupies part of the north-western region of Egypt. The area has been defined by the agreement of MAP and the Egyptian Government (September 1993) and covers a 100 km long north-western Mediterranean coastal stretch of Egypt. It starts from the city of Marsa Matrouh and ends at the site of Fuka situated 210 km to the west of Alexandria (Map 1). The depth of the project area is rather narrow and ranges from 10 to 15 km from the Mediterranean cost to the Saloum road and railway to the inland. For the purpose of meeting successfully the needs of the land use planning policy of the area and the adjacent one, it is possible to expand the project area to 30 km (altitude 31^{o} 05' N) from the coast to the elevated structural plateau in the south (altitude 30^{o} 50' N) so that to cover the stretch to the Mill road (Maps 1, 2). Additionally, an expansion area of about 30 km should be considered west of Matrouh and east of Fuka.

The project area is located in the middle upper portion of the Governorate of Matrouh, one of the largest of Egypt with and area of 212,111 km^2, representing about 22% of Egypt's area. On the other hand, in terms of **population,** the Governorate is one of the smallest of the country. According to preliminary results of census, its population amounts to about 211,966 (in the 1986 census the population was 160.000, which means that we have an increase of 32% over 13 years), which represents a population **density** of less than one person per km^2. The boundaries of the Matrouh Governorate (region), rectangular in shape, are:

- The **Eastern** border extending from the limits of the Alexandria Governorate at El Hamman on the Mediterranean sea, to the south along the border of the Beheira, Giza and Beni Suef Governorates;
- The Libyan border on the **West** extending for about 400 km from El. Salloum to the longitude 20^{o} 30' south of the Siwa oasis;
- The Mediterranean Sea on the **North** extending for about 500 km from El. Hamman to El. Salloum; and
- The **Southern** border in the new Valley Governorate extending from the longitude 28^{o} 30' to the border of the Beni Suef Governorate.

Administratively, the Matrouh Governorate is divided into five (5) **districts** (Markaz), while the city of Marsa Matrouh is excluded, which are from east to west: **El-Hamman** (previously Burg El-Arab already included into Alexandria Governorate), **El-Dabaa, Matrouh, Sidi Barrani,** and **El-Salloum**. Internally, Matrouh is divided into **East Matrouh**, from Fuka to the M. Matrouh City, and **West Matrouh,** from the M. Matrouh City to Marsa Negila.

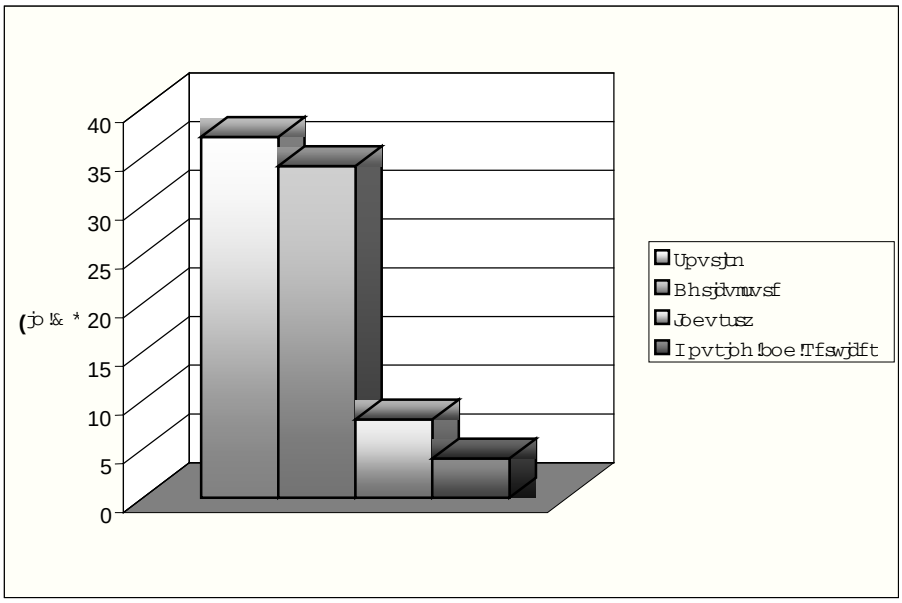

Figure 2: Investment Plan Structure, 2010

The Governorate of Matrouh is mainly regarded as a rather **poor region** where the **activities,** and accordingly, the sources of **income,** are in the following order of significance: **agriculture**, **pasturing**, **tourism** and other activities. However, because of insufficient rain, the main local income coming from agriculture and pasturing (for a long time the main source of income in this coastal region) is characterised by uncertainty. This fact justifies the trend to diversity the activity and the sources of income with more emphasis on the sectors of agriculture and tourism. Tourism in particular is the most expanding activity in the area. Large development projects are under construction along the coastal strip.

Tourism represents the highest proportion of estimated investment (tourism 262, agriculture 220, out of the 703 grand total – L.E.000,000) by year 2010. According to the Investment Plan (A. Ayyad. 1995) the investment in **agriculture** is equivalent to 34% and in tourism approximately 37%. The rest sectors represent only 29%, of which industry 8% and housing, services and infrastructure 21%.

The total investment plan gives 58% to the construction sector, which emphasises the importance of this sector for development, including tourism, housing and infrastructure, while the **agricultural sector** continues to be considered as the **basic component** of the area's economy, with corresponding distribution and relocation of **land uses** in general. It is important to mention here the importance of examination of the spatial character of the National Investments distribution plan, which determines, in a degree, the **land use profile** of the Matrouh Governorate.

2. GOALS AND OBJECTIVES

The main goal of the ICAM Planning Study, as a process, is to build a co-ordination mechanism which is going to translate **project activities** in the Fuka-Matrouh are **and policy objectives** (national, regional and local) into specific tasks and responsibilities within the decision-making authorities structures, and this providing the necessary **links** of the various activities to support each other towards **effective** and **continuous** co-ordination/co-operation.

However, since goals are regarded as windows to the future, reflecting an outlook planning perspective, they should also link a sound understanding of the existing problems, related to land uses and resource use, to feasible opportunities for future movements in **sustainable development patterns** of the key planning and management issues. Accordingly, the **principal goal** of this document is to assist the whole process in cutting across sectoral boundaries and incorporating the interactions between the coastal natural resources and the socio-economic influences affecting the coastal environment.

Due to the need for **integration** – an issue which has been addressed from the beginning of the ICAM process – the **analysis of the coastal profile** has covered a great part of the preparation of the ICAM Planning Study in which **the identification of the main environmental problems**, the examination of the way that the **whole system of resources** of the project area is developed, and especially the land uses of the sensitive coastal environment, as well as the evaluation of the **limitations** (organisational, legal, traditional ways of behaving) involving in the system we are considering in this plan.

It's appropriate, however, to mention here the **main goals** of the ICAM Planning Study presented in a hierarchy way, in accordance with the complexity, cruciallity and priority of each one:

*a) Secure coastal **environmental protection** and in some cases improvements.*

*b) Achieve a **sustainable level** of coastal development and conservation.*

*c) Strike for **integration** of all possible human activities including multi-sectoral and cross-sectoral socio-economic integration, incorporating the vital **tribal system** into planning and management process, as well as other important factors influencing integration, like behavioural factors, local co-operative systems, etc.*

d) Encourage a participatory approach for achieving greater levels of management efficiency and securing consensus amongst the actors involved in the decision making process.

However, taking into account that both goals and objectives are close related and are indeed in the core of any planning process, it will be useful to mention here the specific tasks incorporating the **objectives** of the ICAM Planning Study:

- **Diversification of economic activities** by attracting new employment opportunities at the leisure and financial services sectors, tourist, agricultural, industrial, and fishing sectors as well as stimulating co-operative systems for grazing management.
- Encouragement of **mixed land uses**, and provision of close relation between land uses and transport (public transport in particular), such as trains, buses, as well as air and sea transport, etc.

- **Introducing energy conservation** policies and use of renewable energy sources (especially wind) not only for energy efficiency, but also to combat harmful pollution and preserve sensitive areas, as well as improve the broad relationship between land use planning, energy consumption, and housing objectives.
- **Stimulating population growth** in the region and provision for training people in the new development sectors of tourism, leisure, and agricultural activities.
- **Concentrating population and employment opportunities** among transport routes and in special suburban/rural centres.
- Initiating programmes for natural protected areas, and particularly coastal areas, but also archaeological sites, reserves, etc.
- Improving essential **public accessibility** to coastal seafront areas and to public spaces, and also landscaping the links between the different land uses and transport facilities. In particular scoping features, such as **tree planning** around development areas, affecting positively the micro-climate of the area by reducing wind speeds (regarded as one of the main problems), and thereby differentiating air temperatures.
- **Stimulating agricultural activities** (greenhouses, farmhouses) within and near housing and farm areas (villages, tribes), using underground water or sea water (through desalination process), which will be transported using renewable resources.
- In this way it is expected that not only degraded land can be recovered periodically from intensive utilisation (grazing and cropping), but also other undeveloped and could be developed similarly, in accordance with certain programmes.

Accordingly, the main tasks to achieve the above goals and objectives are:

- To identify the basic parameters of the present status of land use, planning and development policies in the Matrouh-Fuka area;
- To evaluate the possible trends of land uses and activities, and to determine the strengths, weaknesses and opportunities for future development, but also the possible threats for future actions for sustainable development in terms of possible conflicts of land uses, unsuitability of land uses, as well as consideration of possible future national, regional and local changes taking place in land use planning policies; and
- To present alternative directions of the future land use planning and development, setting up the basis for the preparation of the areas “frame” for sustainable land use planning as a policy guidance system, so that to safeguard the necessary sustainable development of the area’s environmental resources.

Within this scope and parallel to the above general objectives greater responsiveness has been focused on specific needs of particular area, zones and sites to have **special attention** and **exclusive planning requirements** to respect local characteristics and environmental conditions of greater significance. This implies that it would be a possibility to introduce the necessary **carrying capacity threshold/limits**, the degree of environmental sensitivity, alternative schemes for redistribution of some of the existing land uses and activities, the nature and the volume of permissible new mix land uses, the degree of prohibition of certain land uses and activities, and also methods of safeguarding sustainable development of the whole coastal area in general, while special attention has been paid to the stimulation, and if possible, attraction of the national population from other congested regions of Egypt to move to this area.

3. METHODOLOGY

For the purpose of fulfilling successfully the main objectives set out by MAP/PAP, and accordingly, of contributing to the final product of the overall ICAM Planning Studying process, it was recognised that **three main streams of resources** should be examined and carefully analysed in advance:

- The existing **legal and institutional framework,** as well as the **responsible agencies** involving within the planning process regarding the land use planning policy;
- The available **planning tools and resources** (plans, research work, survey, programmes, development plans, national/regional guidelines, etc.) directly or indirectly related to the land use planning policy, as well as to other correlated aspects of the area's planning and development in general; and
- Overview of the **existing status of the land use planning and development**, the observed **trends, problems/obstructions** and the **perspectives/potentials** of the area under consideration.

Meanwhile, it should be mentioned here the fact that significant role in constructing the ICAM Planning Study has been played by the outcome of the preliminary reports concerning the land use planning and policy of the area, as well as the strategic Environmental Impact Assessment (El-Raey, 1999).

Using the above sources, reports, conclusions, data and information as a base, it is considered that the main goals and objectives at the ICAM Planning Studying process and plan could be, to some degree, achieved. For this purpose special attention has been focused on aspects related to the **present status of land use planning** and that of the **environment,** in an effort to determine not only the future of the area's development process, but also the necessary introduction of special actions and certain limits so that to reduce or eliminate negative impacts, and, in some cases, protect the area's sensitive coastal environmental resources (Fig. 3).

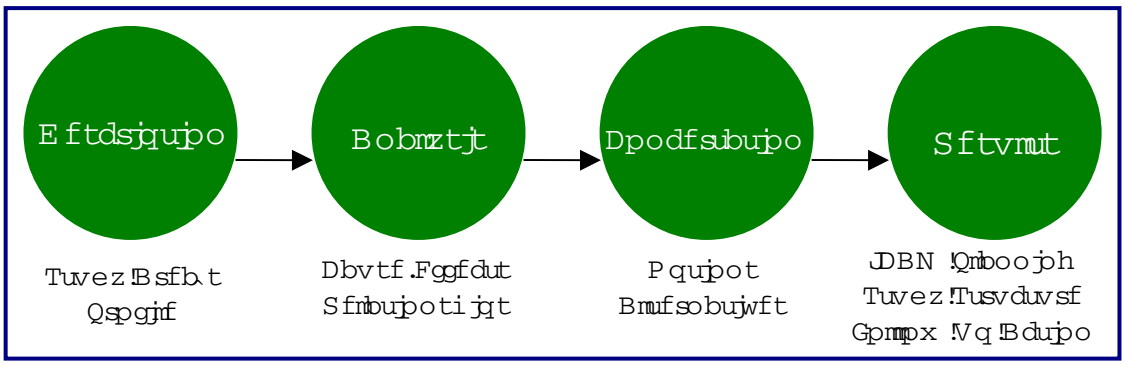

Figure 3: Schematic Content of the Mission Programme

Description	• **Biophysical features and terrestrial ecosystems (Flora/Fauna)** • **Topographical and geomorphologic elements** • **Climatic and atmospheric conditions** • **Land ownership Land systems units** • **Population characteristics** • **Terrestrial land and marine ecosystems** • **Mainland use types – structure planning and development** • **Land resource, survey** • **Infrastructure** • **Protected areas**
Analysis	• **Cause-effects, relationships** • **Main causes of the existing environmental problems** • **Assessment of the possible impact of the main big project plans and programmes** • **Strategic evaluation of the development measures** • **Synthesis of available resources to permit concertation**
Concertation	• **Evaluation of available data, information, etc.** • **Evaluation of preliminary reports of the area** • **Discussion of available options** • **Co-ordination of the actions involved in the planning and management process** • **Formulation of plans and programmes, strategies or visions** • **Evaluation of the strategic environmental impact** • **Assessment of the plans and programmes**
Results	• **Monitoring of the application of existing plans and programmes** • **Analysis of the existing policy problems** • **Feedback process of the application of planning and management tools** • **Lessons for the existing insufficient actions and follow up new actions**

Figure 4: Principal Tasks of the Mission Programme

Accordingly, the methodology has been constructed based on the following main steps:

a) Determination of the ICAM goals and objectives based on previous work.

b) Presentation of the areas profile – main characteristics.

c) Evaluation of the available planning and policy materials in terms of credibility and scope of offer.

d) Analysis of the existing planning and management problems of the area, main trends and dynamics.

e) Presentation of the possible alternative development opportunities but also the limitations and certain threats.

f) Proposals for alternative strategic planning and management actions.

g) Evaluation of the strategic Environmental Impact Assessment of the propose actions.

Methodologically, we should also mention some of the elements involved in the coastal areas we are examining. Firstly the **importance** of coastal zones and the **threats** that they face, must be introduced in a proper way together with a preliminary **definition of the coastal zone**, before any detailed introduction of such tools as carrying capacity of land development. Meanwhile we must agree that, theoretically, it may not be easy to define coastal sub-systems, since there is always a need to reconcile the contrasting perspectives of those involved in the process of management of coastal resources, hazards and activities (Parpairis, 1998).

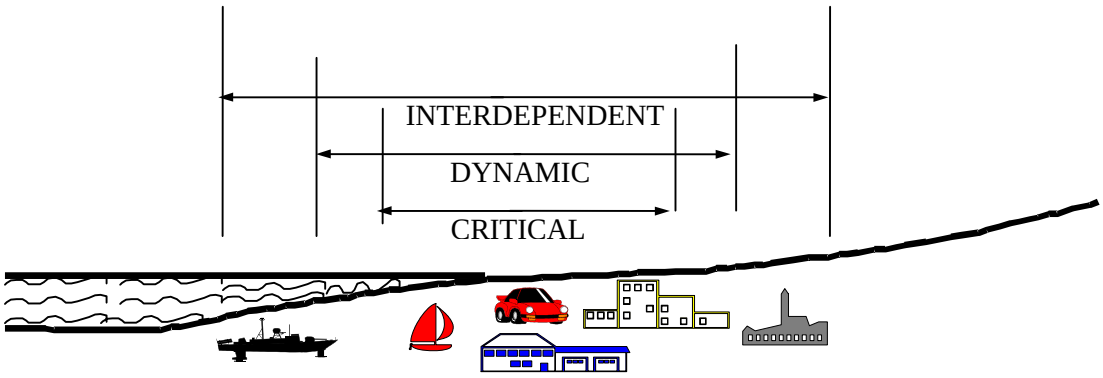

Figure 5: The System of Coastal Zones

However, in recent years many countries have recognised the importance of coastal zones and studied ways of incorporating coastal issues into their planning system. In certain cases the coastal zone is defined as a strip of **land** and **sea,** of varying width depending on the nature of the environment and management needs, while the **coastal system** combines **three (3) main characteristics.** These are inter-linked and produce the unique nature of a coastal zone: **land, sea** and **hazard zone** interactive and dynamic zones respectively, and the narrow hazard zone where they interact (Figs. 5, 6).

However, in certain coastal ecosystems, the need has been expressed to take into consideration a unique combination of **resources, constraints** and **opportunities** for development or use, since the nature and significance of these factors will depend on a combination of the **physical character,** the **natural heritage** and the **coastal use,** of present and past development, historic interest and technological hazards (HMSO, 1993).

