THE EGYPTIAN LANDSCAPE AND TOURISM:

A STUDY OF
THE RED SEA COASTAL PLANNING PROCESS

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Ph.D Thesis

Department of Architecture

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DECLARATION

This thesis has been composed by myself and is my original work

Mohammad Hussein Refaat Al-Sarky

بسم الله الرحمن الرحيم

In the name of God, Most Gracious, Most Merciful

To My Mother and Father (God Bless His soul)

UNIVERSITY OF EDINBURGH
ABSTRACT OF THESIS (Regulation 3.5.10)

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The aim of this thesis is to introduce and place the Egyptian landscape and its relevance to tourism within the modern Egyptian planning process, and to examine the competence of this process by example, in a study of the development of the Egyptian Red Sea coast.

Presentation of the thesis is in Seven Chapters: Chapter One deals with the general features of the Egyptian landscape with relevance to its tourism attraction; Chapter Two is an inventory of the Red Sea region landscape; in Chapter Three the question of defining the "coastal zone" is considered, and followed by a description of the Red Sea coastal ecosystems, their function and how they may be affected by the human activities taking place on the Red Sea coast; Chapter Four discusses aspects of tourism in a broad sense, as well as showing the various impacts of tourism on developing countries, and concludes with a description of the Tourism Development Plan by the government for Egypt in general and the Red Sea coast in particular; the next Chapter deals with the coastal planning process, emphasising international attempts in applying coastal management plans and demonstrating their success and failure with relevance to the Egyptian Red Sea coastal development process; Chapter Six presents a case study examining the impacts of tourism development schemes on the natural environment of the city of Hurghada, on the Red Sea coast. The tourism planning process for the Red Sea Region in general and for Hurghada in particular was shown to be greatly lacking in strategy and principle, as well as in balance with the surrounding natural environment. The final Chapter suggests a set of recommendations for the planning system to overcome its deficiencies, and a draft set of planning and design guidelines aiming to integrate development activities with the surrounding ecosystems, at a regional scale and also at the local scale of tourist centre.

ACKNOWLEDGEMENT

Praise be to God, Lord of the worlds, by His will the accomplishment of this study was made possible.

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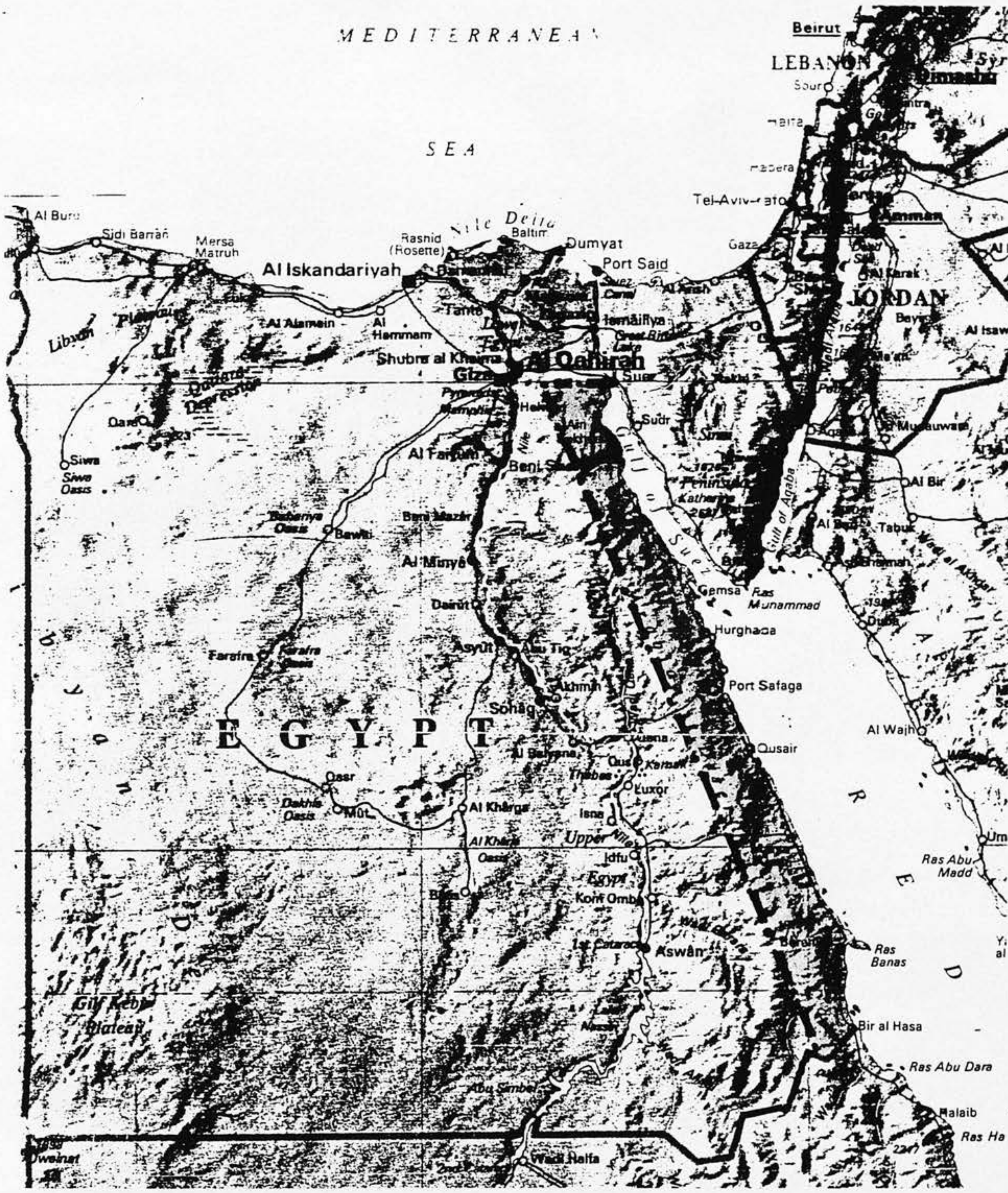

INTRODUCTION

INTRODUCTION

The best worship is the pursuit of knowledge. [1]

Search for knowledge ('ilm) even unto China, because it is an obligatory duty of every Muslim. [2]

Pursuit of knowledge is superior to prayer, fasting, pilgrimage, and jihad (struggle for the sake of God) if and when it is for the sake of God alone [3]

The men of learning are the trustees of my community (ullmma) [4]

The world is confronted by many complex problems which are exerting an increasing pressure on a deteriorating environment. If environmental destruction is to be avoided, the exploitation of natural resources must be controlled. The planning of landscape or landscape by design is now vital for human survival. Such planning attempts to understand the balance of nature and it must have an ecological basis.

In the Middle-East, particularly in the Arab countries, the planning of landscape by professional designers has been almost entirely absent. The landscape design profession itself , at least in its modern sense, scarcely existed here until the mid-seventies. In 1976 King Faisal and King Abd Al-Aziz universities in Saudi Arabia, founded schools of environmental studies, and 'King Abd Al-Aziz' university introduced a Bachelor Degree in Landscape Architecture (*Imarat Al-biaa*).[5] These were the first institutions in the Middle-East to launch a special school for the study of Landscape Design and to begin to take an interest in that part of it which concerned landscape planning.

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[1]Prophet *hadith* quoted by Ibn 'Abd al-Barr', *Jami 'Bayan al-'Ilm*, Cairo, 1968, vol. X, p.90

[2]ibid., vol. X, p.79

[3]ibid., vol. X, p.75

[4]ibid., vol. X, p. 77

[5]In the Arabic language, Imara means Architecture. While AL-Biaa is environment

In 1990, H. F. Werkmiester a former president of IFLA and with a close acquaintance with Egypt, noted that there had been little progress in establishing adequate courses in landscape architecture in Egypt, in spite of an important need which had been identified some six years earlier by the IFLA regional seminar on problems of tourism and landscape.[6]

There are two schools of planning in Egypt: the Department of Planning, Faculty of Architecture, Al-Azhar University which was established in the early seventies; and the Faculty of Urban and Regional planning, Cairo University, which was founded in 1978. These are the only two schools which accept candidates for a degree in planning. The other Schools of Architecture in Egyptian universities, offer only short courses or projects on planning and landscape design within the years of study. Recently, however, the planning education system in Egypt has started to be aware of the importance of producing graduates with an adequate knowledge of landscape design and the Faculty of Urban and Regional Planning Cairo University is currently founding a new Department of Urban Design and Landscape which will provide graduates with a landscape degree.

Hackett (1971) defined a person who takes a professional approach to his understanding of landscape, or is directly involved with it, as likely to accept the explanation that landscape is based upon the land, modified by the climate, and that the result influences the distribution of the types of flora and fauna.[7] Thus, a landscape planning approach considers the landscape as a series of habitats in which various forms of life reside, and in which any change in habitat may be judged in the way it will affect living conditions. He observed that::[8]

> ***"It follows logically that the objective of landscape planning is to ensure that landscape changes continue to provide habitat conditions that will accommodate the various forms of life, either in the existing pattern or, if the habitat conditions are changed, in a new pattern. The term 'creative conservation' has been used to explain landscape planning and is particularly apt in the light of the need to***

[6]H. F. Werkmiester, "Creative Environment Planning and Management in the Nile Valley, Egypt" IFLA Year Book, 1990, Edition 9, Manila, Leningrad, Moscow, p.69
[7]B. Hackett, *Landscape planning an introduction to theory and practice*, 1971, Oriel Press, p.1
[8]ibid., B. Hackett p.1

> ***reconcile and incorporate competing land uses in the landscape."***

If we accept this statement we may define the role of the landscape planner as one who attempts in planning terms to understand the interaction of the geophysical, climatic, economic and social factors on the landscape. By this understanding he may then assess the possible sequences of changes on the landscape and advise how changes may either be reconciled with existing conditions or form the basis of a new ecological balance related to human demands, but retaining always his right to challenge those demands.

Sadly, as this thesis will demonstrate, Werkmiester's comment (page ii) remains true to this day. The teaching and practice of landscape design in Egypt is still very backward and "Landscape Planning" is virtually unheard of in the development process. Inventories of physical descriptions of natural factors are made, but are scarcely or never used in the final plan. Statistics and equations form the main basis for much of present-day planning and in city planning, environmental aspects are almost wholly neglected. A study usually only extends as far as the physical boundaries of a city to guide the direction of city expansion in the short term, but with no consideration of the consequences of what such development might have upon the natural environment. Land use plans and master plans exist but environmental contributions to such plans are almost invariably only decorative. Regional development projects are almost always directed according to settlements' physical carrying capacity, their ability to expand and to absorb more inhabitants, their economic base and infra structure and with no consideration of these pressures upon natural ecosystems. Development plans generally do not consider the relation between the surrounding environment, existing natural habitats and ecosystems and proposals such as these for "growth poles", "balanced development", or "scattered, or concentrated" expansion.

In Egypt, anyone may style himself landscape designer, architect, civil engineer, or agriculturist. No certificates are required to practise as a landscape architect. The true meaning of landscape design is obscured, and its importance is neglected. The twin disciplines of economics and ecology provide a theoretical framework in which to discuss their mutual relation in balanced land use planning. Both take their name from the Greek root *oikos*, meaning house. The economist restricts his interest to the "home of man", while the ecologist studies the relationships between living things and their environment. In spite of their common root, the two disciplines conflict with each other and require an arbitrator in landscape design to resolve these conflicts, a role which as I have said simply does not exist in Egypt.

In the last two decades, the Egyptian government has attempted to exploit the tourism potentials of the Mediterranean coast, but, haphazardly and with a great lack of attention to landscape planning. Land filling, the continuous extension of coastal resorts forming a "concrete wall" along the coast, and the absence of public beaches are the main characteristics of tourism development along the Mediterranean coast. Similar, if not worse, disasters may be foreseen for the Red Sea region if insensitive attitudes persist, threatening its fragile ecosystem.

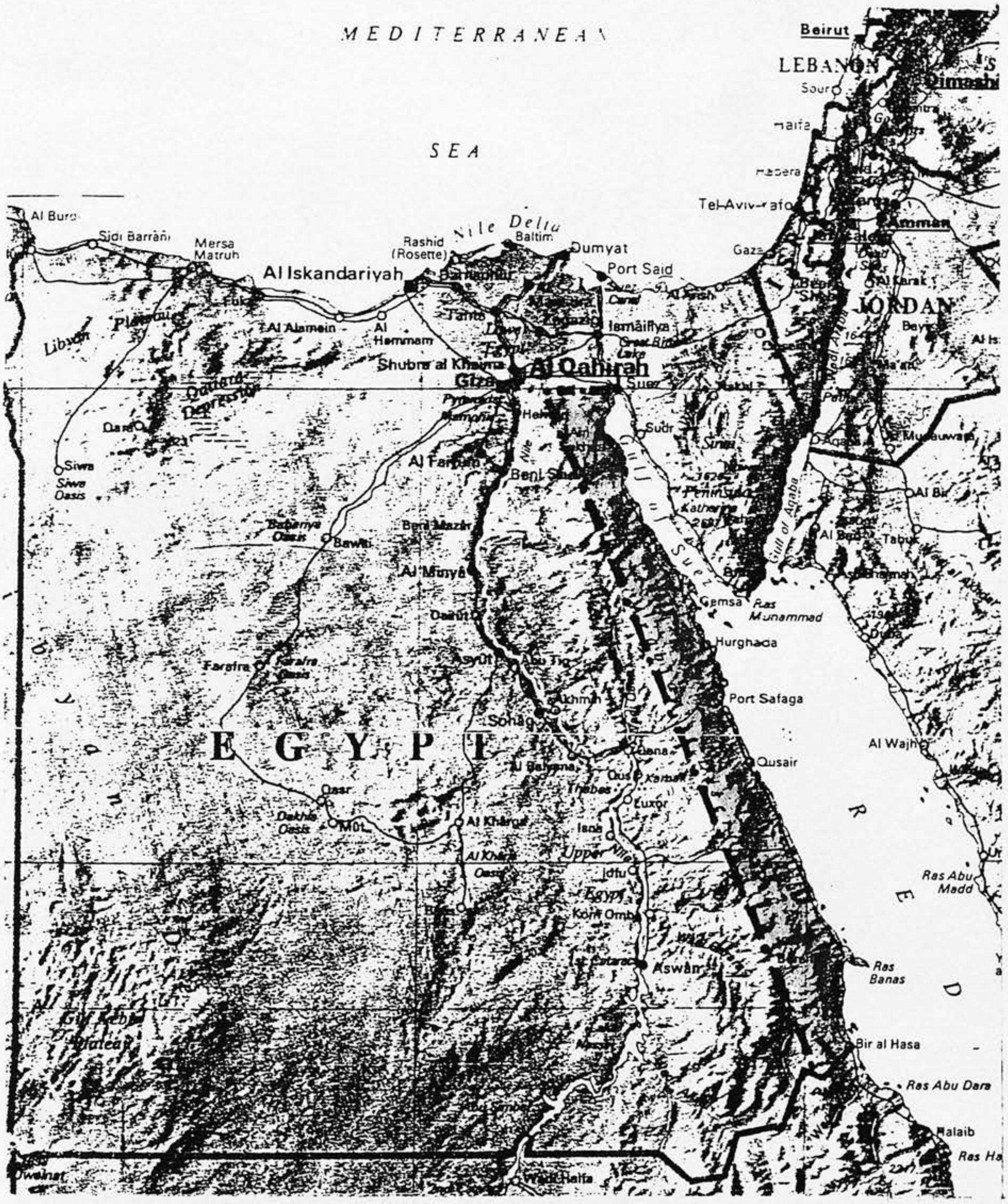
Today, the problem of coastal development in Egypt has now reached a state where it requires serious attention. It has become an issue of regular interest in daily newspaper articles. Recent articles concerning the threat to the environment of the Red Sea include, "Hurghada's shoreline under threat" (Al-Akbar, 12/10/92), "Coastal and marine tourism is in danger", "Pollution is hosted by the Red Sea Gulf" (Al-Ahram, 16/8/92), "Environmental protection and Tourism industry" (Al-Ahram, 27/9/92), "Development triangle seeks solution" (Al-Ahram 1/11/92), "Save Hurghada".(Al-Ahram, 17/1/93), "Tourism and environmental protection" (Al-Ahram 9/1/1993), and "Where is the environmental protection in Hurghada ?" (Al-Ahram, 24/1/1993)[9]

These articles shed useful light on the coastal planning process in Egypt. They show that studies for the planning and development of the Red Sea coast have so far focused only on aspects of the region's physical capacity, and have neglected the landscape planning issues, largely through ignorance. Since 1978 some important studies have been published on coastal planning of the Red Sea. These are: A <u>Regional Plan of the Red Sea</u> (1978) by Sate'c & the Ministry of Dv. and New Communities; <u>Choice of Suitable Sites for Tourism Development</u> (1981) by Adel Tahr & the Ministry of Tourism; <u>Tourism Development on the Red Sea Coast</u> (1982) by the Ministry of Tourism; A <u>Framework for Tourism Planning, Aapplication To the Red Sea,</u> Msc. (1982) by Maged Mahdy; <u>Tourism Development of the Red Sea coast</u> (1983) by Dr. A. Al-Zafarany & Ministry of Tourism; <u>A Red Sea Region Tourism Coastal Plan</u> (1987) by Dr. Ibraheem Koriem & Ministry of Tourism; <u>A Priority Action Plan for Red Sea Tourism Development</u> (1989) by ARICON & Ministry of Tourism; <u>The Regional Development of the Red Sea</u> (1992) by the Urban Planning Authority; and <u>The</u>

[9]Al-Akbar and Al-Ahram are the most famous daily governmental newspapers. The articles are all in Arabic. Titles are my transliteration.

Planning for Coastal Tourism on the Red Sea Coast, Msc.(1993) by Essam Immam. Not one of these studies has included environmental considerations in their development proposals.

This thesis is predicated on an urgent need to re-examine the present coastal planning system in Egypt with particular reference to the landscape of the Red Sea region. It is concerned to demonstrate the need for coherent landscape planning. The hypothesis proposed is that the present coastal planning system in Egypt is incompetent. The first goal of the thesis is therefore to reach a broad understanding of the Egyptian landscape and the Egyptian planning process; secondly by example to demonstrate the recent planning of the Red Sea Coast in response to the demands of tourism; thirdly to consider the future need for landscape planning; and fourthly, if justified, to set down illustrative landscape planning guide-lines for the planner and designer concerned with the Red Sea region, and which may ensure that recreational development is well integrated in the landscape of the Red Sea region, without causing serious disturbance to the environmental balance.


MEDITERRANEAN
SEA
Beirut
LEBANON
Haifa
Hadera
Tel Aviv-Yafo
Gaza
Amman
JORDAN
Al Karak
Al Burdi
Sidi Barrani
Mersa Matruh
Rashid (Rosette)
Nile Delta
Baltim
Dumyat
Port Said
Al Iskandariyah
Al Alamein
Al Hammam
Ismailiya
Shubra al Khaima
Al Qahirah
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Siwa
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Al Faiyum
Beni Suef
Gulf of Suez
Gulf of Aqaba
Bahariya Oasis
Bawiti
Beni Mazar
Al Minya
Gemsa
Ras Muhammad
Hurghada
Farafra
Farafra Oasis
Asyut
Akhmim
Sohag
Port Safaga
EGYPT
Al Balyana
Qena
Qus
Thebes
Luxor
Qasr
Dakhla Oasis
Mut
Al Kharga
Al Kharga Oasis
Qusair
Al Wajh
Isna
Upper Egypt
Idfu
Kom Ombo
Aswan
Ras Banas
Ras Abu Madd
Bir al Hasa
Ras Abu Dara
Halaib
Wadi Halfa

CHAPTER ONE

CHAPTER ONE

A SYNOPSIS OF THE EGYPTIAN LANDSCAPE, WITH RELEVANCE TO ITS TOURISM ATTRACTION

"... To most Egyptians the desert remains a mystery. Few are familiar with its place names. Fewer still venture into it."[1]

The intention of this Chapter is to highlight the relationship between the Egyptian landscape and tourism. This will help in providing an understanding to the thesis context. Although some of the background given in this chapter is related specifically to the research and will be referred to in the following chapters, further background has been added to give an overall description of the Egyptian landscape, and which may be necessary to the reader unacquainted with the country.

Egypt (Figure 1.1) occupies the northeastern corner of the African continent. It comprises some 3% of the total area of Africa. It is bordered on the north by the Mediterranean Sea, on the south by the republic of Sudan, on the west by Libya, and on the east by the gulf of Aqaba and the Red Sea. Geography and climate can rarely have combined to produce a more unusual country. The roughly rectangular area that is Egypt, with the little appendage of Sinai, covers something over a little more than one million square kilometres (its length from north to south is about 1073 km., and its width exceeds its length by about 189 km); yet of this total no more than 3 to 4% is green land. Cultivation is restricted to the entrenched and fertile Nile valley, and to the lush Delta occupying the triangle between Cairo and the sea.[2]

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[1]El-Baz, Farouk, Director of the Centre of Earth and Planetary Studies of the Smithsonian Institution's National Air and Space Museum, *National Geographic*, Vol. 161, no. 2, 1982, p.198
[2]Abu Al -Izz, M., *Land forms of Egypt* , American University Press, 1971 pp. 1-7

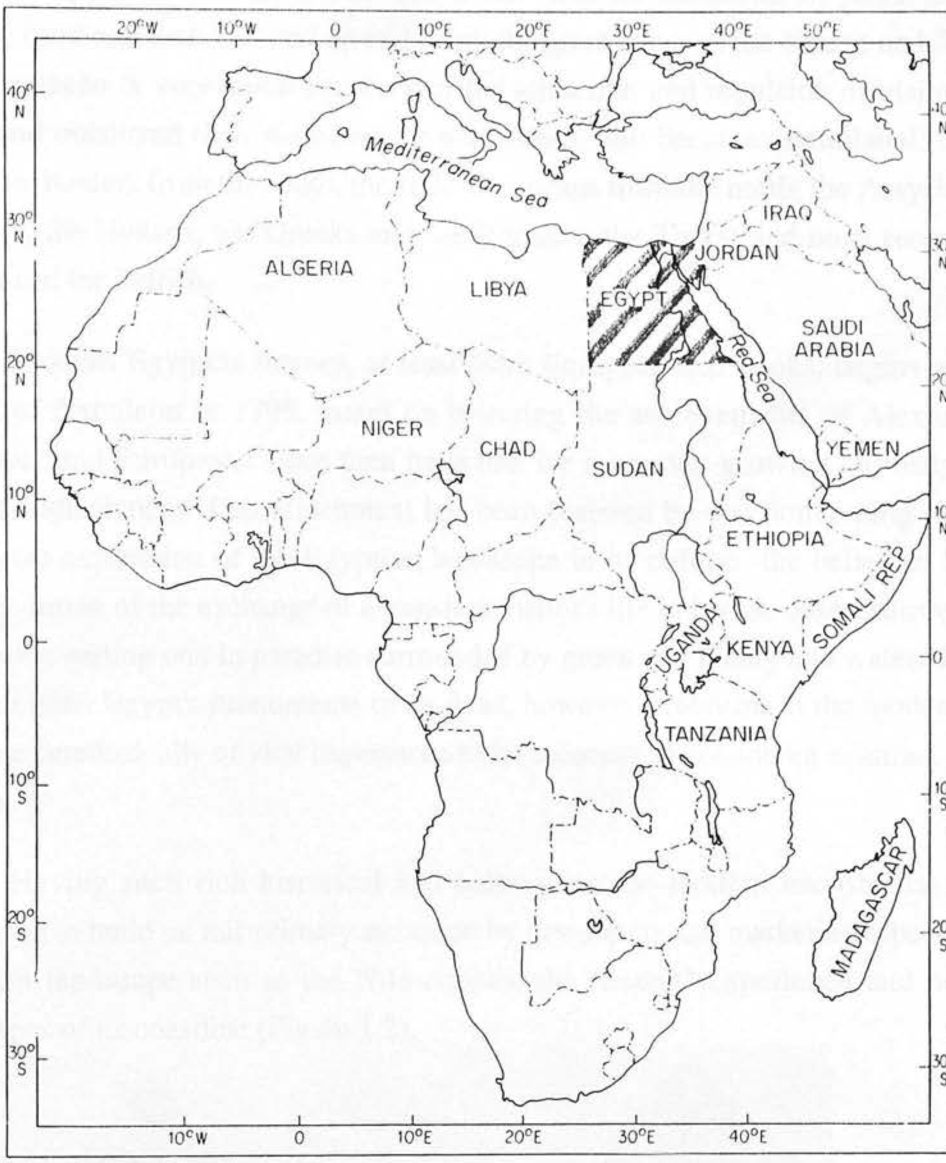

Figure 1.1: Egypt's location as a bridge offering passage between the continents of Africa and Asia.

Visitors, if not tourists, have been coming to Egypt for a long time. Its geographical location as a bridge between Africa and Europe has ensured its attraction for rites of passage by traders from one to the other for thousands of years. Egyptian history, from east and west and up and down the great artery of the Nile to and from the Mediterranean is very much a history of the attraction and repulsion of visitors who came and outstayed their welcome, or who stayed and became assimilated: the first Neolithic hunters from the south, the Indo Europeans from the north, the Assyrians, the Persians, the Hyksos; the Greeks and the Romans; the Turks; and most recently the French and the British.

Modern Egyptian history, at least from European text books, begins with the arrival of Napoleon in 1798, intent on bettering the achievements of Alexander of Macedon: and Europeans since then have had for it an ever-growing curiosity and a romantic attachment. This attachment has been fostered by one dominating and very distinctive expression of the Egyptian landscape in its culture -the belief, at least in dynastic times, of the exchange of a transient visitor's life in hostile desert surroundings for a never ending one in paradise surrounded by green and plenty and watered by the celestial Nile. Egypt's monuments to its dead, however irrelevant to the modern Arab state, are paradoxically of vital importance to its economy in continuing to attract foreign visitors.

Having such rich historical and cultural assets, modern tourism has and is attempting to build on this primary attraction by developing and marketing aspects of the Egyptian landscape such as the Nile cruises, the "desert" experience and now the landscapes of its coastline (Figure 1.2).

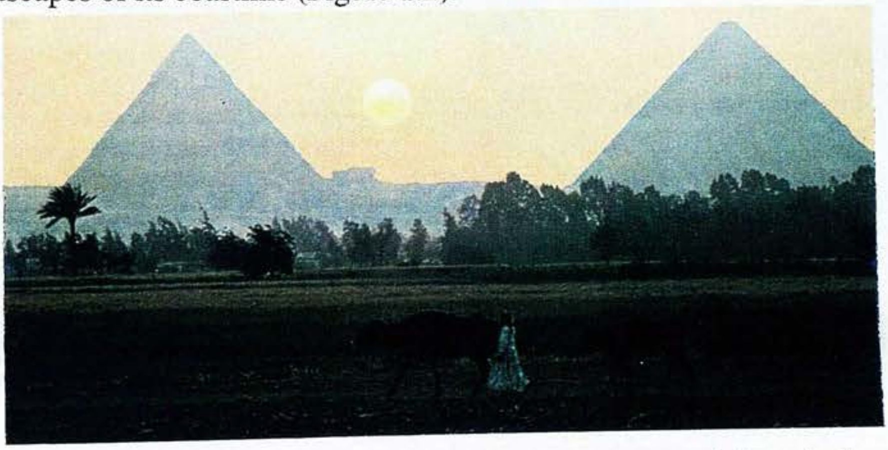

Figure 1.2: A tourist's archetype of the Egyptian landscape but nevertheless a landscape of great beauty, in its shadowy pinks, grays and dark browns.

Figure 1.3: Land sat infra red emphasising the thin lifeline of the Nile with the westward spur of AL-Fayoum depression and the broad fan of the extending Delta. (After National Geographic, 1977)

Looking down from space by landsat, you may take in the whole of the Egyptian landmass at a single glance (Figure 1.3). Its three dominants are immediately apparent: the river, its flanking desert and its coastline; the river with the blood of its lifeline corridor and Delta appropriately marked in infra red; the deserts flanking it, firstly westward in a series of monotonous and extensive depressions, and eastward in a dramatic plate edge of mountains, and the rifted subplate of the Sinai peninsula beyond, and dropping down on all the sides to the coastal fringes of the the Red Sea. Each of these dominant features, the river, the deserts and the coastlines is given a general introduction in the pages following and in order to place in context the coastline of the Red Sea, which is the specific subject of this thesis.

The Nile, the longest and most important river in Africa, flows for almost one third of its length through Egypt. The word Nile itself means 'river' in Semitic, so fundamental is its life giving importance to the people of Egypt. From the Abbyssian and Sudanese tablelands it enters the country at the southern village of Adindan and traverses some 1500 km northward to the Mediterranean. Each year it brings virtually the whole of the country's water supply with it, cutting deeply down through its base rock, firstly of sandstone, and from Aswan onwards through the ancient limestones of Tethys to the Delta and the sea. The green and fertile thread of its valley varies in width from barely a kilometre to upwards of 200 at the Delta, and in height from that of the surrounding desert, to several hundred meters below the limestone cliffs of Qina near Aswan (Figure 1.4). For over six thousand years, survival and prosperity have depended in Egypt on the annual charge and discharge of its floodwaters and silt -a single life giving act, symbolically associated with kings and political leaders intent on bunding and barraging its flow, recharging its gradient in ever larger catchment dams, and in using every last drop of its water.

Across this river valley landscape for six winter months the sun moves with reasonable and moderate effect. It was during this season that the ancients thought that the sun-god Ra in his heavenly boat performed his duties with the greatest consideration, neither scorching the crops, nor allowing too much licence to the north winds.[3] Rising from the Eastern desert the sun draws up the heavy winter dews and

[3]Robin Fedden, *Egypt: land of the Valley.*, Michael Haag Ltd., 1986, pp., 28-29

passes daily across the valley through a cloudless sky. At evening it sinks behind the Libyan hills, creating, as a magnificent finale, its splendid sunsets. Day after day the progress is repeated; day after day the transfer between lightness and darkness is made and this same journey is relentlessly the same. Looking out over the valley, one realizes that this changelessness is made and the green wealth of its crops harvested in a landscape altering but little from one generation to the next.

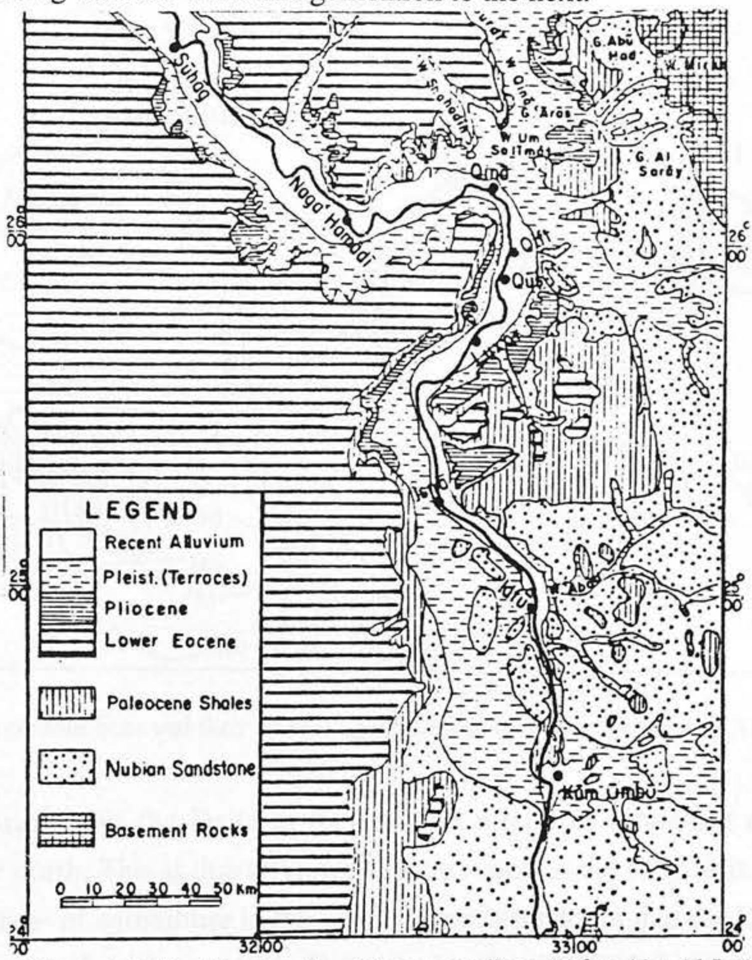

Figure 1.4: The Qina bend and its surroundings. (After Abu Al-Izz)

Passing Cairo, the river flows 20 km beyond to the north where it divides into the Rossetta and Damietta branches, the length of which are 239 km., and 245 km., respectively and which enclose the triangular Delta, whose shape has traditionally been compared to the flower head of the lotus. The map of the Delta (Figure 1.5), shows its division into three parts; the Eastern part where the contours bend southeastward, the Western part where they slope to the northwestward and the Central part where they flatten and follow the broad fan of the river silt. The direction of the slopes in the central part of the Delta, results in the level of the Damietta branch being some two meters higher than that of the Rossetta branch, forcing the irrigation canals to begin at the Dammietta branch and slope northwards. This explains why the Rossetta branch gets around a one-half times as much flood water as the Dammietta branch. The slope at the apex is 1:10,800 and to the north it is 1:30,000.

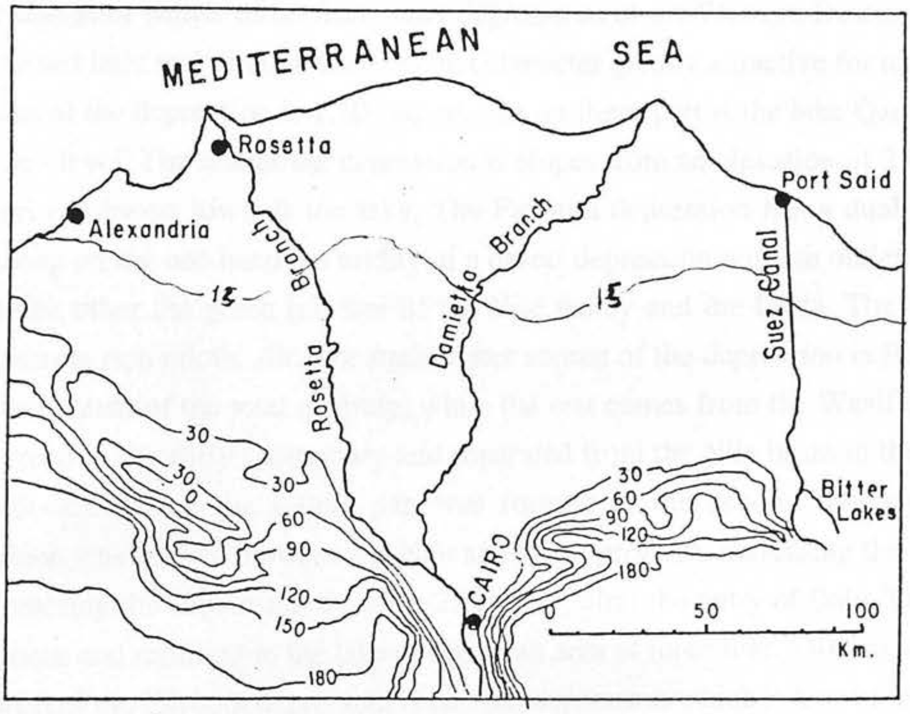

Figure 1.5: The contour lines and their relation to the Deltaic branches. (After Abu Al-Izz)

The surface of the Delta in the south is relatively smoother compared to its surface in the north. This is due to various factors such as the long time absence-during geological times- of agriculture in the north. There is no doubt that the Delta grew faster in the recent past than the present. This may be the result of the perennial irrigation system being impeded by dams, barrages and canals which have reduced the volume of silt outwash. These tracts of fertile land, covering less than 3% of the total area of Egypt, support a dense population. Averaging more than 600 persons/ km. sq., whereas in the vast desert areas, which represent more than 97% of the total area, there is only one inhabitant/ 7 km., sq.[4] It must remain a national priority that such fertile lands are not lost to other land uses, including those of tourism.[5]

Lying to the south west of the Nile Delta is the Fayuom depression,[6] or 'oasis', a subtype of the paradisal river landscape, joined to the Nile by Bahr Yusuf, giving it a unique character which varies from other depressions of the Western Desert which will be discussed later and through such distinct character greatly attractive for tourists. The total area of the depression is 1,700 sq. m. , its northern part is the lake Qarun, 45 km. below sea level. The rest of the depression is slopes from an elevation of 23 m. above sea level northwest towards the lake. The Fayoum depression has a dual character; contrasting on the one hand the aridity of a desert depression with no outlet to the sea, and on the other the green life line of the Nile valley and the Delta. The soil of the depression is rich nilotic silt. The main water source of the depression is Bahr Yusuf, about two thirds of the total quantity, while the rest comes from the Wasif channel. It was formed in the early Quaternary and separated from the Nile basin in the east by a water divide. When the Lahun gap was formed in the second dynasty a direct connection was created between the Nile and the depression, increasing the volume of water entering the depression by some 23 cu km., after the entry of Bahr Yusuf to the depression; and resulting in the lake covering an area of more than 1300 sq. km. To the southwest of the Fayuom depression is another depression which is known as Wadi Al-Rayan. This depression is 42 meters below sea level at its deepest point, with no alluvial deposits.