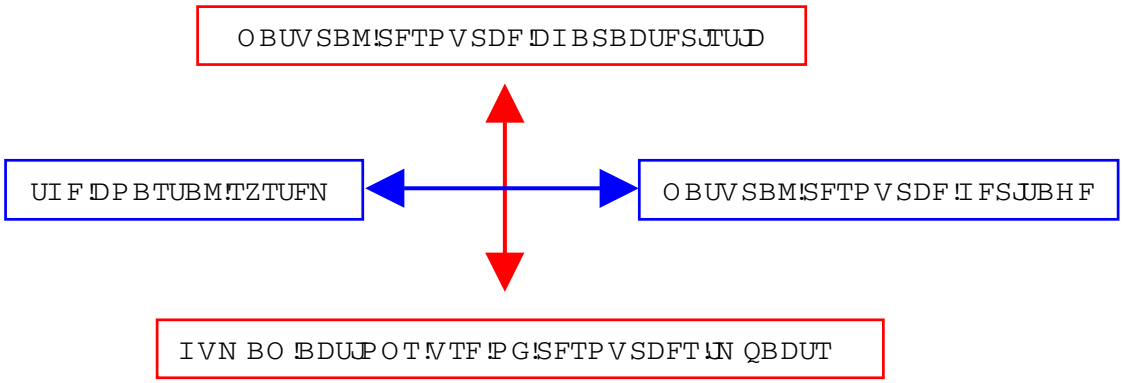

Figure 6: Elements of the Coastal Ecosystem

The coastal zone must also be viewed as a series of **inter-linked physical** systems, comprising both **offshore** and **onshore elements.** This **dynamic nature has important implications** for any kind of action and development in the coastal system elements. Accordingly, the significance of the coastal zone is now surpassing the local character and becomes an international issue. Firstly because of the **important role** these systems play from various aspects (ecological and economic value since they are among the most biologically productive ecosystems in the world), and secondly because of the **threats they face** (energy related development, coastal defence work, land reclamation, heavy industry, recreation and tourist activities, fish farming, etc., Coccossis & Parpairis, 1996). Consequently, a definition of a coastal sub-system incorporating the main elements and their

dynamic nature corresponding not necessarily to geographical, administrative or planning units could be:

> *"The natural coastal system and the neighbouring areas (land & sea) in which human activities involve the use of coastal resources and which may extend well beyond the limit of territorial waters, and many kilometres inland".*

Compared with other areas, the Mediterranean region has a relatively long coastline in relation to its land area. There is a wide variety of types of coastal zones, with different natural, economic and social conditions. The Mediterranean area is where human impact has been greatest, and where changes in the environment have also been monitored and studied longest (EEC, 1997). In the Mediterranean, **Egypt is regarded as one of the richest countries in terms of coastal ecosystems**, owing to its geographical location in the Mediterranean, its geology and climate, and above all its cultural heritage.

In addition to their biological and aesthetic value, the coasts and their ecosystems ensure important natural processes upon which man's productive activities are directly depended. The coastal dunes, for example, are a case in point, the significance of which has only recently been realised. These dunes are not only a habitat for numerous species of **flora** and **fauna**, but also protect the hinterland from the effects of sea and sand, and regulate the required equilibrium of salt and fresh water.

4. STUDY AREA PROFILE – MAIN CHARACTERISTICS

4.1. Biophysical Features and Terrestrial Ecosystems (Sea, Soil Hydrology, Water, Vegetation, Flora/Fauna)

In this chapter we are examining the **environmental characteristics** which affect directly the present and the future distribution of the human activities, and accordingly, the land use pattern and the physical landscape modification. Since the **environmental changes** are the result of both natural and human processes, it is important to present here the **main biophysical elements** as they are defined based on the present status and the nature of land use planning and policy of the project area.

4.1.1. Sea

Information on incidence and the levels of coastal pollution is scarce, since there is no continuous monitoring plan, and therefore, it is difficult to evaluate the situation. However, there is **no visible sewage pollution** or other kind of pollution resulting from off-shore oil exploration, shipping, shipbuilding, traffic and port facilities of the sea water except for the tar which comes from the ships that sail by. The colour of the sea is blue-green with no visible algae formation, and the transparency is high (El-Raey, 1995)

4.1.2. Soil

The project area's soil is regarded as young and essentially alluvial (Harga, 1967), with absence of diagnostic horizons. **This type of soil** is produced from **two main sources**: The **Mariut inland plateau**, composed of limestone alternating with strata of limestone and shale, and **Beach Deposits**, composed of calcareous Eolithic grains (Ayyad, 1995). Soils of the **coastal ridge and dunes** are loose or moderately consolidated calcareous grains of sand dimensions almost free from salts. On the **slopes**, the soils are pale brown and loamy in texture, while on **upper and middle parts** the soils are mixed with cobbles and gravel of various sizes throughout the profile. In contrast, in **lower parts** the surface is covered with relatively thick layers (2-5 m) of loamy soils washed down from higher levels. In **non-saline depressions** soils are highly variable, in some parts calcareous, while in other areas alluvial loamy soils dominate. Near the **seashore line** the soils may be mixed with lacustrine saline sand clays, and in **lagoonal salt marshes** the soils are very shallow profiles usually covered with thin salt crusts. **Transitional areas** between ridges and depressions are covered with layers of down-wash materials transported during the rainy season.

However, the **southern part of the coastal plain** is characterised by three main types of soil. One area is moderately affected by salts and pH values. The second type soil is covered by gypsum together with lime accumulations, while the third type includes soils with definite zones of lime accumulations at certain depths.

The **coastal plain soils**, in general, are well drained, except for some scattered parts which are poorly drained, and there are some saline soils which **are not suitable for agriculture**. The **tableland soils** are loamy and loamy sand, with alternating strata of limestone and shale with a medium to shallow profile in depth strongly affected by salt, while the **soils of the Wadis** which intersect the tableland are composed of loamy deposits and **are suitable for cultivation**.

All the beaches are composed of white, loose carbonate sands, well polished and round, moving towards inland. The loose carbonate sand gradually change to fairly consolidate limestone forming ridges that skirt the coast. The ridges are of marine origin and represent bars and depressions which separate ridges form lagoons in which alluvial loam deposits are present, mixed with calcareous sand.

The depressions that are close to the shore are salt affected, i.e. unsuitable for cultivation. In winter, salt marsh conditions prevail in the low parts of these depressions. Generally, the soils of the beaches – that are affected by salt – are unsuitable for cultivation, unlike the soils in the wadis and around highways.

The coastline of this area is of sandy rocks covered by soft sand along the shore, with certain solid rock headlands and sandy beaches, smoothly sloping towards the sea, which gives a good opportunity for tourism development. The shoreline is characterised by the presence of a succession of bays, formed by rocky headlands. This rocky edged decrease to the south.

4.1.3. Natural Water Resources

Three possible sources of natural water are available in the area as the major source of needs for agriculture and drinking: **surface water** (rainfall and flood water), **ground water** and **water from other facilities**. However, the main source providing water for drinking and culinary purposes is the **Alexandria pipeline**, carrying the Nile water, which follows the coastline and ends at M. Matrouh supplementing the Matrouh desalination units. It provides M. Matrouh with about 10,000 m^3/day of drinking water, and is connected to hotels, some houses and public buildings. Due to increased demand, works to enlarge the above pipeline are under way.

The **surface run off**, due to the homogeneous morphological formation of the project area, favours the accumulation of large water quantities in the **natural drainage channels** (wadis). The existence of elongated ridges prevents run off water from escaping to the sea. **Dykes** have been constructed over the catchment area of wadis in order to conserve water. In the vicinity of M. Matrouh and Fuka there are 22 and 19 dykes respectively (Dragicevic, 1993). They can store 74,000 m^3 of water in M. Matrouh and 69,000 m^3 in Fuka. The water collected behind the dykes is used mainly for irrigation.

Other water sources in the project area are the **cisterns** where the rainfall is collected. This type of water is mainly used for irrigation of orchards and in rural areas for drinking. **The ground water** source is mainly developed in the **Nobian sandstone reservoir** with an area of 2.5 million km^2. It extends from the south-east of Egypt to the north-west, i.e. to the north Qattara depression. In the Fuka region there is also a trapped ground water reservoir from which the water is extracted through **hand dug** or **drilled wells** and used for irrigation of orchards. There are also **shallow wells** along the coastal strip, which are subject to saline intrusion.

In general, the underground water is found at the sediment layers (in the study area). Water generated by shallow wells is limited in quantity. It is of low quality due to its presence in thin layers with low coefficients of permeability and dependence on seasonal rainfall. Underground water can also be found in the limestone layers available under the Fuka basin. It can produce water at a rate of 20 m^3/hour for some wells, with an average quality, which gives approximately 2 million m^3/year, of which only 72,000 m^3/year are used which shows the great importance of the groundwater for the entire basin (El-Raey, 1999).

The amount of rainfall in the project area is approximately 140 mm/yr. Most of the rainfall occurs in winter with maximum in December (in Marsa Matrouh 38.7 mm) and January. Summer seasons are virtually dry.

4.1.4. Vegetation

As it became obvious from the above description, the quality of the area's soils and, accordingly, the **production is rather low** and the **irrigation water is insufficient**. Dense cultivation and pastures can only be found within 25m wide coastal belts. Further inland, only in scattered areas pastures are found and **agriculture's practised**. Figs, almonds and olive trees grow mainly in the coastal plain, while in depressions, where irrigation is possible due to rainfall, wells and cisterns develop.

However farmers prefer olive trees because they are available on the market and tolerant to drought and salinity. The region of study area has a heavy flora that begins at the coastal area and extends to the rocky plateau (El-Raey, 1999). There are two kinds of flora in this area:

- The first kind: plots planted with olive, palm tree, and wheat depending on rainfall and wells that are randomly distributed.
- The second kind: plots with coastal plants and herbs.

Meanwhile, in the **coastal plain and wadis where barely and wheat are cultivated**, the grain production varies from year to year following the high variability of the rainfall. We can estimate that the average grain production ranges from 200-300 kg/feddan (1ha = 2.38 feddans). The **cultivable land** in M. Matrouh covers 86,543 feddans, and in Dabba 24,291 feddans.

The composition of plant growth forms in the region is a typical **desert flora**. The majority of species are either annuals (ephemerals) or geophytes (perennial ephermeroid herbs and grasses).

The phenomenon of succulence is common to the vegetation of saline depressions. It is considered to be one of the mechanisms which enables plants to overcome the problem of "physiological dryness" caused by high osmotic pressures of the root environment.

Five major types of habitat are recognised in this region: **coastal sand dunes, inland ridges, non-saline depressions, wadis, and inland plateau**. Each of these habitats is characterised by the local physiographic variations, which effectuate variations in vegetation composition and species abundance. **Eight main physiographic categories of coastal dunes are recognised** (Ayyad, 1973):

- Very active baby dunes, lying close to the shore.
- Active, partly stabilised dunes.
- Protected leeward slopes of active large dunes.
- Stabilised dunes with typical dune form.
- Deep protected sand shadows.
- Exposed barren rock and escarpment of the coastal ridge.
- Sand sheets overlying saline flats.
- Shallow protected sand shadows (occurring only in the eastern province).

4.1.5. Fauna

The **fauna** of the north-west Mediterranean land may be categorised within **3** well-defined **physiographic zones**: **the coastal sand dunes**, from the sea shore to the Mariut salt marsh depression, the **salt marsh depression** between the 2nd and 3rd ridges, and the **inland non-saline depressions**.

The first zone has an attenuated Xero-Mediterranean climate while the third zone has an accentuated Xero-Mediterranean climate, and this difference, together with the first salt

marsh depression acting as a barrier, has its influence on the **fauna inhabiting the first and third zones.** They are remarkably **different** from each other **in species, population density,** as well as **physiological behaviour and life.**

Because the **coastal dunes** have a more humid environment and their soils are more friable, as well as having denser vegetation, they have a **richer fauna** than the zone of the inland non-saline depressions.

Distribution of animals in these dunes depends on **two main factors: the soil salinity** due to salt spray from the sea and the **position on the dune**, whether facing the sea, on the dune crest, or facing the land, where the dune is more consolidated and stabilised with higher content of fine soil material and organic matter.

Rock **crevices also provide a particular biotope to fauna** associated with the roots of chasmophytes. In most cases, animals are confined to shrub canopies where they are protected from wind and radiation, and where food from accumulated plant litter is available. Richness of fauna is greater on the leeward side of the canopies, i.e., the SE side. This difference is greater under shrubs with V-shaped branching rather than with a cushion-like form. The characteristic species of this biotype are more varied than in the inland depression. It is remarkable, however, that the land snails, which are abundant in the inland non-saline depressions, are absent from the coastal dunes. **The fauna of the dunes** also shows a marked seasonal differentiation.

The fauna of the second, salt marshes zone has not been adequately studied, while the inland non-saline depressions third zone has. The greater diversity at the leeward side of shrubs is also observed. The sand roach populations are of lower densities than on the coastal dunes and have a more extended life cycle, but can benefit more fully from small increases in soil moisture than on the coastal dunes. One of the noteworthy phenomena is that population irruption's of some species may occur unexpectedly and unpredictably. During the seventies three such irruption's occurred, one in the **butterfly *Vanessa***, another in a bug, and a third in ticks. Up till now, no ecological theory or model can predict such irruption's which apparently can happen at any time and with any species (Ayyad, 1995).

Agro-ecosystems of the region are of two types: the older, rain-fed, and the more recent, irrigated. Each of these two types can be either sub-type of field crops or sub-type of tree crops. The four sub-types have different characteristic population of fauna, but remarkable thing is that micro-herbivores (potential pests) increase at the expense of both detrititivores and carnivores. This is due not only to better environmental conditions (more sources of plant living biomass) but also to its better quality, as well as the food sources provided by the proliferation of accompanying weeds. Together with this is the removal of grazing animals from the agro-ecosystems except after harvest of barley in rain-fed farms, or in neglected olive orchards (Ayyad, 1995).

4.2. Topographical and Geomorphological Elements (Geology, Bathymetry and Morphological Elements)

Using remote sensing and field observation, the geology of the study area was found to be simple. The area is covered by sedimentary rocks that vary from limestone to limesandstone and marl (El-Raey, 1999).

The rocks belong to the Miocene, Pliocene and Pleistocene ages. The topography of the area presents unique features. The area contains different elevated hills varying from 5m to 90m above the sea level.

The project area belongs to he western coastal region of Egypt, which is extended south for an average distance of about 50 km. In this greater coastal region we can distinguish physiologically two provinces: an **eastern province** between Alexandria and Ras El-Hekma,

and a **western province** between Ras El-Hekma and El-Salloum (Ayyad, 1993). The landscape can also be divided into a **northern coastal** plateau and a **southern plateau** (tableland). In the eastern physiographic province a number of alternating ridges (bars) and depressions (lagoons) running parallel to the coast in the E-W direction. The ridges are formed of limestone with a hard-crystallised crust, and vary in altitude and lithological features according to age.

The topography of the area is characterised by three features: **coastline** (presence of long stretches of sandy beaches divided by a number of capes), **coastal plain** (3-8 km width), and **south plateau** Tableland (presence of Wadis – natural drainage channels).

Like most places in the north-western coast of Egypt, M. Matrouh – Fuka area is covered mostly by sedimentary rocks, which belong to the Quaternary and Tertiary periods, and long stretches and sandy beaches.

4.3. Climatic and Atmospheric Conditions (Rain, Temperature, Wind, Atmosphere, etc.)

The project area, has a semi-arid Mediterranean **climate** characterised by brief, mild, rainy winter and a long, warm summer (From May to September there is clear sky, high radiation and no rain. The situation changes in October when a windy and relatively rainy winter begins). The whole north-western coastal region of Egypt, according to UNESCO classification (1977), has summer's warmest month with a mean temperature of less than 30^{o}C and winter's coldest month with a mean temperature above 10^{o}C. The temperature regime varies from one location to the other according to the relative proximity to the sea and elevation above the sea level.

The mean annual **rainfall** ranges from 120 mm/yr to 155 mm/yr from Fuka to M. Matrouh. Most of the rain (60% or more) occurs during winter (November to February) and the summer is virtually dry.

Climatic conditions in the examining coastal region area in some seasons favourable for water vapour condensation (dewfalls, due to considerable temperature gradients between different soil strata and overlying air, high relative humidity, and still wind, particularly during summer and autumn. Mighaid and Ayyad (1995) estimated the gain in moisture content due to water vapour condensation on the sand dunes as ranging between 2.35% and 4.7%. The monthly mean **humidity** is higher in summer than in winter. In M. Matrouh during July it is around 73% and in August it reaches 71%.

Wind is generally light – since the wind speed doesn't exceeds 10 m/sec, over almost 95% of the year – but violent dust storms and sand pillars are not rare. The direction of the prevailing winds is from the north-west with percentage of 21%. However, the area is subjected to the Khamasien **hot storms** during the spring months, which blow from the south-east. At the city of M. Matrouh wind blows strongly during winter and early spring, with and average velocity of about 20 to 23 km/hr; the end of summer is characterised by very calm days and the average wind speed drops to 15 km/hr.

Although strong wind occurrences only form a small part of the total, they have to be regarded because of their ability to mobilise and transport soil material. This is an important factor for the **land use** planning of the area. However, strong winds, with or without blown sands, have detrimental effects on **crops** and **yields**. They have a maximum in the NW sectors. A secondary maximum in the SW sectors is very pronounced. There are almost no strong winds from any easterly sector. The fierce sand laden SW winds account for sheets of siliceous sands.

Particularly silt, clay and organic matter, which account for fertility, significantly are subject to deflation. The worst effect is that once they are mobilised they hardly settle down. The

resulting fertility erosion can only be detected and monitored with laboratory soil analysis. Flooding of vast areas of the tableland accounts considerable due to exposing soils to wind erosion by reducing of the **natural plant cover and destruction of soil aggregates (LUPEM, 1993).**

The increase of surface roughness reduces wind speeds at the surface and thus slows down the movement of soil material. Natural windbreaks are an appropriate means to reduce wind speeds in agricultural areas. They can consist of trees, shrubs or even strips of annuals or a combination of those planted in parallel rows. The exact design depends on water supply for the windbreak plantations and specific protection requirements.

The frequency distributions have shown that there is no need for windbreaks in any easterly wind sector (15 – 165 degrees), but in NW and SW directions. Orchards, which are located in sand sheet areas, require particular protection from south-westerly storms. It should be mentioned that an assessment and evaluation, like this one, gives important information for the establishment of wind driven devices, and provide essential information regarding whether **wind energy** can be efficiently utilised. However, in order to be able to decide whether or not **wind energy is a considerable resource**, frequency and force of average wind speeds, as well as frequency of strong and low wind events have to be known.

Prevailing wind directions govern the movement and circulation of seawater masses. According to the frequency distribution of wind directions the sea currents are presumably driven towards easterly or ESE directions. Whatsoever, direction and force of the currents have implications on the change of the coast.

There is a little difference in **sunshine duration** from place to place along the western Mediterranean coast of Egypt with a monthly mean duration of sunshine that ranges between 201 hr in January and 272 in August (Ayyad, 1995).

The average humidity is between 61.3% and 75.6% throughout the year. The most suitable time for sea-side tourism is summer starting from June till the end of October when the maximum and minimum average temperatures are around 27°C and 21°C, respectively.

4.4. Land Ownership, Land Systems Units

An important characteristic of the Population of the Matrouh Governorate, is that most are **Bedouin of Awlad Ajj tribes**, except those in the Siwa oasis (El-Miniawy, 1992).

These **tribes** are divided into two main groups: **El-Saadyeen** and **El-Morabiteen**. The first group occupies most of the land suitable for cultivation, development and tourism mainly land close to urban centres. The land utilised by each tribe takes the form of a band perpendicular to the Mediterranean, which gives the chance for each tribe to make use of a greater variety of productions from north to south. The relationships among tribes are very intimate and are practised in an unofficial manner throughout the whole area under consideration, managing in this unofficial way the region's economy. Each tribe is organised into a number of **"ailas"** (families), which, in turn are associated with a certain geographic location considered as a **homeland** (watan) and **corporate unit** if ever, utilises this land. The land is normally divided among the various **"bait"** (homes) constituting the aila. This land is sometimes also divided into several **"hosh"** (fields) in very different places (Ayyad, 1995).

When the land of bait or a hosh is undivided, each of its members can, theoretically, cultivate or graze any part of it, and becomes a **communal possession** or **corporate unit**. However, this is usually not orchards or cultivated land. Members of other tribal segments are allowed to graze their flocks wherever grazing lands are available, but they are not allowed to use the wells and cisterns. While **animals** are always in individual property, **water** for the flocks belongs to the bait owning the cistern and they can sold it to outsiders for animals and agriculture, but drinking water is given free to anyone in need of it.

Before 1985, the Bedouin were granted the right by the Egyptian Government to use the land of the Matrouh Governorate for grazing and cultivation. But **legally, the land belonged to the state** while in the previous period Ownership rights were based on tribal customs and law. With regard to grazing land, no legislation has been issued to date.

However, Bedouins often have doubts about the way the Government will deal with the land tenure system in the area. There is an increasing worry that land will be taken in one way or another for development projects that have nothing to do with them. Therefore, it becomes necessary to produce tenure legislation in a way that conforms with the development programs, and to actively involve people in these programs, and to secure confidence between parties.

4.5. Population Characteristics

The **total population** of the Matrouh Governorate was 91,142 in 1960, 169,000 in 1986, 179,344 in 1993, and the preliminary results of the 1996 census show that the population increased further and approached the level of 211,966 inhabitants (Fig. 7). This gives a population density of about one person per km^2. Marsa Matrouh City and the surrounding area have the biggest concentration of population accounting for about 40% of the total, while El Alamein has only 1,841 inhabitants. 52% of the total sum are males; 68% live in urbanised areas. Birth rate is still very high in the Governorate (3 to 4%) although the newly established family planning units have in the last three years reduced the number of newly born. There is **two different social groups in the population** of the NWG: **the Bedouin** and **the immigrants** who have migrated from the Nile valley.

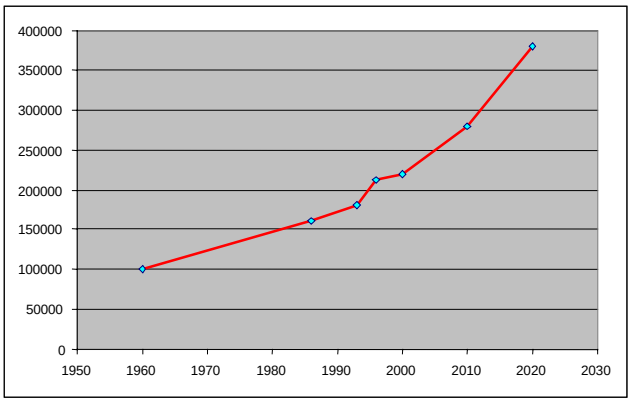

Figure 7: Matrouh Governorate Population Evolution (1960-2020).

The population is not evenly distributed in the region. 48% of the population live in the zone close to the coast (<5% of the total surface), 41% in the middle zone (nearly 5-15 km inland), and 11% in the innermost zone (>15% of the total surface). The average **population density is 55 persons/km^2** in the third zone (Fig. 8).

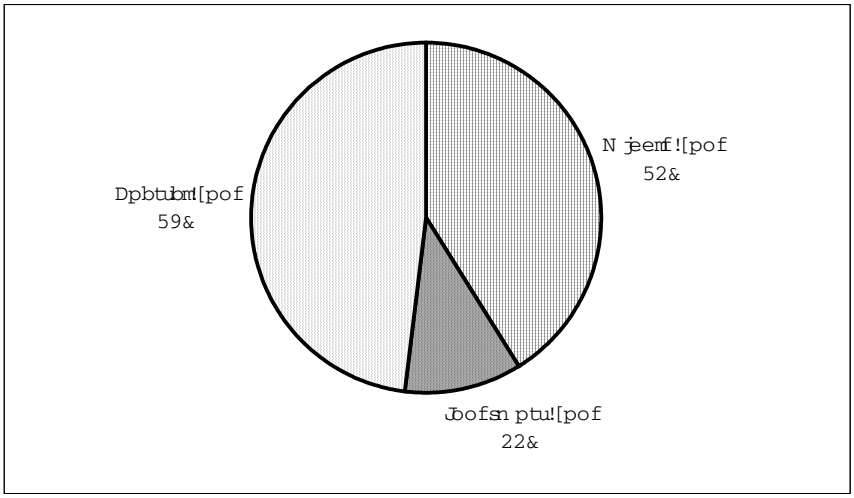

Figure 8: Population Distribution in Three Zones

As for urban/rural distribution, 53% were living in urban areas, and the rest in rural areas. It should be mentioned that this distribution is almost similar to that of Egypt as a whole. About 86% of inhabitants is Bedouin(El-Raey, et. al, 1997).

However, less than 1% of the population have a **university degree** 11% have a secondary school degree; more than 50% of the total population are illiterate, but education has recently received an impressive attention. About 36,000 pupils attend primary and secondary schools. In the project area, all public functions are concentrated in the M. Matrouh City.

There are two different **social groups** in the population of the NWG region of Egypt: the **Bedouin** and the **immigrants** who have migrated from the **Nile Valley**. The Bedouin tend to settle in the desert, whereas the immigrants settle in towns, with separate patterns of life, at different levels of organisation. The Bedouin are employed in livestock production and commerce and look to the Omdas or mayors (head of tribe) and Sheikhs (deputy Omda) for leadership. The immigrants are employed in government services and construction and took to the national Government in Cairo for leadership.

Illiteracy among children and young men is high (70% between 6 and 30 years of age). There is no vocational **training** available in the region. The illiteracy is notably higher among women. According to El-Naggar *et al.* (1980) few schools exist in the region (e.g. in 1985, 67 regular primary schools, 15 preparatory schools, and 11 secondary schools in the areas of Matrouh, Barrani and El-Salloum**). Two schools for technical education** provide training in the town of Marsa Matrouh in the fields of industry, commerce, agriculture, teaching and nursing (but not for tourism!!). Recently (1992), a faculty of Education, affiliated with the University of Alexandria, was established in Marsa Matrouh to supply the region with school teachers.

However, according to a **labour and employment Analyst** (El-Raey, 1995), eighty percent of the Bedouin are engaged in sheep and goat herding and the cultivation of barley, vegetables and trees. About 15% depend on commerce as a source of income and the remaining 5% work for the government or private employers. Most males work in traditional agriculture and animal husbandry. Commerce, meanwhile, engages a small percentage of the male labour force. Some Bedouin work for the Egyptian Government as teachers, drivers, mechanics, clerks, and guards. Bedouin also work in quarrying and construction, but mostly as guards.

About 40% of the farmers allocate family labour for domestic tasks and non-production labour. This allocation includes tasks which are primarily performed by females: preparation of food, the care of family clothing, and handicraft production. There is an overlapping of labour roles for males and females in the harvesting of barley, fig and olive, as well as work with animals in need of special care.

We may conclude from the previous analysis of the human resources that the population of the NWG region has certain characteristics that could be summarised as follows (Ayyad, 1995):

- **High percentage of population under 15 years, and low percentage of working population in the productive age, compared with the national standards.**
- **Low educational standards, and high illiteracy, which reached 75% of the population**
- **Neither the number of the population, nor the educational or training conditions, can offer satisfactory economic base considering the vast acreage of the region, a matter that leads to possible in-migration to the region with application of development programs.**

- **Despite the fact of the small size of the population, it should be necessary to depend on local skills in traditional agriculture and husbandry grazing, in trade and commerce. Their long acquired experience will enable them to play an important role in developing and financing different projects.**

Women are occupied in the tasks of children and family, household chores, tent repair, weaving, and the herding of sheep near home. Work outside the home for females is still considered as improper.

Tribal borders are one of the best-known and documented facts in Matrouh. They are given considerable importance in the development plan because they represent the clearest planning units; and because in this area boundaries of villages and districts, which divide planning for a region of this size into manageable units, are incomplete and/or uncertainly defined.

While tribal borders are clearly defined, the location and size of settlements within these boundaries is uncertain. Part of this problem is due to the mobility of Bedouins, particularly within tribal boundaries. Especially where a tribe has land in several zones, cultivate barley on the north plateau and graze their flocks on the south plateau. Even families with land limited to a single zone may rent holdings elsewhere for the cultivation of barley and may send their flocks with hired herdsmen to distant areas for grazing.

4.6. Terrestrial Land and Marine Ecosystems, Coastal Ecosystems

4.6.1. The Terrestrial Ecosystem of M. Matrouh-Fuka Area

The terrestrial ecosystem of M. Matrouh-Fuka area are as follows:

- The rocky crest of Ras El Hekma and the area of Sallum in the leeward side of the Libyan plateau protect the area of Fuka from the rainy winds, while each receives less water than the rest of the coastal region.
- According to local information, the **wadis east of Matrouh** carry less water than the **wadis west of Matrouh** (El Qasr). This is probably due to the more permeable soils of their catchment area, while the **wadis of Baggush** carry less water than other wadis in the coastal region. This is due to the lower rainfall of the area.

The maximum discharge of the designed hydraulic works for the wadis of the coastal region must be known. Discharge measurements in some wadis are very few and it was possible, in the reinvestment project, to apply a formula for calculating maximum expected depth of precipitation's during the "time of concentration". The physiographic characteristics of wadis (size and length of catchment areas, average slope) can be determined with certain accuracy from the existing maps and aerial photos (Ayyad, 1995).

According to the physiographic variations, **two main sets of habitats** may be distinguished in the area under consideration, one is **ridges** and **plateaux**, and the other in **depressions** (Ayyad et al, 1986a). Ridge and plateau habitats may be further differentiated into **two main types: (i) the coastal ridge**, which is composed mainly of snow white calcareous grains and which is overlain by dunes in most of its parts, and **(ii) the inland**, less calcareous ridges, and the **southern tableland**.

However, **seven main habitats may be recognised:** (1) coastal calcareous dunes, (2) non-saline depressions, (3) saline and marshy depressions, (4) ridges and rocky elevations, (5) inland plateau, (6) wadis, (7) inland siliceous deposits. Each of these habitats is characterised by local **variations in physiography** which results in the formation of a mosaic of microaites with local variations in vegetation composition.

The majority of species are therophytes (40,8%) and chamaephytes (93.4%). Accordingly, **species diversity** may be assessed by several indices. The simplest index is merely the number of species in a community (or habitat) at a site, or in a region, and is called **"species richness"**. As for species richness, the western Mediterranean desert (in which Fuka-Matrouh area is located) is, floristically, one of the richest of all phytogeographical regions of Egypt. The most striking observation is that the highest richness is recorded on ridges and inland dunes: both habitats are characterised by strong heterogeneity of microsites. It is also notable that species richness is lower in man-made habitats than in natural habitats. Because genetic diversity (intraspecies variations) of wild species in Egypt is little explored, more intensive studies of this type are needed to provide information about the genetic diversity of species which exhibit morphological variations in a variety of habitats.

4.6.2. The Marine Ecosystem

According to Beltagy (1993), the area of Fuka-Matrouh is rich in many marine living organisms. But it is obvious that, despite the richness in species composition, the numbers are somewhat limited. These species are endangered because of pollution and urbanisation activities. It has to be mentioned that a disaster occurred in sponge fisheries in 1988, and these fisheries are still suffering from its results.

There is lack in the information about the other organisms, which leads to specific conclusion. This may be due to the fact that this area was carefully studied for only one time so it is difficult to make any comparisons.

A description of the current conditions of the marine ecosystem of Fuka Matrouh area has been present by Jeftic et al, 1995.

The comparatively flat portion of the **beach profile** extends seaward. The **offshore zone** may extend about 10 km from the shore and depends on its slope. The nearshore and beach face slopes are relatively steep, but the slope becomes flatter in the offshore zone. At the western coast, the beach face and offshore slopes are found to be 1:3-1:10 and 1:20-1:90 respectively. The bathymetry of Fuka-Matrouh area indicates that the offshore slope in front of Ras El-Hekma is steeper than that around Ras Alam El-Rum. Comparison of the different surveys shows that erosion is starting to act in deep water and then approaching the shoreline. Such type of erosion may be due to temporary seasonal conditions.

The height and direction of the **waves** are affected by refraction, dissipation of energy and breaking during their propagation into shallow water near the coast. The effect depends on the local bathymetry, which may allow only a limited window of directions to reach a certain location. The directional distribution of the wave energy along the coast generally leads to a clockwise rotation of the dominant local wave direction. This causes a resultant eastward longshore direction of the wave energy along the coasts.

Available data record that the predominant waves are approaching from N. W. sector. The following summarises the wave characteristics:

- Maximum wave height: 250 cm
- Average wave height: 74 cm
- Average wave period: 6.8 sec.

Littoral currents play an effective role in sediment transport along the coast. The gradient current is dominating the surface circulation along the north-western coast and not the drift. Computed velocity values of the total surface current in front of Fuka-Matrouh coast range between 11-15 cm/sec, and feeding eastward. Bottom current values decrease noticeably down to 100m depth to be 3-5 cm/sec, and feeding westward (Fig. 2). Rip current usually occurs along many coasts of the western region. The effect of **tide variations** is felt in delineating the shoreline as well as the **wave characteristics**, and the breaking point, while

determining the current and bar formation. Tide influences, to a limited extent, the sediment movement along the coast by shifting the level of attack of wave action and by governing the flaws in lagoons.

During winter, at both Fuka and Matrouh the intrusion of a **water mass** with relatively lower salinity (39%) and temperature (18^{o}C) moving coastward was observed. This water mass was balanced by a flow of water of higher salinity and temperature moving seaward. During spring, while a weak stratification in both temperature and salinity was observed in Fuka, the coastal water in Matrouh was still relatively homothermal. In both summer and autumn seasons, a distinct seasonal thermocline was observed in both Fuka and Matrouh.

The **oxygen content of the surface seawater** in Matrouh showed a high value during winter and decreased during spring and summer through autumn. In general, the eastern Mediterranean is considered of the oligotrophic areas poor in nutrient salts, which are necessary for phytoplankton growth and flourishment. The area of Fuka-Matrouh is one of the most oligotrophic areas of the eastern Mediterranean. The **phytoplankton** standing crop in Matrouh was slightly higher than in Fuka. The population increased towards offshore of Matrouh and vice-versa occurred in Fuka. While the least population density of zooplankton was recorded during winter season in both Fuka and Matrouh, autumn and summer were the flourishing season respectively. Spring and summer were the flourishing seasons of benthic flora.

However, the highest population densities of the **bottom fauna** were recorded during spring and summer in both the inshore and offshore of Fuka, during winter and summer in the inshore of Matrouh, and during spring in the offshore of Matrouh. The sponges are representing in the area by eleven species, five of which are commercial. There are **three species of marine turtles** known from the Egyptian Mediterranean Sea, but all tracks of emerging nesting turtles around the area Fuka-Matrouh were identified as tracks of the Loggerheads Turtle “Carreta-Caretta”.

Although all the marine turtles are listed as endangered throughout their range, the official statistics show the increase of the Egyptian turtle landing to 418 in 1990. The study area does not provide suitable habitats for Monk seal.

There is a lack in information about other organisms which leads to a specific conclusion. This may be due to the fact that this area was carefully studied only once so it is difficult to make any comparisons.

5. STRUCTURE PLAN – EXISTING SITUATION

The outline of the existing situation of the structural plan of the area under discussion must be seen as a supporting tool to identify the spatial unbalances, the land use conflicts, and of the natural characteristics to be protected in order to safeguard the sustainable use of available resources, and above all, to provide a clearer picture of the existing difficulties in order to enable safer future development planning (Map 6).