One of the biggest projects ever undertaken in the field of irrigation and river control, was the Nasser Dam at Aswan. The project was carried out in the area between Aswan and Wadi Halfa, where the river drops from an elevation of 125 m. above sea level to 92 m. with a mean gradient of one meter every 11 km. This increased the velocity of the river to its maximum causing frequent flooding, and subsequent destruction of villages on the borders of the Nile. Debate continues about the disadvantages of this project; the amount of silt carried in the water is reduced causing

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[4]M. A. Zahran, A. J. Willis, *Vegetation of Egypt,* Chapman & Hall, 1992, pp. 1-4

[5]The Delta is suffering badly from the on-going urban expansion of the existing settlements, which is leading to a rapid loss of the country's most fertile land.

[6]See figure 1.3

erosion of the Delta and decrease in the land fertility. However, at the time this project was undertaken, it had a great cultural and moral significance for the people of Egypt.[7]

To the visitor, the Nile has long offered a convenient and comfortable corridor of access, and a landscape with a rich succession of contrast and interest along its banks between the river banks and the background edge of the desert (Figure 1.6). from the deck of a pleasure boat or a felucca a viewer may easily feel the sense of standing quite still as a progress passes of crops and their tending figures, and rock tombs, temples and pyramids marking the seemingly endless passage of time, as a frieze in a wall painting.

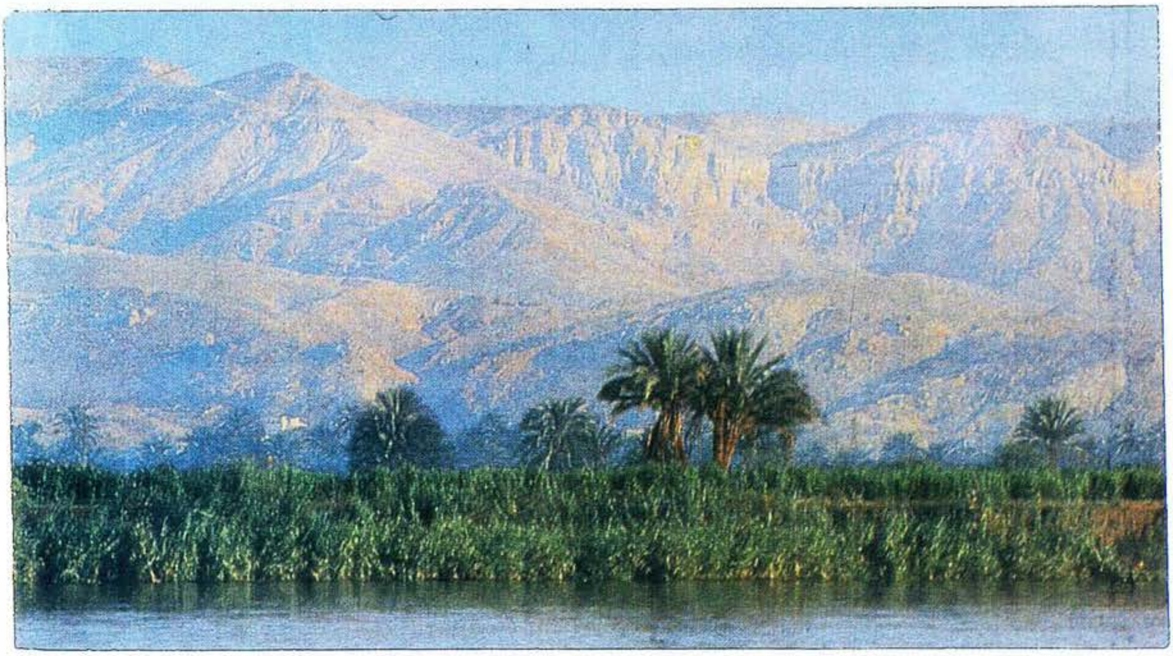


Figure 1.6: Sugarcane, date palms and cash crops: the green thread of life between the river and the desert edge; the desert edge dissected in earlier times by heavier rainfall and now richly varied by a mantle of wind blown sand.

[7]The project was conceived in 1955. Without adequate funding for the project at the time president Nasser nationalised the Suez Canal which led to the 1956 war. During the period of the project Egypt was leading the Arab nations for the liberalization of Palestine, but being defeated in the 1967 war the fulfillment of a major project like the High Dam project was the only proof that the nation could still struggle and fight back for their lost dignity at the time.

East and west of the river lies the second of the dominants of the Egyptian landmass -its deserts: with wind eroded scarps, empty watercourses, gravel and rock flats and white curving dunes all contributing to a spare and vast landscape of great structural beauty. It is a landscape picked to the bone. And above all, it is a landscape that changes with light, from dawn to noon shifting through shadowy gr ys and pinks and ochres, to blinding white, and reversing the spectrum as the day declines. Except when choking sandstorms blow up from the south, the dry air is astringent and clear, the sun is oppressive and the nights bitter. The only sound is that of wind stirring the silence. Lost in its vastness are the wadis and their small intimate oases, where water, palms and a few tamarisks create shade and life. Here trees and water attract a wealth of birds and insects. But these are only small patches within the total land mass. The deserts themselves for descriptive purposes divide simply into three, the Western Desert, the Eastern Desert and the Sinai.

The Western Desert Stretches to the Libyan frontier -a straight line drawn by politicians through an empty Sahara- featureless except for its dunes and a succession of small oases, strung out from Siwa in the north with the ruined temple of Jupiter-Ammon, to Kharga in the south (Figure 1.7). Situated below sea-level, the oases are fed by springs from high ground far to the south. The tops of waving palms, peering over the rim of these green depressions, herald villages, and date groves, in self contained communities. These oases support in total the 15,000 people comprising the whole population of the Western Desert. Some like Farafra, are pinpoints on the map, while the largest, Kharga boasting a governerate and a railway, stretches ribbon-like for over 100 miles (Figure 1.8). The Western desert itself occupies some two thirds of the land mass of Egypt and extends to the borders of Libya, Sudan and the Mediterranean with an area of 681,000 sq. m. It has different sub-divisions according to its physiographic and geological structure, a region of limestone hills along the Mediterranean coast, a region of sand and gravel hills in the areas to the west and south west of the Delta, and a limestone plateau with 4 depressions, a sandstone plateau, and inselbergs in the southwest. difficulties of access and the extremity of its climate make it of little account in present or future tourist development, but the historic value and interest of its oases flora and fauna, and the architectural form of its mixed Arab, Berber and African traditions make it potentially very attractive to visitors.

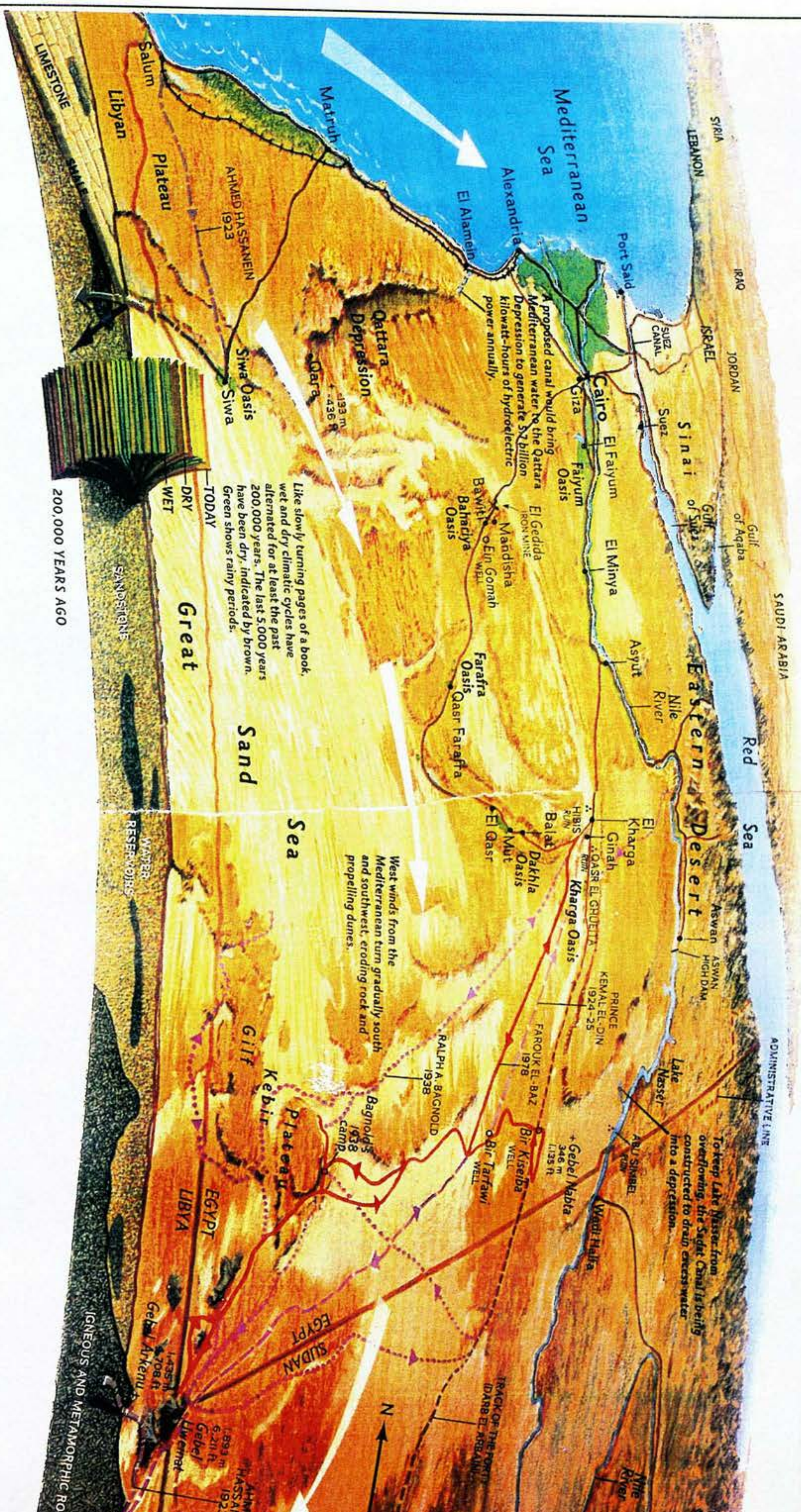


Figure 1.7: Descriptive sketch showing the various landscape features of the Western Desert. (After F. El-Baz)

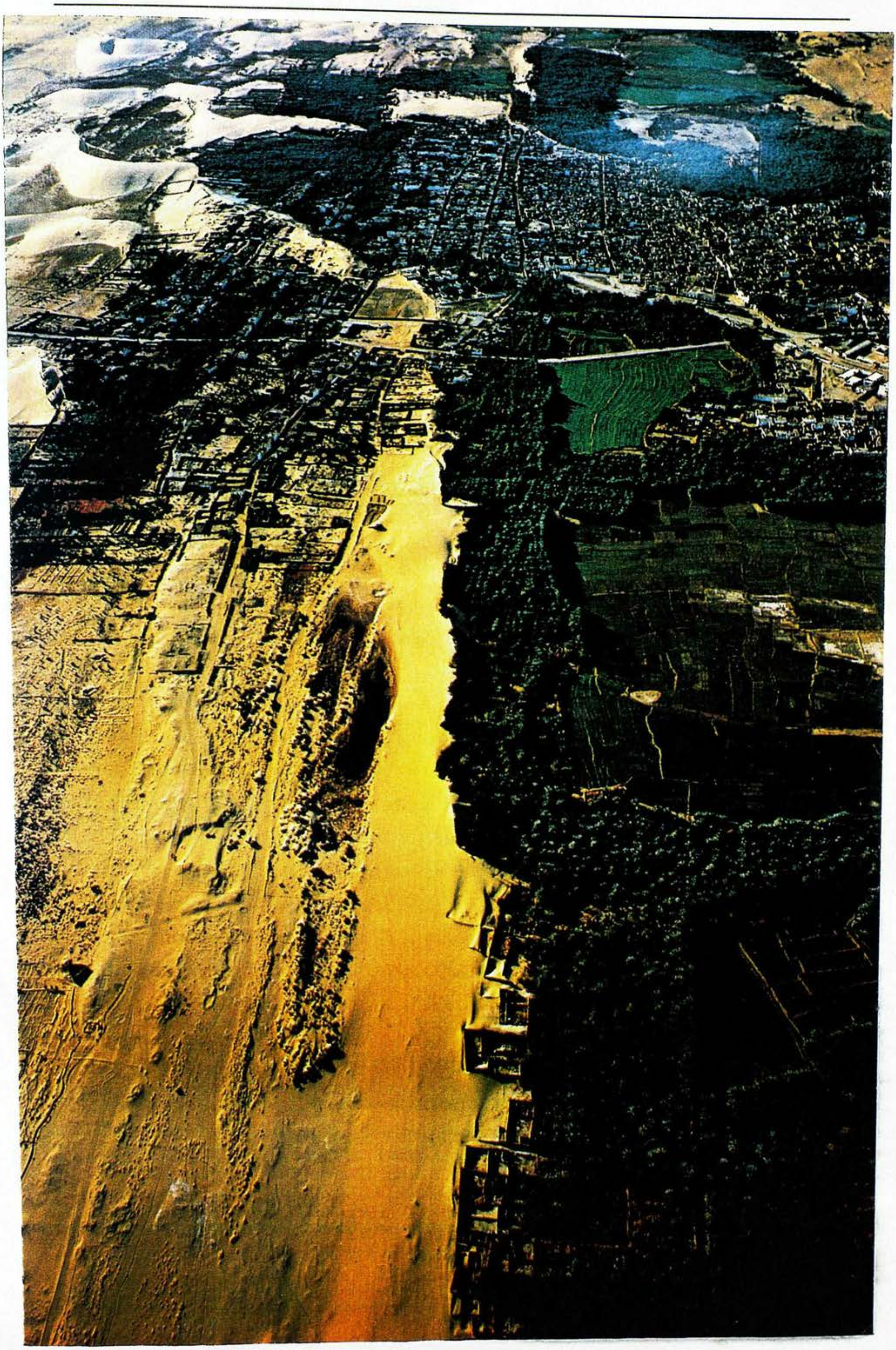


Figure 1.8: Al-Kharga oases, the largest oases in the Egyptian deserts they stretch for over some 100 miles. (After F. Al-Baz 1977)

The culture of such isolated communities is particularly vulnerable to outside influences, and for the time being they are undoubtedly best left strictly alone and not subject to any tourist development (Figure 1.9).

Figure 1.9: The destructive forms of a typical Western Desert settlement of the Siwa Oasis. (After H. Fathy)

The Eastern Desert represents 21% of the total area of the country with an area of about 223,000 sq. m. It may be conveniently divided into four subregions, the Red Sea mountains, the Sandstone plateau to their west, the Wadi Qina and its extensions into the mountains, and lastly the Limestone plateau and Badlands east and south of the Qina bend (Figure 1.10). From the river the Eastern Desert rises to the backbone of the Red Sea mountains and a dramatic skyline reaching in its parts over 2000 meters. The mountain sides are deeply scoured and dissected by rain falling in earlier times and the drainage system contains gullies and gorges and wadis and associated wells, which sustain a scattered nomadic population and a distinctive desert fauna including Ibex and a sparse cover of xerophytes. The eastern watershed of these mountains drops down to a palm fringed coastline and settlements of great antiquity, famous for their sailors and traders and fishermen and with a present-day population of some 50,000 inhabitants.

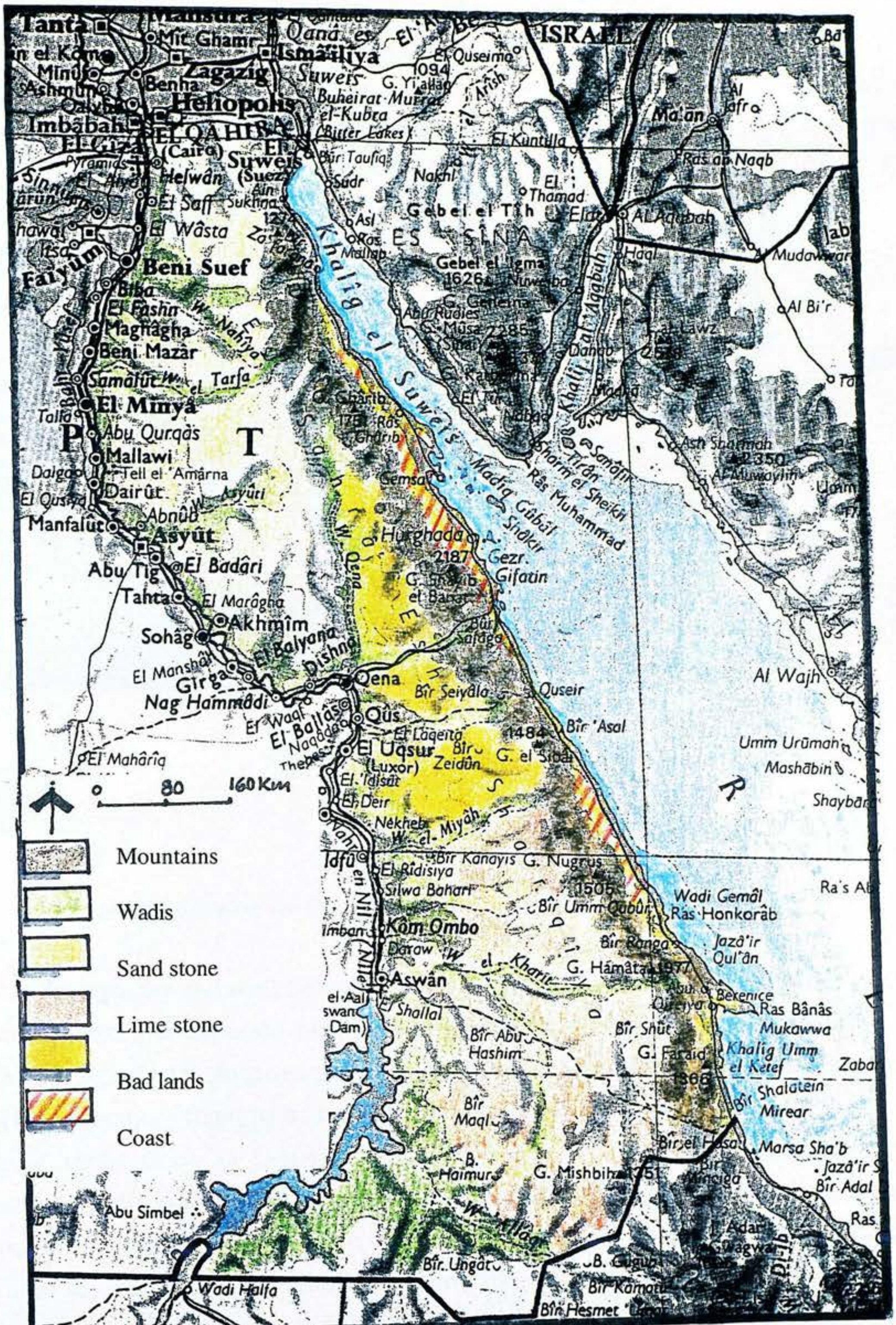


Figure 1.10: The various landscape features of the Eastern Desert. (Adopted from the work of Abu Al-Izz)

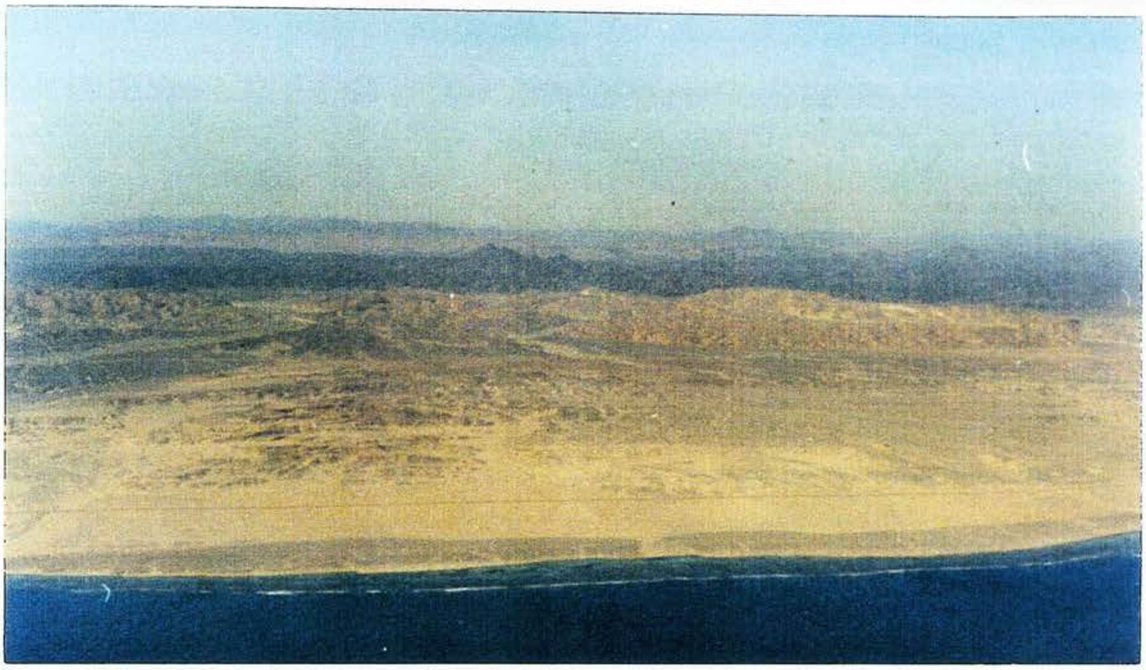


Figure 1.11: Typical landscape of the fringe between the mountains and the Red Sea.

Topography and rock formations play an important role in the landscape of the Eastern Desert. The slopes are highly differentiated, varying in the mountains from 1 in 2, down to the coastal plain at scarcely more than 1 in 100 (Figure 1.11). The plateaus, comprise a group of flat tops with wadi beds in-between ranging from 1 in 18 to 1 in 4. Granitic rocks exist as rounded hills with brown colors. The mountains have characteristically serrated peaks and the wadis between them and the sea are deeply dissected. Visitors interested in the visual qualities of this landscape are sustained by the drama of the side shadowed drainage pattern, the reds and browns of the granite and schistic mountains, and the sandy plains and outlying plateaus. Minor local faulting enhances this drama, and so also the sea itself.

The mountains are affected by climatic factors. Their northern section is under the effect of northwestly winds, and the southern is affected by southeasterlies. These winds meet in a zone of comparative calm above the city of Bernice on the coast and some 160 km north of the Sudanese border. A light cloud cover is frequent over the Red sea mountains. Occasional rains sometimes cause torrents to flow through the wadis towards the sea or the Nile, carrying large amounts of debris and capable of much damage and destruction.

The third of Egypt's great deserts' the Sinai is located on the eastern borders between the Suez Canal and Jordan. It covers a small area of some 61,000 sq. km. representing 6% of the total landmass but it has been of vital importance as a landbridge for both migration and trade. In appearance it resembles a ship's prow, a great tilted plate falling to the Mediterranean from the scarps of Gabel Katherine towering over 2500 meter above the junction of the Gulfs of Suez and Aqaba (Figure 1.12).

Most of it is limestone, the same limestone as the base of the Eastern Desert; rising as a great triangular block from a Mediterranean baseline of some 700 km, through coastal sand dunes east of Ismailia, through the high plateaus of El-Tih to the Gabel Katherine and dropping down sharply to the narrow coastal fringe of the Red Sea at Ras Mohammad. The interior of this desert is particularly dramatic (Figure 1.13) with the low light of morning and evening catching its jagged skylines but it is too remote to be anything except of passing interest to tourists; the coastal fringe on the other hand is all too accessible and is seriously threatened by inappropriate development. Here there is a wealth of many different kinds of corals, of mangrove and other distinctive plant communities, and a spectacular Spring and Autumn migration of many birds to and from their African wintering grounds.

On Gabel Mousa, in the heart of Sinai, Moses is reputed to have brought down the tablets of the law; here the Israelites claimed a safe refuge and later also were built a scattering of Coptic monasteries famous for their scholarship. And for thousands of years before and since, until eclipsed by the Cape passage and by the Canal, the Sinai has been a pilgrim and a caravan route between South Asia and the Mediterranean.

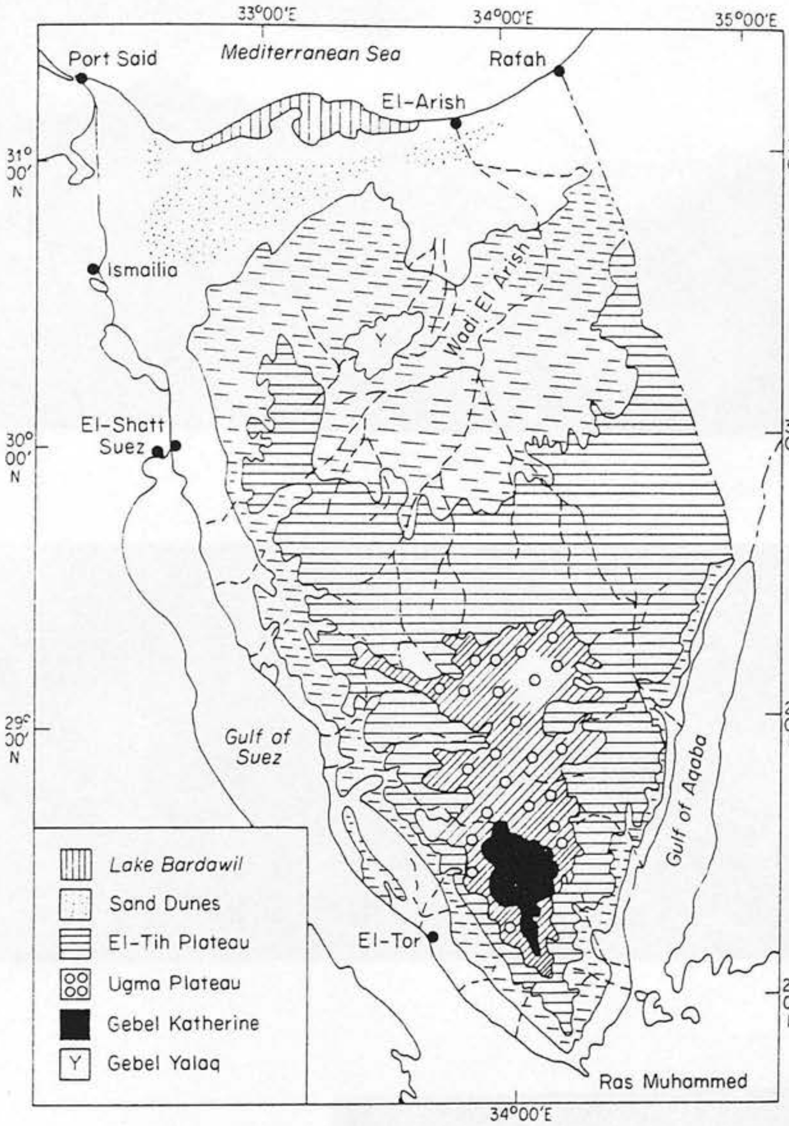
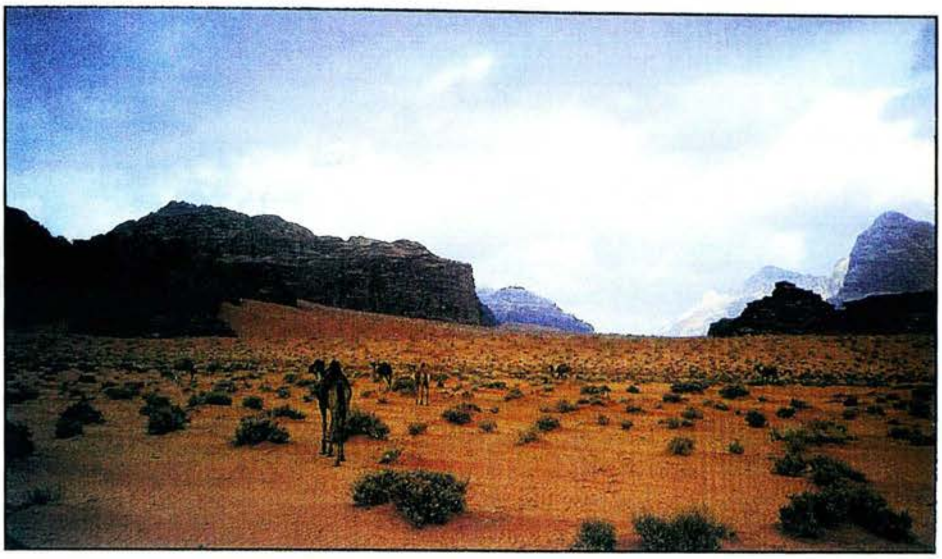
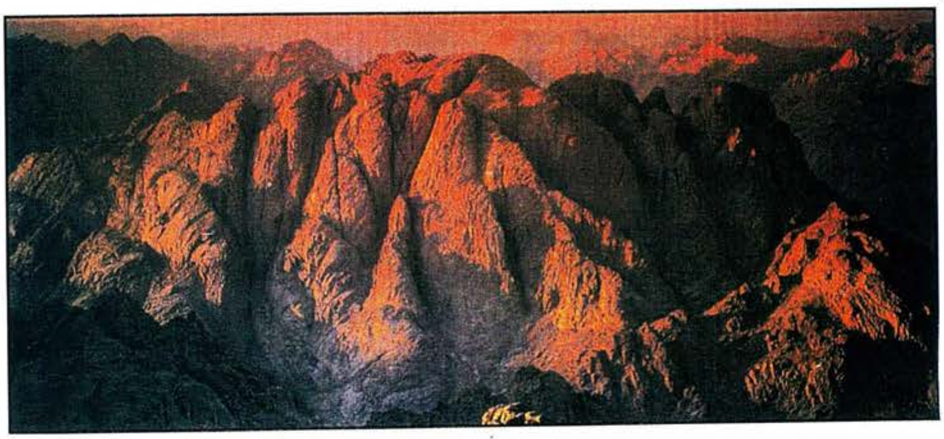


Figure 1.12: The Sinai showing its successive landscape types to south. (After Zahran and Willis)





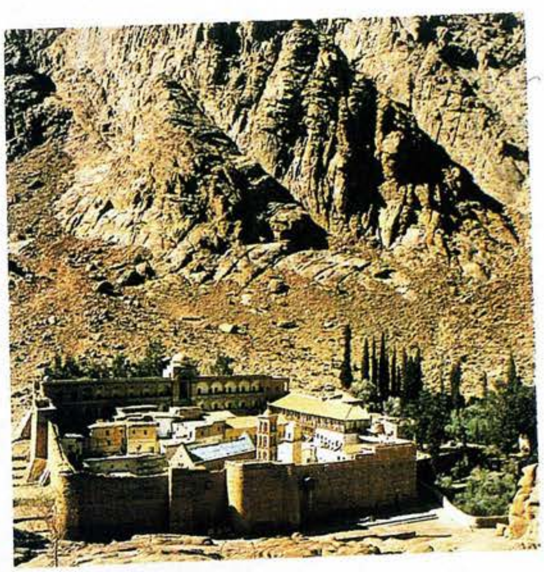


Figure 1.13: Three of Sinai's distinctive landscapes: the plain of the Wadi Al-Areesh to the north, Gabel Mousa in the middle, and the base of St. Katherine mountain and its monastery in the south.

The last of the three dominants of the Egyptian landmass is its coastline -that of the Mediterranean extending some 450 km., and of the Red Sea some 1480 km. The Mediterranean coastal belt is by far the richest part of Egypt in its floristic composition owing to its relatively high rainfall. The number of species in this fringe makes up to about 50% of the some 2500 species of the Egyptian flora.[8] Most of these species are therophytes that flourish during the rainy season, giving the coastal belt a temporary grassland desert. Along the coast as well lies a chain of intensely white calcareous granular sand dunes. These dunes form a continuous ridge with an undulating surface and present a type of habitat notable for its monotony. Integrating with the clear blue sea, such characteristics affect the general scene distinctively in their colour form and texture.

By contrast the Red Sea coast is located in a very dry region of Egypt, which is almost rainless. Here there is little native vegetation except in the wadi channels (Figure 1.14). The landscape of the coast consists of a shelving edge backed by a chain of mountains. The sea plays an important role in the landscape, with its coral reefs and islands. Freya Stark described it by saying[9]:

> *"There is a family feeling about the Red Sea whatever nation may happen to own this or that stretch of its flat shores. When I close my eyes I can see it, as from the air, a rag of blue with green an d turquoise coral reef shallows surrounded by the bleached monotony of sand, and carrying in small clusters uninhabited islands empty and brown and ridged like veined dead leaves that float upon a pond."*

The scenery of the Red Sea is completely different from the bland softness of the Mediterranean. It has a distinctive hard edge and texture, a sharp skyline, and the greens and blues of the sea are enhanced by the browns and yellows of the foreshore.

8Op cit., Zahran and Willis, p. 19

9Freya Stark, *East is West.*, Arrow books, 1991 edition, p. 43

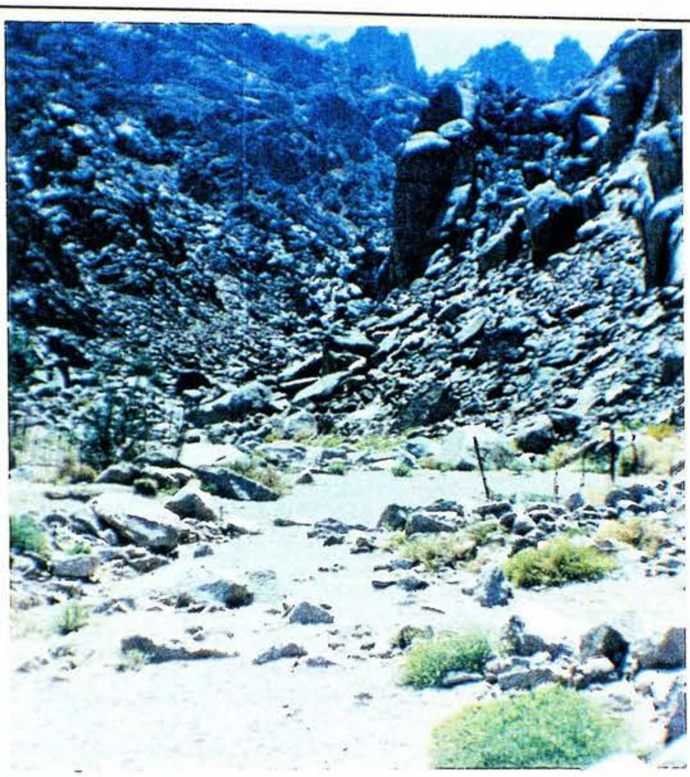


Figure 1.14: Sparse cover of xerophytic perennial herbs along the base and lower slopes of Wadi Qina in the Eastern Desert. (8/1993)

Tourists and tourism are dealt with specifically in Chapter Four, but as much of their preferred activities are influenced by climate, a general comment on the latter in the context of Egypt as a whole is relevant here. Shade is essential for comfort in all parts of Egypt. The scorching dry heat of the overhead sun quickly desiccates and burns, even along the river and the coastline; and soil and leaf salt-tolerant shade species such the Date palm (Doum) are especially valued. In the deserts the mean daily summer temperature at ground level can rise to more than 30 degrees C. (84 degrees F.) and limits even youthful activity to periods of no more than half an hour or so at a time. The intense dry heat of the desert interiors is not for the casual European visitor: so great may it become that even the natural reflex of drawing breath is painful; and unless experienced in shade and from the cool of a moving vehicle is only for the hardy and the adventurous.