5.1. Main Land Use Types, Structure Planning, and Development

Some prominent factors (geographic, topographic, climate, soil) have been already mentioned are affected by the current distribution of the **main Land Uses Pattern**, as well as that of the spatial distribution of urban areas and rural settlements. The existing resources of land, water, and the main connection lines (like the coastal road and the parallel railway line) have greatly affected the land use types of the area, as well as their current sizes and locations.

The main land use types of the area under consideration could be grouped in the following way:

- Agriculture;
- Tourism/leisure/summer holiday;
- Settlements (urban, rural) ;
- Industry/agro-industry and commerce;
- Infrastructure and Services;
- Coastal areas without any use; and
- Undeveloped areas;

However due to the lack of essential (size, quality, etc) fertile land, water, and adequate technologies of use, this area will, no doubt, continue to search for new **methods** and **means** for efficient and sustainable land use distribution and economic development opportunities.

The region is characterised by a definite pattern of **spatial variation showing unorganised land use profile**, and consequently, **the distribution of income** depending on the land nature of the region in combination with variability of climate and physiographic features.

However, the land use planning, as it is happening in most cases in Egypt and elsewhere, is carried out at both regional and local levels could be regarded as insufficient, since it is defining basic land use patterns rather than balancing social, market and environmental values.

5.2. Survey of Economic Activities

5.2.1. Agricultural Sector

In general, **agricultural activity** has been for a long time the main source of income in the north-western coastal region of Egypt, and has become the principal source although the role of other activities (like tourism) is increasing continuously.

According to governmental estimation of the agriculture state in Fuka-Matrouh area (IDSC, 1993) the land used for agriculture covers about 86,543 Feddan, the main crops being wheat and barley. The main problem that faces agriculture is water. Local farmers depend on rainfall, so, crops productivity varies according to rainfall. For purpose of **agricultural classification**, the area can be defined in three (3) production zones (El-Naggar, 1988):

a) **Coastal cultivation strip**: This strip extends from the seashore 5 to 10 km inland, including the beach and the coastal plain. Annual rainfall is about 150 mm. Cultivation of orchards and vegetables predominates, especially in deltas of wadis. The inhabitants are settled. It constitutes 5% of the total land.

b) **Inland mixed production grazing/cropping (barley) strip**: South of the coastal strip, between 5-15 km from the coast. Annual rainfall is 100-140 mm. Soils are poorer. Grazing (especially sheep and goats) and cropping are the main activities. Inhabitants are sedentary. It constitutes 22% of total land.

c) **Inland grazing (range-land) strip**: This strip lies between 15 and 50 km from the sea shore. Annual rainfall is from 50-100 mm. Grazing predominates, with some cropping. It constitutes 73% of total land.

The land used for fruit trees is expanding rapidly at the expense of good **barley land**, while barley cultivation is expanding at the expense of the areas of range-land, which is less suitable for barley. Olive trees are often planted in marginal areas, where no other crops can be grown, but this activity is considered less attractive economically. However, figures regarding the land cover unit and classification of the above agricultural activities are not still available.

Animal husbandry, particularly breeding of small ruminants, has become important activity since the 60's, when the Bedouins earned enough money, through trade with Libya, to buy pickup trucks. The activity is traditionally the major and most prestigious economic activity of the Bedouin in Matrouh Governorate, since 30-80% of their income is earned through this economic sector.

According to El-Miniawy, et al, (1992) estimation, 90% of all agricultural activities are sheep breeding, barley growing and olive production. Grazing is the main activity for Bedouin. In 1992, the flocks/herds are estimated at (IDSC,1993):

- 555,300 sheep;
- 31,373 goats;
- 8 thousand camels.

This is in addition to some cattle and donkey breeding. The value of investment in grazing is estimated at 37.5 million Egyptian pounds.

In contrast, **fisheries** are a minor activity in this region, since Bedouins have a distinct preference for meat over fish, while the remaining population is mostly marine-minded. This is probably the reason why ship-servicing facilities are still very limited in the area.

5.2.2. Industrial Sector – Handicrafts and Agro-Industry

From the available data and information, in the Governorate of Matrouh there is not any legal industrial zone or important industrial site. An exception to the above would be some spontaneous agro-processing activity – mainly oil milling, from olives, and making carpets, units which are classified as artisan shops (cottage industries), and home based traditional handcrafts units, rather than small scale industries.

According to KACO (1978) report, the industrial activity in this region was restricted only to two gypsum factories which manufactured plaster, while the existing petrochemical complex

(Ayyad, 1995) nearby provides a very good prospect and an excellent basis for combined production industries, since the availability of new materials, such as salt, limestone and gypsum, in the region could be regarded as most important.

According to the same source, the number of possible downstream operations based on organic and inorganic chemical complexes is very large, while the future products will depend on the marketing opportunities and the available technical knowledge parameters, which are changing rapidly.

It is possible, however, to mention that women of the region mainly undertake handicrafts and agro-products. To a large extent they depend on agricultural and animal raw materials. The most important of these activities are (Zoghby, 1990):

- producing carpets, blankets and tents, spinning wool, leather curing, embroidery and sewing;
- picking olives, drying peppermint, and producing olive oil;
- Breeding poultry and rabbits.

So, due to the fact that data on the present state of industrial land use are still not available, in terms of scale, character and intensity, any constructive comments on the future of this sector are impossible in this phase.

5.2.3. Trade

In earlier times, the Bedouins monopolised trade and transport. While the form of transport has changed from caravans to pickups, and trade includes new items such as land; the role of Bedouins in this economy is still strong, formally and informally, especially in animal trading. The transportation network is depicted in Figure 5 of El Ray, 1999 (final report).

5.2.4. Tourism/Recreation Sector

Local tourists (90% of the tourists received by Marsa Matrouh) arrive to the area by railroad or by the main highway. International tourists arrive by flights via Alexandria or Cairo. If the area is to be developed for international tourism, technical conditions of Matrouh airport ought to be improved. Overall tourism trends in the project area can be summarised as follows: about 85% can be defined as the sun-and-beach tourism, cultural, health and recreation tourism 10% (mainly concentrated in Siwa), and 5% for business and transit tourism (mainly in the city of Marsa Matrouh).

The tourism sector is one of the leading economy sectors in Egypt and particularly in the project area. The investment in tourism, in terms of bed capacity, is estimated to reach the number of 21,000 by the year 2010. This is an indication that tourism as economic activity, represents a significant part of the land use, mainly of the coastline recreational zone, and consequently of the whole Matrouh Governorate.

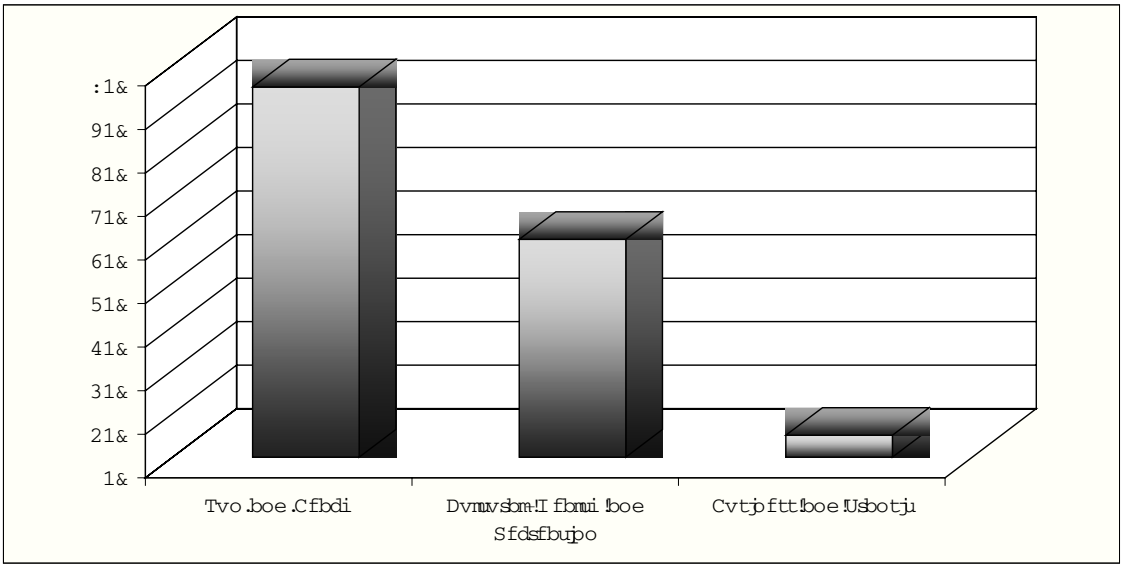

Figure 9: Distribution of Tourist Types in the Project Area

According to El-Miniawy et al, (1992) report, the total investments of the sectored development plan by year 2010, gives 37.3% to the sector of tourism, which is the highest proportion, with agriculture and grazing in the second position (Fig. 2). Additionally, in the Five-Year-Plan budget (1987-1992) for the Directorates of Matrouh Governorate, tourism represents a significant part among all kind of investments (private, public, co-operative, etc.).

Another indicator, regarding the recent tendency of developing tourism, is the change of the population structure, since labour force moved from the sector of agriculture and home industry to the fast developing tourist industry along the coastal zone. This tendency gives hopes of attracting more people from outside the region, as labour demand, especially in tourism, increases, and local/regional labour availability diminishes.

However, since most of the big projects along the coastal zone are under construction, we have not a clear picture of the land use for tourist purpose, at present or at a specific future stage. It should be pointed out that the project area has certain obstacles to the improvement of this particular sector, due to **access and organisational problems** (national security reasons). The only exception is the **national priority programme** of the Tourist Development Authority.

For this reason the project area, until now, has had not any specific tourism-product identity, and accordingly, a marginal access to the international tourist market (Dragicevic, 1993). This present obstacle, however, seems to give a positive perspective, if **new goals** and **suitable strategic development programme** are to be introduced, so that to integrate the international, national and local tourist concept, and to attract more population (trained or not) in the area from other, overpopulated regions of Egypt, such as from the Nile Valley and Delta, to stimulate sustainable development and the population density better distributed throughout the country.

5.2.5. Big Projects

One of the most important characteristics of the Matrouh Governorate development, at present, is that of the big projects under construction, which obviously, when they are

completed, will affect the whole land use pattern of the project area. The main types of these projects are the following:

- Tourist villages, vacation and summer houses;
- Infrastructure (roads, airport, water supply, port, telecommunications); and
- Agriculture development

5.2.6. Infrastructure

Examining the existing land use situation it is necessary to present the important aspects of the technical and social infrastructure through appropriate indicators, so that at the end, to have the opportunity to identify the lessons to be learned from the experience until now, the appraisal of the **trends** and emerged **dynamics** of the project area, and to propose **future scenarios of possible solutions.** Subsequently to approach positively the stage of land use appraisal, it is important to present one by one the existing situation of the most influential types of infrastructure (Map 3).

a) Technical

The project area is poorly connected with the urbanised Metropolitan areas of Alexandria and Cairo by all means of **transport networks**. The main highway, the railroad, and the Matrouh airport are regarded as very poor for the purpose to serve not only the regions needs and future perspectives, but also for the expected attraction of international tourism and trade. The main **highway** and the **railway** follow the coastline from Alexandria to Marsa Matrouh, and then run to inland Siwa, as well as to the Libyan border. The highway is poorly paved but its capacity seems to be sufficient for the present needs of the project area.

Parallel to the above railway and highway, a new military road to Alexandria is under construction, 20-30 km from the seashore, as well as a desert road, 80 km from the coast. Between the existing highway and the seashore there is a **secondary road** connecting the towns and summer holiday sites close to the city of Matrouh. In certain locations – mainly close to tourist villages – there are also **perpendicular roads** connecting the main roads of the area, which should also be regarded as poor and insufficient.

The **airport**, which is located within the limits of the M. Matrouh city, is very poor in terms of technical conditions. It is only used during summer periods, and serves also for military purposes.

However, the majority of tourists (local and international) arrive to the project area by train and highway, since the airport facilities are not able to accommodate efficiently the tourist flow at present, although a certain part of international tourists arrive by plains via Alexandria and Cairo. The existing **M. Matrouh harbour** is rather under-utilised at present although some improvements are needed for it to be used for the transport of people/tourists and goods. In this port trade and fishing activities are only serve in small scale. However, west of the existing port a new one has recently been constructed, but remains unused due to military obstacles. Other types of port, such as **marinas, fishing-ports**, etc. are not available.

b) Water Supply

These are four water sources in the Matrouh Governorate, **Alexandria pipeline, surface run off, desalination plants, and ground water**. The main source of drinking water, of course, is the Alexandria pipeline, which provides M. Matrouh with about 10,000 m^3/day of water. The works to enlarge the pipeline, so that to increase its capacity, are still under way (Canadian firm). So the problem of water supply during the summer season still remains the most important one.

The rural population relies mainly on **cisterns** for drinking water, and on galleries for washing. Villages also have pressurised water systems for domestic uses (Ayyad, 1995). Additional water often arrives to the area via railroad tanker cars and private trucking companies but it is still insufficient, while most tourist facilities, oil companies and construction activities, that do not have a dependable connection to the pipeline, use the private trucks.

The water supply service of the town of M. Matrouh is provided by the city council, while the management of water sources is conducted by a number of different government organisations.

c) Sewage Collection and Treatment

The sewage collection and treatment system of the M. Matrouh city is still under construction. It will have the capacity to cover the needs of 50,000 people and will be run by the city council. As we can see this system will still be insufficient even to cover the urban population needs and the city's capacity, let alone the **rural population settlements** and the **tourist/vacation complexes** along the coastline, which do not have any organised sewerage system or treatment plants.

However, in the meetings we had with the responsible managers of the visited tourist villages they informed us that they would provide separate individual sewage treatment units and plants in the area. The rest of the project area is still served by individual septic tanks where sewage is collected, while the waste water of the population in towns is directly discharged into creeks. There are practically no sanitary sewage disposal, except for few privately run units (El. Naggar et al, 1988).

It must be mentioned here the fact that the existing free sewerage system of septic tanks it percolates though sand and likely to reach the beach. The same free system is also available in many parts of the city of Marsa Matrouh.

d) Solid Waste Collection and Disposal

The existing **solid waste collection** and **disposal system** of the city of M. Matrouh cannot be regarded as effective and healthy, since the dumping is opened to atmosphere (there is no provision to be covered by earth or to use any available modern methods).

Even if the collection in the city seems to be comparatively satisfactory (offered by a private company), there is no any provision for the rural areas or the existing settlements of the project areas. The tourist village will provide their own systems of collection and disposal, but without a common structure or co-ordination of services.

e) Energy

In the M. Matrouh city **natural gas** is the main energy source, while in the rural settlements the use of **shrubs** for cooking and heating is the most popular one, but with negative effects both on the natural vegetation cover and on the soil, because of the resulting erosion.

Recently the **power plant of the city** (generated at the Assuan Dam) – which is still little utilised – has been connected with the interconnected network, which is going to transmit the electricity to Libya. For this purpose a number of high voltage power poles have been erected along the coastline. The power plants in Marsa Matrouh produce 60 MW, only 20% of which is being utilised. The cables are in a poor condition and cause frequent electricity cut-off, but there is a plan to replace the present cables. Since there are no central transformer in the town, each building complex has to install its own transformer. In 1996 the whole system has been connected to the interconnected network. The national authorities provide power supply system services of the project area. However, all farmers rank shrubs and wood as the primary sources of fuel for cooking and heating. Kerosene is ranked as a

secondary source. But, the use of shrubs for cooking and heating contributes to the devastation of the natural vegetative cover, which in turn leads to soil erosion.

Although at present a number of building complex structures, as well as the constructed tourist villages, have their own transformers, it is expected that progressively these will be serviced by the natural power systems, according to the official plans.

f) Telecommunications and Post

The telecommunication system in the area (radio-link), provided by national authorities, is very poor, and the existing 8,000 telephone lines are already utilised, mainly in the M. Matrouh City. Since there are new structures under construction in the project area, such as tourist villages, summer holiday villages, etc, the **telecommunication** and **post system** should be modernised and expanded in order to cover the present and future needs.

h) Social Services

Insufficient social services, such as education, care and health, are poorly provided in the area due to inadequate staffing, building structures and equipment.

Services in study area have a special characteristics, such following:

- Absence of governmental care with study area;
- The bad state of the present services, leakage of budget to develop it;
- Poor staffing and equipment of existing facilities;
- Some services, like education and health, are limited by the local traditions;
- Poor awareness of the population to their constitutional rights.

5.2.7. Prohibited Areas/Zones

Within the area in question there are certain zones which are regarded **as "strategic areas of military importance"** the ownership of which is prohibited to individuals. Such zones are the airport at the city of M. Matrouh, some coastal areas – mainly military campus and observatory networks – deserts lands, areas included in the land reclamation Project Plan, and areas for the establishment of new tourist areas – mainly along the coastal strip.

However, subject to the provisions of the laws No.143 of 1981 and No.7 of 1991, it is also prohibited to own or seize certain types of Land for Habitation and Agricultural Development Projects by any natural or judicial person.

The aforementioned Law has also **limited** the maximum permissible ownership of **Desert Lands**, subject to its provisions according to the results obtained by using economical irrigation methods. The Law **prohibits the drilling of any wells**, whether shallow or deep in desert lands except after the approval of the responsible authority, according to the relevant established terms and conditions determined by it, and after consultation with concerned authorities.

According to the State's Integral Socio-Economic Development Plan there are also certain locations for **free zones** – for industrial, commercial, financial and tourist areas – in the Governorate of M. Matrouh, as found also in Sinai and western desert Governorates.

Law No.59 of 1979 concerning the new communities prohibits the establishment of new communities on agricultural lands. Subject to certain restrictions is also the land of 100 meters allocated on each side of the public road leading to the new communities.

Similarly, the Law for the creation of New Urban Communities prohibits **the disposal of land of more than five kilometres around the new community** from all directions as the

responsible Authority determines it. It is equally **forbidden** to exploit or use this area to annex it to the community precinct, to divide it, or to construct any establishments or buildings there, in any form whatsoever, with some exceptions.

We can deduce from the above that is very important to be determined the prohibited areas on a map in order to be examined in relation to the other land uses of the area under consideration. In addition, to check the suitability of all possible land uses, their conflicts, and generally the preservation of the area's environment.

5.2.8. Natural Environment

Considering the Fuka-Matrouh area from the point of view of its natural attractions and resources it should be mentioned the **high quality coastal stretch, the Qattarah depression and the Siwa Oasis** in the greater area. These three areas have a unique quality, visual and aesthetic characteristics, which give the possibility of an authentic adventure, tourism and recreation.

The Mediterranean beaches, of the whole coastal area in question can easily be proclaimed as the most beautiful and longest in the world with some minor exceptions, something that represent a unique tourist attraction and a **natural reserve area** of cultural value, but also as a potential resource for development of tourism and recreation activities.

In spite of this important resource of the area, the environmental Law and the responsible Environmental Affair Agency do not provide a **special framework of protection and designation** of the coastal area as a **natural park** or other type of protection zone of scientific, cultural, tourist or aesthetic value. As the result the management of this **highly important coastal stretch** seems to be ineffective since the pressure for tourist development is continually increasing in spite of the fact that this area has limited access to the sea, and there are no other types of economic development, except for tourism.

However, the Law No.4 of 1994 concerning the environment organises the protection of the earth's environment from pollution. It has entrusted to the **environmental observatory networks** the task of periodic monitoring of environmental components and pollution, and to provide the relevant data to the concerned authorities. Similarly, the article 28 of the Law No.4 of 1994 prohibits the hunting, killing or holding of wild birds and animals of the species designated by the executive regulations that also determine the areas where the provisions of this article are applicable.

It is obvious from the above information that a more detailed policy and legislation regarding the **designation of areas of special natural importance** should be formulated to provide, a clear and effective framework of environmental management and of protection and development.

5.2.9. Cultural Environment

This type of the anthropogenic attraction, which is actually the basis for creating both nationally and internationally recognisable cultural profile (or product), cannot clearly define in terms of quantitative and qualitative characteristics.

However, there are certain aspects of cultural attractions in the area, such as **archaeological, tourist and natural resources**, that can be mentioned here as examples of significant cultural environment.

Marsa Matrouh city, for example, the capital of the Governorate, which was founded by Alexander the Great, has an **urban structure and numerous beaches, natural attractions and museums** which all together could constitute an internationally important destination, and create an internationally recognised special product.

Considering the greater area, we can value the whole system of attractions – **Mediterranean and seaside resorts, Qattarah depression, and Siwa Oasis** – as a unique cultural part of national as well as Mediterranean and international importance.

In the Matrouh City we can mention also certain focus points such as: the cave and the Rommel's Museum, the Cleopatra beach, the ethnological museum, the Awam Mosque, the old harbour, and cultural institutions of the regional centre. In the rest area there are numerous cultural attractions, such as small rural settlements and urban centres, monasteries (Aboa Mina), Roman ruins (under excavation in Ras El.Hekura), and numerous archaeological mounds. In addition, Bedouin tribes are also an important attraction, especially with regard to their way of life. Furthermore, a substantial attraction is of course the nearby II World War cemetery (in El Alamein), and a major cultural heritage site, that of the ancient Marina, known as "Leokathbes" port, of El Alamein, which is also still in the process of excavation.

We must also mention here the world heritage site of **Abu Mena**, a historic site east of the Matrouh greater area, and the site of **Zawiat Al-Agdab** near Saloum, west of Matrouh.

5.2.10. Urban Environment

We have already mentioned in the previous chapters, as in that on the cultural heritage, the existence of certain larger and smaller urban centres, such as M. Matrouh, Fuka, **Galal Dabba** and the nearby Alamein and Saloum. All these together, with the small rural settlements and Bedouin tribes, constitute an attractive human settlement network which is continuously expanding to cover new urban centres and holiday tourist villages, mainly along the Mediterranean coastal region.

It is estimated that this new combined coastal urban and rural development strip will play a more dynamic role in the region – both in terms of infrastructure (urban and tourist) and of urban expansion of the existing urban centres – in view of the situation with jobs, land uses, transport networks and the re-expected redistribution and possible attraction of greater numbers of people (employees) throughout the region.

6. LAND USE POLICY AND TRENDS – ISSUES AND CONCERNS

6.1. Legal Aspects of Land Use Planning

According to the specific field of activity and to the kind of the existing land use policy, **agriculture,** as a **land use mode,** plays a central role in determining the allocation and the pattern of land uses in the project area of Matrouh-Fuka. This is because agriculture has been granted the priority for land use, so that it is by now the land use mode around which most land management issues will revolve. One of the most important consequences of this situation that can be mentioned here is the structure of the **legal aspects** covering the whole spectrum of land uses and the peculiarities of the soil resource management in terms of perspective, ad conflicts.

This consideration of the land in this region is very important in order to stimulate the agriculture activity in such a way so as to obtain any possible volume of **runoff waters**. In addition, extensive arrangements should be made to exploit it from higher-lying lands and transport it into coastal low lands, where runoff water is practically insufficient for any crop to have serious changes of success.

This water is directly conveyed, in a controlled way, to cultivated depressions, or it flows, intermittently, through Wadis, or in other cases, is allowed to spread, under control, over lowlands subject to flooding. As a consequence, this agricultural system eventually creates special strong links between cultivated and non-cultivated land. Consequently the necessity of managing and equilibrating land between agricultural and non agricultural development is going to be the **most serious land planning issue in the years to come.**

Looking at the legal aspects of the land use, we have to mention here the **1981 Law No.143** which organises the utilisation's of dessert lands, defines the procedures and conditions for administration, exploitation and disposal, the **1982 Law No.203, the Prime Minister's Decree,** which relates to the definitions of dessert governorates, such as Matrouh, and the **1991 Law No.7** relating to some pending provisions concerning the state properties in relation to certain procedures.

In the **Law No.7** there are provisions for **Tourist Land Uses**, since it stipulates that the **General Authority for Tourism Development** has the duty to undertake the management, exploitation and disposal of lands **allocated for tourist purposes** in the same way that the **General Authority of Habitation and Agricultural Development** undertakes its duty on lands allocated for **reclamation and cultivation**, as well as the new **Urban Communities Authority**, which also undertakes the duty for the land allocated for new communities.

However all the above mentioned actions, laws, authorities and their own local units have to be co-ordinated with the **Ministry of Defence** under conditions and rules which are prerequisite for the state defence. This of course complicates the problems of sufficient and sustainable use of land resources of the area.

Similarly, the **Law No.59 of 1997** concerning the ***New Communities*** designates these communities as those which contain an **integrated society**, and aiming of creating **new civilised centres** which result in social settlement and economic prosperity, industrial, agricultural, commercial and other, with the object of redistributing the population through preparing new attractive areas, **outside the areas of established towns and villages**.

According to this Law the only governmental agency responsible for the establishment of **new communities** is that of the **New Urban Communities Authority (NUCA)**, while the law prohibits the establishment of this new communities on **agricultural lands.**

Regarding the policies for local government construction it would be essential to mention here the **Law No.3 of 1982** which is concerned with the organisation and reconstruction **guidelines** for local government units by using the Law and its executive regulations for reconstruction planning, while the **Urban Planning Policy** is the responsibility of the Urban Authority Agency, which prepares all reconstruction development plans and programmes at the state level, while the Local Units prepare **general planning** projects of towns and villages (through special consideration regarding long-term needs, military-defence requirements, etc.). The main duty is to determine the various utilisation's of the Land (land use planning), including residential, commercial, industrial, tourist and entertainment areas, and other uses which conform to the nature of a town or village, its circumstances and the needs of its inhabitants.

Local Units are also responsible to define the kinds of utilisation of towns, or village lands, and to get temporary rules and conditions. These local units organise the reconstruction and the preparation of detailed planning projects for the areas included in the general planning, and which are issued as a decree by the concerned governor. The above Law organises the actions concerning permissible utilisation's of lands and buildings occupancies in the **centre area** and in the **industrial area,** and the allocation of town **quarters,** as well as the determination of public interests, the exploration of **real estate properties**, and all other objectives of **urban planning**.

According to the **Law No.4 of 1994** (the first integral law on the environment in Egypt) a new governmental agency was established, with a body for environmental protection and development under the name **"Environmental Affairs Agency".** This agency has branches in various Governorates, and its goal is to design the **general plan** and the necessary special plans for the environment conservation and development, and also some experimental projects providing standards and guidelines (averages and rates, permissible pollution limits, etc.). The Law also gives to the responsible agency the duty to prepare an **emergency environmental plan**, participation in the integrated National Plan for the administration of the Coastal Areas in the Mediterranean Sea and Red Sea.

The Matrouh Governorate has also the duty to **study** the local environmental problems (through its environmental department), to **define** them, and to **report** to the local and national agencies for designing suitable solutions. On the other hand, additional governmental authorities (Ministries of Health, Marine Transportation, Housing and Utilities, Reconstruction and New Communities, Irrigation, etc.), with their local departments, are also responsible to apply the existing **environmental legislation,** each in its field of competence.

6.2. Land Use Conflicts (Coastal and Inland), and Trends

Examining in brief the existing situation of land uses and activities in the area of Fuka-Matrouh, a great many inland and coastal **conflicts** have been identified dropping within the following **main issues**:

a) **Uncoordinated** land uses and activities, and potential conflicts among existing and future land use patterns;

b) **Deterioration** of natural resources, coastal and inland;

c) **Intensive unplanned** tourist and holiday development on the water frond producing land use conflicts;

d) **Unplanned** international land use activities close to the coastal line;

e) Cultural and recreational **conflicts;**

f) **Uncoordinated**, problematic, or totally absent provision of access to technical infrastructure and social services, and access to the shoreline; and

g) Organisational **conflicts.**

6.3. Suitability of Land Use Planning Policy

In view of the sensitivity and scarcity of the available and suitable land resources of the area under consideration, and taking into account the high **development pressures** related to rapid tourist and holiday growth, especially along the sea-sites, there is a **high risk** of learning the exercise of land use planning in an uncontrolled and undesired land use development policy pattern, as it is happening today.

The incident of huge inhuman scale of the big tourist and holiday projects, taking place in uncontrolled manner of development is a common threat to coastal ecosystems and to the land use sustainable development of the whole area under consideration in general.

The capability of the **natural systems** of the area to provide support for **a multi pattern economic development**, including energy, building materials, and traditional production, and to absorb the interference of any land pollution (ground water, seawater, land, and waste), is the critical threshold within which the area's sustainable economy can expand.

Although information and knowledge of the existing environmental systems of the area is still too limited to answer this particular question with any certainty, a host of warning signals provides us with increasing evidence that the **impact of human activities** (such as that of coastal development), in the area might have already gone beyond the capability of maintaining the integrity and productivity of natural resources.

One perspective from which this can be evaluated is that at the introduction of a **new land use policy**, among other things, the **concepts of carrying capacity**, new land management techniques, conservation guides of natural resources, and sustainable coastal development should be incorporated.

To achieve the sustainability of the current patterns of development policies, both in the level of development processes and in the level of demand for natural resources, should be considered carefully. These are influenced by the **size, volume** and **traditional local characteristics** of human activities, and also by the processes and technologies employed.

If certain measures, including **national Laws and guidelines**, are amended, it will be possible to develop a more safe framework of development of the Fuka-Matrouh area, on a sound basis, without fear of any damage to the area's sensitive environment, and more generally, without any risk in approaching the process of sustainability of the coastal natural resources of the area.

6.4. Problems of Land Use Planning Co-ordination

There are several sources creating Land Use problems in the project area, which have directly or indirectly mixed environmental, socio-economic, socio-political and socio-cultural effects. Among the most important issues observed already in the area, in order of priority, and which have resulted during the last 10 years are some of the following **group of problems:**

a) Planning and management aspects related to all stages of development.

b) Marine pollution of the whole coastal region (Air and soil pollution seems to be limited).

c) Extensive land depredation.

d) Lack of any provision for natural, cultural and historic heritage preservation in the principal areas.

e) Land ownership aspects of all kinds

f) Organisational, Institutional and Legal aspects (lack of an effective authority at the local level /Governorate/ responsible for the integrated planning and management of the coastal, urban and rural affairs, with the exception of the defence requirements of the project area) (Map 5).

g) Infrastructure and institutional capabilities, as well as monitoring and research activities aspects.

h) Infrastructure, technical and social services, such as:

- **Telecommunication systems;**
- **Transportation, traffic and accessibility;**
- **Water supply;**
- **Waste collection and disposal;**
- **Drainage system;**
- **Sewage collection and treatment;**
- **Health and medical services;**
- **Education;**
- **Social services;**
- **Energy;**
- **Environmental monitoring, impact assessment and legal actions;**

i) Geographic distribution of initiatives and public-private investments.

j) Educational aspects and provisions for public participation processes.

k) Seasonal capacity of technical infrastructure (especially water and energy).

l) Local market and Tourist/Holiday Market conflict.

m) Mobility and distribution of the local and national employment sector.

n) Existing settlements and new urban development patterns.

o) Aspects relating to main sectors of the economy:

- **Agriculture and Pasture;**
- **Industry and Commerce;**
- **Tourism and vacation activities;**
- **Housing/Construction.**

However it is worth to mention here the fact that hierarchy of land use planning systems is not well co-ordinated and lacks public participation. However more innovation is needed for detailed consideration of the above problem areas, so that to overview positively recommendations and proposals.

6.5. Environmental Problems

The way the land use pattern is developing in the project area has a primary influence on the **types of pressures**, which are allowed to act on the environment. An environmental impact assessment of the actual land use status of the area is the most crucial prerequisite for identification and final evaluation of the nature, the degree and the impacts of the direct and indirect environmental problems. However statistics, data, existing and planed policies, as well as others necessary sectoral and sub-sectoral considerations, such as an integrated mode of environmental impact assessment of certain human activities, like that of

agriculture, tourism and infrastructure services, are needed before any conclusion is made regarding the level and the degree of environmental awareness.

What is actually obvious is the fact that the majority of the project parts are almost undeveloped, while certain zones – mainly along the coast – are being very much exploited but without systematic employment of policies, plans, programs or necessary environmental protection measures. Therefore due to the lack of available results of analytical studies and research work in this area, it is rather without any practical value the discussion of any possible negative effects of the above main activities on the components of the area's ecosystem.

6.6. Land Use – Main Requirements

When considering the issue of land use requirements of the area, it is first of all necessary to define, evaluate and discuss the existing and the potential **land use conflicts, the kinds of obstacles** that are responsible for this situation, and the **information** on these issues that has been gathered in other areas of Egypt, as well as **comparative results and policies** hat have been already introduced in other cases of the country.

Another useful issue for land use requirements and specific consideration is the examination, through extensive studies and research, of alternative ways of implementing comprehensive policies, providing base sets of reliable and comparable development patterns reflecting sustainability. This imply the need to implement conceptual work on **key resources** of the area which can be sustainable in the long rung within the framework of a carrying capacity analysis of their land units resources.

To improve land use co-ordination of the authorities, their responsibilities and their duties, it is very important to establish a regional planning centre in the Governorate. It would be used to prepare development plans, programs and investment plans in an integrated way, so that, not only to avoid possible land use conflict, but also to prepare an actual take off of a new development pattern in the Mediterranean region.

7. DEVELOPMENT OPPORTUNITIES

From the above presented evidence we firmly believe that coastal protection, planning and management in the project area of Matrouh-Fuka have suffered mainly during the last two decades, when the tourist and summer holiday activity started, based mainly on **uncoordinated decisions** and **actions** at both the national and local levels. Accordingly, we believe that there are inadequacies in **legislation, anomalies in the planning system**, lack of central guidance system, and overlapping and conflicting policies and responsibilities (and in some cases, a lack of any real action) among a host of bodies, with poor co-ordination between them.

Much of this has arisen partly because of the existing traditional patterns of ownership of the coastal areas, and partly because the responsibility boundaries (at the national level in particular) separating the administrative powers are not drawn with regard to the presence of natural coastal processes and the possible consequences on one part of the shoreline of interference in another.

Ignoring this coastal dynamics as a principle (Fig. 5), like in most coastal areas of the Mediterranean region, has led to the present general failure to plan or protect this nation's coastal resources in an integrated and co-ordinated manner.

However, despite the world-wide recognition of the coastal areas overwhelming importance – as has already been presented in the chapter 3 of methodology above – institutional arrangements, and inter-sectoral and inter-governmental linkages are too often poorly articulated, ineffective and inefficient in the case we are examining.

Meanwhile, considering the situation where specific and dispersed interventions (mainly by foreign investors in tourism) still dominate, the time has come for concerned management, of course around a planning strategy – such as that of ICAM Planning Study we are developing here – based on balanced **development opportunities** compatible with the **coastal environment**. To achieve it, a presentation of the realistic development **potential opportunities** should be organised so that the convergence of the public policies and of the local initiatives be ensured:

- **Tourism development** of the type of four seasons (the conditions are ideal for this type of tourism), mainly for international visitors (a sector which is still not well developed) based on the natural attractions, such as superb beaches, coastal capes, special natural locations with excellent view to the shore, and other morphological sites (hills, plateau, etc.), but also on cultural heritage sites, monuments and archaeological sites.
- **Expansion of agricultural activities** through intensive programmes – similar to that of the LUPEM programme of land reclamation – incorporating greenhouse units, agricultural classification, provision of water supply from alternative resources, in combination with wind energy processes, diversification of suitable agro-product, introduction of farm, greenhouse and agro-tourism models under the principles of sustainable development.
- **Development of fish industry** not only for local demand – which has anyway been at a rather low level until now – but for the international market as well. A very promising sector is that of aquaculture, but it should be developed with careful planning and continuous monitoring.