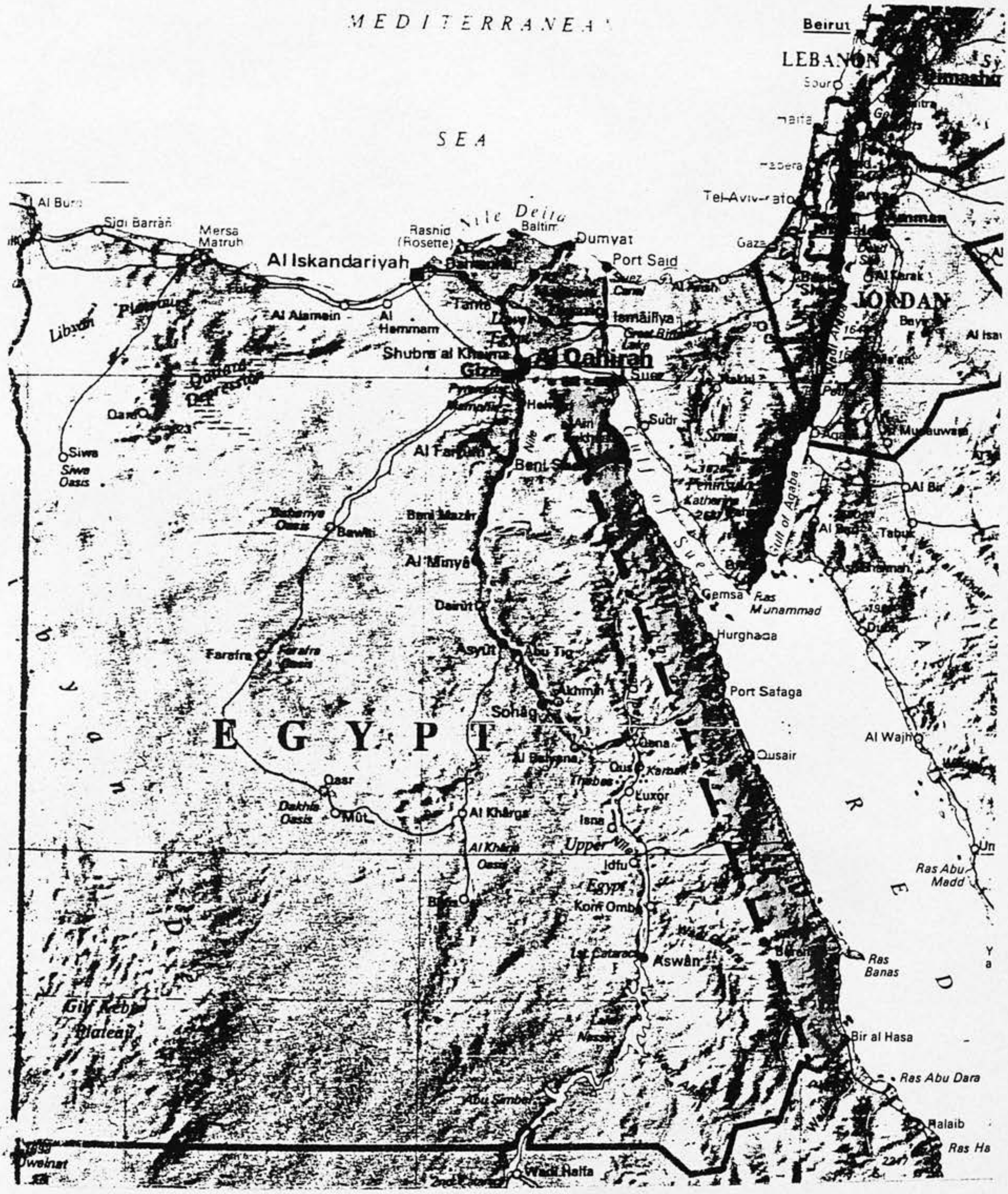
In winter (December-February), desert temperatures at night can drop to freezing, and the average daily figure to some 10 degrees C. (50 degrees F.). Traditionally the rate of heat gain and heat loss is slowed by thick walled buildings, by turbans and loose cloaks; and paradoxically even the foreign holiday makers may be advised to bring warm clothing.

Relief and comfort from these extremes is given firstly by sporadic but unreliable rainfall along the Mediterranean and the Gulf of Suez, not in itself useful so much as in the plant cover which it supports and which helps to reduce and dissipate heat gain; and secondly and still more so in the convected on shore and off shore breezes of the coastline which vary according to the time of day and may extend to a depth of several kilometres inland.

To all of this, a professional climatologist might add that the annual rainfall in Egypt is limited to the coastal zone and its hinterland and is about 1/10 that of Edinburgh at 20-30 mm. Most of it is lost straight back into the atmosphere as evaporation. In other parts of the Egyptian landmass, except for Gabel Elba area of the Red Sea with winter rains, the land mass is essentially rainless and dependent for any water upon the imported resources of the Nile. This physical lack of water, and the associations of water, are therefore of profound importance to tourism, both functionally and psychologically.

Apart from the heat and lack of water, the other great but thankfully infrequent discomfort of the Egyptian climate as mentioned before are the desert sand and dust storms which may envelope the landmass and fill the air with fine dust and which not even the tightest fitting door or window may exclude. At such times (perhaps 6 days in a bad year), hotel and resort managers pray for remission after 2 to 3 days so that their holiday maker's weeks or fortnights may heal the torment. At all other times, except in the extremes of the desert interiors of the south west and north east, conventional design is capable of moderating the climate to produce a comfort zone around the average hotel and its swimming pool reasonably within the discomforts of sweating and shivering.

This brief summary of the main features of the Egyptian landscape should be sufficient to indicate that it has much of interest to offer visitors. Planning to exploit these resources requires a high level of awareness and competence and this thesis examines its effectiveness in the development of the Red Sea coastline. As an introduction to this; the following two chapters give further details on the landscape of this coastline.


MEDITERRANEA
SEA
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Gaza
Al Burj
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Matruh
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Nile Delta
Baltim
Dumyat
Port Said
Al Iskandariyah
Tanta
Ismailiya
Al Alamein
Al
Hammam
Shubra al Khaima
Al Qahirah
Giza
Suez
Siwa
Siwa
Oasis
Al Faiyum
Beni Mazar
Bawiti
Al Minya
Dairut
Asyut
Abu Tig
Akhmim
Sohag
Farafra
EGYPT
Qena
Al Balyana
Qus
Thebes
Luxor
Qasr
Dakhla
Oasis
Mut
Al Kharga
Isna
Upper
Idfu
Egypt
Kom Ombo
Aswan
Abu Simbel
Wadi Halfa
Sudr
Gulf of Suez
Gulf of Aqaba
JORDAN
Al Karak
Tabuk
Ras
Muhammad
Gemsa
Hurghada
Port Safaga
Qusair
Al Wajh
Ras Abu
Madd
Ras
Banas
Bir al Hasa
Ras Abu Dara
Halaib
Gilf Kebir
Plateau

CHAPTER TWO

CHAPTER TWO

THE LANDSCAPE OF THE RED SEA REGION: DESCRIPTION AND EVALUATION

***" The Landscape has many dimensions. The physical landscape surrounds us in space and time, a product of the interaction of people and nature."*[1]**

Garret Eckbo

In Chapter One an attempt was made to give a general description of the landscapes of Egypt and how they are an important potential for tourism development. In this chapter focus will be on the Red Sea region as it is the area covered by this research. In order to analyse the efficiency of coastal planning for tourism development on the Egyptian Red Sea coast, it is essential to start with an understanding of the nature of the Red Sea region and reveal its causality. As Lewis Mumford observed of the planning process:[2]

"All good planning must begin with a survey of the actual resources: the landscape, the people, the work-a-day activities in the community. Good planning does not begin with an abstract and arbitrary scheme that seeks to impose on the community: it begins with a knowledge of existing conditions and opportunities."

1. Methods of Evaluating and Analysing the Red Sea Region Landscape

Land suitability analysis seeks to evaluate sites for particular uses, and to assess and compare a range of sites in order to select the best one for a particular use or range of uses. Some of the earliest variations of the evaluation methods were developed by

[1]E. Zube, R. Brush, J. Fabos, *Landscsape assessment: values. perception and resources*, Dowden, Hutchinson and Ross, Inc., 1975, p. 31.

[2]Lewis Mumford, *The City in History*, Harcourt, Brace and World, Inc. 1961, p. 12

ecologists, seeking means of classifying rural land according to natural features, that would be useful for evaluating alternative land-uses, such as mineral extraction, wild life habitat and outdoor recreation. Other professionals, particularly landscape architects, have subsequently refined and developed these evaluation methods for numerous applications, including the particularly challenging problem of land use planning in urban development.[3]

Land suitability assessment serves as an evaluation tool for planning areas that retain important natural environmental features. It can be used to evaluate alternative sites for a particular use, such as a high way, power plant, or regional recreation facility. Or, it can be used as an aid in preparing a complete land use plan for each of several land use options. Most variations of the method are designed to ensure that land use evaluations give adequate attention to the environmental impacts of land conservation. However, impacts are not made explicit by the method; rather they are implied by scientific data on land characteristics, such as geology, hydrology, soils, vegetation and wildlife (Figure 2.1). Expert judgments by planners and natural scientists play a central role in such evaluation. Important decisions are made in selecting the categories and measures of land characteristics, estimating impacts of land conservation, and assigning ratings or priorities for land suitability. The greatest usefulness of land suitability assessment arises in the early design stages of land use planning, where a large number of alternative spatial patterns must be screened in order to narrow the choice to the few most promising options. As the design work progresses toward the detailed definition and assessment of a few alternatives, generalised mappable information becomes less important, and more precise evaluative information becomes more crucial including that gained from special field studies.

Most variations of the land suitability assessment take one of two approaches;[4] the 'quantitative' approach or the 'qualitative' approach. These approaches differ in the manner that information is organised to derive a statement of land suitability. The quantitative approach uses the conventional method of assigning ratings and calculating a grand index- in this case, of land suitability. The qualitative approach classifies land into ecological types to which land use principles are applied for determining suitability.

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[3]Donald McAllister, *Evaluation in Environmental Planning; assessing environmental, social, economic, and political trade-off*, MIT Press, 1986, p. 186

[4]ibid., p. 189

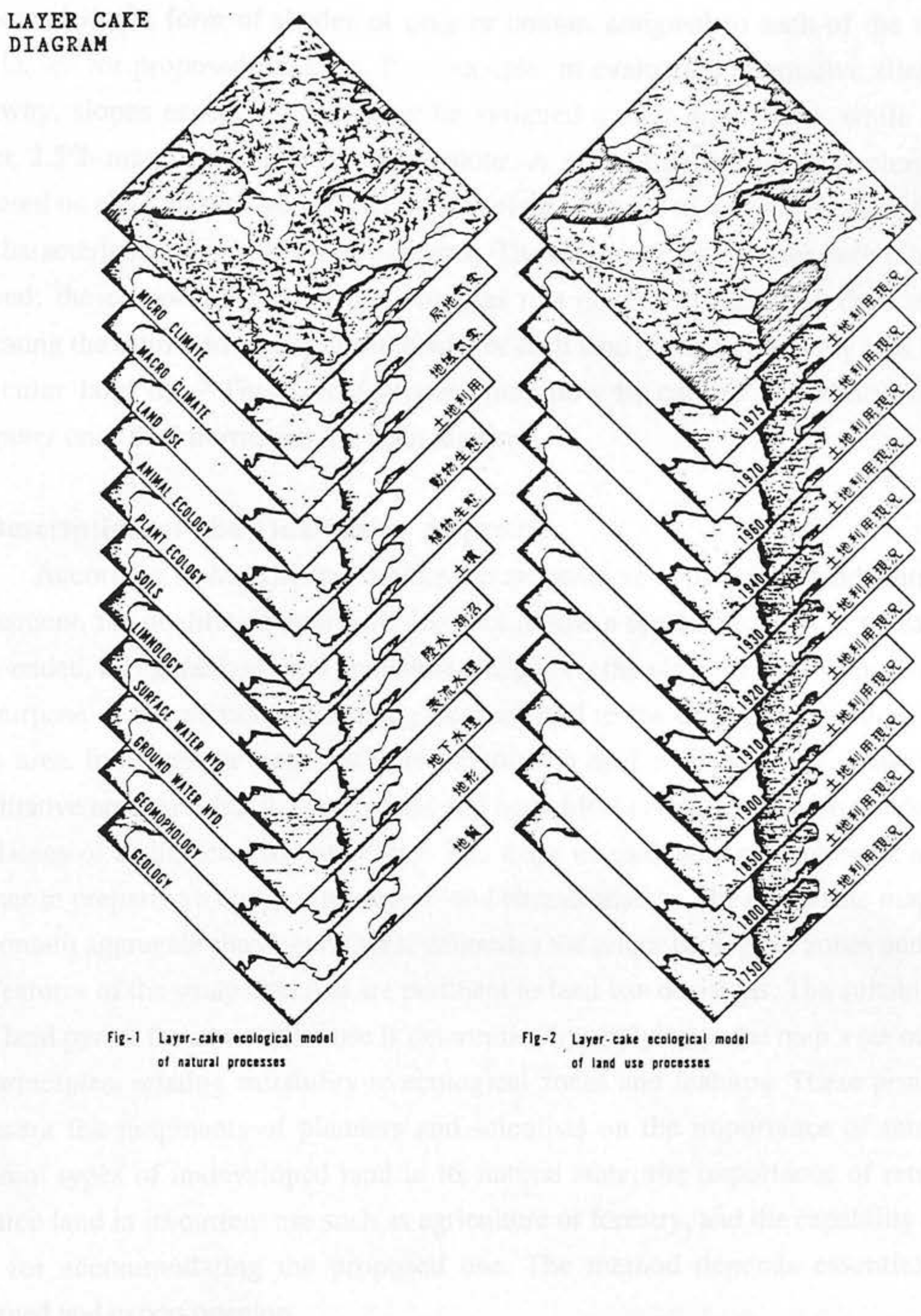

Figure 2.1: Layer-Cake ecological model of natural and land use processes. (After Ian McHarg)

a) Description of the Quantitative Approach

Such an approach is one in which implicit, or explicit numerical ratings, are assigned to subclasses of each land characteristic and aggregated for each land parcel into a grand index of land suitability for a particular use. McHarg uses a map overlay method in which the quantitative nature of the ratings is not explicit. The ratings are expressed in the form of shades of gray or colour, assigned to each of the several subclasses for proposed land-use. For example, in evaluating alternative sites for a highway, slopes exceeding 10% may be assigned a dark gray shade, while slopes under 2.5% may be clear or a white colour. A map of each land characteristic is prepared on clear plastic overlays, using the colour shadings to indicate the variations in the characteristics throughout the study area. The sheets are placed over each other and viewed; the composite picture that emerges is a pattern of light and dark shades, indicating the estimated aggregate suitability of each land parcel in the study area for the particular land use.[5] This whole process may now be carried out effortlessly by computer once the information has been digitised.

b) Description of the Qualitative Approach

According to McAllister,[6] unlike the quantitative approach to land suitability assessment, the qualitative approach does not follow a specific pattern. It tends to be open-ended, using methods and procedures judged by the planners to be appropriate to the purpose of the particular planning exercise and to the ecological features of the study area. It utilises the same basic information on land characteristics as that by the quantitative approach, but the similarities end here. Most characteristics are divided into subclasses of a characteristic on a map. The maps of each land characteristic aid the planner in preparing a composite map of land characteristics. The composite map does not contain aggregate shading; rather it delineates the major ecological zones and other key features of the study area that are pertinent to land-use decisions. The suitability of each land parcel for a particular use is determined by applying to the map a set of land-use principles, relating suitability to ecological zones and features. These principles represent the judgments of planners and scientists on the importance of retaining different types of undeveloped land in its natural state, the importance of retaining resource land in its current use such as agriculture or forestry, and the capability of the land for accommodating the proposed use. The method depends essentially on informed and expert openion.

Sustain?

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[5]ibid., p. 197
[6]ibid., pp. 197-99

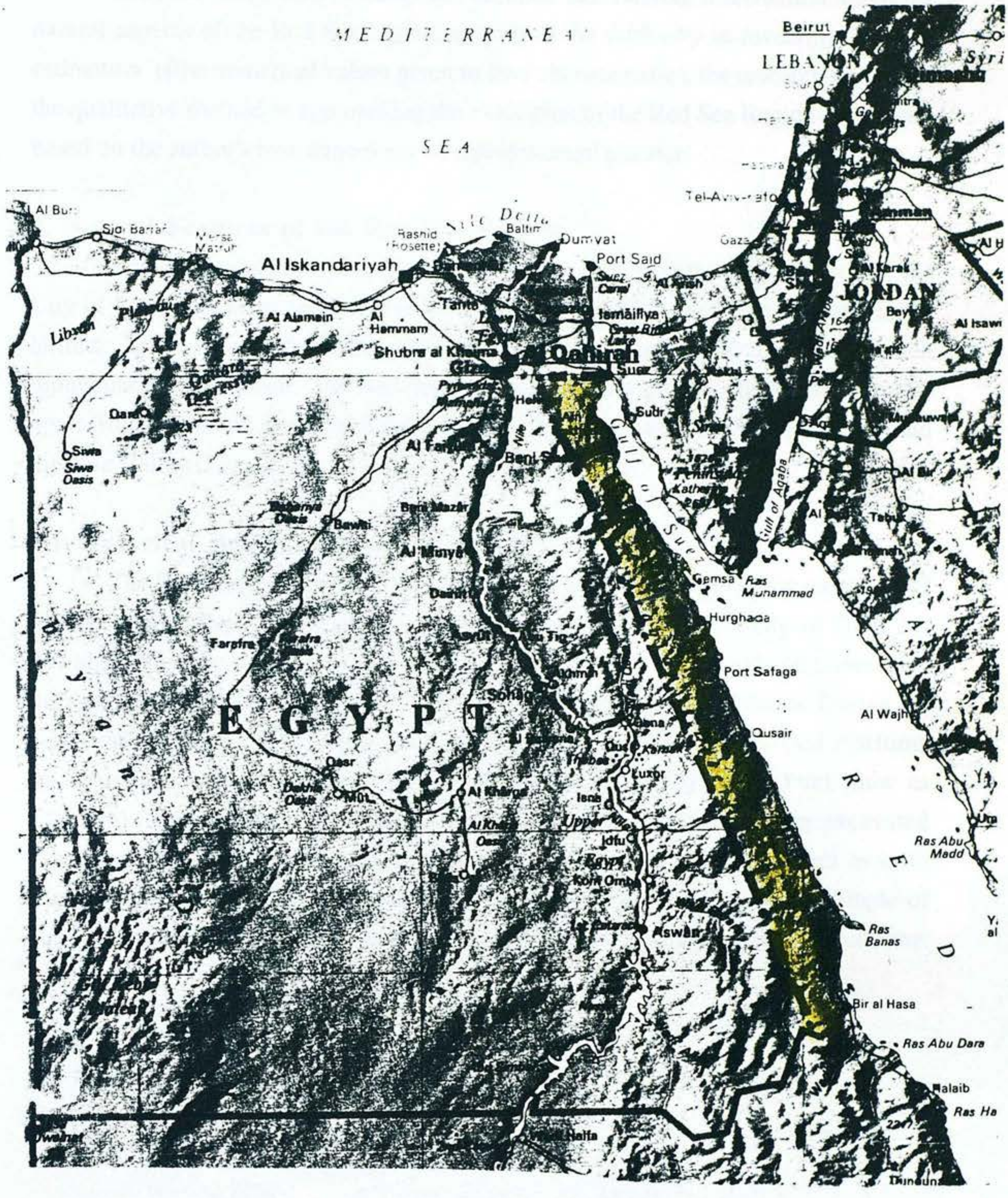

Figure 2.2: The boundaries of the Red Sea Region. (The Study Area)

Because of the lack of adequate, accurate and reliable information about the natural aspects of the Red Sea region, as well as the difficulty in revealing accurate estimation of the numerical values given to land characteristics, the research will adopt the qualitative method in approaching the evaluation of the Red Sea Region landscapes based on the author's own experience as a professional planner.

2. Natural Features of the Red Sea Region:

The study area of the Red Sea region may be defined as the area bounded by the City of Suez and Ataqa mountain in the north, the Egyptian- Sudanese boundaries at latitude 22 degrees north in the south, the Red Sea from the east and the Red Sea mountains from the west. The Red Sea region dominates most of the Eastern Desert, apart from the inland desert, and the area located between the Red Sea mountains and the Nile Valley (Figure 2.2).

2.1 Historical Background of the Region

The Red Sea region has an ancient history, starting even before the existence of known civilizations. There are still traces of stone age life in the city of Oum Al-Fawkhir. This city was also explored by the Pharaohs mining for gold and minerals in the area. Some of these ancient mines still exist within the city boundaries. During the eighteenth dynasty (1552- 1305 B.C), the Egyptian kings first developed maritime trade along the Red Sea with Africa, mainly with what they called Punt (now as Ethiopia). An important port existed at Wadi Gavesis, which has been excavated recently. Accounts of these Egyptian expeditions to Punt are preserved in both inscriptions and mural paintings, the most famous being the reliefs at the temple of queen Hatshepsut at Deir Al-Bahary. Figure (2.3), shows the route of trade at that time.

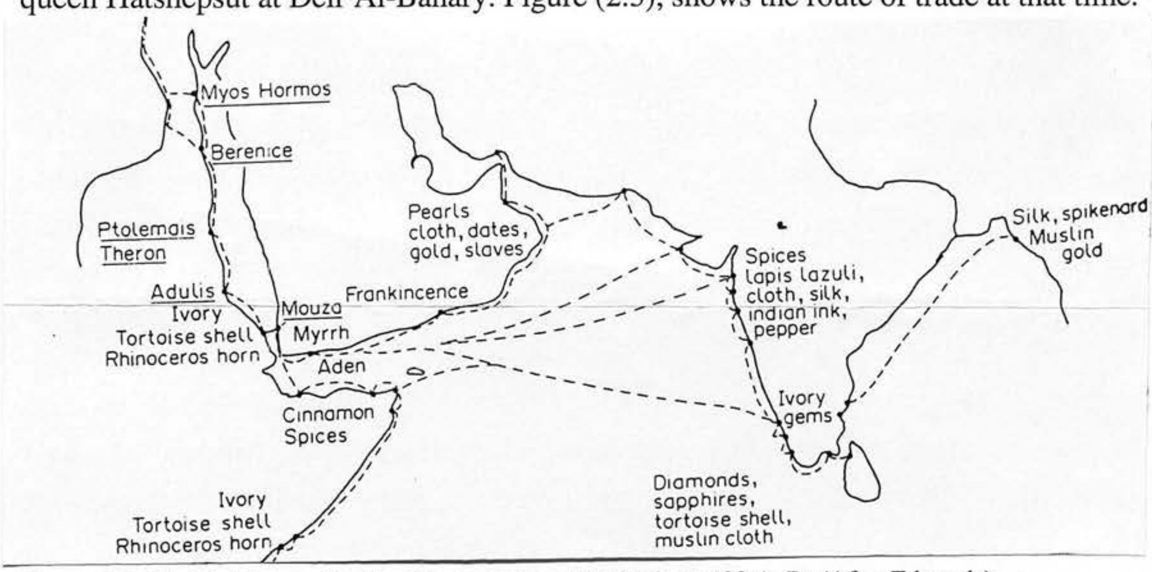

Figure 2.3: The Red Sea and Indian Ocean routes of trade about 100 A. D. (After Edwards)

In Roman times, the region witnessed trade exchange through the ports of Myos Hormos (Abu Sha ar), Philoterus (Wadi Gawesis), Albus portus (Quseir), and Berniece (which was named after the daughter of Potlemy the second). The region also provided a shelter for Christian priests seeking refuge from the repressions of the Roman Empire and some monasteries still exist from these times such as, St. Paul and St. Antoni.

Islam reached Egypt in 640 A.D. and the country became the home base of Islam in its spread westward into Africa and parts of Europe. The Red Sea region was affected by this situation, as it is the eastern border not only to Egypt but to the whole African continent. New settlements were established to achieve a defensive line against the conquest from this direction, and also to wrest control of trade from the Ethiopian kingdom, which was not part of the Islamic Empire.

In the following three centuries, trade was transferred to the Arabian Gulf, until in 961 A.D the Fatimid dynasty was established in Egypt. During this period of the tenth century, trade returned again to the Red Sea. Not only Muslim but also Jewish traders were important in this revival. Fustat[7] and Alexandria became trading centres of immense importance, and new ports were found in the region.

In 1498 A.D, the discovery of a route to India around the Cape of Good Hope by Vasco de Gama, outvalued the Red Sea trade monopoly of the Islamic empire. Goods could be brought to Europe on Portuguese and later, Dutch ships. Egypt lost its trade advantages and by 1517, it became a part of the Ottoman empire, also losing its place as the capital of the empire and falling into deterioration. The Red Sea, reflecting the state of Egypt at the time became a trade backwater.

The Red Sea became important again in the early 1800 A.D, as the British used the land bridge through to Alexandria in developing their trade with India, thereby eliminating the lengthy Cape of Good Hope route. By 1869, the Red Sea was transformed into one of the most important trade routes firstly with the opening of the Suez Canal and secondly with the advent of steam navigation.

At present, seven countries have shorelines on the Red Sea, amongst them some of the richest and poorest countries in the world. As shown in figure (2.4), Egypt forms the western boundaries of the sea to the north, Sudan borders the central section, and Ethiopia lies to the south. On the eastern shore, the Kingdom of Saudi Arabia

[7]The Fatimid constructed this city to be their capital, which is now found in the heart of old Cairo.

forms the north and central sections, the Republic of Yemen occupies the southern section and Jordan and Israel forms the northern boundaries of the Gulf of Aqaba.

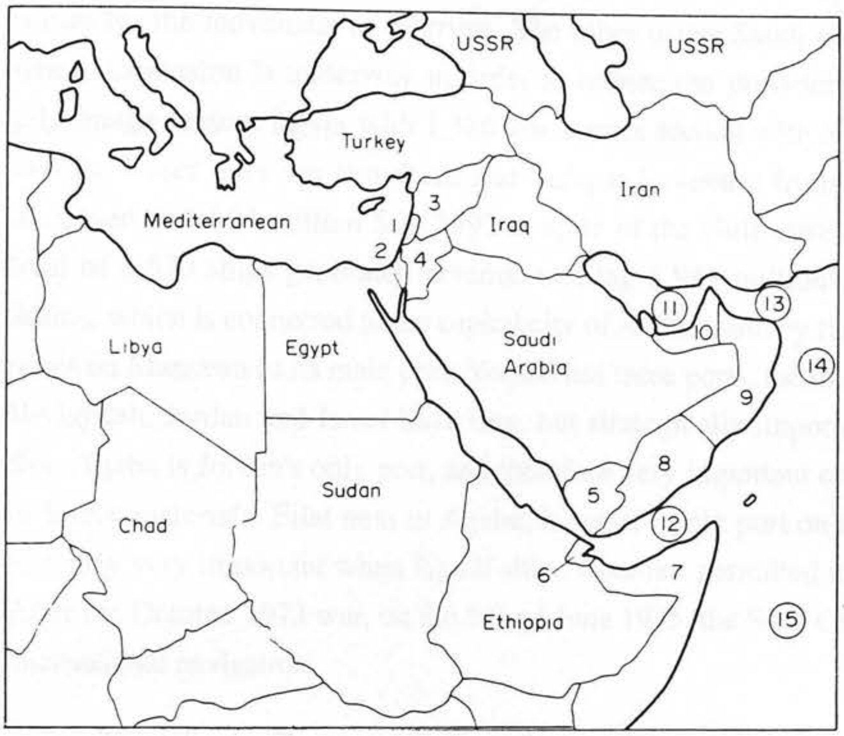

Figure 2.4: Countries surrounding the Red Sea.

	Area km^2	Approx. Red Sea shoreline km	Population millions	Trade balance million US$	G.N.P. million US$	Per capita G.N.P. US$
EGYPT	1,002,270	1,386	47.0	−$5,958	$28,160	$600
ETHIOPIA	1,222,896	800	32.0	−$383	$4,530	$141
ISRAEL	20,711	<10	4.2	−$3,455	$20,420	$4,861
JORDAN	97,821	27	3.5	−$2,451	$3,880	$1,108
SAUDI ARABIA	2,151,443	1,740	10.8	+ $38,464	$117,240	$10,855
SUDAN	2,507,857	750	21.1	−$730	$7,390	$350
NORTH YEMEN	195,185	430	5.9	−$748	$910	$433

Table 2.1: Geographic and economic statistics for countries boarding the Red Sea. (After Edwards, 1990)

From the figure and table 2.1, it can be seen that the largest country with shoreline access is the Kingdom of Saudi Arabia with Jiddah being the most important Red Sea port of the country, and with a large international airport which serves as a center for the movement of pilgrims. The other major Saudi port is Yanbou Al Bahr where expansion is underway in order to reduce the pressure on Jiddah during the pilgrimage season. Egypt with 1,386 km. comes second with Suez as the major port, and the lesser ones are Hurghada and Safaga. Revenues from the Suez Canal were increased to 1,664 million $ in 1992 in spite of the Gulf crises, and by mid 1993, a total of 8,670 ships generated revenue totaling $ 981 million[8]. The Sudan has Port Sudan, which is connected to the capital city of Alkhartoum by railway. While Ethiopia relies on Massawa as its main port, Yemen has three ports, the most important being Al Hudaydah. Jordan and Israel have tiny, but strategically important access to the Red Sea. Aqaba is Jordan's only port, and therefore very important especially in the export of heavy materials. Eilat next to Aqaba, is Israel's only port on the Red Sea, and was formerly very important when Israeli ships were not permitted to use the Suez Canal. After the October 1973 war, on the 5 th of June 1975, the Suez Canal was reopened for international navigation.

In evaluating the tourism competition in the area, it can be assumed that the only competitor to Egypt in tourism development is Israel, not entirely due to its tourism potentials, but because of its well organised publicity. Due to it's religious constraints Saudi Arabia is not currently trying to develop international tourism. The Sudan, Ethiopia, and Yemen are considered among the poorest of the world's nations in the last decade. They are either suffering from civil war or economically too dependent on foreign aid. None of these countries is able to provide tourism potentials or facilities like Egypt in the fields of services, infra-structure and natural characteristics, as will be seen in Chapter Four.

2.2 The Morphological Features of the Region

From the definition of the Red Sea region mentioned earlier in this chapter, we may say that the following morphological features are the main components of the study area: the Red Sea, the coastal strip, the coastal plain and the Red Sea mountains (which have been already discussed in Chapter One). (Figure 2.5)

[8]As it will be mentioned in Chapter Four, the earnings from the Suez Canal are the major source of income to the Egyptian economy. Egypt's economy suffered badly during the period of the wars, 1956-57, 1967-75, when the Canal was closed to international navigation.

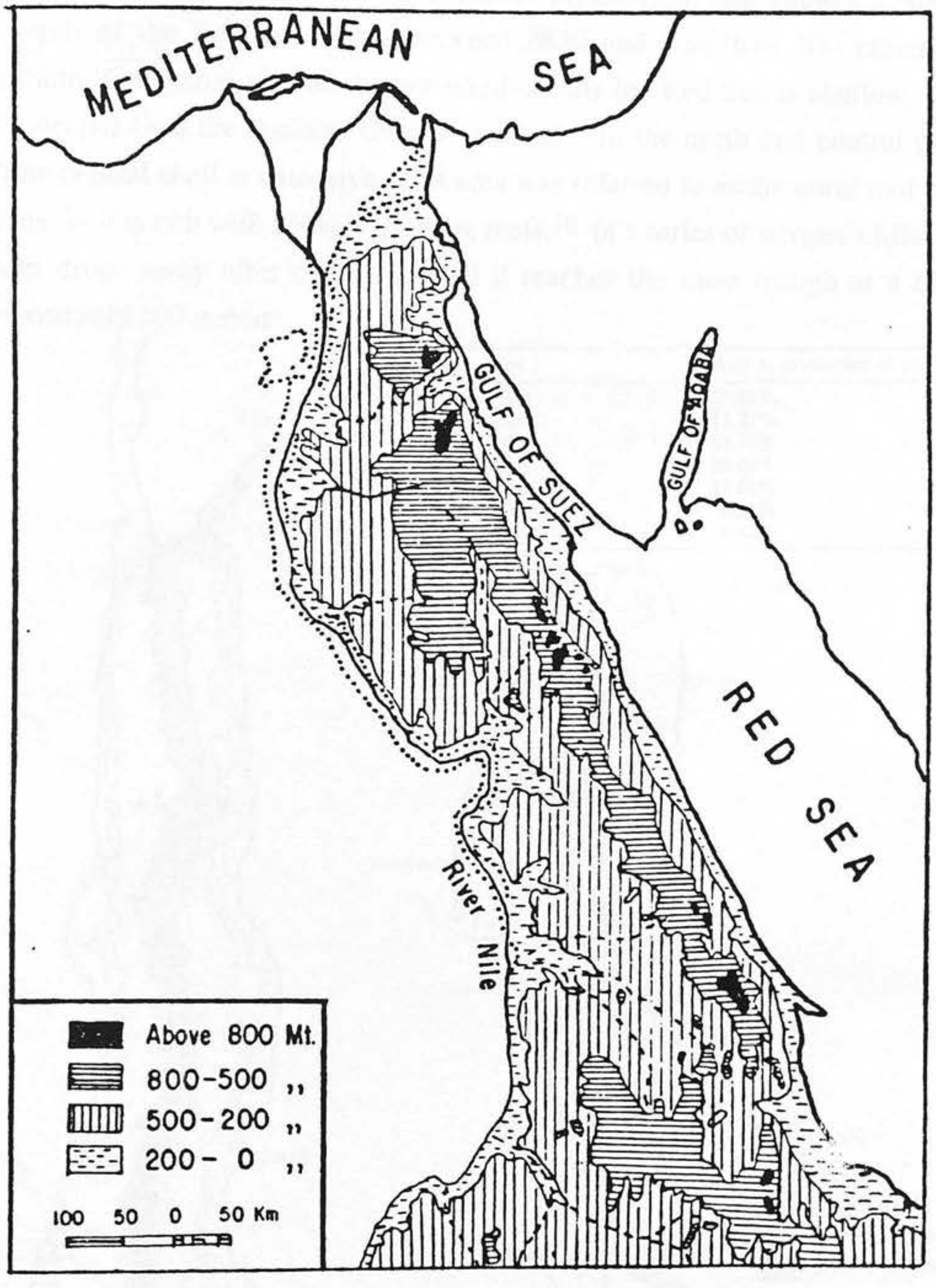

Figure 2.5: Morphological map of the Red Sea region. (After Abu Al-Izz)

2.2.1 The Red Sea

The length of the Red Sea is some 1930 km long, and its average width is 280 km. Its total surface area is estimated to be between 438 and 450, 000 sq. km. and its volume between 215 and 251,000 cubic km.[9] Figure (2.6) and Table 2.2, show that the depth of the Red Sea varies between 2850 and less than 100 meters as its maximum. Compared to other bigger-sized oceans the Red Sea is shallow, but it is much deeper than the Arabian Gulf for example. In the north and central parts, its shallow coastal shelf is extensive. This area was referred to as the coral reef zone by Morcos, as it is rich with actively growing reefs.[10] In a series of stepped cliffs, the sea bottom drops away after this area, until it reaches the main trough at a depth of approximately 500 meters.