- **Natural attractions potential opportunities**. A remarkable feature of the shoreline is the succession of bays, the first of which begins east of Matrouh City and extends to Alamein. Owing to the above features, the area is distinguished from other coastal areas. The coastal capes are formed by rocky projections. The most remarkable of them is Ras El-Hekma with its excellent location, overlooking Hekma bay to the east and Abu Hashfa bay to the west. Abu Hashfa bay contains Ras Hawala, where beaches are superb for tourism (El-Bastawissi, 1989). Other locations should be mentioned here such as Ras Alam El Rum, M. Matrouh inner bay, and the water collection areas adjacent to M. Matrouh city which become special ecosystems.
- **Historical-cultural heritage**. A remarkable culture heritage site east is that of Marina/Alamein located 190 km from Marsa Matrouh, which is still being excavated, while under extremely heavy tourist development pressure on all sides. Taking into account the construction under way of a new airport, a harbour and a tourist marina, this monument will be in the near future a cultural pole with strong influence on our study area. The framework of this project area takes us in the east to the international heritage site of Abu Mena, in the south to the temple of Jupiter Amun in the Oasis of Amun-Siwa, and to the west to the site of Zawiat Al-Agdab near Salum. In the Mediterranean context, however, the site of "Abu Mena" cannot be ignored or even overlooked, as it eminently appears both in the World Heritage List and the list of "100 historic sites of common Mediterranean interest" (El-Raey, et. al, 1998). Among other major sites we can mention here are the following:

  1. *Abu Seir,* some 50 km out of Alexandria, includes many of ancient Egyptian, Roman, and Coptic monuments. Excavations are also currently underway in search of Roman monuments.
  2. *Marinul El-Alamein*- the ancient " Leokathbes "about 100 km out of Alexandria. It is a Roman settlement, still being excavated.
  3. Some interesting archaeological sites to the west of Matrouh like:
     - *Cleopatra Site:* 15 km west of Matrouh, including Cleopatra's Bath and the famous Cleopatra's Rock.
     - *Agiba Site:* at Um Al-Rakhm- about 30 km west of Matrouh, including Roman catacombs. The site is still being excavated.
  4. Some of interesting archaeological sites to the south of Matrouh like the Oasis of Siwa. Siwa includes the Temple of Jupiter Amun (temple of secrets), the temple of Nectanebo II and Gabal Al-Mawta (Mountain of the Dead).
  5. The other compelling example, with vast capacity for comprehensive development potentials, is that of the World- and Regional- Heritage *Site of Abu Mena,* which lends itself readily to fill restoration of function (if not also of form). Whereby, it can recover its past glory as a pilgrimage centre of great popularity and attraction throughout the Mediterranean region (El Ray, 1998).
- **Economic resources base for industry**. The raw materials, which are available in the region, provided the support to organic and inorganic chemical processes. These industries are very important because they can act as a nucleus, attracting other industries. The number of possible downstream operations based on both the organic and inorganic chemical complexes is very large. The choice of products, which should be manufactured in the future, will depend on the marketing opportunities and the technical knowledge available by that time; both change rapidly. It is, therefore, premature to enumerate the possibilities.
- Socio-economic potential opportunities.

- It is likely that members of a single family would be willing to co-operate in communal development;
- The dominance of extended families living together as a community is an asset for implementation, particularly of model trials and action area projects where the target community would belong to a single family;
- The project area has soils, which are likely to be suitable for the fabrication of environmentally suitable and cost-efficient construction materials with very little processing;
- Income of needy families could be supplemented by agro-processing and traditional handicrafts, which are usually made by women;
- Older women have more mobility and decision-making privileges. They, rather than younger women could be better targets for training.

8. DEVELOPMENT CONSTRAINTS, LIMITATIONS AND THREATS

8.1. Constraints

As concluded from the above analysis of the profile of the study area, there are important constraints which need to be taken seriously into consideration in the outline of the strategy for the planning and management of the coastal areas we are examining. The most visible examples are the following:

- Instability of the coastline due to natural processes, such as coastal erosion and sedimentation, creating an unstable coast.
- Loss of wildlife, natural habitats, and landscape degradation due to unlimited grazing – mainly by Bedouins – and hunting, uncoordinated land uses, infrastructure works and tourist/summer holiday large scale projects development.
- The ad hoc model of responsibility boundaries and authority regarding ownership and powers of control and co-ordination of the development of the area.
- Conflict legislation and available planning and management instruments concerning not only the horizontal relations between sectors of activity, but also the intermeshing of the policies and actions carried out at various levels of territorial authority. Application of the subsidiary principle (tourist villages for example) too often leads to a panelling out of responsibilities, which are simply distributed between the levels of competence, with no scope for taking account of the numerous interactions between them. Owing to this lack of co-ordination, the complex relations between human activities and the coastal environment are neglected, and the isolated measures fail to achieve their goal, or may even be mutually contradictory.

8.2. Limitations

Among the most crucial limitations of the area under consideration the following should be mentioned:

Regarding the area's surface water, it is very limited in volume as it originates from the rainfall of the winter season. Most water harvests are concentrated in the northern part. Runoff is possible after rather heavy rains, and a considerable amount of water may percolate to deeper soil layers. The main elements of the water balance of the project area is rainfall, as input, and evaporation, runoff recharge to groundwater and change to soil moisture storage as output.

The main groundwater source is the Nubian sandstone aquifer which extends to the north of Qattara Depression. In the Fuka region, there is also trapped groundwater aquifer from which water is extracted through hand dug or drilled wells, and is used for irrigation of orchards. A minimum safe yield from Fuka aquifer is estimated to be 5,000 m^3/day. Salinity is low and ranges from 2000 to 3000 PPM. The groundwater, which is suitable for agricultural and domestic uses, occurs in relatively shallow non-artesian aquifers or in small shallow semi-perched aquifers with slight artesian pressure. The non-artesian aquifers in the coastal plain found in near land surface, are recharged directly by rainfall and the infiltration of surface runoff. The quality of the water in the several aquifers in the area varies widely according to

seasons. The best quality is found in winter and the worst in autumn. Also the water contains about 20,000 ppm of solid matters, which reduces the water quality.

Other Water Facilities: Currently, an estimated 434,700 m^3 per month of water in winter and *453,300* m^3 per month in summer is supplied to the Governorate via the pipeline system, train and desalination plants for areas west of and including El- Alamein (USAID, 1988). While the rural population relies mainly on cisterns for drinking and on galleries for washing, the water resource for the main population centres comes from outside. Extension of a pipeline from Alexandria supplies public water to Ras El-Hekma (Ayyad, 1995).

There is no satisfactory system for sewage collection and effective treatment covering not only the coastal zone –which is of course very important – but also the whole study area, so that we can achieve both environmental protection and water recycling for non drinking purposes, which is essential for an area poor in water supply.

More specifically, the vacation complexes developing along the coastline do not have any sewage systems or treatment plants. Sewage is collected in septic tanks and it percolates though sand, and is likely to reach the beach. Septic tanks are used in Marsa Matrouh, too. The waste water for the population in towns is discharged directly into creeks and no sanitary sewage disposal is practised except for few privately owned separate units (El- Naggar et al, 1988).

Energy supply is also a limiting factor for the study area since the power plants in Marsa Matrouh produce 60 MW, only 20% of which is being utilised. The cables are in a poor condition and cause frequent electricity cut-off, but there is a plan to replace the present cables. Since there are no central transformers in the town, each building complex has to install its own transformer.

Infrastructure and accessibility limitations should also be mentioned, such as:

- Insufficient infrastructure for harbours (the new one has already been abandoned for military purposes), roads, railroads, airport, and specific development zones (tourist and industrial).
- Inadequate system of transportation, communication and other technical and social services. It should also be highlighted that there is a poor level of education and health services, a fact which is crucial for developing international tourism.
- Low level of awareness, as well as lack of public participation and, accordingly, positive contribution to developing plans and policies regarding the area under consideration. This particular limitation during the last years has been proven to be the key issue for planning consensus and successful development projects.
- There is a lack of specialised staff, followed by the lack of sufficient population to support extensive tourism and agrotourism programmes. There is a growing need not only to absorb more population in the area but also to provide specialised knowledge to the trainees.

A number of limitations can also be found in organisational aspects, such as:

- lack of land ownership maps and database,
- lack of infrastructure to help the Bedouins organise their own way of life within the modern system safeguarding the traditional culture in the production activities,
- uncertainty of individual land ownership,
- uncoordinated planning and management of big projects constructed in coastal zones, as well as smaller ones,
- overlapping authorities starting from the ministry level down to the local one.

8.3. Threats

In an era of globalisation and social and economic transformation of many areas, regions and sub-regions, the question remains in which way the process of development will be directed in the area we are studying. The local, regional, national and international factors will influence differently the existing trends and dynamics of the study area. Accordingly, the present threats should be considered as changing conditions, and the expected changes could possibly be proved to act as beneficial factors for the future development of the area. Therefore, the present dangers presented below have only relative value:

- Pressures upon the coastal ecosystems due to tourist and summer holiday development projects, as well as sea and inland pollution;
- Environmental degradation to be caused – as actually was in the past – by heavy coastal land utilisation mainly due to urban and leisure activities, port and marina developments;
- Intensive military presence along the beaches;
- Intensive future fish industry (mainly aquaculture) development; and
- Conflict between land ownership and infrastructure development.

9. RECOMMENDATION OF THE ICAM PLANNING STUDY – ALTERNATIVE SCENARIOS

In order to develop a programme of integrated management (ICAM strategy) there is need for planning and developing some basic prerequisites of the design and development of the coastal zone in the form of **alternative scenarios**, so that to enable the evaluation of the proposed planning of the study area and especially the strategic evaluation of the environmental impact assessment.

Within the basic **prerequisites**, as they develop from the examination of the existing situation, the tendency and dynamics, the expectations of the local actors – to the extent which was possible – we can mention the following:

- Growth and spatial stabilisation of the internal population flow (migrations) into the study area and development of opportunities will result in an effective **concentration of the decentralised population** along infrastructure axes (development corridors), transportation junctions and close to urban centres. This will result in decongestion of Marsa Matrouh and its urban environmental upgrading.
- Encouragement of **mixed land uses** (rural/urban/tourism) and development of sustainable processes, so that to safeguard the future of Matrouh Governorate, especially regarding the employment of Bedouins and other social groups.
- Encouragement of the **agrotourist development** (farm tourism and ecotourism).
- Concentration of the industrial development in different areas so that to safeguard the population distribution within the study area.
- Development of **alternative energy resources** in order to find sustainable, easy and low cost energy useful for industry, farm industry, agriculture, agrotourism, water production (underground, sea water desalination or recycling) and other economic activities. It must be mentioned at this point that there are good prospects for solar, biogas and wind energy (special parks are proposed in the following programme).
- Modernisation and expansion of the essential social and technical infrastructure units (transportation, communication, education, health, etc.) with which we can achieve the preparation of the region to absorb the expected development. Transportation networks (air, sea, railroad, metro, and road) should be co-ordinated effectively.
- Diversification of the sustainable tourist product so that to be used especially by the international market – today it is at a low level – and indeed for four season type of tourism owing to the special positive local climate.
- Modernisation of the existing five sea water desalination stations and proper expansion.

Accordingly, on the basis of the above mentioned prerequisites, the following five basic scenarios could be proposed:

- **Scenario I** with emphasis mainly on the **tourist sector;**
- **Scenario II** with emphasis mainly on the **agricultural sector;**
- **Scenario III** with emphasis mainly on the **industrial sector;**
- **Scenario IV** with emphasis mainly on the **agrotourist sector; and**

- **Scenario V** with emphasis mainly on the combined **light industry-agrotourism sector.**

The above five scenarios could be possibly further diversified in terms of degree of emphasis, intensity of use, scale of development and, of course, that of their combination. In this way we can produce more scenarios with the appropriate restructuring of the requirements proposed by the local officials and the public.

10. STRUCTURE PLAN – PROPOSED SITUATION

The study area of Fuka-Matrouh was considered as a potential **internationally oriented** coastal region combining not only the tourist sector, which will be used in any way as a focus activity, but also light industry, international trade and institutional activities. The location of the study area next to the Libyan border and with the Mediterranean Sea to the north, should be seen as an advantage for the development of international relations and accordingly positive growth potential.

For this purpose a mixed model of land uses and activities, such as tourism, light industry, trade, training, cultural and educational activities are planned, along with other proposed investments in the private and public sector (especially for infrastructure facilities), agricultural and energy sectors. Cultural activities seem to have a higher priority in the proposed plan (taking into account the need for extensive excavation works when the financial opportunities permit, in order to find possible archaeological sites and historical monuments).

The coastal study area has a special position in the Mediterranean tourist pattern of Egypt, with its excellent climate, its potential international orientation, but above all its commitment to culture and growth of its population structure for the period to come. That is why the coastal planning is important for the whole country, and must be organised with the double aim of reinforcing the Mediterranean regional opportunities to take care of Egypt's interests internationally, and of promoting local development for the benefit of the study area's inhabitants.

According to the proposed plan the coastal region comprises the greater M. Matrouh urban area and the 5 rural/tourist centres from Garawla to Fuka. With moderate expectations of population growth, the entire coastal area is differentiated in terms of development strategy from urban to rural and to mixed type of development.

This mixed and integrated model of planning is considered to have better prospect not only with respect to restructuring of the existing rather segregated type of development, but also to the expected growth as well as the attraction of new development. According to the proposed plan the **development strategy** moves within the following 6 main axes:

- Restructuring of the **urban form** of the greater M. Matrouh area.
- Re-planning of the existing **traffic structure** for the whole coastal region integrating all modules of transport.
- Provision of new urban/rural/tourist **development opportunities**.
- **Higher population density** should be utilised to locate workplaces that need to be easily accessible from the whole coastal region. The **new mixed urban/rural/tourist construction possibilities** will, in principle, be located in "**close-to-station areas**" in the proposed linear coastal development.
- Location of **six key areas** (points) combining stations, junctions are envisaged out of the M. Matrouh city. The realistic construction possibilities around these key points should be assessed in connection with further local planning, considering both the limitations of the "close-to-station areas" and the proposed urban/rural/tourist planning guidelines for their future.

- Development of a new **international multi-functional district** southwards to the city boundary and close to the M. Matrouh airport, combining light industrial part, free trade market, exhibition and training centres. The new district could have up to 50,000 workplaces (2020) mixed with **housing** and **tourist/cultural/educational institutions** such as a **new university**.

The above strategic planning of the coastal area is expected to act as a **dynamic financial model** for its innovative development structure, generating for the projected period (2020) real possibilities to bring the urban area of M. Matrouh together in a functional co-operation with the rest of the coastal region (integrated planning concept).

Accordingly, the observed transformation of development of the north part of the Mediterranean region (EU expansion, national competition, co-operation with non EU regions, etc.) should also be perceived as an opportunity to raise Egypt's Mediterranean profile and its development prospects.

The proposed plan covers the time period until the year 2020, which means that until then there is a need for a **detailed planning instrument** (Master plan) incorporating political goals and development opportunities for certain short periods (4-5 year plans). It was considered, however, that a more secure **long run target** is more appropriate for the case we are examining, due to certain limitations and obstacles we mentioned previously, in order for both the **sustainable development** and the coastal environmental protection to be considered as primary objectives of the proposal.

As shown on the maps (Maps 7, 8, 9), the scenario which was chosen to be used in the ICAM Planning Study as a basis for the development of its structure, is the **fifth scenario** which emphasises the mixed land use system of the balanced (to the degree that this is possible) **urban/rural** growth based on the principles of **sustainable development**.

As it became obvious from all of the above scenarios, the re-planning of the basic infrastructure axes (especially that of the road access) is considered a necessary prerequisite in order to:

  - safeguard the expected urban, rural, tourist and industrial planning and development;
  - avoid the possible conflict of land uses; and
  - accelerate the concentration of urban and rural developments in a rather friendly environment and close to their activities.

- Thus, a **new motorway** replaces the existing international road at a distance of approximately 10 km from the existing old one, in order to lift the load off the programmed activities and land uses, as well as to limit the negative environmental consequences on the coastal ecosystems. For the development of the new motorway, **7 junctions** have been planned for the immediate – multilevel connection of the equivalent urban/rural centres (existing and new: Fuka, Hekuma, Bagoush, Hawala, Garawla, airport/M/ Matrouh and M. Matrouh city).
- The **old road axis** takes the place and use of a local road network and **development corridor**, which with the existing railway track provided with an appropriate modernisation in the form of the fast transit system, will serve both the new urban/rural centres and the surrounding development activities (tourism, agricultural, etc.). These will reach, where possible, ports – tourist marinas and the proposed coastal leisure and tourist activities.
- A **coastal zone of 200 to 250 m width** regarded as a critical zone in the coastal system of Figure 5, combined with the El Hekma area, should be **totally protected**, and if possible become a **national coastal park**, where only vertical axis (access

roads) to the coasts, parking, bicycle zones, pedestrian areas (along the coast) and beach activities (see special programme and guidelines) will be permitted.

- The development of **7 tourist zones** from M. Matrouh city to Fuka with their own urban/rural centres, mixed land uses, stations and junctions which will facilitate their growth over the years depending on the developments taking place in the surrounding areas which are studied here.
- Strengthening of **training centres** (tourism, agrotourism and light industry/agriculture) and **special parks** (5 energy wind parks, environmental awareness park, exhibition centre, etc.) to support the programmed actions.
- Development of certain **zones for intensive cultivation**, industrial parks, light industrial/agro-industrial parks, and mixed agro/tourist zones.
- Hierarchical development of **sea tourism** with ports, marinas and other suitable facilities, as well as inland tourism, rural urban centres and development corridors.
- Encouragement of the development of special urban areas of the "**urban village**" type in the greater M. Matrouh area for the redevelopment of the urban framework structure of the city, absorption of the development tendency towards expansion of population growth and human actions. Their development can take place in the Planning zone III, strengthening the parallel development of the rural/urban land uses.
- Categorisation and distribution of the appropriate **planning density** in Planning zones I, II, III and IV, according to the planning provision of the special guidelines and specifications designed through the planning strategy and noted further on.
- Use of the urban part of the **railway line** with the appropriate modernisation, redevelopment and underground construction, in order to transform it into a Metro line system serving the central area, the airport and the proposed main new urban/rural centres of the city of M. Matrouh. This initial underground metro system can later be expanded so that to cover the area among the developing 6 district urban/rural centres from Fuka to M. Matrouh, and possibly the whole Mediterranean coastal region. The perspective of this fast railway system transfer from Fuka to M. Matrouh will aid to a significant extent the developing initiatives, help lessen environmental pollution, and finally attract even more population, investment and the concentration of activities at the railway junctions (key points).
- Development, not only in the capital city of M. Matrouh but in the whole coastal area, of the necessary **infrastructure** for water supply, sewage and waste collection and treatment, energy, transport, and telecommunications, as well as for education and research, in order to achieve the sustainability of the Governorate and the appropriate sustainable planning and development of the coastal area in general.

10.1. Preliminary Planning Zones

Within the study area, **two main planning zones** (Action plans) have been proposed: one urban (covering the greater M. Matrouh area) and one mixed urban/agro/tourist (for the remaining coastal area) (Map 13). Each planning zone (action plan) has been divided into subplanning zones, two in the first zone and five in the second. Both planning zones have three planning dimensions covering the **coastal zone system**: the **crucial, dynamic** and **independent zones**, at a distance of approximately 200 to 1000 m for the crucial, 1-6 km for the dynamic, and 10-16 km for the independent one.

The **preliminary planning zones** should be examined in a more detailed way within a framework of the **local plan** (Action plan) in accordance with the **guidelines** (see special reference), the planning regulations and the co-ordination requirements of the whole integrated coastal system.

The **urban planning zone 1** (Map 14) incorporates two sub-zones: that of M. Matrouh and Ras Alam El-Rum with a total population of 200,000 in the year 2020 at a surface area of 805 km^2, giving a density of 212 persons/km^2. Within this planning zone 1, there is a provision for **two tourist coastal sub-zones** with a surface area of 47 km^2 (max. depth: 3 km) (Fig. 10). Furthermore, in this zone we have protection areas, such as a coastal zone of 200-250 m, and about 5 natural and cultural monuments (Map 15).

Planning zone	Sub-zone 1	Sub-zone 2	Sub-zone 3	Sub-zone 4	Sub-zone 5	Sub-zone 6	Sub-zone 7	Outside tourist zones	Total area
1	26	21						758	805
2			32	21	29	21	23	1669	1795
Total	**26**	**21**	**32**	**21**	**29**	**21**	**23**	**2427**	**2600**

Figure 10: Tourist Development Sub-Zones within Planning Zones 1 and 2 (km^2)

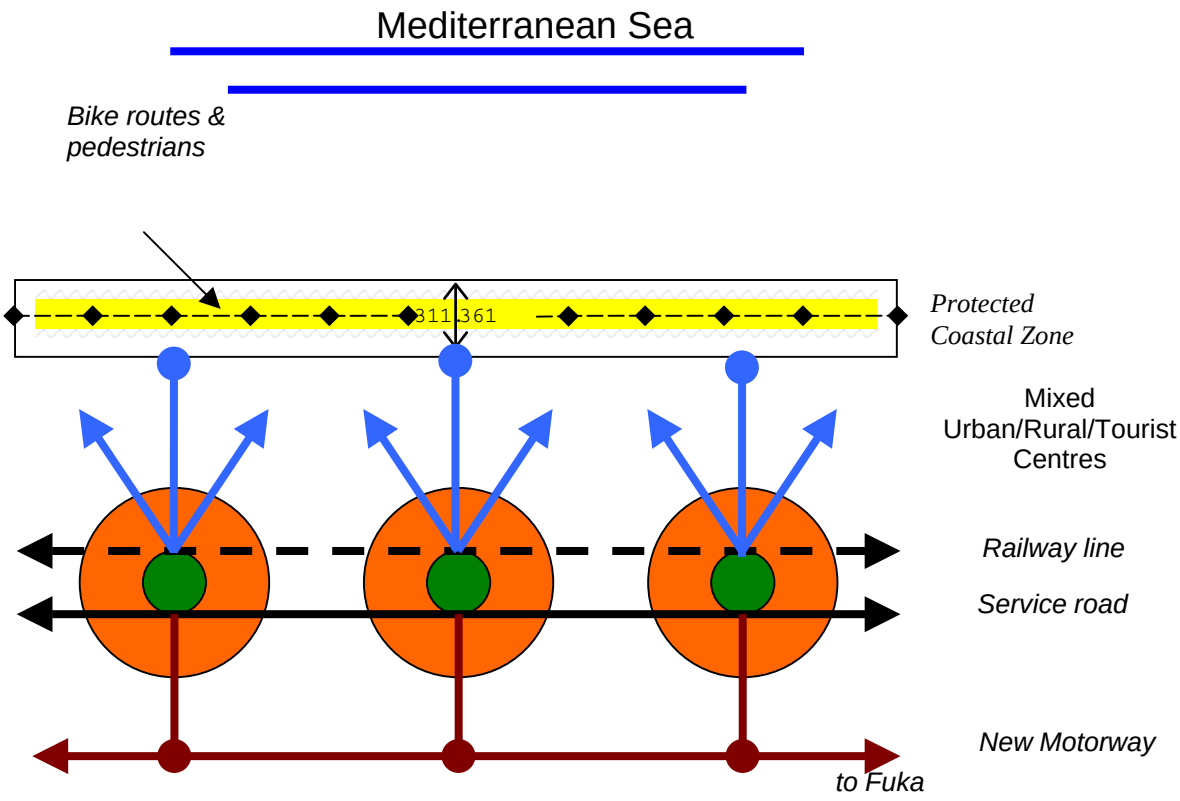

Figure 11: The Mixed Land Use Planning Concept

Similarly, the **mixed urban/rural/tourist preliminary planning zone 2** (Map 14) incorporates five subzones: that of Carawla, Ras Hawala, Mersa Boggush, Ras El-Hekma, and Fuka, with a total population capacity of 180,000 inhabitants for the year 2020 at a surface area of 1,795 km^2, which gives a density of 109 persons/km^2. Within this preliminary planning zone 2 there is provision for **five tourist coastal sub-zones** with a surface area of 126 km^2

(max. depth 3 km) and tourist capacity of 500 persons/km^2 for beach activities (Fig. 10). Apart from the protected coastal zone of 200-250 m, we have in this zone one natural monument, that of Ras El-Hekma, with high value and international reputation.

In Figure 12, we propose a **planning control system** to be applied for the effective safeguard of the sensitive coastal environment. In the same figure some of the possible permitted human actions are proposed for the three zone coastal system as well as their capacities. Further details should be available in the second phase of the ICAM Planning Study when the basic development and planning figures will be approved (Parpairis, 1998).

Coastal system	Coastline (km)	Coastal area (km^2)	Tourist capacity (beds)	Local population	Total population	Degree of control	Main activities/uses
Critical zone (0.2 km)	170	20	-	-	-	Absolute	Beach activities
Dynamic zone (3.0 km)		300	100,000	100,000	200,000	High	Tourist, residential, buffer zones
Independent zone (the rest within the study area)		2280		280,000	280,000	Partial	Mixed land uses, light industry, rural areas
Total	**170**	**2600**	**100,000**	**380,000**	**480,000**		

Figure 12: The Coastal System Zones, Main Uses and Capacities (Tourists and Local Population)

However, the importance of coastal habitats and natural ecosystems calls for the **biodiversity** and environmental considerations to be accounted for in determining detailed level and degree of development of the area could be permitted. **Criteria** for the application of a detailed planning and management scheme for such a coastal ecosystem should be proposed in the **second phase** together with other analytical techniques and suitable tools for a unique **biodiversity sustainable strategy** for the entire coastal area.

In the Map 15, only a general scheme for biodiversity, as well as cultural protection and conservation has been drafted for the study area, identifying only the crucial areas to be protected according to their environmental qualities and requirements.

However, the problem of the effective protection of the entire coastal system calls for a more detailed approach – within the framework of the **action plans** – through extensive survey for each identified area or monument, so that not only the natural and cultural environments are protected, but also the sustainable way of development of the areas, mainly for tourism and for the related infrastructure. In this way it is expected that certain types of ecosystems will be identified, classified according to the IUCN classification system (I, III, IV, V and VI), and designed for each of these types and categories consequently, governing the protection and conservation requirements and the possible nature, degree and form of any development, like leisure and tourism, but also mixed agro/tourist activities (Parpairis, 1997).

10.2. Action Plans and Programmes

Within the framework of the ICAM Planning Study's first phase, it would be useful to consider the basic figures of the proposed action plans: that of **population**, **tourism** and the main structure of **land use requirements**.

Regarding the **proposed population capacity** for the projected year 2020, in the **Planning zone 1**, 200,000 inhabitants are located in the subzones 1 and 2 (180,000 and 20,000 respectively) while in the **Planning zone 2**, 180,000 inhabitants are distributed in the five

sub-zones (35,000, 30,000, 45,000, 25,000 and 45,000 respectively) (Fig. 13). It was estimated that the total population growth of 380,000 inhabitants should be distributed within the 2 planning zones in a total surface area of 2,600 km^2 of the study area which gives a gross density of 146 persons/km^2 (Fig. 14).

Year	Total population	Projected population in the preliminary planning zones						
		Planning zone 1		Planning zone 2				
		1	2	3	4	5	6	7
2000	110,000	90,000	?	?	?	?	?	?
2010	200,000	120,000	8,000	14,000	12,000	16,000	10,000	20,000
2020	380,000	180,000	20,000	35,000	30,000	45,000	25,000	45,000

1–Marsa Matrouh, 2–Alam El Ram, 3-Garawla, 4-Hawala, 5-Baggush, 6-Hekma, 7-Fuka

Figure 13: Population Distribution in the Study Area in Year 2020

	Matrouh Governorate	Study Area Fuka-Matrouh	Preliminary Planning zone 1	Preliminary Planning zone 2
Area (km^2)	212,000	2,600	805	1795
Population	211,966 (1996)	380,000 (2020)	200,000 (2020)	180,000 (2020)
Density (inh/km^2)	1	146	248	100

Figure 14: Projected Population and Densities on the Level of Governorate, Study Area and Planning Zones

Year	Total number of beds	Projected tourist accommodation capacities (beds) in the preliminary planning zones						
		Planning zone 1		Planning zone 2				
		1	2	3	4	5	6	7
2000	40,000	?	?	?	?	?	?	?
2010	66,000	14,000	8,000	6,000	8,000	14,000	6,000	10,000
2020	100,000	20,000	15,000	8,000	12,000	20,000	10,000	15,000

1–Marsa Matrouh, 2–Alam El Ram, 3-Garawla, 4-Hawala, 5-Baggush, 6-Hekma, 7-Fuka

Figure 15: Tourism Distribution in the Study Area 2020

Similarly, the tourist development – in all possible **forms** (hotels, villages, hostels, camping sites), **types** (mixed, tourist, summer holidays) and **categories** (3, 4 and 5 star units) – in the coastal region has been proposed and distributed in the following capacities in each action plan and its sub-zones (Fig. 15). During the projected period and according to the detailed master plans of the second phase (the existing situation is presented in Figures 16, 17 and 18) it would be possible to restructure the synthesis of Figure 15 so that to approach better the national and international demand for certain types and categories of tourist accommodation of the coastal region. The possibility of improving the airport of M. Matrouh as well as the new one near El Alamein will help further the tourist development.

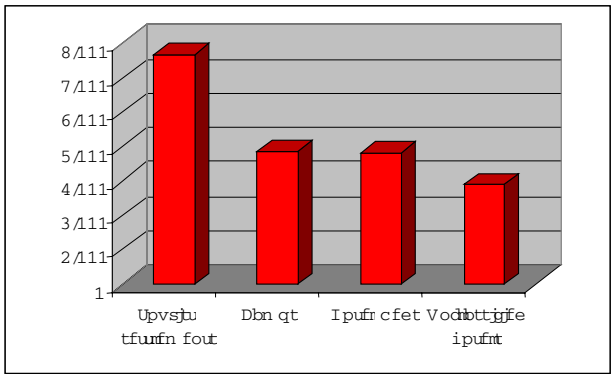

Figure 16: Tourist Accommodation Capacity in 1992 (Quantity Indicator)

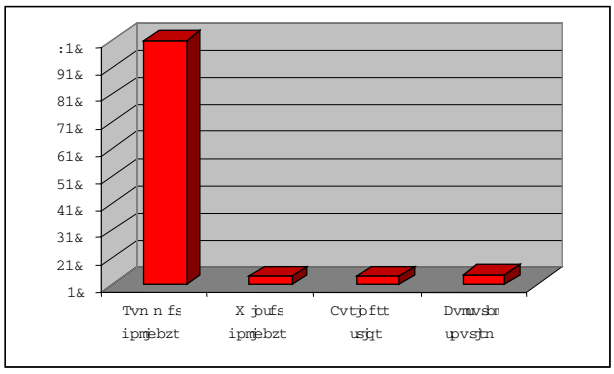

Figure 17: Tourist Accommodation Categories in 1992 (Quality Indicator)

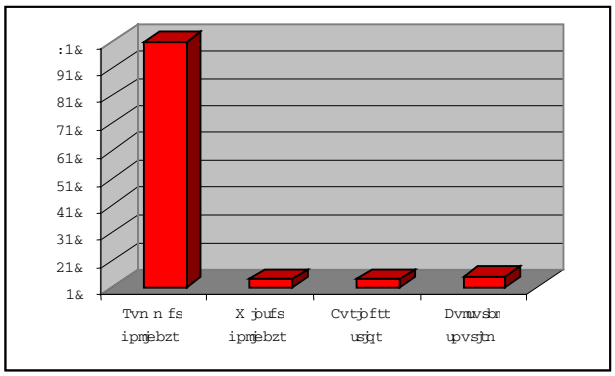

Figure 18: Motives for Tourism in 1992 (Trends and Attraction Indicator)

So the necessary **space distribution** in categories and types (models) of the tourist total proposed accommodation capacity should be further studied in the light of the **carrying capacity assessment** (Final Draft Report of Prof. El-Raey, Parpairis, 1997) as well as the result of the 1998 detailed **action plans** to be drafted in the second phase. In this study, all possible **parameters** of the tourist sector will be examined carefully parallel to the necessary associations with the urban, rural and mixed land uses already proposed in the planning structure of the 7 subzones of the coastal study area.

Accordingly, the **tourist sector**, which is the most crucial activity in the study area, should be examined in the second phase together with the accompanied **infrastructure requirements** (leisure facilities, sport, tourist marinas, cruise ports, etc.) and other possible **supporting facilities** within the integrated ICAM Planning Study, and the possible new development in

the remaining sectors of the economy, the quality and the way of life (income, employment structure, education and training, etc.) of the local population, but also of the attracted national and international visitors.

Meanwhile, issues such as **environmental protection**, **collection and treatment** of the **sewage** and that of the **solid waste, water supply,** and **alternative energy production** will remain in priority for the study area together with the provision of **safety** and **quality** requirements for the whole area under consideration. Accordingly, the above infrastructure requirements should be carefully planned and developed before any new tourist project is approved. In the meantime, there is an urgent need to start a **new study** (urgent action) of the existing tourist project and those under construction, so that to be integrated within the proposed action plans 1 and 2.

10.3. Strategy and Measures for Sustainable Planning and Development

Further planning work will be concentrated on specific **central sites** with high priority. In addition, the planning work will be directed to clarifying the relationship between the **current local planning framework** of the study areas, for site planning or action plans and master plan, in the rural areas (outside the M. Matrouh urban area) and in the greater Matrouh city area, and that of **urban development strategies** that have been decided upon in the Ministry of Physical Planning.

Attention will be focused on trying to achieve a further movement of the total **population** capacity (immigrants) of the nation into the study area in **satellite new mixed planning centres** and indeed "**close-to-station**" areas (see the mixed land use planning concept of Fig. 11), as they are placed in favour of better distribution of human resources outside the already congested urban area such as M. Matrouh city, especially its coastal part. In this way the second target of supporting the effective **mix of urban and rural land uses and activities** with that of the **tourist and summer holiday development** of the area, would be approached. Requests for larger tourist developments, which would significantly interfere with the possibility of achieving this movement of population, cannot be expected to be promoted fully, and if necessary, efforts will be made to limit them through detailed and integrated local planning and effective control regulation and authorities.