Depth range	Area as proportion of total
0– 50m	23.86%
50– 100m	17.27%
100– 500m	15.71%
500–1000m	29.06%
1000–1500m	11.64%
1500–2000m	2.04%
2000m	0.42%

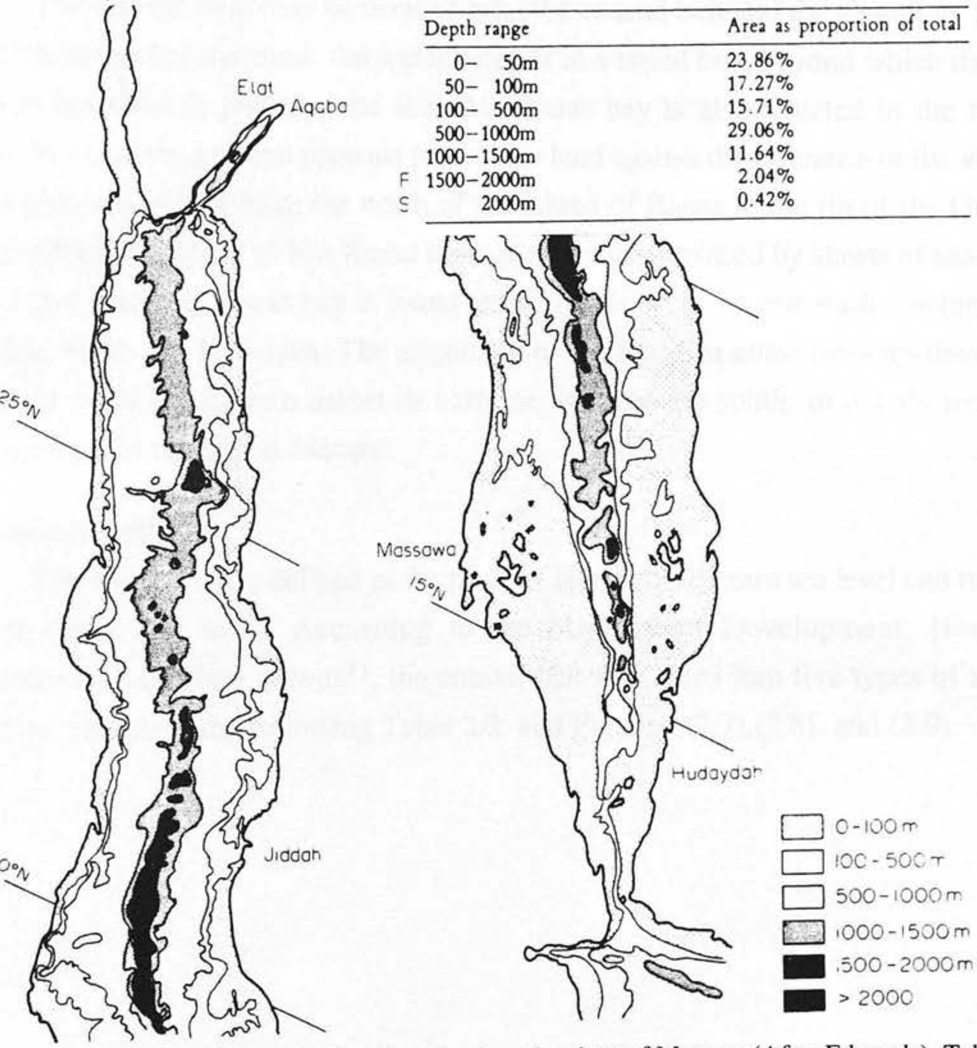

Figure 2.6: Bathymetric map of the Red Sea, based on the chart of Morcos. (After Edwards), Table 2.2 approximate distribution of surface area by depth for the Red Sea (After Morcos)

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[9] Alasdair j. Edwards, *Key Environments, Red Sea*, Pergamon press, 1987, p. 3
[10] ibid., p. 4

At the central axis of the Red Sea the depth may typically reach 1000 meters, dropping locally to 1500 and in some pits to depths of up to 2500 m. The Red Sea is a part of a system of crustal expansion in which Africa and the Arabian peninsula are drifting slowly apart. The deep axial trough of the Red Sea forms a part of a much larger system extending from the Dead Sea to the African rift valley, and from Aden eastwards into the Indian ocean. The uplift of mountain ranges parallel to the Red Sea behind the coastal plain accompanies this rift system. The separation of the African and the Arabian masses have led to the formation of the rift and the injection of new crust into this region.

2.2.2 The Red Sea coastal strip

The coastal strip may be divided into: the coastal belt and the shoreline. In the southern borders of the coast, the water extends in a broad bay, beyond which the Ras Halayib headland is just into the sea. Ras Banas bay is also situated in the south, formed because the gypsum plateaus protect the land against the influence of the waves. These plateaus extend from the north of the island of Banas to the tip of the Gulf of Suez, while in the south of Ras Banas these plateaus are replaced by sheets of sand and other loose material. Banas bay is found at the mouth of the largest wadi reaching the Red Sea, Wadi Al- Hawdyan. The alignment of the Red Sea coast from northwest to southeast gives the Eastern desert its extreme width in the south. In details we may evaluate the coastal strip as follows:

a) Coastal belt

The coastal belt is defined as the piece of land between zero sea level and twenty meters above sea level. According to the Ministry of Development, Housing Construction, and New Towns[11], the coastal belt is divided into five types of zones which are shown in the following Table 2.3. and Figures, (2.7),(2.8), and (2.9)

[11]Ministry of Development, Housing Construction and New Towns, "Al Tanmeia Al-Omranya Al-Shamela lekleem al bahr alahmr ", Arabic reference, *Regional development for the Red Sea Region,* April 1992 p. 6

Type of Zone	Name of Zone	Area of Zone in Sq. Km	Mineral Activity Located In Zone	Important Buildings
More than 50 Sq. Km	-Ras Zafarana -Ras Ghareb -Gabal Abu Shar -Mersa Malk Al owd - Bernice	51 57 72 54 93	The mines of Marbles and some Petroleum fields	Airport
Between 40 to 50 Sq. Km	-Ras Bakr -Hurghada -Ras Gamsha -Ras Abu Soma	45 49.5 42 45	Some Petroleum fields, and the mines of Sulfur	Airport
Between 30 to 40 Sq. Km	-Wadi Deeb -Wadi Al Gemal -Wadi Lahmy	39 36 33	Petroleum fields	
Between 20 to 30 Sq. Km	-Dair St Poul -Qusair -Beer Om Ghadeer -Beer Om Alhowitat -Wadi Kalhan -Mersa Om Aeg	24 27 27 21 27 27	Phosphate, Lead and Zinc mines.	Some Monuments
Less Than 20 Sq. Km	-Wadi Abu Gad -Gabal Grandl -Ras Shokair -Al Zeet Gulf - Safaga -Beer Koweeh -Beer Asl -Abu Gosoon -Wadi Alhomr -Ras Berniece	18 — 12 — 3 6 — 4 3 —	petroleum fields and Phosphate mines.	Port

Table 2.3: The general characteristics of the coastal strip. (After Ministry of Housing)

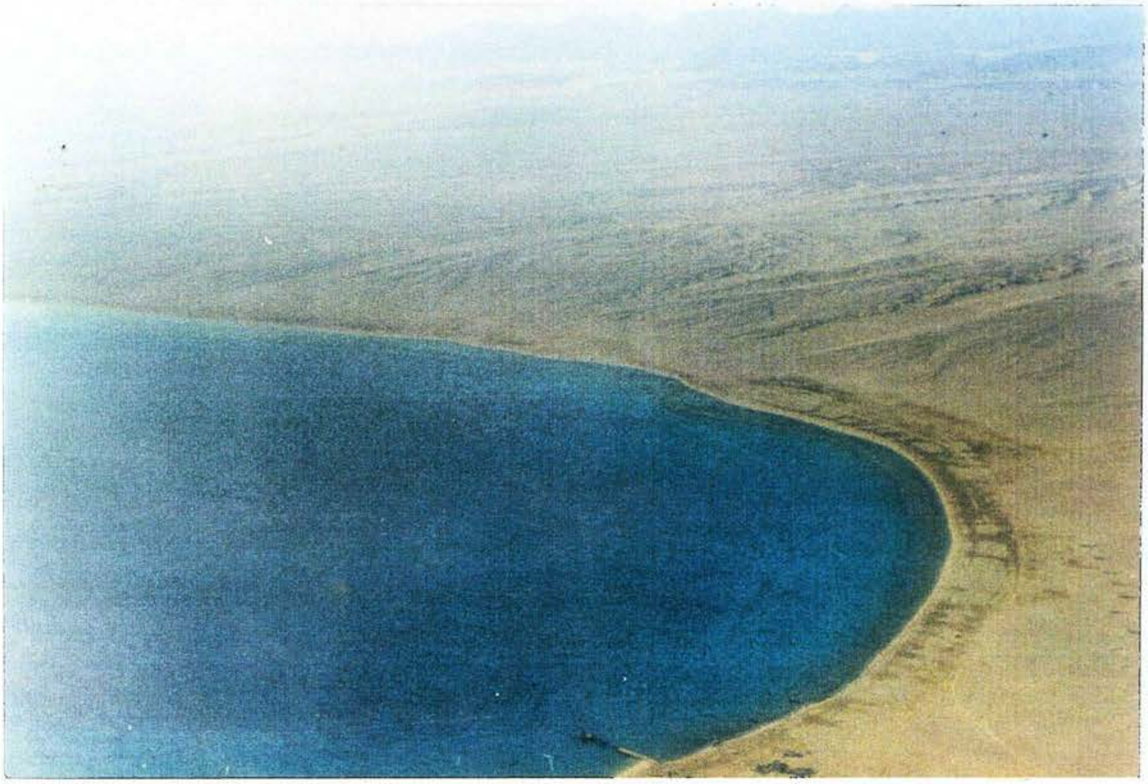

Figure 2.7: The North part of the coastal strip, extremely wide. (After T.D.A)

Figure 2.8: The middle part of the coastal strip, the strip is narrow. (After T.D.A)

Figure 2.9: The southern parts of the coastal strip, the strip is wide again. (After T.D.A)

As the table shows, the most important characteristic of the coastal belt is its suitability to accommodate any sort of coastal development due to its vast width as well as being an appropriate building site.

b) Shoreline

The main characteristics of the Red Sea shoreline, are that it has a large number of Headlands, Islands and Coral Reefs. From the land, rocky headlands project into the sea (Ras Ban as, Ras Gharib, Ras Gemsa and Hurghada). All these headlands were longer, but over time erosion has broken them into islands, as shown in figures, (2.10),and (2.11). There are about 40 islands in the Red Sea, mostly sand cays which vary in size, stability and location[12]. Sandy cays are lens shaped, crescentic, triangular or near circular islands, constructed of concentric or parallel sand ridges built by reflection of waves round the underlying reefs. The thickness of the sand accumulation varies with the tidal range. The orientation of the islands may be controlled by orientation of the underlying reefs. Unvegetated cays may be 50-100 meters at their longest dimension, awash at higher tide and clearly ephemeral. Contemporary beachrock is not found in such islands because the sediments are too mobile for

[12] O. A. Jones, *Biology and Geology of Coral Reefs, 1977*, Academic Press, London, p 247

Figure 2.10: One of the headlands, very wide and vast in size. (After T.D.A)

Figure 2.11: Semi-attached headland, under the effect of erosion on its way to being transformed to an island. (After T.D.A)

cementation to occur, but the existence of a beachrock may indicate the former existence of a larger island, often confirmed by historical records.[13] Vegetated islands differ from unvegetated cays in size, morphology, stability and possible development of beach rock. Smaller islands may be colonised by herbs, vines and low shrubs, as shown in figures (2.12), (2.13) and (2.14)

The islands of the Red Sea can be divided into two classes according to their grouping. The first group being the 'Scattered'. Such a group can be subdivided into;

a) oceanic islands, which having the characteristics of islands formed at great depths. Examples of such islands are the Ikhwan and Zabargad islands, the latter has an area of 12 sq. km. The African and Asian coasts can be seen from here.

b) Off-shore islands, located close to the shoreline, arranged in three rows. Each island has an igneous core with a fringe of coral reefs, formed at a time when the core was covered with sea water, coral development continued until it appeared above sea level.

The second type of grouping is the 'Concentrated islands'. They form half the number of the Red Sea islands, about twenty, located in the axis of the gulf of Suez, in what is called the Gobal Zone. The central line of this group of islands is found at the southern end of the Gulf of Suez. The most important island in the group is Shedwan, being the largest coastal island. Its dimensions are 14 km from north to south, by 4 km., east to west. There are many hills on the islands with altitudes over 300 meters above sea level and surrounded by atolls. Submerged reefs appear on the surface at low tide, in lines parallel to the coast at a distance of one kilometer or so from it. When the sea is calm, the water above the reefs is lighter in colour than the deeper water. Waves break on the reefs during stormy weather. The following Tables (2.4 & 2.5) show a list of the linear off-shore islands located in the Hurghada-Safaga region. and the other shows some of the concentrated ones showing their properties.

[13]ibid., p. 248

Figure 2.12: Sahl Hasheesh island, small in size surrounded by corals. (After T.D.A)

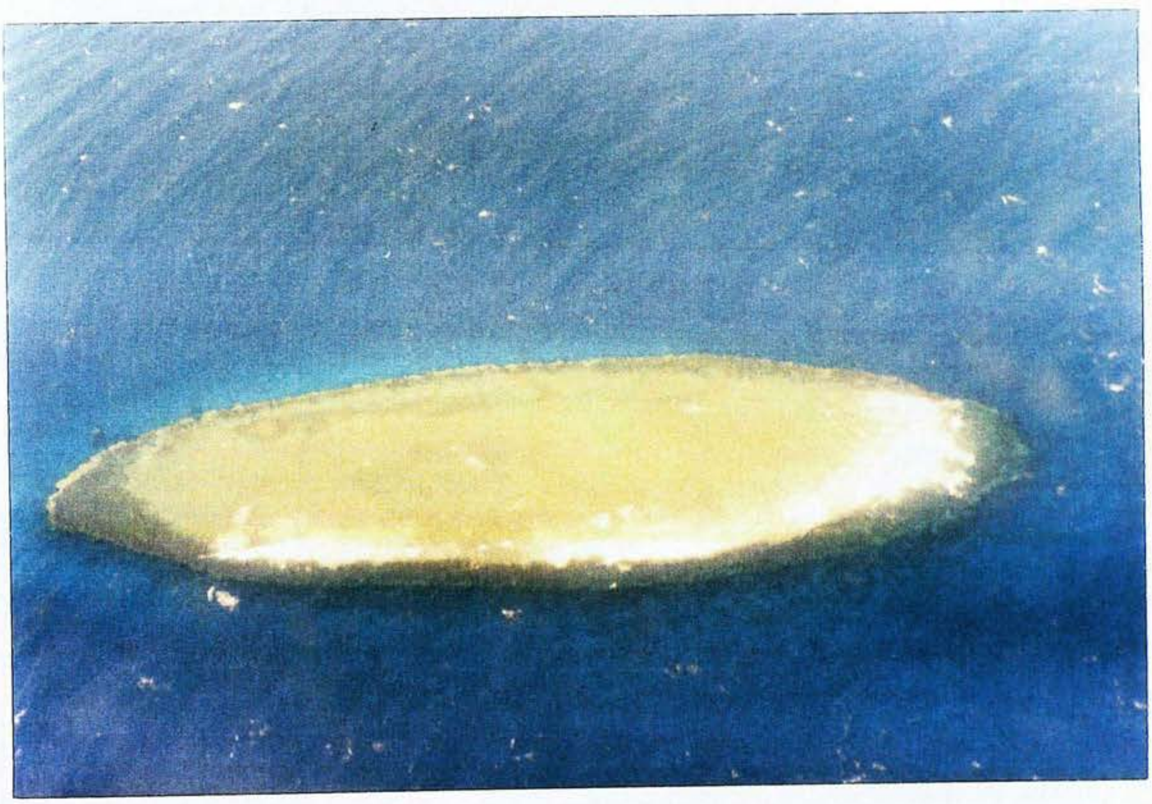

Figure 2.13: A typical lens shape Sandy Cay, north of Hurghada. (After T.D.A)

Figure 2.14: A floating Atoll, north of Hurghada. (After T.D.A)

Name of the Island	Location	Area	characteristics
Oum Gammr	15 km. north east of Hurghada port	100 sq. meter	Rocky island surrounded by coral reefs, at depths of 15 to 75 meters.
Al Giftoun Islands	15 km., east of Hurghada port	25.2 sq. km., the bigger, while the smaller is 3.5 sq. km.	Sandy shore with naturally protected beaches. surrounded by coral at depths of 20 to 90 meters.

Abu Minkar [14]	2.8 km. east of Hurghada port	1.8 sq. km.	flat island, with very shallow coral reefs, at depths of 3 to 6 meters. The island is characterised by having Mangrove trees, also as being a National Park for birds.
Abu Ramada	15 km. south east Hurghada	700 sq. meter	The island is rich with marine life as it has corals with depths between 13 to 27 meters.
Oum Gawish	7.5 km. south east Hurghada	1.12 sq. km	The depth of corals between 2 to 22 meters.
Sahl Hashish	2 km north east Dashet Al Daba	50 sq. meters	It forms a natural wave barrier for the area. the depth of corals is 9 to 34 meters.
Safaga	1.5 km. east of Safaga port	22 sq. km.	Sandy island, reefs at depths between 4 to 60 meters
Hammata	40 km. south east Wadi Hammata	1 sq. km.	Formed of three flat sandy islands surrounded with corals at depths of 9 to 55 meters.

Table 2.4: The 'Scattered Group' of islands. (After Ministry of Housing)

[14]Abu Minkar was designated as a national park ,but lately was sold to be developed as a tourist resort.

Name of The Island	Location	Area	characteristics
Geum Islands	10.5 Km north east of Ras Gemsha	The bigger is 9.1 sq. km., while the other is 5.4 sq. km.,	Rocky islands, with coral reefs at depths 10 to 26 meters. The western shore of the island is polluted with petroleum
Gobal Islands	18.5 Km. east Ras Gemsha	The bigger is 20 sq. km., the smaller is 1.7 sq. km	Rocky islands, corals at depths 7 to 42 meters. Like the Geum islands, the western shore is polluted with petroleum.
Tawela	15.5 Km. south east Ras Gemsha	24.6 sq. km.	Sandy, flat with corals at depths 2 to 29 meters.
Seuol Al-kebeer	29 Km. south Ras Gemsha	3.3 sq. km.	Small island with reefs at depths 11 to 85 meters.
Shedwan	31 Km. north east Hurghada port	46.4 sq. km	The biggest island in the area. With reefs at depths 30 to 45 meters. It also has a lot of fishing areas and a lighthouse for ships.

Table 2.5: The 'Concentrated Group' of islands. (After Ministry of Housing)

To summarise the main features of the shoreline, it can be said that the three main features are the headlands, the islands and the coral reefs. Gulfs and bays are formed as a result of the shoreline erosion by waves and wind. The islands are concentrated in front of the headlands, thus they may function as a protector of the headlands from wind and wave erosion. Most of the islands are barren due to their sandy or rocky nature.

2.2.3 The coastal plain

Between the Red Sea mountains and the coastal belt there lies a coastal plain of level land constituting the edge of the Eastern Desert. The coastal plain extends along the edges of the gulf of Suez and the Red Sea southward to the Egyptian Sudanese borders. The width of the coastal plain varies between 8 and 35 km. and can be divided into three zones:

Zone one: from the middle of the Gulf of Suez till Safaga. The plain reaches its highest width at Ras Gemsha.

Zone two: From Safaga to Ras Benas. The plain is narrow in a regular width of 10 km.

Zone three: From Ras Benas (latitude 24) to Ras Halayb (latitude 22)[15] The plain looks like a land bay, specially in its central part between Wadis Ayb and Alhodayn, where it is about 35 km., wide.

The elevation of the coastal plain varies from one place to the other. In sections where the elevation decreases, the plain turns into salty lagoons colonised by halophytes. Elevation then rises gradually westward. The gradient of the coastal plain varies between 6 : 1000 and 3 : 1000. The surface of the plain is covered with sand deposits brought by the wadis. These deposits have caused the lower portions of the wadis to be shallow. The accumulation of sand in the courses of the wadis smothers the valley features to an extent that they can only be identified by the vegetation growing in their beds.[16]As was mentioned in Chapter One, the wadis play an important role in the landscape features of the Eastern Desert in general and the Red Sea coastal plain in particular. The wadis are an important source of ground water in the area. They form natural enclaves for mines and the exposure of hidden minerals, not only on land, but also in the sea, due to their flow from the land to the sea carrying sediments, they open gaps in the fringing reefs that close the shore line forming what are called "Sharms". Figure (2.15) illustrates this phenomena. Thus helping to define the coral reefs borders with the borders of the wadis. This can also help in identifying the suitable sites for ports and marinas.

[15]Halayeb is now a very infamous part of the country, as it is the main point of conflict between the Egyptian and Sudanese governments. Both are claiming that it is located in their lands. The story of this dispute has a very long history and whenever there is a political disagreement between the two countries the issue is raised.

[16]op cit., Abu Al-Izz, p.254

Figure 2.15: The Sharm phenomena, where the Wadi cuts the fringing reefs to form a natural port. (After T.D.A)

2.3 Climatic Conditions

One of the primary attractions of the Egyptian littoral of the Red Sea area is the relatively constant temperate climate ensuring pleasant weather in all seasons. Of specific interest to tourists are the temperature, amount of rain fall, sunshine and wind. A description of the climatic conditions in the region may be briefly summarised in the following:

2.3.1 Temperature

The temperature in the area is subject to wide fluctuations; however average temperatures are high, ranging from 10 to 33 degree c. mean maximum and minimum temperatures (Table 2.6). No precise data on daily temperature variations were collected. As regards extreme values, a gust of Khamsin wind, which is the seasonal dusty hot wind in summer, can certainly bring the temperature up to 35-38 degrees C. during the day. In winter, winds from the west and north west can bring the temperature down to 8-10 degrees C. at night as shown in Table (2.6). In general the temperature plays an important role in the seasonal attraction of tourists, summer is not considered the high season for international tourism, to the contrary it is the peak season for domestic tourists who can bear such relatively high temperatures in summer. Winter months appeal to international tourists.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Min.	9.6	9.9	12.3	16.1	20.7	23.5	24.8	25.0	23.2	19.7	15.5	11.9
Max.	20.6	20.9	23.0	26.0	29.6	31.4	32.6	33.0	30.6	28.5	25.7	22.4

Source: Upper Egypt and the Red Sea, Night and Day.

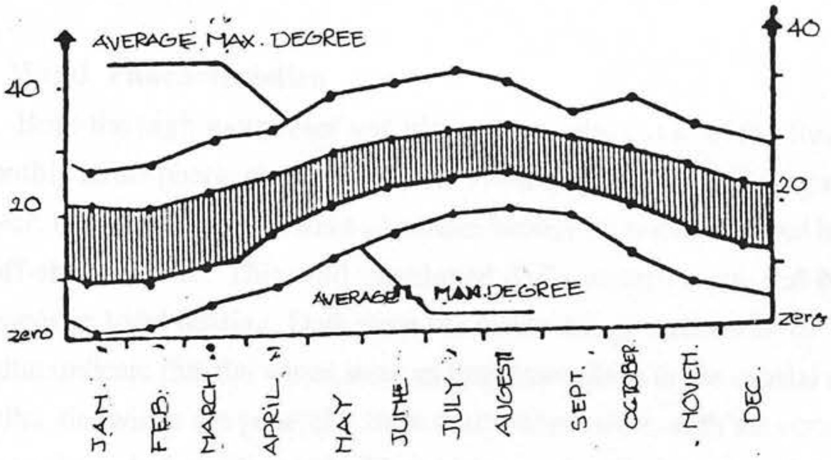

Table 2.6: The Average Temperature in the Region. (After T.D.A)

2.3.2 Rainfall precipitation and humidity

Climatically, the entire Red Sea region, including the sea itself and the surrounding lands, can be considered a hot desert. The northern third of the region, which includes most of the Egyptian coast, is an extreme desert, with annual rainfall below 10 mm. In Hurghada, it is sometimes under 4 mm. Along the coasts, thanks to the sea breeze which often develops in the afternoon, air humidity usually ranges between 50 and 70% and reverses in early morning breezes.

2.3.3 Evaporation

Due to the aridity of the region, the annual evaporation rate is higher than the annual rainfall. The Red sea region has a very high evaporation rate of approximately 200 cm / year in the north and 235 cm / year in the south.

2.3.4 Solar insolation

Levels of sunshine (solar insolation) in the area are similar to those found in other sites in Egypt. Consistently high solar insolation is an important component of the natural tourist appeal of the area. Also it is an essential factor for primary productivity in the sea environment. Average annual global radiation in the area is approximately 21.0 MJ / Sq. meter. Compared to 11.8 in Munich, 13.6 in New York and 10.7 in

Tokyo.[17] In such conditions, solar water heating for domestic use is an extremely effective technology. Solar water heating systems can be designed to fulfill a high percent of the water heating load. Other solar technology such as the solar electric cells may also be useful in the tourist village setting.

2.3.5 Wind characteristics

Both the high mountains and plateaus on either side of the Red Sea, constrain the monthly atmospheric circulation in the lower troposphere to flow parallel to the sea. However, near the coast, the wind alternates between a nocturnal land breeze and a day time off-shore breeze. This well developed daily pattern is caused by large diurnal differences in local heating. Data from the meteorology stations of El Tor, Quseir and Hurgadha indicate that the winds have an important place in the coastal meteorology. In Hurgadha, the winds are generally from north -north west, with the occurrence of some exceptional winds from the south. Their average speed is 11 knots (5.5 meter / second) They range from 7 to 16 knots 51% of the time, over 16 knots 25% of the time.[18] For centuries, the local builders have used malkafs (wind scoops) and other architectural elements designed to moderate the extreme effects of temperature inside buildings. Such low cost devices promote natural air movement within the building causing the desired cooling effect. Wind power turbines can also be employed in resorts for direct mechanical tasks such as water pumping (Table 2.7).

2.4 Hydrology

Ground water in the region is still subject to continuing research. According to the latest study by the Institute of Desert Studies in Egypt, several water-bearing rock formations have been found. Table (2.8) and Figure 2.16, provides a general description of the ground water found in the region.[19]

[17] Ministry of Electricity and Power, *Annual Report* 1992
[18] ibid., p. 23
[19] op cit., Ministry of Housing, p 13

STATION	SENSOR HEIGHT (m)	AVERAGE VELOCITY (m/s)	POWER FLUX (W/m^2)
Hurghada	10	6.2	231
Ras Ghareb	10	8.2	481
Ras El Behar	10	7.9	460
El Tor	20	5.5	288
Sharm al Shaykh	20	5.0	245
St. Katherine	20	3.4	50

Table 2.7: The Wind characteristics in the Red Sea Region. (After NREA)

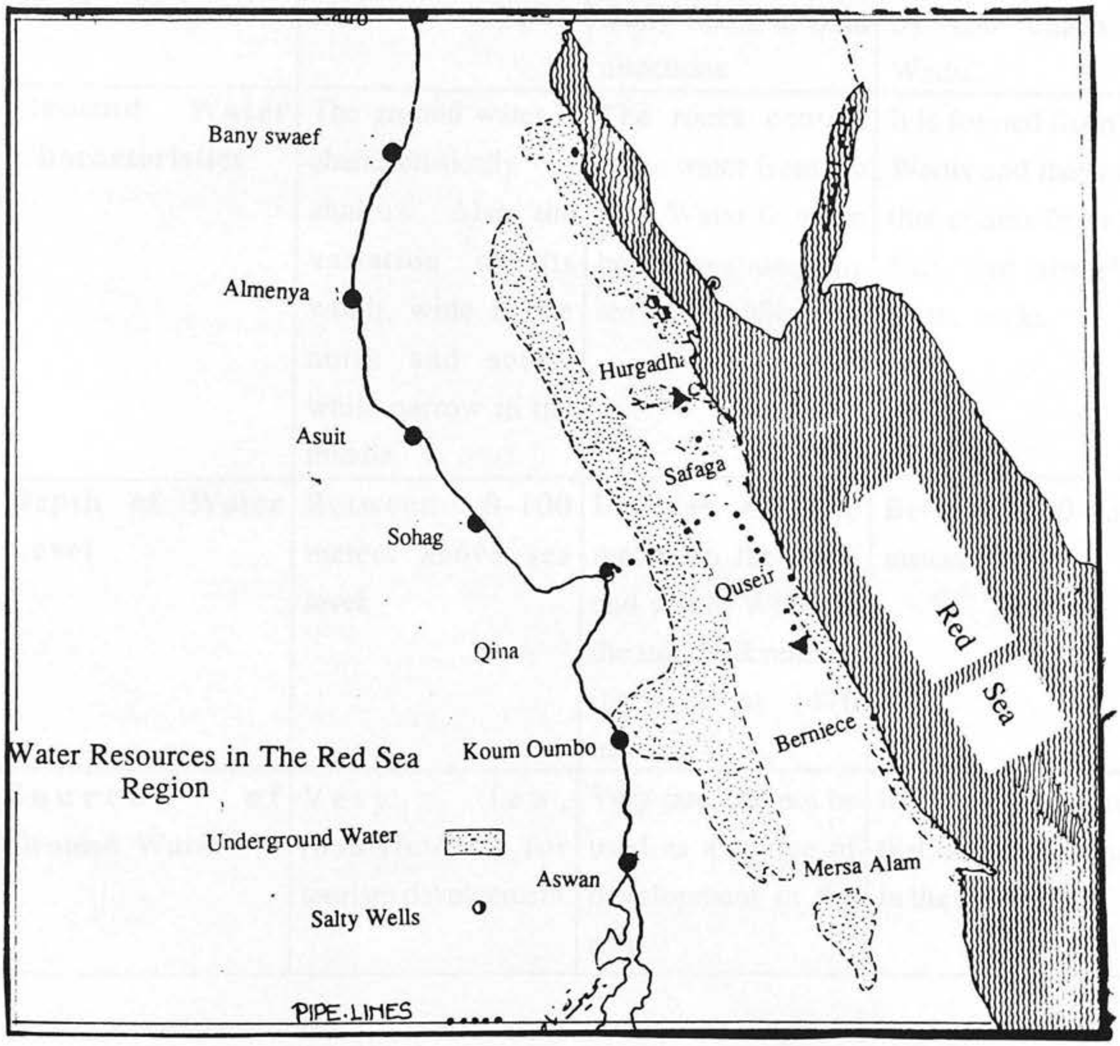

Figure 2.16: Ground water distribution in the region. (After Imam)

Properties Description	First Strip	Second Strip	Third strip
	The Eastern part of the coastal strip. It includes the area located between the Western Red Sea shore and the Igneous rocks representing the Mountains of the area.	The Igneous rocks, which is characterised by its existence in a wide strip parallel to the Red Sea. It gets wider towards the South.	The area located between the Nile valley and the Red Sea mountains.
Types of Rocks of The Strip	Lime, from the coral reefs	Cracked rocks, with many faults in both directions.	Lime stone rocks cut by the chain of Wadis.
Ground Water Characteristics	The ground water is characteristically shallow. Also the variation of its width, wide in the north and south, while narrow in the middle.	The rocks contain some water from the rain. Water flows in both directions, the sea and the Nile	It is formed from the Wadis and the water that comes from the Nile and absorbed by the rocks.
Depth of Water Level	Between 0-100 meters above sea level.	Between 600-900 meters in the north and south. While in the middle it reaches its peak at 1470 meters	Between 100- 300 meters
Source of Ground Water	Very few, insufficient for tourism development	Very rare, can not be used as a source of development in the area	Related to floodings that occur frequently in the area.

Table 2.8: The Ground water features in the region. (After Ministry of New Development, 1991)

From the table, it can be seen that, in general, ground water can not be considered to be a reliable source for the remote tourist resorts. Desalinating brackish ground water, however, may be economically viable on some sites.

2.5 Mineral Resources

The region has an important role in mineral extraction in Egypt. The Red Sea mountains and the Eastern desert have the most important manganese mines in Egypt. Petroleum is concentrated in the area of the Gulf of Suez, forming an important development axis. The basic minerals are petroleum, magnesium, phosphate and iron.

a) Petroleum; Egypt was the second country in the world after the U.S.A to extract petroleum. It was discovered by coincidence in 1869, during the extraction of sulphur.[20] The region accommodates about 93 oil fields; 76 of them on shore, the others off-shore. Most of the oil fields are concentrated in the Gulf of Suez, Figure (2.17), shows this distribution of oil fields. The oil fields are classified according to their productivity into three categories:

1) productivity ranges of 10,000 to 1 million barrels. There are only two fields in this category Al Morgan and Ramadan, both located in the Gulf of Suez. Their productivity comprises half the total productivity of the Gulf of Suez.

2) productivity ranges of 1000 to 110 million barrels. This group comprises of five oil-fields, Balaeem Ardy, Bahary, Ras Ghareb, Bakr, and Al alameen.

3) productivity less than 100 million barrels. The remaining of the 93 oil-fields fall in this group.

According to the Ministry of Petroleum, there were 9 oil-fields discovered between 1908-1957, 6 from 1957 to 1965, 7 up to 1974, and 12 between 1974 -1981.[21] Despite the fact that the inventory of fields in the southern zone of the Red Sea showed discouraging results, the Ministry of Petroleum is still planning for more extraction to the south from the Gulf of Suez, all over the shores of the Red sea. Oil pollution persists in the area of the Gulf of Suez, due to the emphasis of production and shipping. Many kilometres of coastline are severely polluted from spills, oil rigs and ships. Weathered oil pavements, many centimeters thick, blanket rocky promontories,

[20]ibid., p. 16
[21]ibid., p. 18

sandy beaches and in a few locations, shallow patch and fringing reefs. Some sandy beaches in heavily-oiled areas appear relatively clean, as a result of self cleaning by wave action and also because oil may be buried and the beach lightly covered with clean, wind blown sand. The issue of oil pollution and its impact on the regions' environment will be discussed further in Chapter Three .

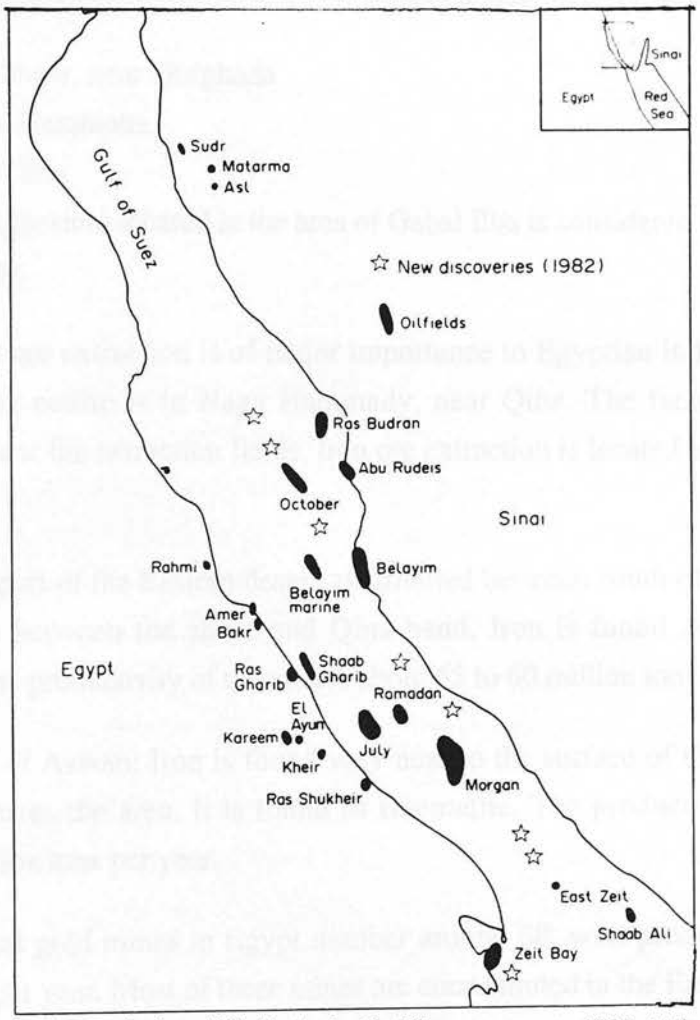

Figure 2.17: The existing oil fields in the Red Sea coast up to 1989. (After Edwards)

b) Phosphate; The Phosphate industry is considered one of the main industries in the Egyptian industrial context; fields exists in both the Western and the Eastern deserts. In the Red sea region, the area between the cities of Safaga and Al Quseir forms the main core of Phosphate extraction fields. The field is characterised by being coastal in spite of being hilly. The main core of the field is in the south around Al Quseir, supplying 75% of the total production, while the remaining 25% is in the north around Safaga. The field (main core) is on of the oldest fields in Egypt having been excavated in 1909. Its productivity is about 140, 000 tons per year, most of it is exported to Sri Lanka and Indonesia. Lately, a huge project was constructed in the area, for extraction, production and concentration of Phosphate gas. The project was constructed in the south of Safaga near Al-Quseir city where a complete new settlement was created called Al Hamraween.

c) Magnesium; Magnesium is considered one of the rare elements to be found in Egypt. It is mostly found in Sinai and the Eastern Desert. The magnesium mines are concentrated in the area of the Red sea mountains mainly in three sites;

-Abu Shaar, near Hurghada
-Gabal Hammatta
-Gabal Ilba

The crude magnesium located in the area of Gabal Ilba is considered very pure, as it has the 43% purity.

d) Iron; Iron ore extraction is of major importance to Egyptian industry. The biggest manufacturing centre is in Naga Hammady, near Qina. The factories having been constructed near the extraction fields. Iron ore extraction is located in two main sites in the region:

-The part of the Eastern desert; distributed between south of Quseir, and some of the wadis between the shore and Qina bend. Iron is found as solid ore and as magnetite. The productivity of the area is about 55 to 60 million tons per year.