Possibilities will be generated of creating **new urban/rural centres**, in sufficient quantities (6 new centres apart from the existing one of the M. Matrouh city) to make it possible to retain, or if possible, to increase the number of inhabitants moving into the coastal region (a tendency already observed). On this basis, the following new areas are zoned for mixed land uses incorporating **working places**, rural/tourist complexes, as well as **urban and land use facilities**. The large, partly undeveloped coastal area in the back of the coastal zone (2-3 km away from the beach site), will be zoned mainly for **mixed land uses** in preparation for establishing **step by step** new urban/rural residential areas or of the type of "**urban villages**", while a provision of a green buffer zone and reserve should be made for future consideration.

Light industry, as well as trade and office buildings, education and training structures, and other supplementary facilities would also be attracted for the **diversification of the building new mixed structure** combining multi-economic, social and cultural activities, supporting simultaneously the tourist and summer holiday development as well as the expected flow of population migration into the study NWG coastal region.

A number of **infrastructure adjustments** in the framework of the **action plans** have also been planned, in accordance with the development of land uses in the 6 new centres as well as in the existing one of M. Matrouh. The planned multi purpose mixed activities, including the housing areas, can be carried out in accordance with the implemented localisation

planning process (need for exclusive action plans for each new centre, well co-ordinated with the proposed general coastal structure). However, priority should be given for detailed planning and management to the attractive but very sensitive areas along the beach site (water front), and areas close to the new urban/rural centres.

The new **multi-complex district** outside the city of M. Matrouh next to the airport is planned also to play the **international focus point** of absorbing more population movement, economic activities (industry, light industry, offices, education and training, culture and tourism), as well as manufacturing and commercial enterprises and trade facilities representing the NWG region international profile.

Especially the **industrial areas** (heavy or light) should be distributed throughout the study coastal region for minimising the population movements and creating more environmentally friendly zones and parks close to residential areas and new centres. The combination of the extra supported facilities (education, training, conference, health, etc.) in the proposed industrial zones and light industrial parks will provide more variable spatial structures, sustainable development opportunities, and better socio-economic integration possibilities.

Moreover, there is the need for an effective sustainable planning and development process of the coastal region, and an integrated planning and management **strategy** concentrating efforts, should be planned to **reduce the scale of structures,** and especially that of the big projects (mainly the tourist and summer holiday projects which are in a construction phase), **integrate urban, rural and tourist activities**, and **mixed land uses**, in an effort to minimise the danger of urban, rural and tourist isolated zones (basic limitation of the existing situation), further environmental deterioration, and more social and cultural separation.

From the above suggestion it becomes clear that the issue of **integration** of all human actions is the focus element of the whole ICAM Planning Study strategy proposed for the study area, in the context including, among others, the provision of the following characteristic advantages:

- **Co-ordinating** and **matching** of environmental, economic and social values.
- **Co-ordinating** and **harmonising** the planning operations and other functions of the diverse agencies and organisations having responsibilities with impact on the coastal area.
- **Blending** and **securing** (in a synergy way) the value added – amongst the **measures** employed – through the planning and management process.
- Working towards **consensus** amongst the involved “actors”, so that they may share a common vision and are conscious of the consequences of implementing the proposed plan or even a vision for their area.
- **Securing public participation** and the expected consensus of all “actors” involved in the planning process, and finally
- Reporting any kind of conflicts or disputes continuously through feedback mechanisms to be incorporated within the planning mechanism (possibly within the proposed new coastal authority).

In this way, inevitably the process of the **coastal zone planning and management** of the study area, in this context, is a rather **multi-dimension process** including:

- Guidance,
- Planning and study,
- Participation, and
- Feedback mechanisms

Accordingly, the above presented, in a draft way, **general strategy** and the **main measures**, should be further analysed, organised and well evaluated in a **second phase** of the ICAM Planning Study, so that to be incorporated successfully into the final ICAM Plan.

10.4. Management Proposals – Planning and Management Tools and Guidelines

The subject of the **mixed land use**, proposed in the ICAM Planning Study for the study area, is a sustaining quality proposal, **redistributing** the urban, tourist and rural activities and functions, **improving** the coastal environment, and **revitalising** the whole NWG region. However, how to mix different land uses (housing, manufacturing, agricultural, tourist and commercial enterprises) is regarded as a **critical point**. Some characteristics are the following:

- Strengthening the urban forms through mixed land use;
- Handling environmental management;
- Integrating neighbourhoods (new and existing especially tribes);
- Humanising the coastal environment through mixed land use (avoiding zone separation);
- Redeveloping the built environment by stimulating the processes involved;
- Providing sustainable and resource-concerning development that improves everyday life of the local population as well as that of tourism and holiday makers; and
- Regenerating a multi-ethnic and social mixed people and land use areas.

Meanwhile the structure of the proposed **planning programme** should incorporate, as a priority, the following **basic planning and management tools** as well as **guidelines**, as similar provision is mentioned in the Guidelines No R (97)P of the EU:

a) The principles, measures and special instructions;

b) The planning legal, institutional and administrative framework; and

c) The planning and management tools and guidelines.

a) The Principles, Measures and Special Instructions

a1) Basic Principles of Coastal Planning and Development

- Avoidance, protection and therapeutic action, allied with the need for sustainable development, as mentioned at the Rio de Janeiro conference.
- Restoration of the damage already done to the environment.
- Appropriate management of the cultural and natural resources, especially the sea, respective to the renewal capacity, adopting a long term approach.
- Tourist development complying with the qualitative demands and respecting the special characteristics of the region.
- Spatial framework of the tourist development at a level relative to the social and ecological carrying capacity of the region.
- Urbanisation that is strictly controlled and which ensures the specific protection of coastal areas of great scientific, ecological, cultural and archaeological interest.
- Tourist development designed so that it covers the needs of the local community and protects its socio-economic interests.

- Balanced development of the mainland.
- Protection of important coastal habitats and natural areas, in particular of lakes and wetlands.
- Balance between different activities, such as agriculture, fishing, tourism, housing, and industry.
- Free access to the beach, respecting the natural characteristics and values.

a2) Measures of Coastal Protection

- Enacting legislation which provides protection of a significant part of the coastal zone, whose width should reach the natural limits of the land-sea functions.
- Enacting of a specific protection regime for as many areas as possible (land or sea areas), especially those which are considered as significant sites, or landscapes, or are characteristic of the natural and cultural heritage of the area, or of the state, and which are necessary for the maintenance of the biological or the coastal balance, or have still ecological significance.
- Protection of the areas which are still unspoilt and especially sensitive, through a policy which will control land use in every purchase, lease or management agreement.
- Insurance of the free access of the public, only when it is ensured that this will not jeopardise the interests of the land owners, of the nature or of the environment.

a3) Special Instructions

- Ensuring that all the tourist activities which are completed conform with the laws and regulations which have been adopted for the environmental protection.
- Assessing often the impact of the tourist activities on the coast, and ensuring that the carrying capacity of the tourist areas has not been exhausted.
- Taking into consideration the appropriate standards for drinking water, water for washing, sea water and waste, and lessening the emission of toxic substances.
- At coastal resorts, to ensure that the management and cleaning installations for the waste (including the connection with the main sewage pipe, the recycling and distribution systems for the waste) use appropriate equipment for the local population and the number of tourists, checking often the good function of these installations.
- Installing appropriate tools for the monitoring of the pollution levels, and offering alternatives for the avoidance of the pollution due to land sources, including the tourist establishments, or pollution due to accidents such as oil spills.
- Connecting with other sectors whose activities affect the coast.
- Promoting technological innovations and ways of reducing the consumption of water and energy, and the respective production of waste.
- Limiting the circulation of cars and sea transport.
- Legislating strictly the circulation on coasts and coastal zones.
- Promoting the use of public transport and encouraging means of transport which are less noisy and polluting, as well as constructing pedestrian zones.
- Ensuring that the beaches are cleaned often, through a systematic microbiological assessment of water quality and informing the public.
- Increase the participation of the public in the problems of the development and protection of the coastal environment.

- Developing information campaigns and education programmes for:
  - Tourists and tourism professionals so that their knowledge in the field of environmental protection is increased, not only for their admiration but also for the sensitivity of certain landscapes and the significant value of a certain often devalued cultural heritage, local culture and local traditions.
  - Decision-makers, so that they become capable to choose the most appropriate and viable development type for their Municipalities.
  - Local authority staff for the advancement of the tourism and the carrying out of certain accommodations.
  - Local population, so that they are informed not only about the attractive points of their coastal region, but also about the sensitivity of the coastal areas they inhabit.
  - Appropriate personnel for the urban planning and restoration-redevelopment, so that they aid in the promotion of an environmentally sensitive architecture.

b) The Planning Legal, Institutional and Administrative Framework

b1) Legal Framework

Although Egypt has already enacted a number of laws related to environmental issues (Law No. 4), it should be mentioned here that there are difficulties in applying effective coastal environmental protection due to the absence of a strategic provision of Environmental Impact Assessment (EIA), either in the latest Law No. 4 or in any other documentation. Similar findings of the El-Ray report (1999) reflect some weakness of the existing Law system which should be further expanded to cover Strategic Environmental Assessment (SEA) requirements.

Concerning the existing partial coastal environmental protection, it should also be mentioned that there is a need for a review of the plethora of laws and regulations and co-ordination efforts in order to be capable of taking effectively the conflicting views and demands of those involved in the coastal development.

For the proposed preliminary action plans 1 and 2, it would be useful to construct a new law framework, specially designed for this case – even as a pilot law framework – so that to deal with protection and development issues.

b2) Institutional Framework

Under the provision of the Law No 4 (1994), a new Agency, the **Environmental Affairs Agency**, was created with the prime goal to carry on the exercise of the Law for environmental protection. However, such central Agency seems to be far away for a problem solving process, exercising successfully both the permission and the control (monitoring) of any development taking place within the responsibility boundaries.

Taking into account also the weakness of the overlapping planning authorities (Map 5), more efforts should be directed towards the co-ordination and integration of authorities and legislation. It would be an advantage if **a new Agency**, responsible for the entire planning and management of this study coastal area, was created based in the capital city of M. Matrouh, and responsible for the whole **coastal region** of the NW Governorate – including that of the study area – together with a new legal framework, and supporting funds available for the purpose of regulating effectively all possible affairs within the coastal area.

b3) Planning and Management Tools and Guidelines

The above proposed new coastal area Agency for the NWG coastal region, incorporating that of the Matrouh-Fuka study area, should be organised with suitable financial resources, power and authority including programming, planning, controlling and monitoring (Fig. 1). In this way the whole spectrum of the planning and environmental control (a critical part of the development process) would be exercised effectively for both sites: that of the Agency as well as that of the developer, since everybody will be able to plan and programme in advance and in a safe way.

For the same purpose, the Agency should be organised with the necessary **executive authority**, special planning and management **regulations**, **strategies** and special **guidelines**, as well as suitable personnel and expertise covering the complex aspects of the Agency's affairs. Within the responsibility boundaries of the Agency should also be the development of **close relations** with the already created national (Egyptian Environmental Affairs Agency) one, aiming to move as an efficient and well co-ordinated entity. Accordingly, special **guidelines**, such as EIA ad SEA, should be previously checked and appropriately adapted to local circumstances in an effort to establish flexible, well informed and value evaluated mechanisms.

Finally, the evolution of the central Agency's powers to move close to the study area's environment, seems to be **realistic**, close to the **problem solving process**, and more able to prepare **incentives**, environmental standards and guidelines, environmental profiles, annual and emergency reports, public participation and public educational procedures, surveys and monitoring exercises and other activities.

Table 1: Matrix of Evaluation of the Foreseen Actions

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Table 1: Matrix of Evaluation of the Foreseen Actions - Continued

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Table 1: Matrix of Evaluation of the Foreseen Actions – Continued

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11. STRATEGIC ENVIRONMENTAL ASSESSMENT OF THE PROPOSED ICAM PLANNING STUDY – QUALITY CARRYING CAPACITY ASSESSMENT

As we have already pointed out, despite numerous mechanisms established for the environmental protection (Law No. 4/1994) and the application of EIA to some proposed development projects, the Mediterranean coastal resources – internationally important ecosystems – are diminishing rather than increasing. This situation is applicable not only to Egyptian coastal areas, but also to most other national coastal areas especially in the Mediterranean region. As a result, habitat loss is continuing and the natural coastal characteristics are disappearing. According to international research studies, more than 50% of the internationally important estuaries face the threat of losses by direct or indirect human actions. Among them, 26 estuaries in the Ramsar/SPA network have suffered recent losses.

Reports by international, national and non-governmental organisations confirm that coastal management practices are poor and that there is a need for better co-ordination and guidelines.

Accordingly, the study area of Matrouh-Fuka, as well as other areas of Egypt, call for management of the wider coastline, and state what is missing is the national policy framework for the coast as a whole (the above proposed Mediterranean coastal Agency is moving within this line), because **integrated coastal zone management can help save the remaining estuaries and their wildlife by treating them as functional units**.

Policies and management plans that are incorporated in the above proposed scenario, at a rather local level, need to be, first of all, linked together by regional and national policy frameworks, and then all uses of the coastal area should be integrated. This means that a strategic environmental assessment is needed before the second phase of the detailed approach. It is at this level that attention must be focused on truly **strategic planning** of the coastal zone and Strategic Environmental Assessment (SEA). Although there may be problems in practice with the distinction between local, regional and global impacts, this recommendation deserves support.

Moreover, if further policy measures for coastal environmental protection are to be introduced, as a result of the SEA, the measures themselves will need appraising for their effectiveness. Three main areas for improvements of the policy-making process could be proposed:

- Anticipation of the macro environmental, social and economic effects of the proposed plan;
- Integrated analysis and responses; and
- Flexibility and effectiveness in environmental control.

Such arguments have been repeated in the more recent work of OECD and other organisations (Therivel, 1995). The virtues of a more strategic approach are therefore being advocated by both international, national and governmental agencies as well as by the conservation lobby.

Consequently, after the scope of the SEA for the proposed development scenario of the study area has been agreed, the following main steps should be proposed for the second phase of the ICAM Planning Study:

- Collection of the baseline data;
- Impact assessment (prediction);
- Impact evaluation and synthesis (significant impact to be evaluated); and
- Proposing mitigation measures and preparing a special SEA report.

Recommendations will be derived from the findings of the impact evaluation and may include:

- Identification of the preferred alternative;
- Mitigation measures; and
- Monitoring measures and feedback that may be necessary.

Techniques that could be used in the light of SEA findings to select the scenario for implementation (among a choice of alternatives), include the application of evaluation criteria, public participation, and consultation with other agencies, while often, impacts will have to be evaluated despite a level of uncertainty concerning their likelihood or risk. It is also possible that the use of pilot projects and contingency plans will reduce the level of uncertainty and of risk posed by this uncertainty. In this line, **carrying capacity** and **sustainability** should provide fundamental criteria by which to evaluate impacts. On the other hand, distinctions should be made between **short-term** and **long-term impacts**, and **reversible** and **irreversible impacts**.

The **final product of the EIA** should be a **formal report** incorporating the findings of each stage of the process, in the form of a tax and supported by overlays, mapping, photomontages, models, matrices and summary sheets and any other possible useful material. However, as pointed out in the El Raey 1999 report, the problem in obtaining maps, information and data on the study area, as well as lack of co-operation among the agencies, are responsible for the ineffective application of the above proposed SEA process. This means that efforts should be made to overcome these obstacles during the second phase of the ICAM Planning Study.

12. CONCLUSIONS AND RECOMMENDATION

The analysis of the existing situation of the study area's coastal zone, although not quite comprehensive and detailed (due to lack of real-time baseline data, maps and information), shows that the realisation of the ICAM Planning Study goal, that of integration and sustainable development of all human actions, depends to a large extent on a more complete and systematic application of the **principles of integration** and of **subsidiarity**. Accordingly, the proposed draft plan and programme have been centred on the conditions for the application of these principles – some of which are presented in this report – in the forefront of which feature the co-operation mechanisms between numerous public and private actors who influence the evolution of the coastal zones.

As a conclusion, the study area's main components and proposals presented here will be marked by the following main **axes**:

- **Opening up the area's national and regional borders** towards the construction of a new international profile;
- **Implementing a primary structure of the ICAM Planning Study** of three planning dimensions: Regional (Planning zone 1 and 2), District (master plans of each sub-zone), and Local (detailed plan for each mixed urban/rural/tourist centre or project;
- **Diversifying economic development** through mixed land uses, as well as educational and training opportunities, so that to solicitate further population growth (through migration) and employment opportunities;
- **Implementing an effective infrastructure programme** including technical, social, economic and environmental (Biodiversity and natural – cultural protection) programmes;
- **Integrating planning and management processes** based on the principles of sustainable development, carrying capacity requirements, and those of the SEA tools (protection of special areas, introducing public fast transport, and the use of bicycles, renewal energy plans, etc.);

Accordingly, the principle aim of this document is to apply the first step of the ICAM Planning Study and programme which was approached mainly through the synchronisation of the necessary planning of multiple issues in coastal areas of overlapping interest. However, during the second phase it is expected to be approached in a more detailed way through the collection of more accurate data, maps and information needed, as well as more public involvement, and the results of some task force actions.

Meanwhile, since the implementation of the proposed ICAM Planning Study is a multi-dimensional activity requiring a wide range of **tools**, **powers**, and a successful mixture of responsible agencies, control and market forces, it would be most appropriate to stress that efforts should commence towards introducing **supplemented market-based instruments** to the existing government-based "command and control" tool of implementation.

Finally, it would be useful to mention that **environmental aspects** have been the **focus motive** of the proposed alternative scenarios and of the selected one, for handling the coastal area's main problems and issues. The harmonic framework of this Mediterranean NWG region of mixed land use types of development, demands an **urgent action** to implement, not only the main findings which can be in any case tested in practice, but also

the components of the next phase of the ICAM Planning Study strategy, since the expectations are great and the future perspectives for the study area are very challenging.

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ANNEX: MAPS