-East of Aswan; Iron is found very near to the surface of the Nubian plateau, which dominates the area. It is found as Haematite. The productivity of the area is about 60 million tons per year.

e) Gold; Total gold mines in Egypt number around 68, with production of about 75 million tons per year. Most of these mines are concentrated in the Eastern Desert. In the Red Sea region they are located in seven sites. Only two in the northern parts, south of the Qina Al Quseir road, while the rest being in the southern parts. 50% of the total amount of Egypt's' production is produced by two sites, in the southern borders of the region, Albaramia with production of 35 million tons per year and Al Sakry with 20 million ton per year.

Some secondary minerals found in the region are:

Copper, in the area north of Aswan, producing 1.5 million tons per year. Lead and Zinc, in the area near Al Quseir, producing 5000 tons per year. Sulphur, in Gemsha, where sedimentary rocks make up 40% and produce 15,000 tons per year.

Uranium, around Safaga, where the productivity of the Safaga-Qina sector alone is 5000 tons per year. Development and construction of a factory for preparing the crude metal is now underway, offering 4000 job opportunities and costing 4 million Egyptian pounds.[22]

The existence of all these minerals in the region is an asset for integral development between the various sectors. It can also be of indirect help in the development of tourism development in the region, by imposing some pressure on the government to supply suitable infra structures, essential in the development of any sector.

2.6 Soils

The assessment of the pattern of soil types in a landscape plan is frequently complicated by the difficulty of defining whether a particular soil is part of the natural landscape base, or has been so altered by drainage or cultivation that it is now 'artificial soil'. According to the Ministry of Development and New Communities, the soil of the coastal shoreline area ranges in depth from a few centimeters to several meters. It is made-up of successive layers of sand, sand stone, limestone formed from the shells and above the old coral reefs; it is very hard but porous, a good representation of that material is given in two core samples taken close to the coast[23] (Figure 2.18).

In and along some wadis beds, such as wadi Al Quseir and Alhamraween, small proportions of clay are noticed , and some indications that the soil might be at least partially waterproof are found in the area of the salt swamps near the shore. Soils generally severely limit the choice of plant selection in and around tourist resorts.

[22] 1 sterling is equivalent to 5.25 Egyptian pound. (August 1994)

[23] op cit., Ministry of D. and New Communities, p. 7

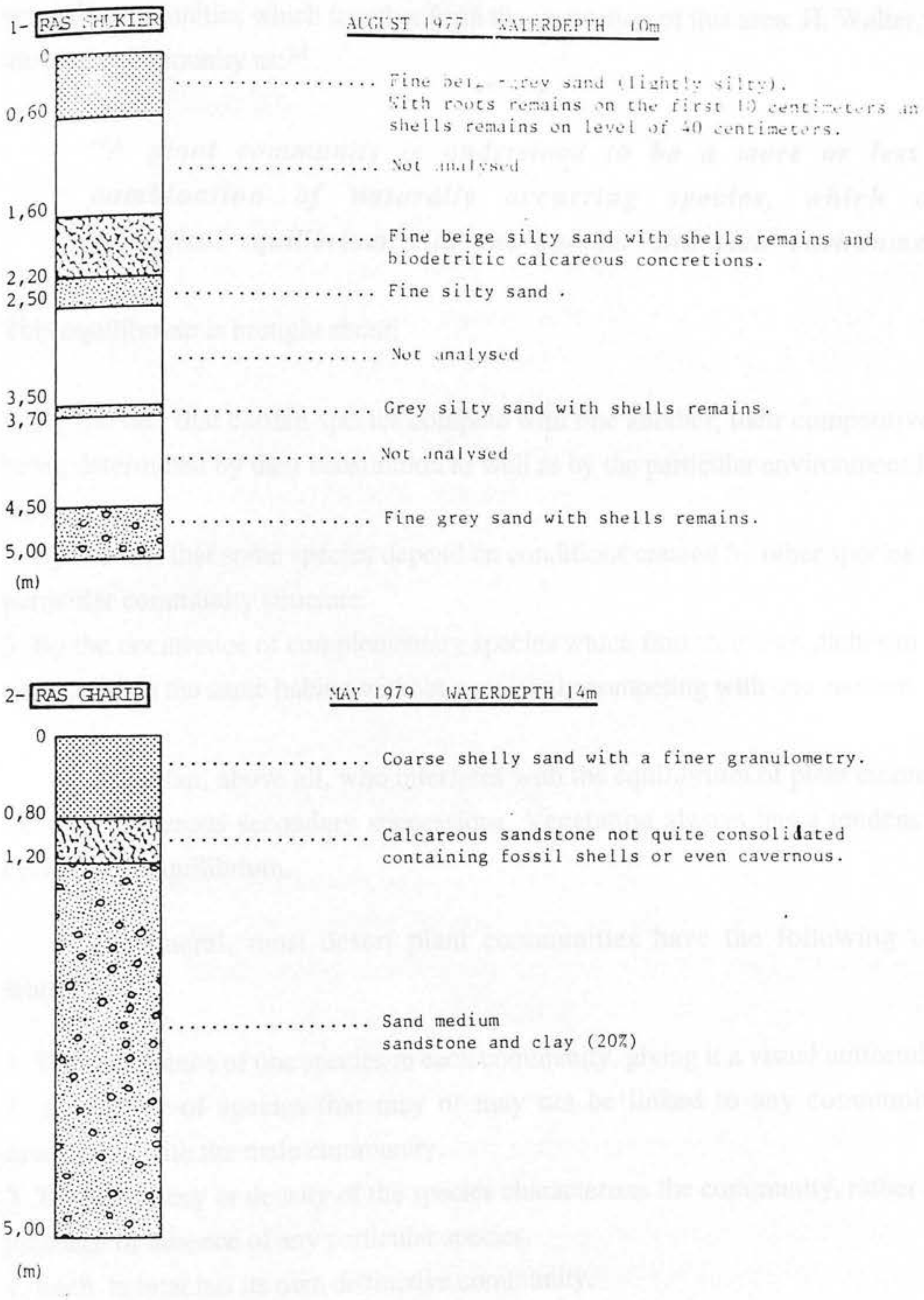

Figure 2.18: Soil profiles taken near Ras Shukier and Ras Ghareb. (After Ministry of Housing)

2.7 Vegetation

The natural vegetation of an area reflects the geological structure, the climate, the soil and the hydrology. The plant cover of a geographical area is composed of several communities which together form the vegetation of this area. H. Walter, defined the plant community as:[24]

> ***"A plant community is understood to be a more or less stable combination of naturally occurring species, which are in ecological equilibrium with one another and their environment. "***

This equilibrium is brought about:

1. By the fact that certain species compete with one another, their competitive ability being determined by their constitution as well as by the particular environment in which they grow in.
2. By the fact that some species depend on conditions created by other species within a particular community structure.
3. By the occurrence of complementary species which find their own niches in time, or space, within the same habitat without necessarily competing with one another.

It is Man, above all, who interferes with the equilibrium of plant communities, causing numerous secondary successions. Vegetation always has a tendency to re-establish an equilibrium.

In general, most desert plant communities have the following common features.:

1. The dominance of one species in each community, giving it a visual uniformity.
2. A number of species that may or may not be linked to any community type, associating with the main community.
3. The frequency or density of the species characterises the community, rather than the presence or absence of any particular species.
4. Each habitat has its own distinctive community.

Habitat in an ecological sense, is understood to be the totality of the physical and chemical factors which constitute the environment. The plant community with its

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[24]Heinrich Walter, *Ecology of tropical and subtropical vegetation*, Oliver and Boyd, 1971, p. 5.

species composition and relations represent the local environment. However the plant cover can only be employed as an indicator of the habitat factors when the plant community habitat relations are well known. Also from the fact that plant communities reflect any change in habitat, it may be concluded that while definite boundaries between communities are correlated with abrupt changes in habitat, community boundaries are more difficult to determine where habitat changes are gradual.

2.7.1 Coastal Desert plant types and communities

The coastal area of the Red Sea region may be conveniently grouped for study into three ecosystems; the salt marshes, the coastal plain desert and the Red Sea mountains. The vegetation of the coastal desert ecosystem presents a complicated pattern due to the impacts of different conditions of topography, characters of surface deposits and the relation ship with the mountain groups. The habitats of the coastal desert are in general non saline except those of the salt marsh, but the climate and soil aridity are the main environmental features. The desert transporting agents water and sand are highly active, there is a wide range of alluvial deposits ranging from fine silt to coarse gravel and boulders. There is a strong relationship between vegetation and drainage systems. The desert ecosystem supports a great number of species and a diverse floristic composition in its communities.

According to Zahran and Willis, the vegetation of the Red Sea coastal desert may be classified into two main types; ephemeral and perennial.

A) Ephemeral plants; form more than half of the species of the Red Sea region. They have a very short life cycle and are mainly herbaceous. They have rapid growth, and characteristically complete their life cycle in 6 to 8 weeks. They indicate soil conditions that allow for no overyear storage of moisture: soil wetness being maintained only a part of the year, this may be due to either scantiness of rain fall or to surface deposits that are too shallow. Their response to the dry season and drought is to bypass them altogether, the moist season is the time when they are active. They are characteristically small with shallow roots, very fast growth and flowering. The state of dormancy of their seeds extends from one rainy season to the next. Even if there is no rain in the succeeding year, the seed can still remain in the soil undamaged. According to A. Adam after the work of Went (1953), in order to promote germination there must be not less than 15 mm. of rainfall. The germination process is completed with 25 mm rainfall. But unless all the circumstances are favorable to germination, it will not occur even at 75 mm rainfall, as the seed contains some agent which will inhibit germination.

Sherve (1957) also discovered that there is a direct relation between seed germination and the number of sunny days that follows the rain. He classified the Ephemerals into two groups according to their requirements of temperature. For winter the optimum being between 15 and 18 degree C., and in summer between 26 to 32 degree C.

As they may be spread by animals, insects and wind, the ephemerals are the first to colonise in the desert environment. After their death and decay, soil organisms start attacking them thereby gradually improving the soil fertility. Associated with these variable conditions of establishment, this process leads to the introduction of new plant types. Three types of ephemeral vegetation are recognised in the Red Sea coastal desert, one dominated by succulent plants, the second by grasses and third by herbaceous species.[25] The succulent type of ephemeral vegetation is dominated by Zygophyllum simplex, Trianthema crystallina and Tribulus pentandrus. As mentioned previously in this chapter, these plants have certain special adaptations for the desert environment.

Grasses include several species such as, Aristida, Bromus, Eragrostis and Schismus, while other herbaceous plants may be dominated by one of the following species; Arnebia hispidissima, Asphodelus fistulosus, Astragalus eremophilus, Ifloga spicata, Malva parviflora, Senecio desfontainei, Plantago ciliata and Tribulus longipetalus.[26]

B) Perennial plants; According to Zahran and Willis, in general the perennial xerophitic vegetation of the Red Sea coastal desert may be classified into two main types; suffrutescent and frutescent. The suffrutescent perennial is the widespread type in the desert , it is composed of two layers; the suffrutescent which characterises the vegetation, and the ground layer which is mainly of dwarf or trailing perennials. The suffrutescent includes the following units:

a) Succulent half-shrub forms; The enlargement of the outer plant cell (parenchyma) in the stem and leaves, leads to the occurrence of the succulence phenomena. This characteristic signifies that the volume of the plant stem or leaf is increased and enables it to store a large amount of water in its structure. The water loss by the plant may be also reduced due to the existence of the water proofing layer of wax on the plant's external surface, associated with the cell proliferation, an overall self reduction of water loss is fulfilled. The succulent perennials are either spiny or non-

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[25]op cit., Zahran, p. 151
[26]ibid., p. 153

spiny, but physiologically swollen plants. There ability to close the stomata during the heat of the day, to avoid excessive water loss through transpiration and opening them through the coolness of the night instead, is a very special property which enables them to resist drought and survive in the hot desert environment. The most dominant communities are; Zygophyllum coccineum, Sasola baryosma and Hammada elegans.(Figure 2.19)

b) Perennial grassland forms; on the sandy formations of the Red Sea desert , Panicum turgidum is one of the most common. It is a tussock-forming grass that may acquire an ever-green habit. Under less favorable conditions it may have a strictly deciduous growth form, remain dry and look dead, but regain its green habit after the rain. The other existing communities include Pennisetum dichotomum , which is abundant mainly in the wadis of the limestone plateau and Lasiurus hirsutus.

c) Woody Perennials; Woody perennials are the most dominant plant type in the desert, in spite of the prevalence of ephemeral plants. They are composed of a number of morphologically different forms, ranging from woody herbs, through shrubs to trees. They are very hardy, can be evergreen or drought deciduous in the hot deserts. Their growth mainly starts after the rain, becoming more dormant during the period of drought. Many of the woody perennials are spiny or harsh-textured. In many cases, according to the work of Went, their seeds have a very particular germination property, they do not germinate unless their coat is damaged in some way.[27]This damage could occur in number of natural ways; by the action of stones and boulders pushed along wadi beds after sufficiently large volume of water accumulates. These stones grind the seeds as well as collecting and opening them. Another method that helps the germination is by relying on the digestive juices of animal intestines to soften their coats, prior to germination. Once germination is fulfilled, they produce very few leaves before they stop growing. This is due to a shift of their activity to the root structure, which grows deeper into the soil to penetrate the moisture layers below. As soon as the roots are well established, the plant starts to produce more leaves and expand above its surface growth. The dominant communities in the Red Sea desert are; Zilla spinosa, Launaea spinosa, Cleome droserifolia and Sphaerocoma hookeri.

The frutescent perennial vegetation includes the scrub land types of the desert vegetation. M.Zahran recognised two main forms in this type. The succulent shrub form and the scrub land form. The first is not as well represented in the Egyptian Red

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[27]ibid., p. 36

Sea desert as in Sudan. While the second type is well represented as noticed from its associated species present in the main channels of the principal wadis and their tributaries. The most dominant communities are :

A spinescent shrub, developing an evergreen growth form under favorable condition of water resource is the Lycium arabicum, while in less favorable habitats it is deciduous, shedding its leaves early in the season the main part of its shoot may also dry up. The flat topped, umbrella shaped spinescent shrub, Acacia tortilis is the most common scrub land type within the desert area (Figure 2.20). It occurs in a variety of habitats, the slopes of the low hills at the northern and eastern foot of the mountains as well as the main wadis and their large tributaries. Also recorded in most of the main wadis of the desert is the Acacia raddiana. A tree that reaches a recognisable size, Tamarix aphylla, may form an open forest, and represents one of the main climax communities in the desert wadis. As it is always under the pressure of cutting, grazing and other destructive agents, it acquires a bushy growth form that covers the ground in patches.

2.8 The Desert Fauna

Desert animals also suffer from the lack of water, and solve the problem of water shortage in diverse ways. Most are primarily active at night, remaining under cover in the heat of the day. Excretory systems are designed to conserve water, and many desert animals are able to use the water they produce in their cellular metabolism. Many desert insects are annuals like the plants they feed on- synchronizing their periods of activity with the evanescent desert bloom. One of the main factors affecting any habitat are the biotic factors, which are those dependent directly on the action of living organisms on the vegetation. It is thus necessary to regard and study separately any species or group of animals which have marked effects on the plant community. Animals may affect vegetation in many ways; they may eat and damage so as to cause in an extreme case, the replacement of a community by a totally different one. They may act as pollen or seed distributors, or loosen or compact the soil. Grazing by virtually all herbivores is a selective process, the more potable plants being eaten first. Generally speaking the fauna of the Eastern desert is related in the northern part to that of Sinai, Palestine, the Arabian Peninsula and Western Asia. In the southern part, specially near Ilba mountains, because of the similarity in weather in the form of the

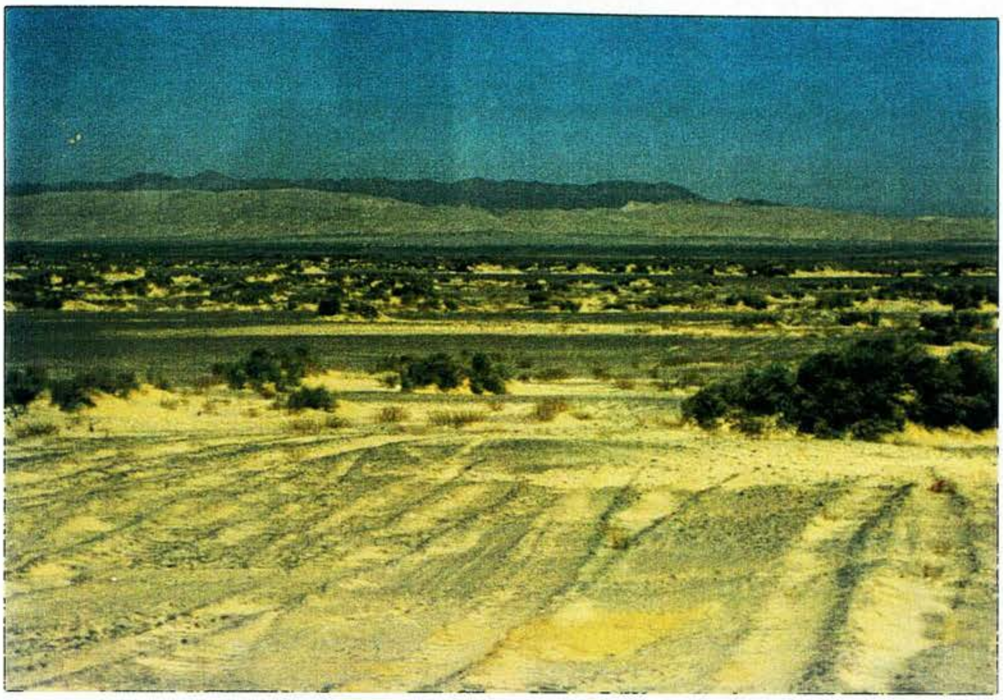

Figure 2.19: A close-up of *Hammada elegans* in one of the wadis of the Red Sea Region.

Figure 2.20: Part of a Wadi with a typical stand of *Panicum turgidum* grassland and bushes of *Acacia tortilis*.

amount of rain fall, the fauna has a more clearly Mediterranean character than would be expected.[28]

a) Mammals

According to Ayyad after Wasif (1976), the mammal fauna of Egypt are common on both sides of the Nile, including the dorcas gazelle (Gazella dorcas), Cape hare (Lepus capensis), jackal (Canis spp.), Ruppel's fox (Vulpes rueppelli), Libyan striped weasel (Policilictis libyca), Common genet (Genetta genetta). White tailed mongoose (Icheneumia albicauda), Striped hyaena (hyaena hayaena), Serval (Felis serval) and Rock dassie (Procavia capensis). There are also some mammals that exist in the Eastern Desert only such as, Wild ass (Equus asinus), Wild boar (Sus scorfa), Nubian ibex (Capra ibex nubiana), Beisa oryx (Oryx beisa) and Soemmering's gazelle (Gazella soemeringi). The rodents are in many ways the most important group of mammals in the ecosystem of the region under discussion.[29] According to Ayyad after Osborn and Helmy (1980), one can distinguish five major habitats in which the following rodents live ;

Rock: Acomys russetus, A. cahirinus, Dipodillus dasyurus, D. henleyi, Eliomys quercinus, Jaculus, J. schlueteri, sekeetamys calurus.
Desert: Dipodillus campestris, D. henleyi, Gerbillus gerbillus, Meriones crassus, Psammomys abesus.
Salt Marsh: Dipodillus amoenus, D. campestris, D.henelyi, Meriones libycus, Psammomys abesus.
Palm groves: Acomys cahirinus, Dipodillus amoenus, D. campestris, D. henleyi, Gerbillus andersoni, G. pyramidum, Jaculus orientalis, Merione crassus, M. libycus, Nesokia indica.
Riverine: Arvicanthis niloticus...etc.

b) The Reptiles

The most recent surveys of the reptilian fauna of Egypt are those of Kamal (1966 a, b) and Marx (1968) according to Ayyad. The Egyptian herpetofauna comprises some 93 species, with the richest affinity exhibited towards southern Asia, western North Africa and the other Red Sea coastal regions (Aritria, Ethiopia and

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[28]M. A. Ayyad, S. I. Ghabbour, " The hot deserts of Egypt and Sudan ", *Ecosystems of the world, 16* b, pp. 171-180

[29]Rodents are any mammal of the world wide order Rodentia, making up nearly half of all mammal species. Besides ordinary "cheek teeth" they have a single front pair of incisor teeth in both upper and lower jaw, which continue to grow as they are worn down.

Somalia). Four species are endemic to Egypt. Three in Sinai and the fourth is the Ophisops elbaensis, which is a lizard from Gabel Elba. The number of species decrease from north to south and from east to west (Table 2.9). According to Ayyad, the northern parts of the Eastern Desert, which seemed to have served as a gate with south western Asia, has strong affinity with all other regions (50-65%) except with Sinai (45%) and Gabel Elba (30%). The zone of Gabal Elba has a strong affinity with the southern parts of the Eastern Desert (59%) and weaker with the Nile Valley (45%) and bears almost no resemblance to other regions as far as its herpetofauna is concerned (27%) with Sinai.

District	Lizards	Snakes	Total
Sinai	13	13	26
Eastern Desert (northern part)	19	11	30
Eastern Desert (southern part)	11	6	17
Gebel Elba	12	7	19
Wadi Natrun	14	7	21
Siwa Oasis	7	5	12
El Maghra Oasis	3	2	5
Faiyum	16	8	24

Table 2.9: Number of Species of Lizards and Snakes in different regions of Egypt. (Based on Data of Marx)

Interpreting plant and faunal data in detail can not be undertaken in this thesis as it is beyond my own professional competence. An outline of it has been included here only to draw attention to its importance in future planning and to the need to include in the planning team scientists able to provide planners and designers with necessary advice in land suitability analysis.

3. Evaluation of the Features and Potentials of the Red Sea Region

From the foregoing, we may sketch a tentative summary evaluation of the natural features of the Red Sea region (Figure 2.21). The region may be divided into three sectors, according to their natural features and possible suitability for accommodating development activities. These sectors are:

Sector 'A'; the coastal strip. It forms a natural lagoon between the sea and the coastal plain. It is possible to use it in tourism activities, especially in beach sports, like snorkeling, surfing and diving. The length of this sector is about 1100 km., starting from Zafarana in the north to the Sudanese borders in the south. The sector may be divided into the following zones:

> Zone One; from zafarana to north of Gamsha (the area of the Gulf of Suez). Most of its parts are polluted, it is not suitable for any recreational development. The length of this zone is about 320 km., representing 30% of the total length of the sector.
>
> Zone Two; from Gamsha in the north to Safaga in the south. It's length of 190 km., represents 17.5% of the total length of the sector. This zone is suitable for tourism development, and actually is the main area where tourism development projects are now taking place. The potentials of this zone are, the concentration of the islands (22 island) and coral reefs along its shores.
>
> Zone Three; extends from Safaga in the north to the Sudanese borders, it's length of 570 km., represents 52.5% of the total length of the sector. This zone has similar natural potentials for tourism development, but it also hosts various diverse habitat. Thus it has to be carefully designated for any suitable development.

In general, the length possibly suitable for tourism development is 760 km., representing 73% of the total length of the sector. About 10% of this area is characterised by sandy beaches, representing 110 km., of the total length.

Sector 'B'; the coastal plain, extending from north to south. It is a flat strip, where most of the existing settlements are located, as will be described in Chapter Five. It has the capability of absorbing any further expansions of these settlements. Most of the sources of ground water as well as aquifers are accommodated within the

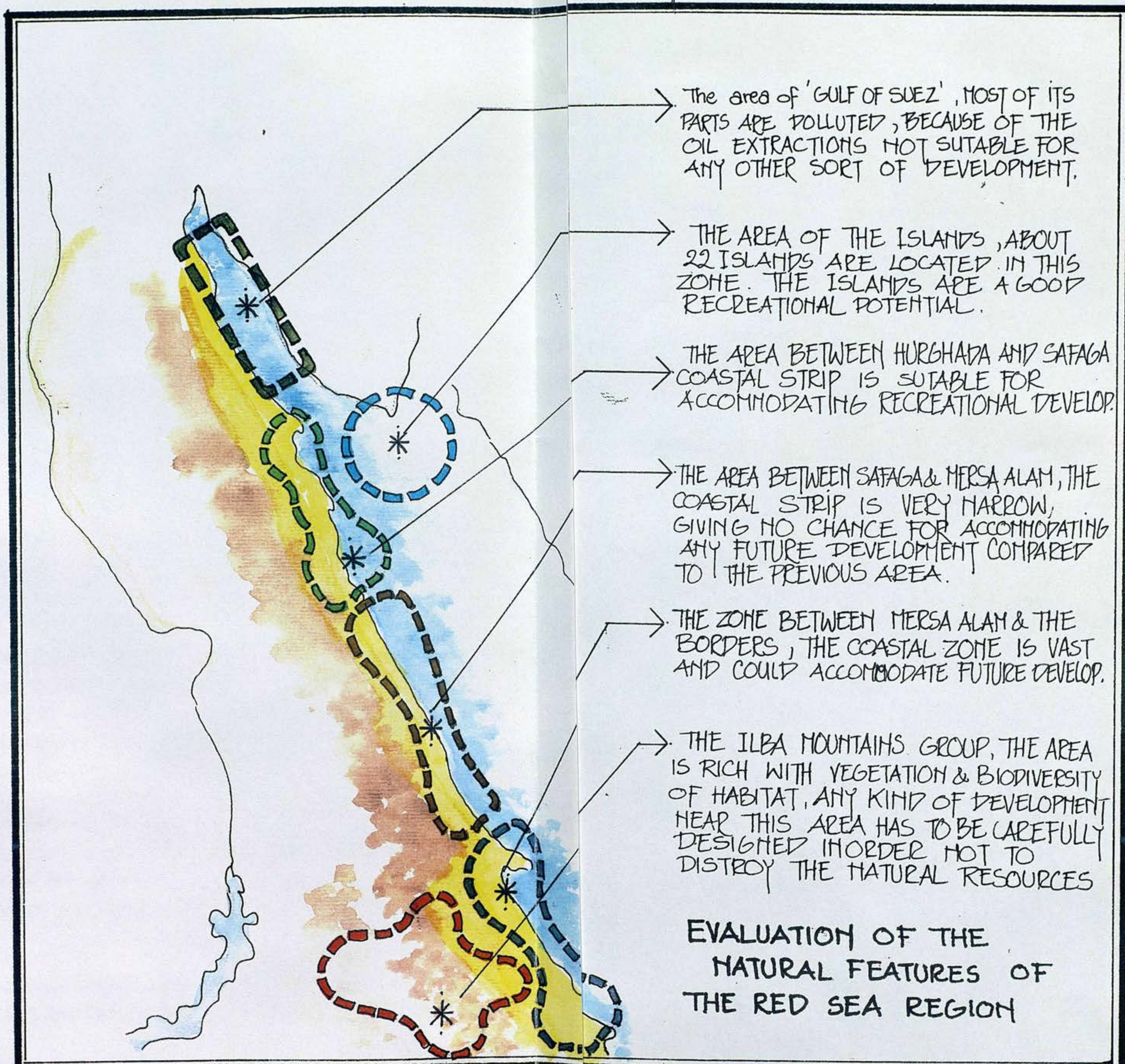


Figure 2.21: Evaluation of the potentials of the Red Sea Region.

borders of the coastal plain, which is an additional potential for hosting any future development.

Sector 'C'; The mountains area, extending in a chain like form, from north to south. It works as an edge to the urban settlement expansion in the area. In spite of the existence of the minerals and mining potentials, it could host some mining settlements. However, development must not be encouraged, specially in its southern zone, where the Gabal Ilba national park is situated to prevent any possible habitat destruction in the zone.

4. Concluding Discussion

From the description and evaluation of the natural landscapes of the Red Sea region the following observations may be made;

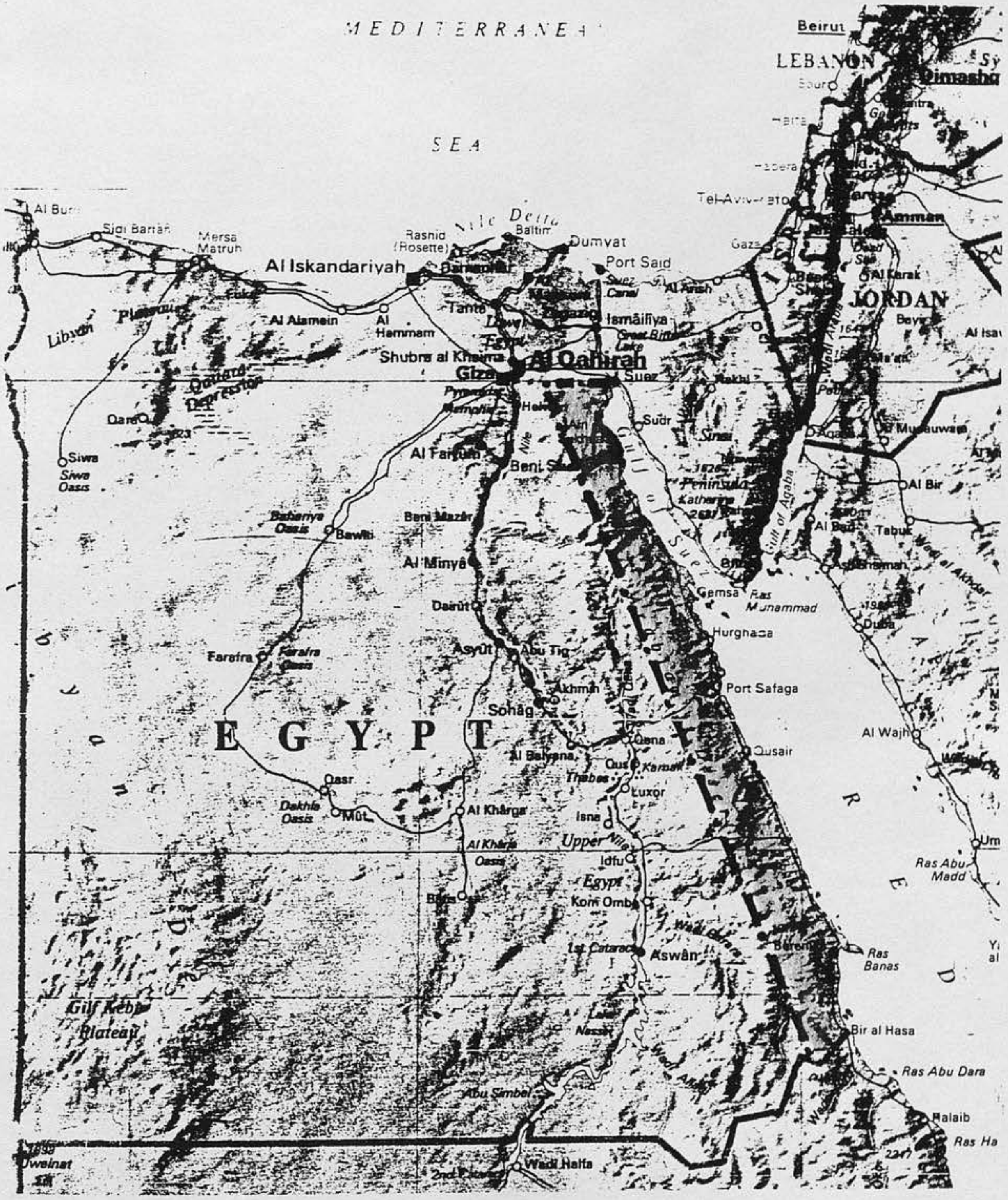
Some coastal zones along the Red Sea, at least in theory, are favorable for tourism development activities. Resorts may be built on coastal land just few meters above sea level, providing an easy walk to the water edge. They can also be built on the rock outcrops tens of metres above sea level, overlooking the water.

Climatic conditions are also preferable for tourism activities all year round ranging between domestic and international. The character of on and off-shore breeze in such a tourist setting with emphasise on water sports (sailing and wind surfing), needing light to moderate wind is a distinct advantage. Sunbathing, another waterside activity, can be easily satisfied. Quite apart from the water, however, tourists may find hiking, camping or motor sports in the interior regions attractive. The region is extremely rich in potential for tourism industry development. But many other considerations must be accounted for befor development decisions are taken, and these are presented and discussed in the following chapters.

The Gulf of Suez is mainly devoted to petroleum extractions, and because of the pollution impacts of such activity, it would be very difficult to integrate it with any other sort of land use activity. The same could be said about the Phosphate industry as will be discussed in Chapter Three as it is causing major water pollution in its surroundings.

The mountain area should be treated with special attention, development should not be allowed to invade such area at random as it represents a unique biogeographical character. The Ilba mountains zone should be carefully protected, its limits may be extended to secure more safety for habitat biodiversity.

In general, the region has potential to host several land uses. Chapter Three will focus on the natural ecosystems of the Red Sea region in general and the coastal zone in particular, in order to understand how they function and how they might be affected by any man-made impacts in the forms of land use activities.



CHAPTER THEE

CHAPTER THREE

NATURAL ECOSYSTEMS OF THE RED SEA COASTAL ZONE; THEIR USE AND ABUSE

"Man is a material using animal. Every thing he uses from the food needed to keep him alive to the objects he fabricates, whether tools or sculptures, comes from the substances of the planet on which he lives. Wastes are then returned to the biological and abiotic systems of the earth. Due to the question of culture, man desires to use these systems for non-utilitarian purposes of a recreational or spiritual kind." [1]

This chapter will attempt to complete the overall understanding of the natural landscape of the Red Sea region, by describing its natural ecosystems. As the thesis is concerned with the 'Coastal Zone', the focus of the study will be limited to the ecosystems of the coastal zone. The definition of the 'Coastal Zone' worldwide and in Egypt will be discussed, as well as the factors affecting the functions of the ecosystems and how they might be effected by human interference. The Chapter will conclude by addressing the various development activities operating in the Red Sea coastal zone and their effects in general, on the coastal environment.

The growing acceptance of the need for an ecological basis in planning large areas of landscape is an encouraging fact to set against the insatiable demands of materialistic societies. In the natural landscape, the link between the flora and fauna and the habitat can be expressed as cover bondage and food bondage. With the former, the dominant plants and animals find the basic characteristics of the habitat suitable for their needs, while the subordinate species exist because of the modifications the dominants make to the basic characteristics of the habitat. With the latter, the link appears as a cycle of events; food production plants are linked to a habitat favourable to them, the

[1] Simonds, *The ecology of natural resources,* McGraw Hill, 1977, p. 35

animals and insects feed on the plants and on one another, and both plants and animals help build up the habitat: thus, in landscape planning, an important study is to ascertain the suitable dominants and then select the subordinate species which will flourish under the modified conditions produced by the dominants.[2]

An ecological survey is essentially an exercise in awareness. It is a systematic investigation of the ecological factors, or 'eco-determinants', which deal with the relationship of humans, and all attendant forms of life, to the natural and man-made environment. As such it provides the base and basis for all sound land-use planning.[3]

1. Types of Desert Ecosystems

R. Adams (1978) referred to the work of Kassas, Ozenda and Emberger (1968) in distinguishing the desert ecosystems. M. Kassas in 1955 working for UNESCO distinguished nine ecosystems in the desert, not all of them can be found in every desert, but these are the basic morphological types to be found in most deserts:

1. Desert plateaus
2. Desert wadis
3. Desert mountains
4. Erosion surfaces
5. Erosion pavements
6. Gravel deserts
7. Desert plains and playas
8. Desert sand drifts and dunes

Ozenda, managed to distinguish seven biological habitats while working in the Saharas in 1958:

1. Ergs and other sandy soils
2. Regs with clay and rocky soils
3. Hamadas and rocky soils
4. Non saline depressions
5. Saline soils
6. Aquatic habitats
7. Oasis habitats

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[2] op cit., Hackett, p. 25
[3] John Simonds, *Earthscape; a manual for environmental planning*, McGraw Hill, 1978, p. 261

Emerger, however depending on Ozenda's work, took his classification as a basic order and tried to expand it slightly and include more details of the structure and sub-structure of the desert surface. His classification included the following:

1. Hamadas, denuded plateaus with depression
2. Mountains and hills
3. Regs, bare except in depressions
4. Gypseous and clay regs with depressions
5. Gravely regs and ergs
6. Gypseous deserts interspersed with ergs and sabkhas
7. Ergs and dunes with valleys
8. Dunes, bare except in depressions

2. Ecological Characteristics of the Red Sea Region

According to M. A. Zahran and A. J. Willis, the Eastern Desert is divided into two main ecological units due to the range of the Red Sea mountains: the inland desert and the coastal land. As the research study is concerned with the coastal land, the inland part of the region may be summarised as the area lying between the range of the Red Sea mountains in the east and the Nile valley in the west, an area of some 223 000 km. sq. As mentioned in Chapter Two, it is a rocky plateau cut by a number of wadis. Each wadi has a main channel with a large number of tributaries. The run-off water being collected by these catchment areas of the drainage systems. The direction of the drainage passage way is towards the west to the Nile in most of the wadis. The inland part of the region can be divided into four ecological regions: the Cairo-Suez desert; the Limestone desert; the Sandstone (Idfu-Kom ombo) desert; and the Nubian desert.

The Red Sea coast according to Abu-Al-Izz (1969), can be divided into five ecological regions: the sea environment; the lagoons; the coastal dunes; the wadis and the coastal plain.

Zahran and Willis, (1992) disagree with Abu-Al-Izz. After reviewing all the literature written on the Red Sea ecosystems,[4] they divided the coastal zone into three ecosystems only: coastal salt marsh; coastal desert and coastal mountains.

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[4]The other literature reviewed by Zahran and Willis were: the studies by Ruprecht(1849), Schweinfurth (1896-99),the description of the mangrove swamps by Ferrar (1914), the description of Montasir for the salt marsh vegetation (1938), the life-form spectrum of the flora of the Red Sea of Egypt by Hassib (1951), the detailed study of the flora of the coastal lands done by Kassas and Zahran (1962,1964,1967,1971) and Zahran and Mashaly (1991).

3. The Red Sea Coastal Zone

Natural coastal systems may differ in degrees of ecological significance and in importance to human beings. Ecosystems of the same basic type may vary widely in the mix of organisms present and in their biological diversity or complexity. Consequently, they vary in sensitivity or resistance to environmental changes. Many types of coastal ecosystem are found throughout the world, such as those associated with, marshes, sea grass beds, islands, rocky coasts, sandy beaches, lagoons, mangrove swamps, mudflats, coral reefs and embayments. There is no satisfactory way of describing the "Coastal zone". Like the term "Environment" itself, it is generally used in a very broad fashion to emphasise the holistic qualities of the phenomenon. This is clearly an asset when attempting to assert the need for developing a rather inclusive management regime for the zone, but it is less helpful when scientists want to establish a precisely defined area for ecological analysis. Consequently, some biologists may define the zone as being between high and low water marks. Oceanographers, on the other hand, may trace the influence of the river system far out to sea and call the distance between that point and the river's head waters the coastal zone. Similarly, the policy-maker and administrator will select definitions that reflect specific functional and legal understandings of the zone. Political divisions do not recognise the ecological unity of the zone, nor that the zone is, for the most part a common property. Nor do they neatly divide the multiplicity of human uses to which the zone is put.[5]

The Coastal Zone may be defined as a linear strip of land and adjacent ocean space (water and submerged land) that are mutually interdependent. The coastal zone includes transitional and inter-tidal areas, wetlands, the coastal flood plain, and upland of flood plain, and includes all shore lands that drain directly into coastal waters. The American Coastal Management Act of 1972 has defined the coastal zone as:

> ***"The coastal waters -including the lands therein and thereunder- and the adjacent shoreland-including the water therein and thereunder-,strongly influenced by each other and in proximity to the shoreline of the coastal states, including islands, transitional and inter tidal areas, salt marshes, wetlands and beaches."***

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[5]O. P. Dwivedi, *Resource and the Environment,* 1980, Mccelland and Stewart Ltd. p 108

In developing countries in the tropics, according to James E. Maragos,[6] this definition could include additional categories of ecosystems, such as coral reefs, mangrove swamps and sea grass beds.

In Egypt, according to Dr. M. Fawzy,[7] the Coastal Zone is defined as:

"The area situated between the wave edge (shore line) and the last line of the highest tide"

The importance of having a clear definition of the coastal zone is a major aspect in the success or failure of any coastal planning programme as will be seen in Chapter Five.

Ecologically, the coastal zone ecosystems have a sharp gradient of environmental features within a relatively short distance. Only species that are adapted to these conditions can survive. Tide and surf make this a zone of rapidly varying environment. In this narrow, constantly fluctuating region, however, numerous stable natural communities with high species diversity have developed and they are vulnerable to environmental changes. Many organisms are commonly exposed to conditions at the extremes of their ranges of tolerance in the course of natural daily or seasonal fluctuations, so additional stresses are likely to have particularly severe effects and natural and human-induced stresses. Each ecosystem has what is known as an 'Ecological Carrying Capacity', which is defined by J. Clarck as:[8]

" The limit to the amount of life that can be supported by a specified habitat; most narrowly, it is the number of individuals of a particular species. It is always used as a potential. The actual number of species present in an area at any one time is the standing crop. In a wider sense carrying capacity expresses the total amount (numbers or mass) of beneficial life that an ecosystem or subsystem can support. Thus, in an ecological sense, carrying capacity is the ultimate constraint imposed on the

[6]J. Maragos, "Development Planning for Tropical Coastal Ecosystems", p. 229 in R. A. Carpenter, *Natural Systems for Development: What planners need to know,* 1983, Macmillan Publishing Company.

[7]Dr. M. Fawzy, Chairman of the Egyptian Coastal Protection Programme, in the EEAA, September 1993.

[8]John Clark, *Coastal Ecosystem Management, John* Wiliey and Sons, 1977, p. 9

biota by the existing environmental limits, such as the availability of food, space, breeding sites, predator cycles, sunlight, temperature or salinity. The carrying capacity of a system can be markedly reduced by man-made disturbances that reduce energy supplies or interfere with energy utilisation..............in other words carrying capacity expresses the potential of the ecosystem to provide products useful to human society, thus it measures the condition of natural resources base."

3.1 Factors affecting the Ecological Carrying Capacity of the Coastal Zones

The biota of the coastal ecosystem includes a great variety of plants, birds, fish and invertebrate organisms. In natural condition, the ecosystem is a balanced network of biotic relationships that is all too easily upset by pollution and other man-made disturbances. The carrying capacity of the coastal ecosystem is controlled by climatic, oceanic and terrestrial factors that influence its conditions. Although the whole system that supports coastal resources and its relation to human life support systems is complex, the following factors govern the resources' carrying capacity of coastal ecosystems in the Red Sea Region.[9]

Limiters-primary supply factors that control potential primary productivity;

a) Nutrients; A food chain supports all life in the coastal ecosystem, beginning with vegetation that includes large plants, such as Sea grass and Mangrove, as well as micro plants which in general are called phytoplankton. These types of plants are consumed by a wide variety of species, for example, shrimps, some fish and zooplankton. These species serve as forage for birds and some predatory fish. Disturbances that may decrease the supply of natural nutrients to the coastal areas may directly affect the primary productivity of the ecosystem.

b) Gases; Many gases are found dissolved within the coastal water the most important to all fauna being oxygen. Oxygen is needed to keep organisms alive and to provide optimum ecosystem function and highest carrying capacity. The minimum amount of oxygen required for healthy ecosystem function is maintained by natural processes in

[9]ibid., p. 55

undisturbed coastal water. But oxygen may fall to unhealthy levels when sewage and other wastes with high biological oxygen demand pollute the coastal water and induce high bacterial action. According to J. Clark, the bacteria involved are common residents of coastal waters and are species that multiply rapidly to reach enormous abundance, thereby depleting the water oxygen faster than it can be replaced by either plants or atmosphere.

c) Water clarity; Sunlight is the basic force driving all ecosystems, it is the fundamental source of energy for plants, which in turn supplies the basic food chain that support all life. Sunlight must be able to reach the roots of sea grass as well as the suspended algae to foster their growth. Increased turbidity from the addition of excess suspended matter to the water reduces light penetration and depresses plant growth. Increased turbidity may be caused by excavation , discharge of eroded soil with the run-off from shoreland and other increase may be due to excessive use of nutrients derived from land run-off, sewage or industrial waste that stimulate algal growth and lead to clouding the water. J. Clark summaries this factor by saying:[10]

> ***" In undisturbed and virginal state, the ecosystem responds and adjusts to the existing levels of turbidity caused by suspended matter. The organisms in turn adapt to these levels and the system comes to equilibrium. However, when the system is disturbed and degraded by sudden addition of suspended matter, its carrying capacity is reduced and its general function declines below optimum conditions."***

Modulators-primary variable factors that govern total productivity;

A number of factors outside the direct energy path have strong effects on the biotic balance of ecosystems, the most significant of these are:

a) Temperature; The temperature of water has a major control on life. Migration, feeding efficiency, swimming speed and basic metabolic rates of fish are all controlled by temperature. The optimum temperature for the coastal water ecosystems depends on the preference of each species and the optimum functional balance of the system as a whole.[11] Temperature alternation, that may be caused by power plant thermal effluents

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[10] ibid., p. 59
[11] ibid., p. 60

or changes in water flow patterns is particularly critical for the biota, as it is adapted to existing long-term patterns of seasonal temperature in such a complex manner that any significant change must be presumed detrimental in the absence of evidence to the contrary.

b) Salinity; Some coastal species tolerate a wide range of salinity, whereas others require a narrow range to live and reproduce successfully. Some species require different salinities at different phases of their life cycles, variation such as are provided by regular seasonal rhythms in the amount of run-off. Moreover, any factor that affects circulation affects salinity. As other environmental factors, coastal species have evolved over the years in harmony with their salinity environments and have become adapted to the natural regime, the natural salinity patterns usually maximize the carrying capacity of coastal ecosystems.

c) Chemical suitability; Toxic substances added to coastal waters in significant quantity have obviously harmful effects. There are definite lower limits of water quality, below which, mobile animals either desert an area, or survive in reduced health and abundance, failing to grow or reproduce properly. A variety of repelling substances comesfrom the industrial discharges, oil, organic substances and sewage. This will lead directly to the failure of the general carrying capacity of the ecosystem.

d) Physical suitability ; The accumulation of sediments on the bottom of the sea has harmful effects on the water quality, circulation and ecosystem function. Fine sediments on the bottom of the sea trap pollutants and when resuspended by wind, currents or boat traffic may cause oxygen depletion, turbidity and release of toxic substances. A heavy layer of fine sediments will cause coral reef suffocation and prevents occupancy by much of the normal bottom fauna and the rooting of sea grasses.

e) Water circulation; One of the key ecological factors is the water circulation. Water motion transports nutrients, plankton, flushes wastes from animal and plant life, cleans the system of pollutants, controls salinity, shifts sediments and mixes water. The specific pattern of water movement found in coastal basin is a result of the combined influences of fresh water flow, tidal action, wind and the depth and shape of the bottom of the coastal basin .The rate of schedule of the flow of fresh water is important in its effect on the productivity, stability and general health of the coastal ecosystem. In addition to freshwater inflow, the circulation of water in any coastal basin is affected by many factors that govern the relative influence of tide and wind. Where run-off is relatively low, wind and tide usually prevail as major circulation forces. Tidal dominance is particularly to be expected when bays are relatively deep and the tidal amplitude is relatively high as in the Red Sea. Wind is little affected by human activity, tidal influence is quite alterable by changes in the form of water basin. Projects which need land fill can significally affect these circulation patterns and involve the building of structures in the estuaries.[12]

f) Pathogenicity; The discharge of disease-carrying substances from sewage, land run-off and other effluent wastes may cause great losses of carrying capacity and ecosystem function. The well known pathogens are bacteria and viruses that cause serious disease in human beings who eat fish which become infected, and the formation of red tides due to the explosive growth of poisonous algae. This is because of the added nutrients in soils near the coast, as well as untreated sewage.

3.2 Landscape = Natural Habitat + Man [13]

The landscape planning of a coastal zone requires classification of areas of environmental concern, or areas of concentrated ecological value which are particularly essential to the ecosystem, and which may be called vital areas. According to J. Clarck, in the coastal ecosystem three types of <u>Ecologically Vital Areas</u>[14] may be identified, firstly <u>vital habitat units</u>; that is areas which chiefly provide general living space for particular species, secondly <u>productivity units;</u> that chiefly supply nutrients to the system and lastly <u>structural units</u>; that is those areas that physically protect the ecosystem through their structure.[15] A good development planner has to consider carefully the coastal ecological factors that may be affected by development activities. This analysis forms the basis for data gathering, planning and developing management strategies. If the planner follows the recommendations on information gathering, coastal zone planning and management guidelines for specific types of projects, adverse impacts of development will be reduced. In the Red Sea coastal region, according to my understanding of the earlier literature, we may identify and classify the following <u>seven specific habitats</u> that may be threatened by any sort of development, and tourism in particular (Figure 3.1) :

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[12] ibid., p. 63

[13] Fairbrother, N., *New Lives New Landscapes*, 1970, Architecture Press, p. 32

[14] Although we may not agree with Clarck about using the term "Ecological Vital Area" as any ecosystem is vital for environmental sustainability, but we may follow his classification as it helps planners to have a clear understanding of the ecological aspects involved in their planning process.

[15] op cit., J. Clark, p. 133

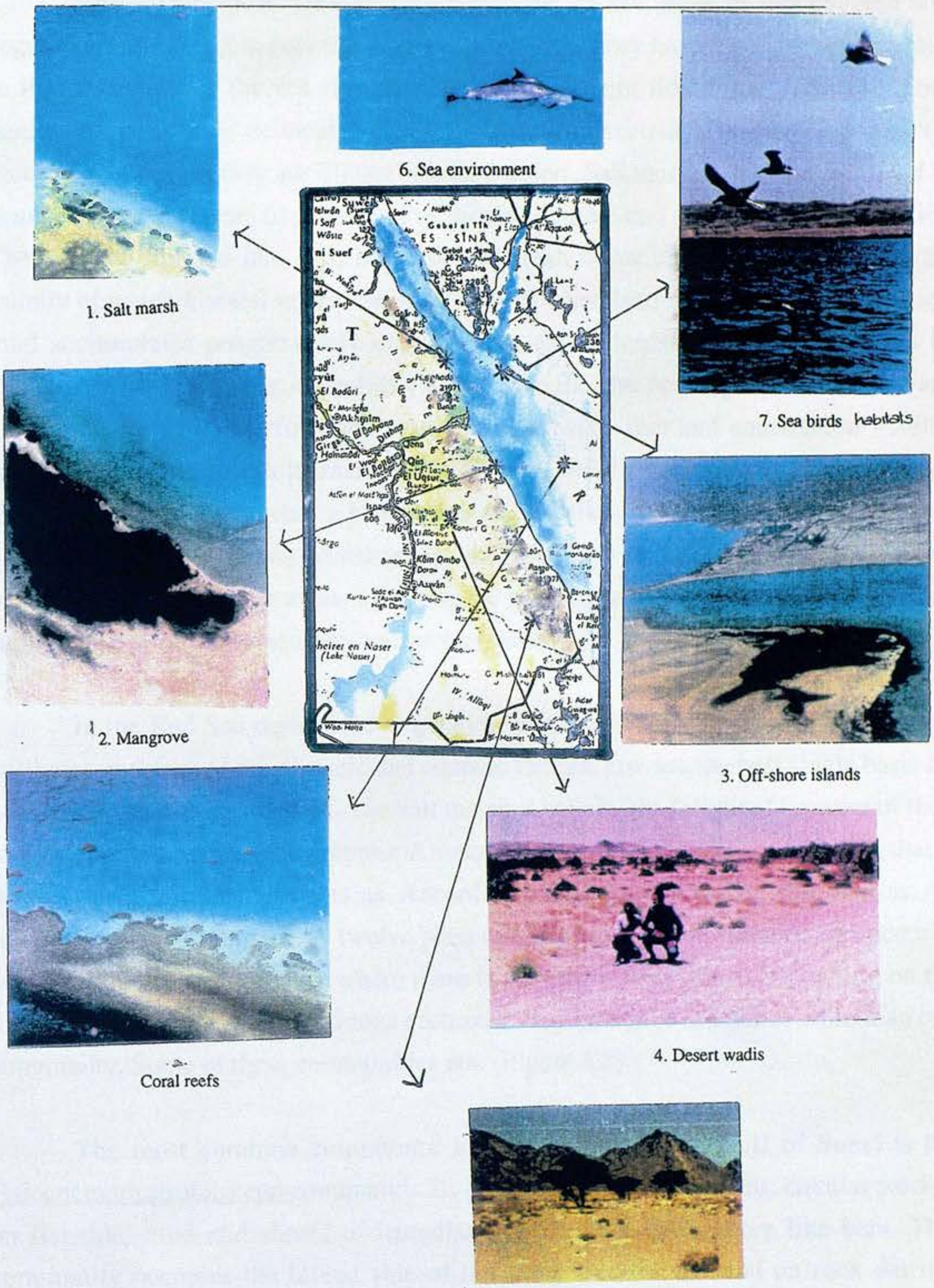

Figure 3.1: The seven specific habitats of the Red Sea coastal zone.

3.2.1. The Salt Marshes

Marshes comprise areas of land bordering the sea, more or less covered with vegetation and subject to periodic inundation by tides. They have certain features related to the proximity of the sea that distinguish them from inland salt marshes. Their landward boundaries' delineation is of ecological importance, being defined by the desertic qualities, as they are fringes of inland desert. Salt marshes may be delimited by some ecological factors like, the type of terrain, climate and physiographic formation. They can be divided into salt, brackish and fresh water categories based upon the salinity of water. Coastal salt marshes are formed when land rises in relation to the sea; mud accumulates progressively on tidal flats and colonisation by plants starts on exposed mud, increasing its stability. They provide the primary food resource and nesting habitats of waterfowl and wading birds. Many rare and endangered wildlife species depend on marsh habitats for their continued existence. Coastal marshes are also important in supporting a large quantity of fishery resources including oysters, crabs, shrimps and prawns. Marshes, as other wetlands serve as natural flood control basins and water recharge areas, confining the movement of damaging floodwaters and supplying ground water aquifers and surface waters.

In the Red Sea region, the vegetation characteristics related to physiographic attributes, reflecting both climatic and edaphic factors, provide the best single basis for delimiting littoral salt marshes. The salt marshes are clearly delimited because of their physiographic limits, as they represent a narrow belt of lowland along the coast that is cut by a steep barrier of mountains. According to Zahran and Willis, after Kassas, the salt marshes are dominated by twelve plant communities. These communities occur in zones following the shoreline where there is mangrove vegetation. Depending on the local topography and soil conditions each zone may contain a mosaic of more than one community. Some of these communities are: (Figure 3.2)

The most common community in the northern parts (Gulf of Suez) is the <u>Halocnemum strobilaceun</u> community. Its growth occurs in two forms: circular patches on flat tidal mud and sheets of irregular-shaped patches on shore line bars. This community occupies the inland side of the shore line bar of sand on rock detritus heaped by wave and tidal action. Nine other species are recorded associating with this community, the most common, <u>Zygophyllum album</u> and <u>Arthrocnemum</u>. The <u>Arthrocnemum glaucum</u> community occupies the same shoreline zone as the former community. It shows similar growth habit. Associated with eleven species, similar to <u>Halocenemum</u>, the dominant species forms carpets of single layers 30-50 cm high. The upper shrub layer is usually absent or negligible. Not only on the shoreline may sand bars of the community form almost continuous mantles, but also wind or water born sediments are often deposited in the form of mounds which are covered by patches of the dominant species.

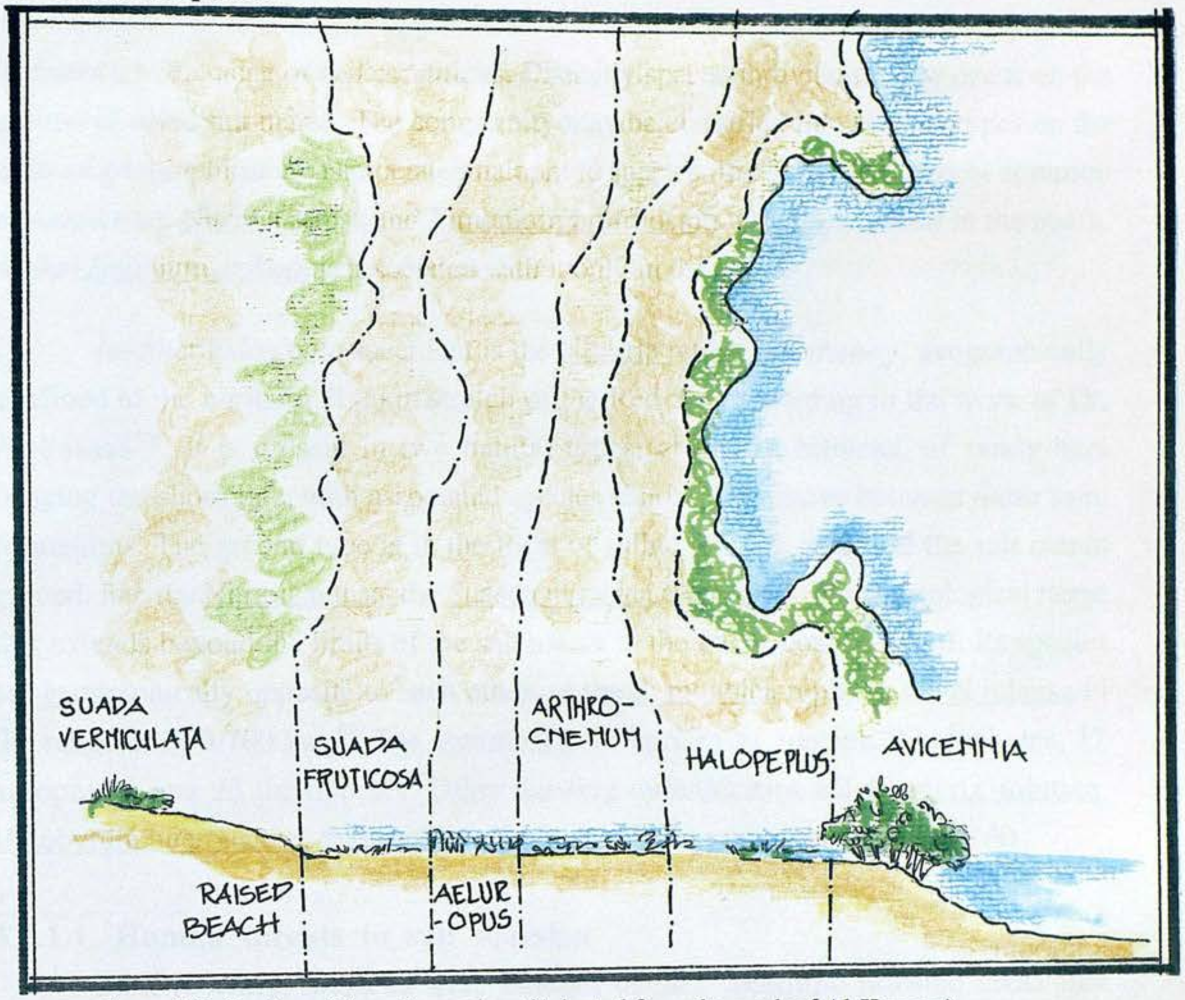

Figure 3.2: Section of the salt marshes. (Adopted from the work of Al-Kassass)

The Halopeplis perfoliata community has the general features of the salt marsh vegetation as they are simple in structure, with limited numbers of species and notable differences in cover due to minor changes in ground levels. It occupies a low level zone, which is third in ranking, usually lower than the second zone, where slightly elevated bars may be formed by the effect of wave-heaped detritus or wind deposited sand.[16]

16 op cit., M. Zahran, J. Willis, p. 131

Because this zone is also lower than the ground further inland, free drainage may be impeded. The Zygophyllum album , the community type dominated by it, shows a wide range of ecological conditions as it associates numerous number of species, 44 including 6 annuals.[17] with different ecological requirements. The phytocoenosis of this community is of several layers. It is a succulent halophyte, and tolerates a wide range of soil conditions. Distantly spaced individuals may occur on the ground of dried salt marsh. The community may be classified into two subtypes on the basis of geographical area associated halophitic species. In the north, the most common associates are Nitraria retusa and Limonium pruirnosum which are absent in the south, while Limonium axillare is associated with it only in the south.

Another halophytic succulent is the Nitraria retusa community, geographically confined to the northern 700 km stretch of the Red Sea, according to the work of Dr. Al-kassas[18]. It is present in two habitat types; chains of hillocks, of sandy bars fringing the shore line, with associated species sharing the spaces between these sand formations. The second type is in the form of saline mounds that stud the salt marsh ground. like the Nitraria retusa, the Suaeda monoica community has an ecological range that extends beyond the limits of the salt marsh to the fringe coastal desert. Its species are geographically opposite to each other, as the S. monoica replaces the N retausa in the range of 300-700 km.[19] The community comprises 51 species, 9 halophytes, 17 xerophytes and 25 therophytes. Other existing communities are ;Tamarix nilotica, Halopyrum nucronatum, Sporobolus spicatus and Aeluropus spp. (Appendix A)

3.2.1.1. Human threats to salt marshes

Until recently, marshes were thought of as mosquito-infested areas that should be drained and filled, often for sanitary landfills. There is a lack of understanding of the importance of the salt marshes to the marine life productivity. Due to the destruction of marshes, there is a noticeable decrease in freshwater fish and invertebrates, which are dependent populations on them.

Dredge -and- fill activities can eliminate marshes entirely and result in modifications to water circulation and oceanography, turbidity and sedimentation damage, loss of adjacent habitat and blockage of migratory routes used by aquatic

[17]ibid., p. 134

[18]M. Al-Kassas, "On the Ecology of the Red Sea Littoral Salt Marsh, Egypt", *Ecological Monographs*, 37: 297-316, Fall, 1967

[19]ibid., p. 136

species. In Hawaii, Guam and the main land United States, marshes have become the victim of land reclamation for urban development and dryland agriculture. Land filling has also aggravated flood control and sedimentation problems, because many marshes serve as natural flood control and water recharge areas.[20]

Aggravated downstream sedimentation, flooding, water quality, water supply and major disruption of wild life habitat are caused as a result of the excavation of harbors. As the water is relatively calm in the salt marsh areas, harbors and marinas are often situated there. The existence of this type of development causes the clearing of vegetation and dredging to maintain safe navigation depths. This will result in poor water quality in the coastal habitat adjacent to the harbor and at the disposal site.

The harmful impacts of sewage disposal are numerous, as it leads to lowering the dissolved oxygen concentrations, higher levels of plant nutrition, the introduction of pathogens and other microbes potentially harmful to fish and human beings especially in coastal ecosystems with restricted water circulation. Also the changes in vegetation composition, encroachment of aquatic weeds and the loss of open water habitat for waterfowl.

Alternatively, if properly planned, marshes can be managed to serve as suitable receptacles for treated waste discharges.

3.2.2. Mangrove systems or Mangles

The second specific habitat of the Red Sea is the Mangrove. It is an important ecosystem in coastal areas, in salt or brackish water. Of all marine macrophyte systems, they are the only ones characterised by storage of aerial biomes, so that the individual plants are trees or shrubs and the whole takes the aspect of a forest. They are found from the highest level of spring tides down almost to main sea level, on sheltered sedimented shores throughout the coast. They occur in fully saline waters but also penetrate considerable distances in from the coast. They provide a very valuable and ecologically significant habitat with many uses to people. They are major producers of detritus. They make a significant contribution to inshore productivity. Particulate organic matter sustains elaborate food chains within mangrove stands. This organic matter also flushes out of the mangrove to benefit off-shore ecosystems. Diverse flora and fauna are associated with mangroves, adult and juvenile fishes frequently migrate

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[20]op cit., *Natural systems for development*, pp. 255-257

from off-shore ecosystems to feed and seek shelter during growth., while shrimps, prawns and fish move in and out with the tides. The high productivity sustained through detrital food chains contributes to resident and migratory animals and birds and to trophic balances in associated ecosystems. The upper canopy supports a rich insect fauna, together with insectivorous and fish-eating birds and often provides roosts for large population of bats.[21] Mangrove also controls coastal erosion and contributes to shoreline accretion. Table 3.1 indicates the economic value of the mangroves, as it shows the products produced from the mangrove ecosystems.

The word mangrove has traditionally been used to describe either a community of mangrove trees or the individuals within it. The trees have a peculiar system of branching prop roots that extend downwards like stilts from the trunks and lower branches. The seeds germinate on the trees to form a club shaped hypocotyls 30 cm., long.[22] They hang by two cotyledons until they drop into the water or the mud below. If the mud is deep enough, the seedling may take root. If not, the seedling rises to the surface and for a while floats horizontally, often drifting with the wind and tidal currents far from its point of origin. Their root system removes salt from water entering the trees vascular system, any remaining salt being removed by the leaves. One group of mangroves, including the Avicennia, has salt secreting glands on their leaves. The sap which passes up their xylem contains 0.2- 0.5% sodium chloride. Eventually the root end becomes water logged and the seedling floats in a vertical position until the tip of the root touches the bottom in the shallow water. If the bottom is soft, roots form rapidly, the young plant is anchored and a new mangrove grows above water. As the plant grows, new prop roots sprout from the limbs and grow down to the water. The tangle of roots blocks tidal currents, which drop their loads of organic debris among the mangroves. This together with falling leaves and the droppings of birds, gradually builds the soil up to high tide level. As they have the ability to take fresh water from salt, they are in an excellent position to achieve high primary productivity. However, the difficulties of working among the dense growths of prop roots and branches have proved deterrent.[23] (Figure 3.3)

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[21] op cit., *Red Sea , Key to the environment*, pp. 211
[22] K. H. Mann, *Ecology of Coastal Waters a System Approach*, 1982, Blackwell publications, p. 24
[23] op cit., Red Sea; key environments, p. 122

Category	Products
Fuel	Firewood (cooking, heating)
	Charcoal
	Alcohol
Construction	Timber, scaffolds
	Heavy construction (e.g., bridges)
	Railroad ties
	Mining pit props
	Boat building
	Dock pilings
	Beams and poles for buildings
	Flooring, paneling
	Thatch or matting
	Fence posts, water pipes, chipboards, glues
Fishing	Poles for fish traps
	Fishing floats
	Wood for smoking fish
	Fish poison
	Tannins for net and line preservation
	Fish-attracting shelters
Textiles, leather	Synthetic fibers (e.g., rayon)
	Dye for cloth
	Tannins for leather preservation
Natural products	Fish
	Crustaceans
	Shellfish
	Honey
	Wax
	Birds
	Mammals
	Reptiles and reptile skins
	Other fauna (amphibians, insects)
Food, drugs, and beverages	Sugar
	Alcohol
	Cooking oil
	Vinegar
	Tea substitute
	Fermented drinks
	Dessert topping
	Condiments from bark
	Sweetmeats from propagules
	Vegetables from propagules, fruit, or leaves
	Cigar substitute
Household items	Furniture
	Glue
	Hairdressing oil
	Tool handles
	Rice mortar
	Toys
	Matchsticks
	Incense
Agriculture	Fodder, green manure
Paper	Several kinds of products
Other products	Packing boxes
	Wood for smoking sheet rubber
	Wood for burning bricks
	Medicines from bark, leaves, and fruits

Table 3.1: The products obtained from the Mangrove ecosystems. (After Clark)

All marine flowering plants have a tendency to form dense, low diversity stands which act as traps for sediments. Mangroves play an important role which should not be overlooked, in protecting the shore from erosion. The massive amount of sediments and the plant biomes associated with them serve very efficiently as a buffer zone between the open sea and dry land, owing to their capacity to absorb wave energy. These ecological and economical functions of mangroves have only recently been taken into account in the planning and decision making processes. Another function of mangroves is their storage of genetic resources for scientific research. In recognition of the numerous scientific and commercial benefits dependent upon their preservation, many countries have set aside substantial portions of mangrove swamps as sanctuaries, protected areas, or parks to preserve the system for the future.

Figure 3.3: The Mangrove Patches located in the southern parts of the coast, the area between Mersa Alam and the Egyptian Borders. (After T.D.A)

The shoreline morphology and climate of the Egyptian Red Sea coast, especially south of Hurgadha, seem to favor the growth of mangle vegetation according to Kassas's work in 1957. Along the raised coral reefs there is a series of small bays that cut into the beach and are partly land-locked by further coral reefs. These sheltered bays provide a favorable habitat for the growth of mangle vegetation.

Avicennia marina usually grows in the pure stands, but may be found mixed with Rhizorhora mucronata as a codominant where both species grow together[24], R. mucronata forms an open layer higher than the thick and almost continuous bushy canopy of A. marina. In a few localities, A. marina grows on the terrestrial side of the shoreline, in one locality (Wadi Al-Gimal) the bushes are partly covered with sand hillocks, a situation which is apparently due to the silting of the shoreline zone originally occupied by the mangrove. The ground layer is formed of associated marine phanerogams, such as Cymodocea ciliara, C. rotundata, C. serrulata, Diplanthera uninervis, Halophila ovalis and H. stipulacea.[25]

The tidal mud of the mangrove vegetation is usually grey or black in colour, often foul-smelling. A notable difference between the tidal mangrove mud of A. marina and that of R. mucronata is the low content of total carbonate in the former as compared to the calcareous mud in the latter.

3.2.2.1. Human threats to Mangroves

Although mangroves are disturbed or destroyed by natural events such as cyclones, tidal waves, eustatic sea level changes, or coastal erosion, human activities have had the most far-reaching effects. Activities such as land filling and dredging can cause changes in drainage patterns, deforestation can increase sediments runoff, changes in agriculture practices and coastal development can have a depleting effect on mangroves. Discharges from power and desalination plants can modify temperatures and salinity. About 3 to 5 degrees increase in the ambient sea water temperature can cause mangrove mortality, as well as up to a 90% reduction in the density and mass of associated fauna.[26] Water polluted by refuse dumps, sewage, oil and chemicals can be destructive to mangroves as to associated food chains which are of importance to people.

According to J. Maragos, A. Soegiarto, E. Gomez and M.A. Dow[27], commercial timbering operations in mangroves are becoming more commonplace throughout Southeast Asia. The net effect has been the clearing of large areas of mangrove swampland with resultant erosion and siltation. Also, the conversion of the

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[24] M. Ayyad, " Hot deserts of Egypt and the Sudan "in *Ecosystems of the World*, Chapter 5, pp. 149-180

[25] op cit., Zahran, 1977, p.12

[26] International Union for Conservation of Nature and Natural Resources, The *Saudi Arabian Red Sea, an assessment of coastal and marine resources, 1986, p.* 5

[27] op cit., *Natural systems for development*, pp. 280-285

mangrove swamps into brackish-water fishponds for the culture of prawns and milkfish, is one of the most important threats to the swamps in Southeast Asia. The trees are removed, the silt and mud dredged and if suitable , used in dikes. Due to their existence near the shore line they are often the first areas to be reclaimed for agriculture and urban developments. Extensive mangrove swamps are being eliminated to be converted into croplands or plantations in Fiji, Indonesia and Malaysia. Some reclamation has been done to a more limited extent for human settlements, for industrial areas in Singapore and oil refineries in central Java in Indonesia. Because of their seemingly forbidding and inhospitable environment, they are sometimes used as solid waste disposal sites and garbage dumps. These activities affect the hydrology of coastal areas and cause dramatic changes in ground cover.

As for the mangrove swamps in the Red Sea region, although they are not relatively rare, they form a community which is particularly vulnerable to the effects of pollution. Reports have been made of damage from oil, industrial effluents and sewage. According to B. Dicks, the Geisum island-north of Hurghada- has a heavily oiled stand of mangroves, the oil having completely coated the breathing roots and killed the mangrove. The fine carbonate muds at this site are also heavily oiled and anaerobic. Also, Hiscock reported oil pollution on the mangrove in the area of Ras Mohammed the Egyptian national park.[28] Mangrove roots typically grow in fine anaerobic muds and receive oxygen through aerating tissue which communicates to the air through small pores (lenticles) on the silt roots or special 'breathing' roots (pneumatophores). Thus any contaminants which interfere with aerating tissue (e.g. oil deposit on aerial roots) may reduce oxygen diffusion to the underground root system. Likewise, pollutants incorporated into sediments may damage root systems and so interfere with the ultra filtration process.[29] Such effects are usually followed rapidly by defoliation and death. The slow grow of trees to maturity means that recovery of these systems, following the damage, takes a considerable time, may be more than 50 years.[30]

3.2.3. The off-shore Islands

The third specific habitat of the Red Sea is the off-shore islands.[31] Three major features are important in discussing the island ecosystem: the geographical isolation,

[28]Hiscock, "Some Notes on the Exploitation and Conservation of the Coral Reef Community in the Red Sea Coast" in *Marine science laboratories*, 1972, p. 44

[29]op cit., Red Sea, Key environments, p. 394

[30]ibid., p. 349

[31]See Chapter Two for more details about the distribuition of the islands.

size and age. These three features have biological consequences, determining the number of species that can reach the island, their population size and the age of the climax communities found in the island ecosystem. Vulnerability to catastrophic natural events such as typhoons, subsidence and volcanic eruptions is also greater for islands. The vegetation on a small island tends to be simple. The importance of the islands ecologically comes from their service as fish gathering places which normally exhibit greater productivity levels than any other zone. Most of the small islands which are covered with vegetation are sea bird nesting areas as well as sea turtle habitat. From a scientific point of view, small islands are invaluable study sites. Their manageable size and discrete biological and physical structure help researchers understand processes such as succession and competition that also occur in far more complex environments on larger land masses.

Islands may be divided into two main categories, continental islands and oceanic islands. The Red Sea islands fall in the second category. Also, the types of islands vary according to their use, Rodny V. Salem classified such types as: uninhabited and seldom visited by humans; uinhabited but regularly visited by humans; inhabited by people with traditional economies; and inhabited by people with trading economies and relying on the sale of exports to support cash economy.

The Red Sea off-shore islands are mainly of the first and second types, and they form three rows close to the shore line. In Chapter Two, the various types of islands formation, -mainly from an igneous core with coral reefs surroundings- was discussed. The islands of the Red Sea are relatively rich in vegetation cover, especially with Avicenna marina (Figure 3.4).

The island of Abu Minkar is taken as an example of the ecosystem description due to its relative vegetation richness with the other islands and it represents one of the islands falling in the second category. The island is located three kilometres south east of Hurgadha. Shallow creeks are the dividers of the island. Three vegetation types characterise the island; mangrove, salt marsh and high ground. The pure thickets of well developed Avicennia marina represents the mangrove vegetation. They cover more than 80-90% of the island. The salt marsh vegetation is dominated by Arthrocnemum glaucum, found in the inland zone of the island, with widths varying according to the ground level. The width is in direct proportion with the rise of the land. The high ground in the island is mostly covered with a sparse growth of Zygophyllum album with the occasional presence of Nitraria retusa and suaeda monoica.

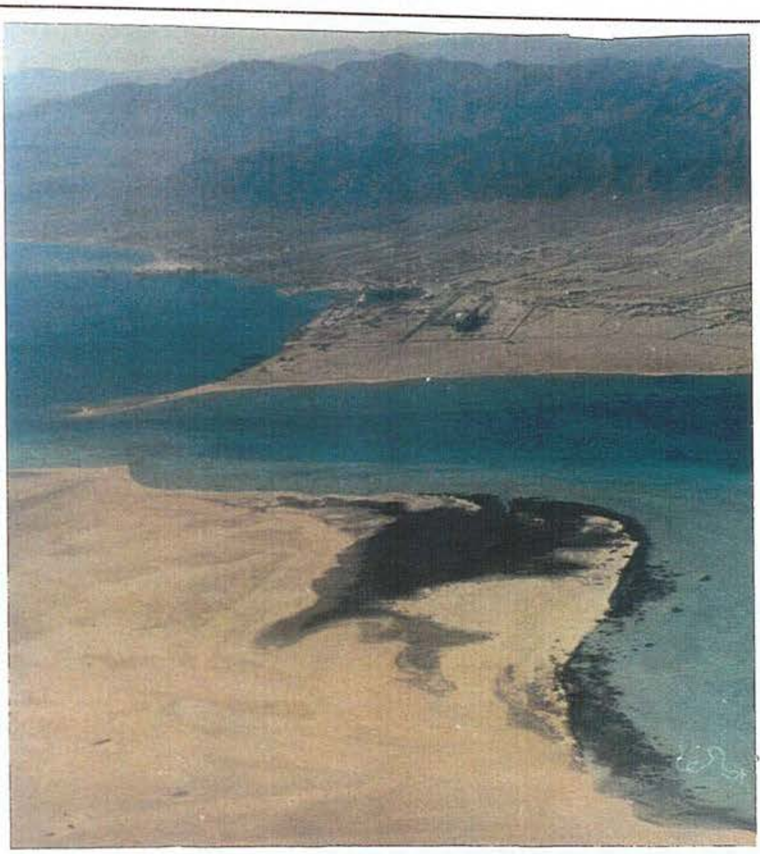

Figure 3.4: Safaga island covered with Mangrove on its eastern coast. (After T.D.A)

The coastal zones of small islands represent a larger proportion of the total land area than continental coastal zones, their entire area being in fact part of the coastal zone. Thus the management and use of their coastal ecosystems takes on an even greater significance for islands.

3.2.3.1. Human threats to the islands ecosystems

Although most continental islands have been accessible to people for many thousands of years, people have reached the oceanic islands and disturbed their biota largely within the last millennium. Power boats allow ready access to these islands and have contributed destructively to the vulnerability of their habitats. Although island biotas appear particularly vulnerable to the impact of people, their vulnerability has been viewed as greatly increased compared to the biotas of the continents as regarded by R. Salem. Decline and extinction of endemic island species, such as; the dado, giant tortoises and some plants, may be merely the last convulsions of those parts of the wild nature that are unable to adapt to humans as they reach the last habitable and least accessible lands on the planet.[32] Furthermore, threats to the islands are increasing due

32op cit., R. Salem, p. 175

to human misuse of these areas under the pressure of money power in the form of creating new tourist resorts.

3.2.4. Desert Wadis

The fourth specific habitat of the Red Sea coast are the wadis. Zahran, Kassas and Imam, have designated the term wadi as a dried river bed in a desert and which may be transformed into a temporary water course after heavy rain. Each wadi has a main channel and branched tributaries. The wadi habitat has distinctive features including a characteristic plant cover. It has the great merit of being a drainage system collecting water from an extensive catchment area (Figure 3.5).

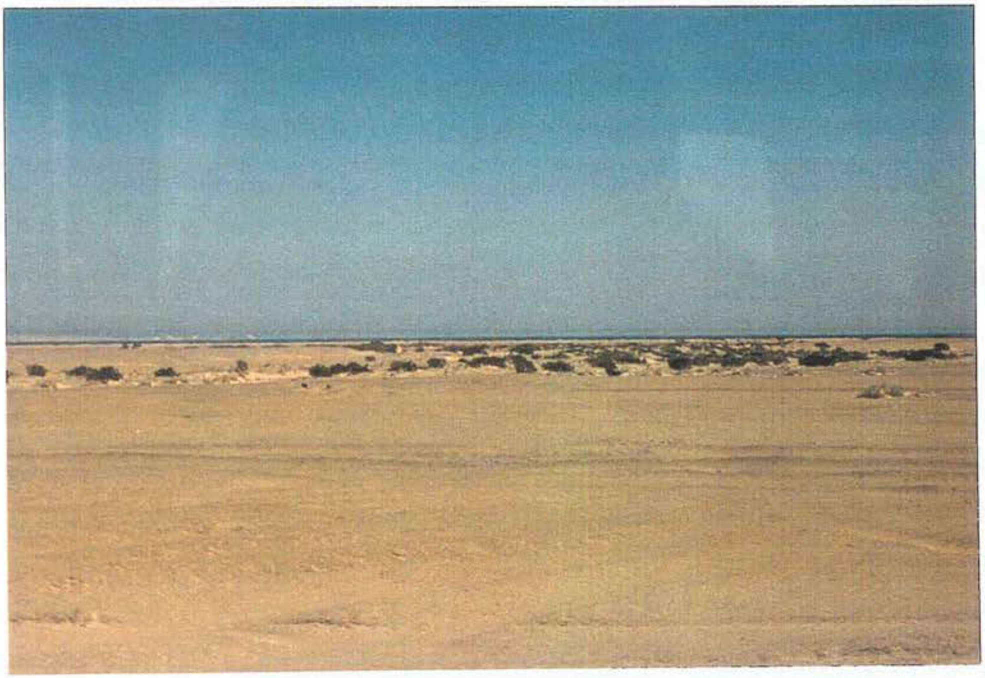

Figure 3.5: Wadi Al-Gimal bed, rich with mosaic species of plants.

Ḥassib in 1951 stated that the amount of water in the wadi beds is much greater than the rainfall, and noted that the whole stream is about 300 m wide and 1-2.5 m deep, rushing continuously for 2-3 days. It sweeps away the vegetation and sometimes men, cattle and roads (this phenomena was recently recorded in the Wadis of Sinai as well, and every year the rainfall destroys the road network in south Sinai). A certain amount of water percolates into the soil, forming the ground water which is utilised by numerous wells sunk along their courses. The water supplies in the wadis are immense, explaining the richness of wadi vegetation. However, this advantage is counterbalanced by two destructive elements; torrents and grazing.

As explained in Chapter Two, the central part of the wadi bed the waterway, is usually devoid of plants, vegetation being mostly restricted to the sides. In any bend of the wadi meander, the plant cover is very scarce on the outer curve where the torrent effect is greater and along the inner curve it is well developed. The influence of torrents is partially mechanical, destroying, uprooting and partially eroding the soil.[33]Wadis are also subject to grazing, the most common species being the least grazed. According to Zahran and Willis, many palatable species acquire a cushion-shaped or grazed trimmed growth from which they do not recover if protected. Cutting and lumbering especially towards plants that are valuable to fuel. This leads to the deprivation of the soil of its plant cover, rendering it susceptible to torrential erosion and to deflation, thus hindering the natural development of the habitat. The vegetation scarcely attains maturity and is usually kept in a juvenile or deflected stage of development.

As discussed in Chapter Two, the soil of the wadis is usually of rock detritus, ranging in texture from fine silt to gravel and boulders. The wadi bed is often covered with layers of fine materials alternating with coarse gravel. The alternating layers reflect episodic variation in water resources of the wadi, as their texture may be indicative of the transporting capacity of the water bodies contained in the wadi. It also has a substantial influence on the water available to plants. A gravel bed at the ground surface, will afford few possibilities for seed germination as it will be subject to desiccation. Although the gravel bed has the least water retaining capacity, it may be a safe guard against run-off as it allows the underground gravel layer to store greater amounts of free water in its spaces. A deep soil allows for the storage of some water in the subsoil which will provide a continuous supply of moisture for the deeply seated roots of perennials.

3.2.5. The coastal mountains facing the Red Sea proper

The fifth specific habitat of the Red Sea coast are the mountains facing the Red Sea proper. As mentioned in Chapter Two the chain of mountains and hills forms the boundary or the divider between the inland and coastal deserts. Their presence has influenced the climate and the water resources of the desert. Judging from the vegetation cover and altitude and distance from sea, the influence of orographic precipitation is very effective in the mountains facing the Red Sea. These mountains include a group that extends between latitude 24, 50 degree N and 22 degree N on the Sudano Egyptian borders and comprises: the Gebel Nugrus group, the Gebel Samiuki

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33 op cit., M. Zahran, J. Willis, 1992, p. 144

group and the Elba group.[34] The vegetation cover on the slopes of the mountains, is delimited into latitudinal zones, the lower of which shows a recognisable character of community structure. The vegetation of the upper zone is influenced by minor differences of habitat. The individual plants are crowded in patches, forming a mosaic that makes the recognition of clearly defined communities difficult. With such an ill-defined pattern, the relationship between the habitat conditions and vegetation may be interpreted on the basis of moisture requirements of species.[35]The flora of the mountains is listed in the table after the studies of Kassas. It is classified into three groups:

a) trees, shrubs and undershrubs,
b) persistent herbs and herbaceous herbs,
c) ferns and bryophytes.

The first two of these groups include Leptadenia pyrotechnica, Ochradenus baccatus and Ephedra alata. Some of the trees and shrubs that are less drought tolerant include, apart from the Acacia spp , Moringa peregrina, Ficus pseudosycomorus and Dracaena ombet. (Figure 3.6)

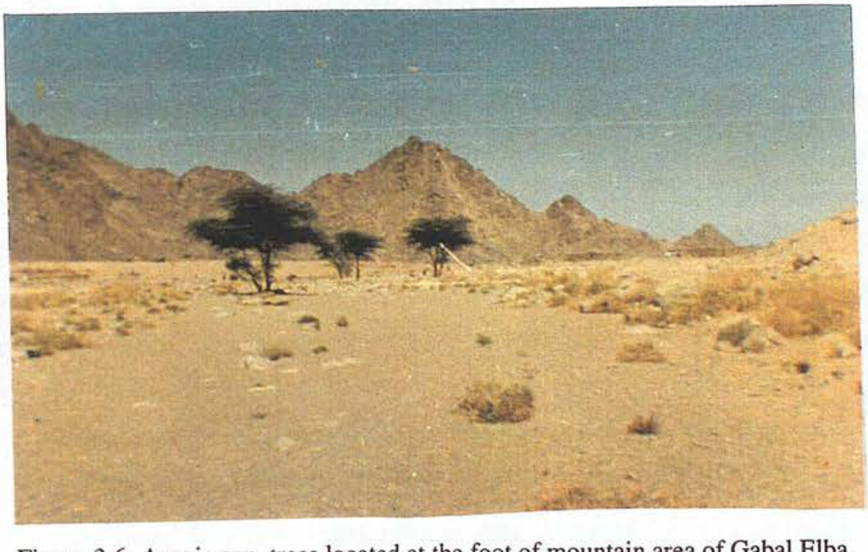

Figure 3.6: Acacia spp, trees located at the foot of mountain area of Gabal Elba.

The persistent herbs and clearly herbaceous herbs may also be classified into two groups, the first having lower water requirements than the second. The first group

34Kasas, Zahran, " Plant life on the coastal mountains of the Red Sea, Egypt" *J. Ind. Bot.* Vol. 50A, 1971, pp. 571-89
35op cit., Zahran, Willis, p. 178

includes, Aerva javanica, Cleome droserifolia and Launaea spinosa. The second group of herbs is much more restricted in distribution as they are confined to the less arid localities. The ferns and hydrophytes are mostly confined to less arid habitats and all grow best on the upper zones of the north slopes of the mountains. The most widespread is Adiantum capillus-veneris.[36]The most important human threat to the mountains comes from the grazing impacts of the safari trips in the area.(Appendix B)

3.2.6. The sea environment

The sea environment represents the sixth specific habitats of the Red Sea coastal zone. The sea shore is where the edge of land meets the edge of the sea. All shores are either, sandy, rocky, muddy, protected or exposed, and have one thing in common; they are alternately exposed and submerged by the tides. Roughly the height of extreme low tides bounds the region of the sea shore from one side. Within these confines, conditions change from one hour to the other, with the ebb and flow of the tides. At flood tide the seashore is a water world; at ebb tide it belongs to terrestrial environment, with its extreme in temperature, moisture and solar radiation. In spite of all this, the sea shore inhabitants are essentially marine, adapted to withstand some degree of exposure to the air for varying periods of time.

3.2.6.1 The characteristics of the Red Sea

a) Red Sea temperature; As might be expected, the general pattern of mean temperature throughout the year is one of increasing temperature from north to south. Throughout the Red Sea, the lowest surface sea temperature occurs in February (Figure 3.7). The average reading in that month in the area of Hurghada is about 17.5 degrees C. higher variability , associated with lower average temperatures, occurs in two areasin the whole body of the Red Sea in the North between November and February, cooling of the surface water by cold northerly winds causes overturning of the water which results in comparatively large fluctuations in observed readings and the range becomes 5-6 degrees C. The other area is the far South between latitudes 12 & 14 degrees N., during the months of July and August, the temperature falls due to up welling of colder water from below, the range reaching as much as 9 degrees C.

As for the temperature of the in shore water, in the hottest months of the year, these may reach 37-45 degrees C. especially in the areas of the fringing reefs. In

[36]ibid., p. 186

winter, probable decrease in temperature is relatively small, since the temperature of the surface water is at all times warmer than the deep water.[37] The relatively high temperature of the Red Sea plays an important role in the richness of the biota in the area.

b) Salinity; The average salinity at the surface of the open oceans does not vary widely and is generally about 35 parts per thousand. Higher salinity occurs in the areas where evaporation substantially exceeds precipitation and it is not surprising therefore that the waters of the Red Sea are the saltiest of any of the world oceans exceeding even the waters of the Arabian Gulf. The salinity of the Red Sea increases from South to North, (Figure 3.8) it reaches its peak in the area of the Gulf of Suez at 40.5 parts per thousand. In the shallow waters along the coasts, some increase in salinity is expected in parallel with the higher temperatures as was mentioned previously. However, whereas in regions where water is both shallow and fairly stagnant, water temperature may both rise and fall, the salinity, in the absence of a mixing with fresher water, can only increase as evaporation continues.[38]

c) Currents, Tides and Water level; The two main features of the Red Sea currents are their weakness and their great variability. The main features of the surface currents, at least till the deep water is reached are: during the summer months, the northerly winds over the entire basin causing a set of the surface water in a south south-easterly direction. This flow averages about a quarter of a knot (12 cm / sec.). From October to May the drift is reversed. The north-east monsoon tends to pile up water in the Gulf of Eden and there is a surface flow in the Red Sea reinforced by the south-easterly winds blowing over the staits of Bab Al mandab and the southern part of the sea. This inflow is somewhat stronger than the summer outflow averaging between 0.75 to 1 knot. During the transitional months in Spring and Autumn the current pattern is indefinite almost everywhere. The exception is in the far south in May and early June when the inflow through the straits persists until after the North-westerlies become established.

[37]op cit., Red Sea; key environments, p. 59
[38]ibid., p. 63

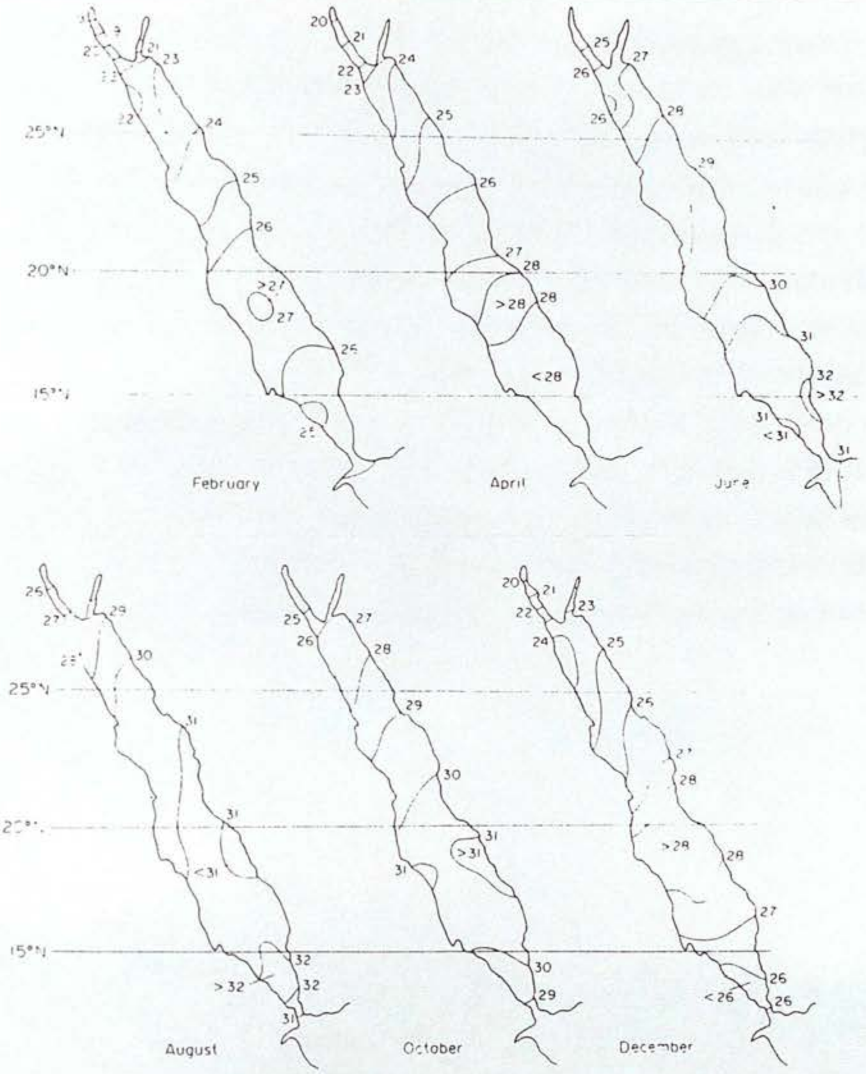

Figure 3.7: Mean sea surface temperature of the Red Sea. (After Robinson)

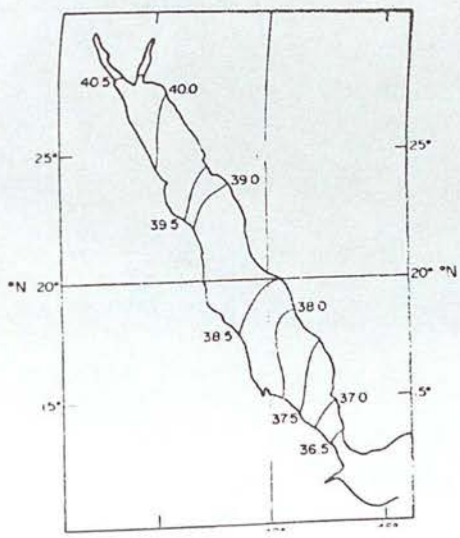

Figure 3.8: Annual mean salinity. (Parts per Thousand) (After Robinson)

The tides in enclosed and partially enclosed seas and bays are complex and may or may not be directly influenced by the tides in the oceans with which they communicate. Within the Red Sea there is a local oscillatory tide of small amplitude and semi- diurnal period which results in high water at one end of the sea when it is low at the other end. The time differences between successive high waters or low waters at any location is approximately 12 hours and it follows that there is a six hour difference between the times of high waters at the two ends of the sea. The range of the tide in the Hurghada zone is about 0,5 meter[39] (Figure 3.9). Associated with changes in tidal level is the horizontal movement of water referred to as tidal streams. These are often confused with water movements caused by other agencies. In general, tidal streams in the Red Sea are negligible , but in restricted waters reports occur of tidal streams as high as 6-7 knots. Some of these may be of tidal origin, but topographical influences and the effects of local diurnal wind variation are probably major factors in their production.

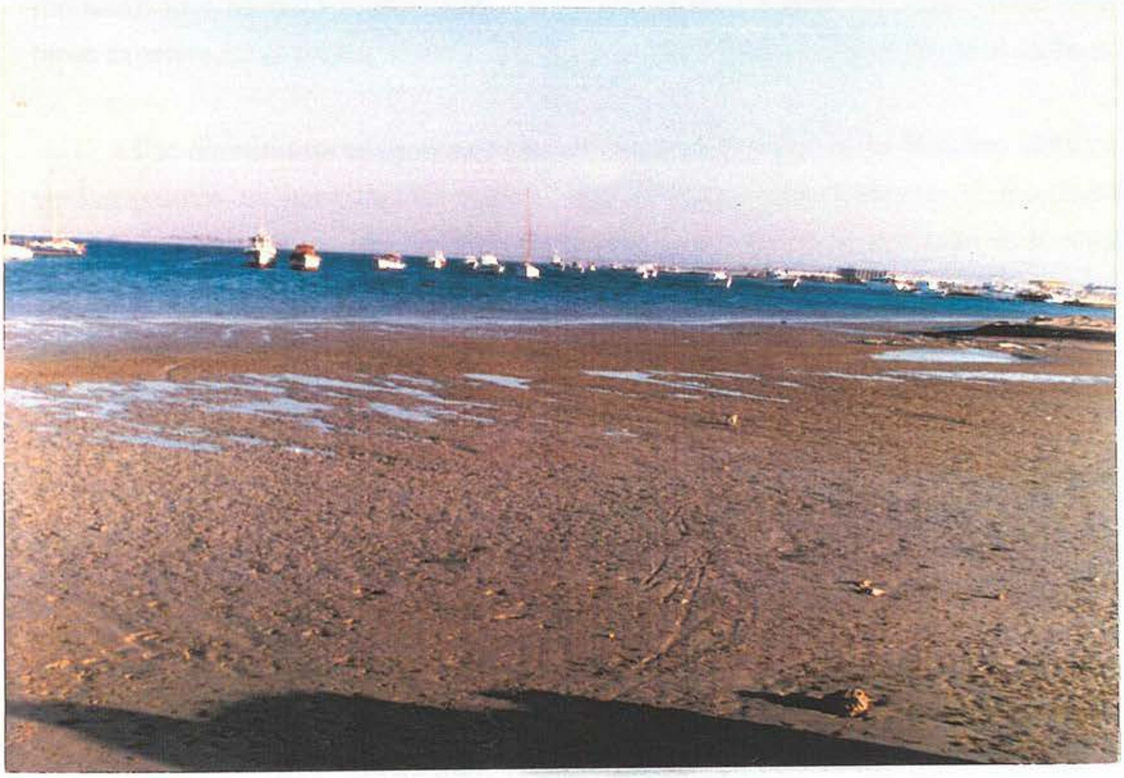

Figure 3.9: Tide reaches more than 0.5 m. in Hurghada, shallow shelving of edge exaggerates the effect of weak tidal draw.

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[39]ibid., p. 65

There is a tendency to assign all variations in water level along coastlines to vagaries or abnormalities of the tide even though they may be caused by quite different factors. In the Red Sea, the sea level is strongly influenced in the long term by the rate of evaporation and the balance between the in flowing and out flowing water. In winter, the inflow exceeds the outflow and the loss by evaporation combined, in spite of the fact that evaporation is higher in winter than in summer. Consequently mean sea level rises over the whole of the Red Sea. In summer the combined losses are greater and mean sea level falls.

d) Oxygen, Phosphorous and Nitrogen contents; The amount of oxygen required to saturate sea water decreases with both increasing temperature and salinity. For this reason the absolute oxygen concentration in the Red Sea is inevitably lower than that in cooler and less saline water. In fact the surface water of the Red Sea is quite close to oxygen saturation; the concentration varies from a little under 4.5 ml-o2/1 in the north to 4 ml-o2/1 in the south. These low oxygen values are much lower than those experienced at similar levels in the Atlantic and Pacific oceans at the same latitude.

The distribution of inorganic phosphorus and nitrogen in the Red Sea shows a similar pattern to that seen else where.[40] But the actual concentrations of phosphate and nitrate ions differ markedly from those in the other basins. In common with other areas the nitrate and phosphate content of the surface water is low and increases with depth. The Red Sea suffers a deficiency of both nutrients. The ratio of nitrogen to phosphorous in the Red Sea is about 20:19 (by atom).

e) Plankton; Plankton organisms live within the water column of the sea, the pelagic zone, their movements being principally dictated by those of the water in which they are suspended. According to H. Weikert[41]

> ***" The term plankton covers the heterogeneous assemblage of organisms, which may be divided into phytoplankton (plant) and zooplankton (animals). Phytoplankton are the most primary producers of the sea; they are usually single celled and very small. Their productivity, like that of terrestrial plants, depend on adequate supply of light and nutrients."***

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[40] ibid., p. 70
[41] ibid., p. 90

In the tropical setting of the Red Sea, light is rarely a limiting factor in shallow water. Light does not penetrate water very well and only the top 100 meters or so receives enough light for photosynthetic fixation by plant to exceed their daily energy requirements. The depth at which photosynthesis and energy loss by respiration of a cell balance is called the compensation depth and the layer from this depth to the surface, where the net gain of energy allows a cell to synthesize organic material in surplus is called the euphotic zone. Photosynthetic primary production is confined to the shallow euphotic zone and it is this production which is the energy source of the zooplankton. Zooplankton are in turn eaten by animals. Through series of overdeveloping ladders of vertically migrating zooplankton and by the linkage of falling organic debris and carcasses, energy fixed by photosynthesis is transported from the synthesizing surface layer to the consuming pelagic deep sea and bottom habitats.

The Red Sea is an extreme environment for plankton. The characteristics of distribution, diversity and abundance all suggest that the substantial proportion of the biota live close to their physiological limits. Knowledge of the function of the pelagic ecosystem and its stability is urgently needed before it is disturbed by man. The off-shore exploitation of oil fields is proceeding, and urbanization and industrialization in coastal zones must inevitably produce local effects on the system.

e) The Red Sea fish and turtles; The Red Sea is often considered as a rich area for fish. In reality this wealth is a wealth in diversity, forms and colors. Bi eographically the Red Sea relates to the Indo-Pacific group. It is characterized by impoverishment of the stocks and a decrease in number of species of the 2000 or so species of fishes of the Indian ocean, 800 only are present in the Red Sea, and of them, less than 100 are considered as endemic species or subspecies. The Red Sea, has a south-north gradient of impoverishment. From some 139 identified species in Hurghada, down to 126 species at the Gulf of Suez only 25 are common (Appendix C). Among these are more than 30 species of shark. The Red Sea provides a multitude of islands and remote beaches for nesting marine turtles which are present in five species. Like the Risso's Dolphin, (Figure 3.10) which also survives in the region, the most important threats to them are; accidental takes in fishing nets, chemical pollution from oil extraction, disturbance and habitat modification due to the existence of new tourist resorts.

Figure 3.10: The Risso's dolphin, near Abu Minkar island. (August 1992)

3.2.6.2. Coral reefs

The corals of the Red Sea are among the most attractive , photographed and studied of any in the world. They represent an immense economic resource in their recreational and tourist use, as for fisheries. With the exception of tourism in the Hurghada area, they are largely unspoiled by pollution or human interference. They provide shelter and a trophic basis for a wide array of marine animals and plants. Accretion of coral reefs modifies wave energy inshore and allows the establishment of algal reefs and other ecosystems requiring protected environments and soft sediments. The contrast between the vibrant reefs beneath the surface and the desert landscape above water never ceases to amaze.(Figure 3.11)

It emphasizes how successful the corals have been in transforming an equally sterile environment below the water into a thriving ecosystem. Generally, coral reefs are found throughout the tropics from 30 north to 30 south, and are confined to regions where the annual mean water temperature is greater than 18 degree centigrade. Various physical factors interact to determine geographical and depth distribution of coral reefs, such as, light, temperature, salinity, water circulation, sedimentation and dissolved nutrients. They occur in water less than 50 meters in depth with maximum growth taking place in 20 m. depth, reflecting the depth to which light may penetrate in sufficient quantity to maintain metabolism by zooxanthellae. Optimum coral growth occurs at 25-29 degree centigrade and at 34-36 0/oo salinity.[42]

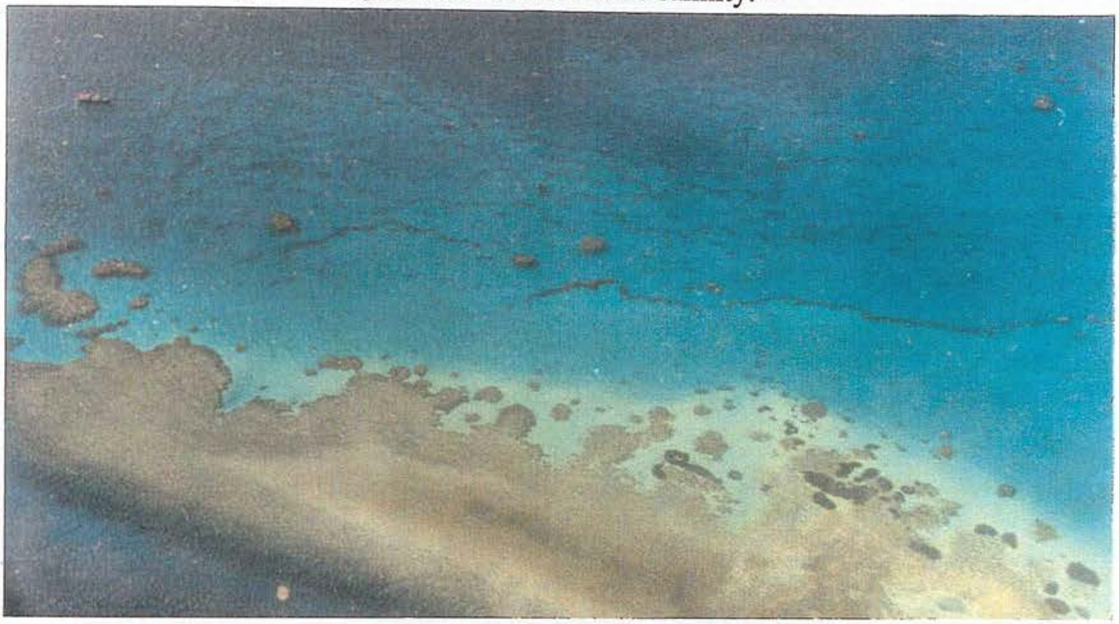

Figure 3.11; The contrast between the desert and coral reefs. (After T.D.A)

Types of Coral

A large number of animals associate with "coral". These are two basic kinds, best defined as hard coral and soft coral.[43] Hard corals generally live in groups, not as a single animal, but as part of a colony. This means that the individual members live together in a permanent association that enables each to survive by their combined response to the environment. Soft corals also have a similar body plan and form colonies , but they do not have a solid limestone skeleton.

a) Hard corals; The polyps of the hard corals are formed in three layers, (Figure 3.12) the walls of the outer and inner layers sandwiching a jelly mass forming the

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[42]Corals are basically very simple animals that belong to a large group of organisms called coelenterates. This group also includes jellyfishes, sea anemones and sea fans. All these animals have a number of characteristics in common, The most dominant is that they share a simple radial body plan in which only one single opening acts for both , being a passage for materials into the body and for expelling wastes. Also they share the property of having a remarkable defense and prey catching structure, which is called nematocysts, coiled sharp and often barbed threads are contained in a tiny capsules, which can be triggered , by a combination of mechanical contact and the chemical taste of the prey. In keeping with the coelenterate plan, cylindrically shaped animals called polyps surrounded by tentacles compose the soft parts of corals. All reef-building corals and a large number of anemones and various other coelenterates contain within their tissues millions of single- celled plants known as zooxanthellae. These plants safely protected inside the tissues of the polyp, are able to photosynthesize, using the energy of the sun to convert carbon dioxide and water into carbohydrates and oxygen. The zooxanthellae benefit the coral by providing a supply of oxygen in its tissues for respiration, according to E. Boo there is evidence to suggest that a high percentage of the carbohydrates produced through photosynthesis leak out of the algal cells and are used by the corals as food, this enables the coral polyps to deposit their limestone skeletons more rapidly.

[43]Les Holiday, *Coral Reefs*, 1989, Tetra Press, pp. 1-16.

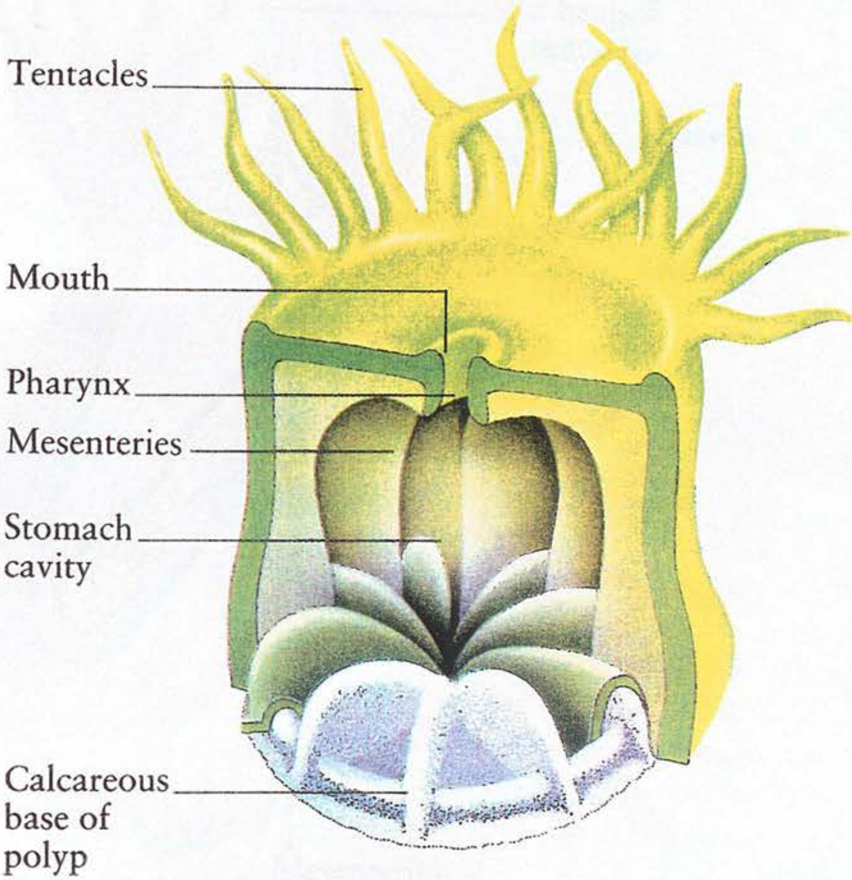

Figure 3.12: The structure of the Hard Coral Polyps. (After Holiday)

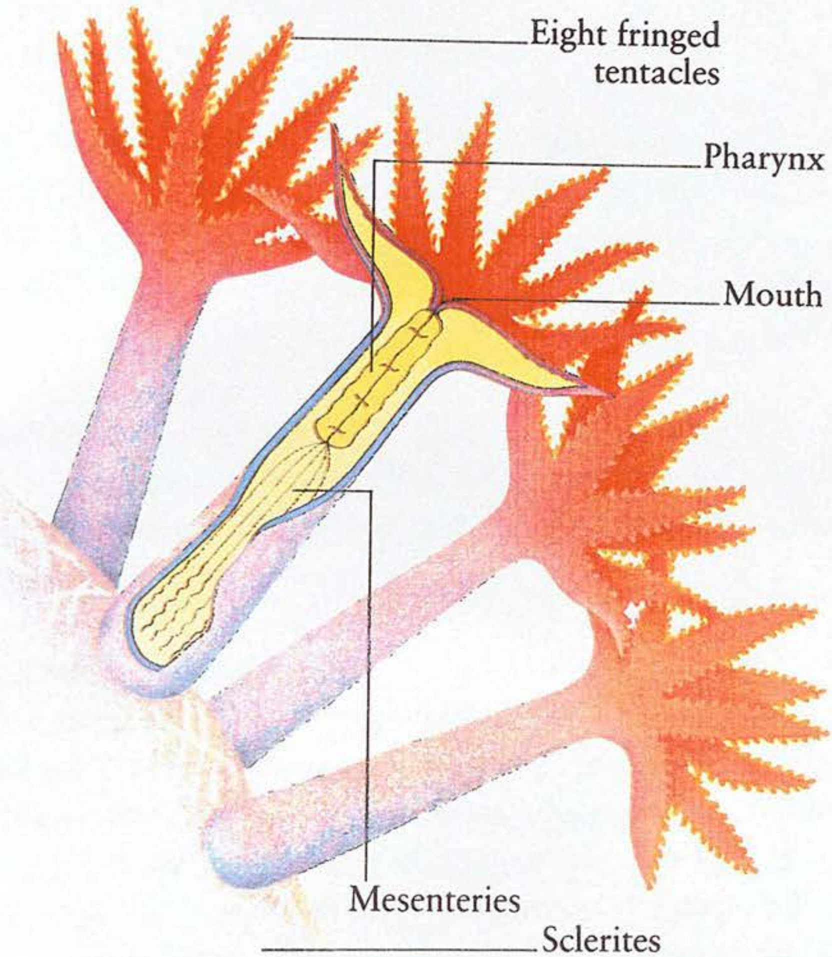

Figure 3.13: The structure of a Soft Coral Polyps. (After Holiday)

middle layer. A skeletal limestone is secreted by the outer layer, forming a hard, intricately patterned casing around the animal. The polyp reveals an anemone-like creature. The tentacles which surmount the cylindrical body, can vary in number with species, the opening leading to the body cavity is surrounded by them. Mesenteries, which are sheets of tissues, partition the body cavity. A stony skeletal cup encases each polyp, vertical folds producing the intricate symmetrical patterns associated with the different types of stony corals fashioning the upper surface. The stony cups that form the colony can be arranged in a wide variety of configurations, including in a flower-like type on stalks or in a star-shaped arrangement forming a mound.[44]

b) Soft coral; The structure of the soft coral is similar to the hard coral, but without the solid limestone skeleton. The soft coral polyps are arranged on the outer surface of the main tissue mass of the colony and are supported by tiny limestone crystals, or sclerites (Figure 3.13).

The Corals' feeding system

All corals are carnivorous and the polyps are capable of shooting out nematocysts, their microscopic venomous darts, from extended tentacles to paralyze and disable their prey. Zooplankton forms the basis of their diet. Once trapped, this is passed by tentacles into the mouth opening and then to the stomach, where the food is rapidly digested by secretions from the mesentries. Zooplankton is most plentiful at night in shallow waters, as the vast range of creatures that make the plankton rise from depths to feed. Most of the hard corals live in shallow waters and are therefore, nocturnal feeders, while the soft corals, which generally occur in deeper water feed during the day.(Figure 3.14)

The growth process of Corals

The main factors that encourage healthy reef coral growth are, warm clean sea water with strong sunlight. Sea temperatures need to lie within the range of 16-36 degree centigrade. Most active reef growth takes place within a much narrower range, perhaps 23-26 degrees. Salinity of the sea water is also very critical and needs to be at an optimum concentration of 35 gm./litre. A range between 25 to 40 gm./litre can be tolerated but the extremes of this range are harmful to many corals as well as other reef plants and animals.

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[44]ibid., p. 19

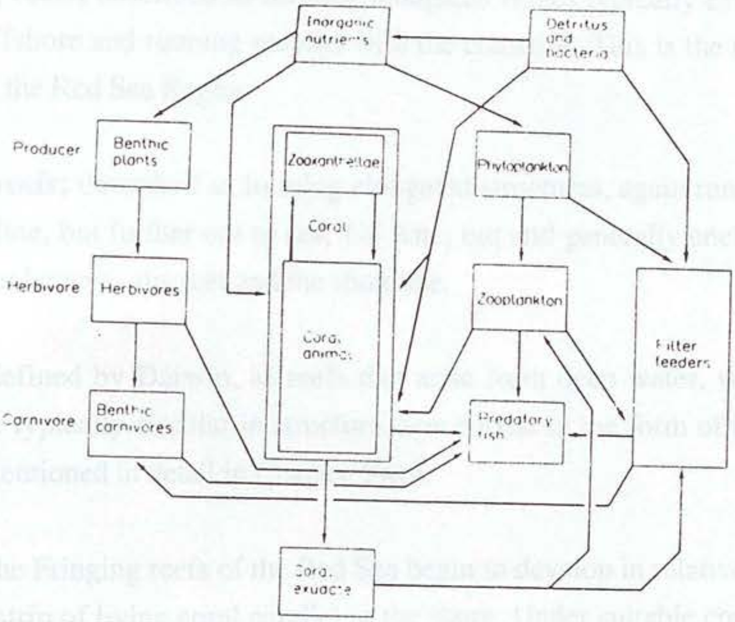

Figure 3.14: Simple trophic web for a typical Coral Reef Community. (After Lewis)

Clean water is necessary to allow sunlight to penetrate to where corals live for the benefit of their associated zooxanthellae. Corals are also unable to withstand large amounts of sediments, particularly fine silt, because it clogs the mouth and tentacles, preventing feeding and breathing. Since they are carnivorous animals, however, they can not live in entirely sterile conditions, but require a constant supply of small floating or swimming creatures on which to feed. Finally since the corals are unable to move, they must be exposed to currents that provide food.

Thus the picture emerging is one that shows reef corals as animals that require a stable environment and particular conditions in order to thrive. Living in such conditions, they have limited resistance to outside influences such as pollution.

The development of Coral Reefs

As we have seen, the accumulation of the stony "skeletons" of coral animals has enabled huge reefs to form. The continuing growth of these immense structures is due to a thin covering of living polyps that flourish on the limestone remains of their ancestors. The exact form and shape of these reefs can vary considerably and were first defined by Charles Darwin in 1842. These definitions hold true today and are used by marine scientists all over the world. He defined them into three types:

Fringing reefs; described as forming elongated ridges typically extending 50 to 500 meters offshore and running parallel with the coastline. This is the type of reefs most typical in the Red Sea Region.

Barrier reefs; described as forming elongated structures, again running parallel with the coastline, but further out to sea, 1-5 Km., out and generally enclosing moderately deep water between the reef and the shoreline.

Atolls; defined by Darwin, as reefs that arise from deep water, when viewed from above are typically circular in structure. Some exist in the form of islands in the Red Sea (as mentioned in detail in Chapter Two).

The Fringing reefs of the Red Sea begin to develop in relatively shallow water, as a thin strip of living coral parallel to the shore. Under suitable conditions, this strip broadens into a platform of part dead and partly living corals, extending horizontally from the shore for many kilometres along the coastline, often forming a lagoon between the reef and shore. The living and actively growing part of the reef is on seaward face. because conditions are more favorable in this direction ; on the landward side, high temperature and high salinity levels occur and increased amounts of deposited sediment offer a less conducive environment for coral growth. Further development into deeper water depends on coral broken by storms falling to the base of the slope and building up to a level that will allow growth to continue and to provide a suitable coral growth. The dependence of reef corals on their symbiotic association with tiny zooxanthellae only allows vigorous growth where strong sunlight penetrates. Sunlight is very quickly absorbed by sea water and luxuriant growths are seldom found deeper than 30 meters.[45] Below 50 meters, the light loving stony corals are substituted by those that do not contain zooxanthellae and by sponges and soft corals, which are not dependent on sunlight. As the reef extends outwards, the top of the reef also extends outwards, cutting off the supply of clean water to the corals trapped behind. Although some corals can thrive in this back reef area, over a period of time, the natural progression is for this trapped part to die and the coral rock remaining to be reduced to sand, thus forming the sandy lagoon (Figure 3.15).

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[45]ibid., p. 33

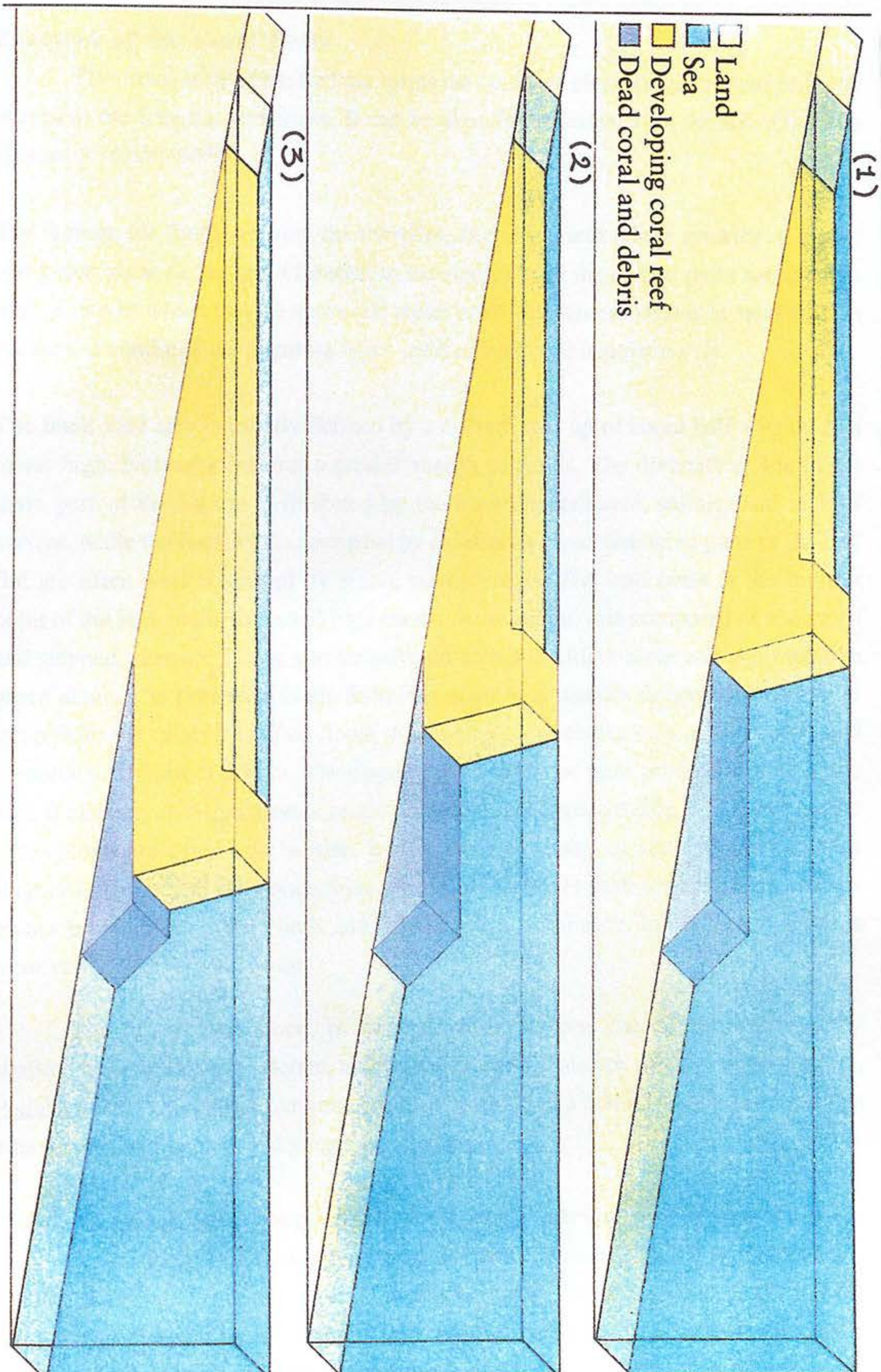

Figure 3.15: The development of Fringing Reefs. (After Holiday)

Zonation of the Coral Reefs

The corals reefs of the Red sea forms the complete classic type that can perfectly represent the fringing reef zones. It can be classified starting from the shoreline into (Figure 3.16) the following:

The **lagoon,** the first zone from the shoreline, is a sandy area where growths of brown and green algae or sea grass flourish in the shallows. In the deeper parts towards the reef, in depths which may be about one meter or so, the general vista is of sand with an occasional coral mound, featuring types such as brain and boulder corals.

The **back reef** area is usually defined by a distinct step up of about half a meter to a meter high. Normally features a greater variety of corals. The diversity of life in the main part of the lagoon is inhibited by the high temperatures, salinity and lack of current, while the back reef is encrusted by calcareous algae. Sheltered parts of the reef flat are often well colonized by small, sturdy corals. The **reef crest** is the highest point of the reef and is subject to high energy wave action. It is composed of a serrated and stepped, seaward-facing surface covered with a coralline algae and short turflike green algae. The **reef edge** is the following zone. It is usually stepped down a meter or so from the crest. It is often home to wave-resistant corals such as fire corals and branching colonies of porites. The **upper reef** slope is the most productive area of the reef. It can vary in shape, from a gentle slope to a sheer vertical drop. The corals on the outer slope are often spectacular, with a wide diversity of species that includes staghorn, porites and star corals. Fine algal turf and bright pink coralline algae fill the niches between the living corals and colonize dead coral rock. In this part fish life is most varied and very abundant.

The **lower reef** slope, is the final zone, beyond the depths which many shallow water corals can tolerate, and is populated by platelike colonies of Montipora, Podabacia and Oxypora. Caves and overhangs are often a feature of this zone and this area is rich in soft corals and gorgonian sea fans.

3.2.6.2.1. Coral Reef connections with neighbouring and linked habitat

As for the neighbouring habitat, which are, the Reef flat, the sea grass beds, sand or mud flats, lagoons, estuaries and mangroves, the corals benefits from them through the introduction of fixed nitrogen, the dissolving and precipitation of organic compounds and their accumulation into the food web, the consolidation of sediments, trapping pollutants and silt, thus protecting the reef from poisoning and smothering.

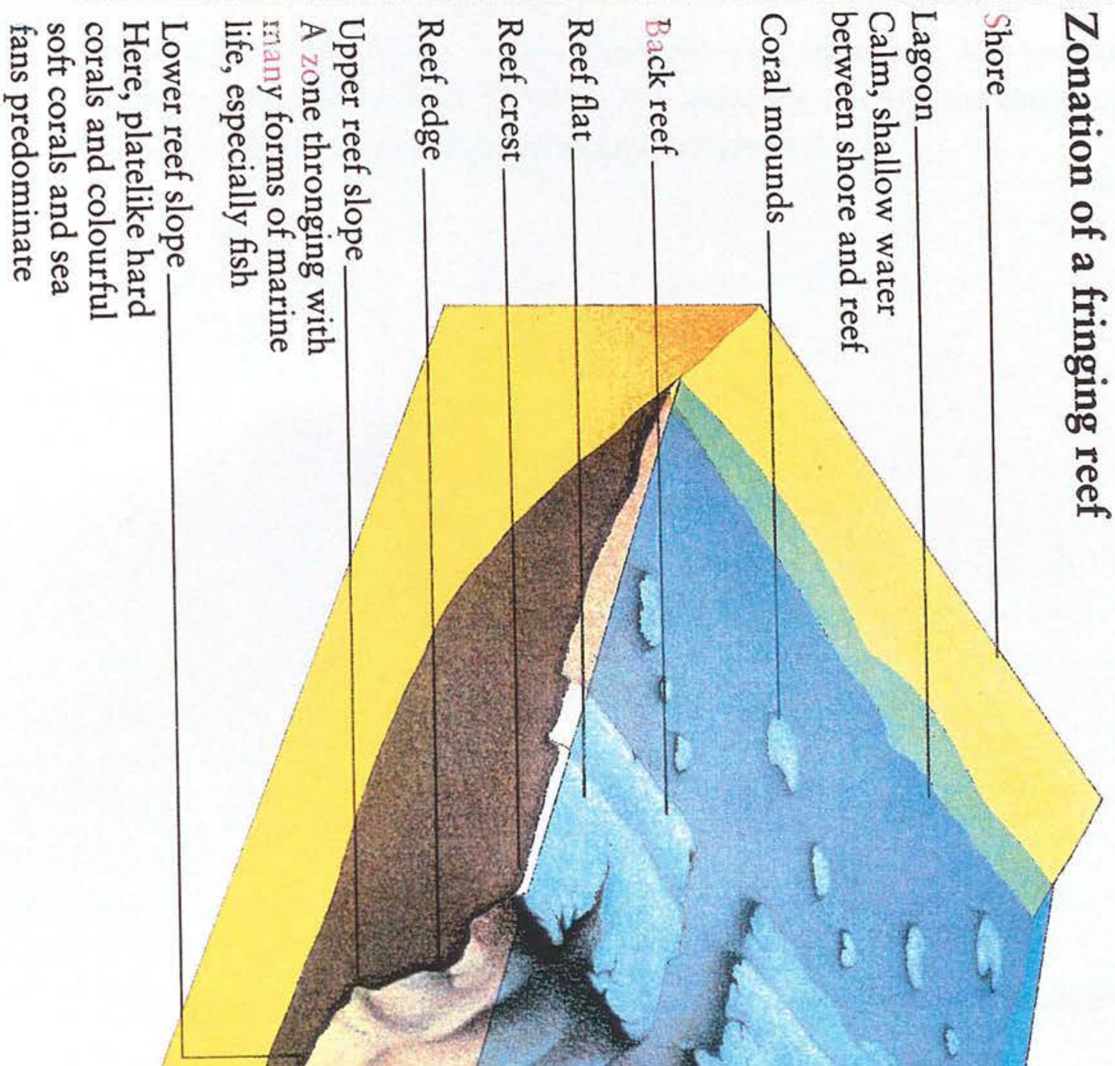

Figure 3.16: Zonation of Fringing Reefs. (After Holiday)

This is done by wave transportation, currents, fishes and sea urchins. Also by acting as feeding ground and nurseries for reef fishes, increasing diversity and abundance of species, during the nocturnal/diurnal migration (Figure 3.17).

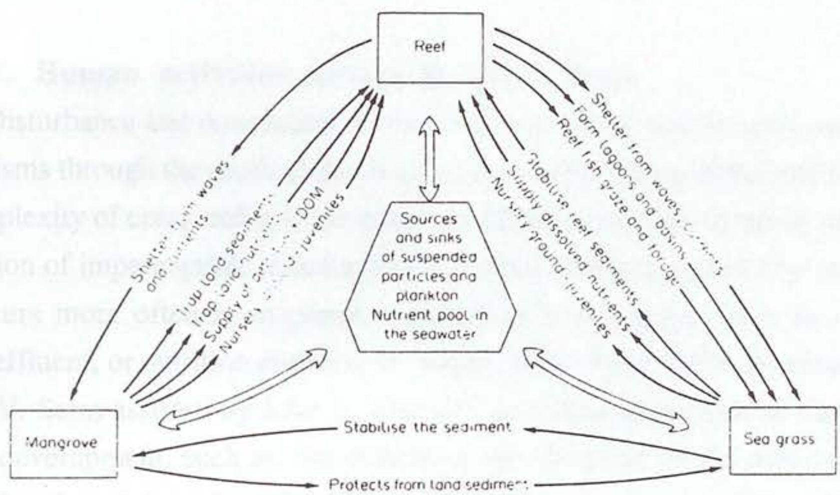

Figure 3.17: The relationship between corals and neighboring habitats. (After Edward's)

There are some potential harmful impacts on coral reefs from the neighboring sea grass beds; destruction of sea grass beds by repeated anchoring releases sediments into the water column and increases turbidity; reef organisms can be smothered, resulting in decrease of diversity and abundance of reef species. As for the mangroves, lagoons and estuaries, the disturbance of substrate, and the release of trapped silt and pollutants can result in smothering and poisoning of reef organisms. The linked habitat can be generalised as, beaches and sand dunes, water sheds, urban, industrial and agricultural developments. The corals do not benefit from them except from the watersheds as they regulate the stream flow. But, the potentially harmful impacts may be summarised as follows:[46]

[46] Rodney V. Salm, *Marine and Coastal Protected Areas; a guide for planners and managers*, IUCN, 1984, pp. 113-114

- Sand released by erosion or destruction of binding.
- Vegetation may smother organisms, floods and dilution of sea water caused by deforestation, as well as erosion can stress organisms.
- Litter; domestic, chemical and thermal pollution; increased fresh water runoff can poison or physically damage organisms.
- Pollution by pesticides, herbicides and fertilisers can smother organisms and cause eutrophication.

3.2.6.2.2. Human activities threats to Coral Reefs

Disturbance and destruction of coral reefs can result in short term modification of organisms through the death of the living cover or destruction of the reef framework. The complexity of coral reef systems results in different response to stress, often with a progression of imperceptible transformation to dead substrate covered by macroalgae. This occurs more often in response to pollution from such sources as sediments, thermal effluent, or nutrition enrichment (wallis, 1971; Voss, 1973; Bjorklund, 1974). Rodney V. Salm assisted by John R. Clarck[47] provides many cases of damage from careless development, such as, the erosion of the shoreline on the east coast of Sri--lanka, after the mining of coral reefs, causing trees and coconut palms to fall into the sea. Dredging causing sedimentation has killed portions of reefs off Florida, French polynesia and Indonesia. Sewage discharge near reefs has killed corals in the U.S. Virgin Islands and parts of Kaneohe Bay, Hawaii. As for thermal pollution, the release of power plant cooling water has destroyed reefs off Hawaii. Chronic pollution from oil and phosphate fertiliser shipments has also killed a mile of reef in a reserve at Eilat in the Red Sea and has prevented the recovery of reef damaged by unusual weather conditions.

Although perhaps of lesser importance as regards the survival of large geomorphological features, boat anchors constitute a serious threat to individual reefs, causing greater harm than "crown of thorns" star fish, bristle worms, and parrot fish combined. Yet, rarely has widespread anchor damage to reefs been documented. Gary E. Davis, studied this phenomenon in the area of the dry tortugas "atoll" located 110 Km., west of Key West, Florida. Isolated from mainland runoff by its remote location and protected by statutory constraints on use, the coral reef system at dry Tortugas is one of the best protected from man's influences in the western Atlantic. The Dry Tortugas reef is a standard against which other coral reefs may be compared and

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[47]ibid., pp. 98-105

provides all the benefits ascribed to undersea wilderness.[48] It is a sanctuary and an area of replenishment, it has aesthetic value, and serves as a science and educational study site. However, the wilderness character of the Dry Tortugas reef is under threat by fishing boats.

Nightly, during the winter and spring months, a fleet of several hundred trawlers (15 to 30 m long) fish the Dry Tortugas shrimp grounds for pink shrimp. By day, these boats seek the shelter of the nearby Dry Tortugas coral reefs, in and near the Jefferson national monument. During the frequent winter storms they may remain at anchor for several days in the Lee islands and the reefs. These winter storms usually approach the Dry Tortugas from the north. One of the most convenient lees afforded to these north winds is just south west of the Atolls. Water depths of 8 to 15 meters are found within a few hundred meters of the islands and are preferred by the shrimpers and other boaters for anchorage. In this area the coral is well developed, the ridges are 7 to 18 meters wide with sandy bottomed ravines 3 to 10 meters wide between them. Boats, primarily shrimpers, drop their anchors into the sandy ravines hooking the bases of the coral ridges. With the prevailing north east-south west currents and northerly winds, the anchor chains and lines drape across the fragile coral. As the boats swing on their anchors with shifting winds and changing tides, swathes of coral are broken and swept from the ridges. The broken coral branches are rebroken several times until nothing but rubble remains. The extent of recent anchor damage was measured in July 1975. Two transects, approximately 1.1 km., long each, were made along the 12 m. and 9 m. depth contours, using the techniques described by Randall (1961) in underwater mapping. An observer was towed at constant speed along the transact, during which time observations of the reef directly beneath him were timed and recorded by a stenographer located in the tow boat. The bottom was categorised as (1) sand, (2) living coral, (3) recent anchor damaged corals, (4) other hermatypic coral species, (5) bare rock. The bottom contour was recorded with a Raytheon model 725 C fathometer. A typical 275 m. long section of the 12 m. depth transact. Approximately 40% of the bottom along the transect was occupied by coral reef, 20% of that reef showing severe anchor damage.

Coral destruction can also be caused by direct physical activities of human beings. D. J. Woodland and N. A. Hooper proved in an experiment in 1977 on the

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[48]Gary E. Davis, "Anchor damage to a coral reef on the coast of Florida", *Biological conservation Journal*, (11), 1977, Applied Science Publishers, England

Great Barrier Reefs at Heron Island, that not only gross interference by man such as mining and dredging can lead to major changes in coral reefs, but also the more unobtrusive of human activities, such as walking and collecting can lead to rapid deterioration of their coral formations on the reefs.[49] The method they used for the experiment was, choosing a flat reef area 0.5 Km., from the island and the depth was only 0.5 m., at low tide. This zone was chosen because it presents most interest to the visitors and it is impossible to walk through it without trampling on corals. A representative area 4 m., wide and 12.5 m., long extending back from the reef crest was marked out for subjects to walk on. Quadrats, 1 m., square internally divided into 25 aerial units, were used to estimate the percentage of the substrate that was covered with living coral. The full length of both long sides of the site was assessed in this way. A photographic record of the area was used to determine the proportional representation of coral genera on an "area covered" basis.

Four adults of body weight ranging from 50 to 85 kg., wearing the commonly used rubber soled gym boots were made to walk abreast and in a straight line throughout the length of the chosen area, that is each person had a track 1m., wide in which to walk. On the first walk, each person walked directly along his/her track. On the second traverse, the walkers collected the corals broken off by the first team. The members of the third traverse repeated the procedure of the previous walk. The area was then traversed another 7 times and the broken corals again collected. The last tactic was then repeated 8 times. In all, then the area was traversed 18 times by 4 persons. The collected coral was drained and weighed. This consisted of the live coral and the dead bases which formed an integral part of the living colonies, but excluded dead coral which might probably be considered part of the substrate.

The results of the trampling were dramatic. In all, some 607 kg., of living coral were destroyed by the walking. Considering the traverses separately, 12% of this was broken off in the first traverse and 14.5% in the second. Of the remaining traverses, 36% of the coral was broken off by walks 3-10 and 37.5% by the last 8 walks, by which time it was considered that little additional damage would be done by further walking.

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[49] D. J. Woodland, N. A. Hooper, "The effect of human trampling on coral reefs", *Biological conservation journal,* (11), 1977, Applied science publishers Ltd., England

Summarising, originally 41% of the total area was covered with living coral. Mainly delicate, branching species. This was reduced to 8% cover after 18 traverses. Increasing human population pressure on coral reefs will lead to deleterious changes to the reefs. These pressures arise from an increasing tourist trade and increases in the indigenous populations. This will proceed to a point where nothing will remain in the coral zones but the dead coral foundations of the reefs.

As for the tourism impact on the coral reef ecosystem, it has been observed by Salm as follows:[50]

The construction of tourist facilities may affect the reefs by its immediate mechanical impact, by land filling causing sedimentation, by altering the water flow around the reef and thus changing a major ecological factor, by shading the reef locally, causing a reduction of photosynthesis, and by point sources of pollution and littering. These pollutants may be in the form of sewage, detergents, fertilisers and nutrients (form plantation) and may stimulate phytoplankton and other plant productivity beyond the capacity of control by grazing reef animals, and thus modify the community structure of the reef system. Two other main sources of pollution, are the heated water from power stations, industrial plant cooling and the other is hypersaline waste water from the desalination plants, as they change the water temperature and the salinity, which are key factors in the distribution and physiological performance of many reef organisms.

As for the activities associated with tourism, like diving, almost all diving results in minor unintentional damage to corals and other reef biota; at frequently dived sites this damage can become significant and can lead to local loss of the fragile species. During the 1970s, areas of formerly healthy coral reefs in the Egyptian Red Sea became infested with huge populations of Diadema sea urchins that damaged the living corals as they foraged for algae. Scientist studying this phenomenon believe that the urchin population explosion may have been caused by the almost total annihilation of a major predator of the urchin, the Porcupinefish (Diodon hystrix), by collectors for the curio trade.[51] Reef walking at low tide is a popular method of reef viewing, which causes some physical coral damage, as was proved by Woodland previously in this chapter. Reef walkers move or overturn boulders to view animals beneath them; if the boulders

[50] op cit., Salm, pp. 106-108
[51] op cit., Les Holliday, p. 63.

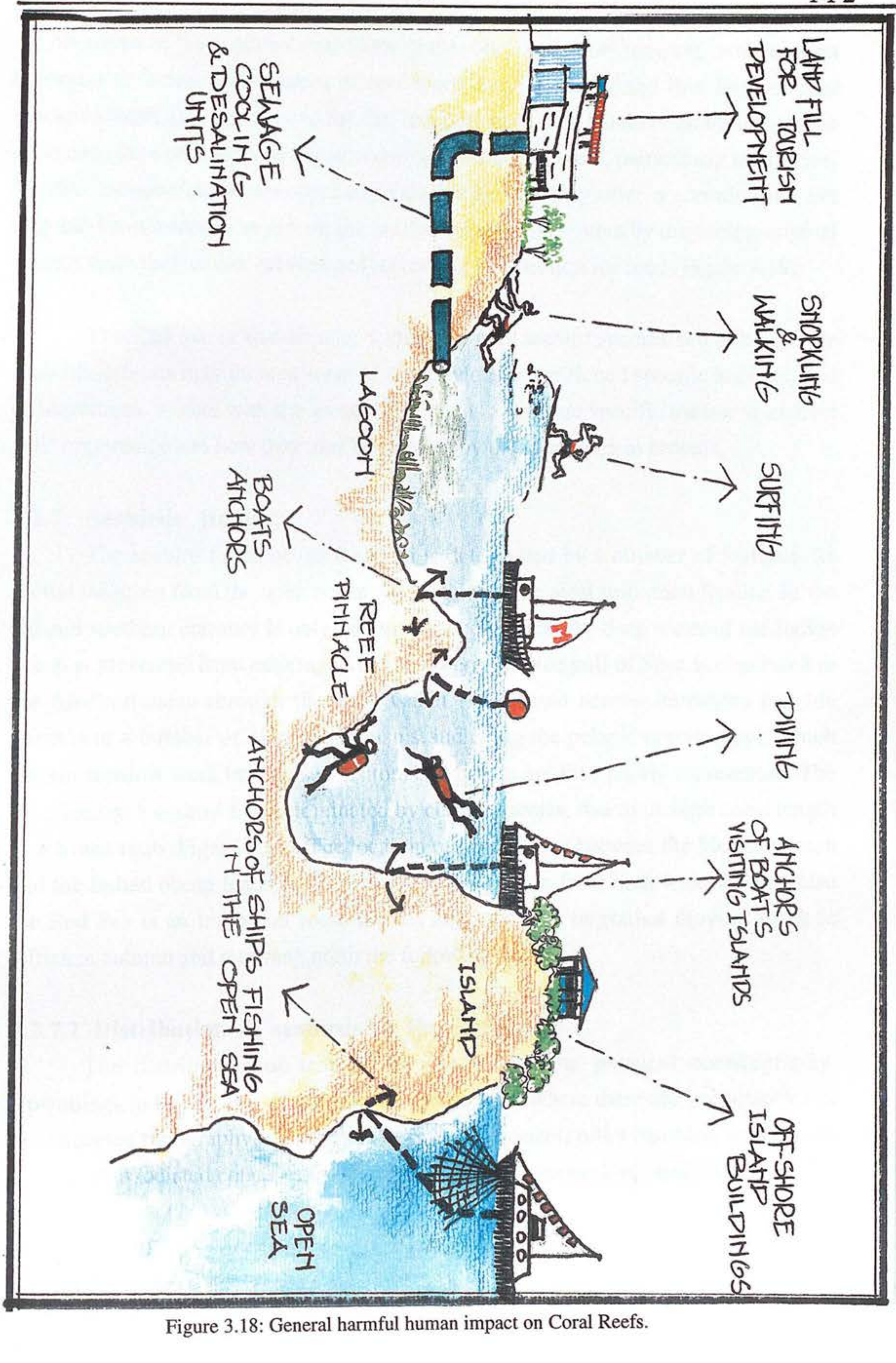

Figure 3.18: General harmful human impact on Coral Reefs.

are not replaced these animals are likely to die. Shell collectors may use crowbars and hammers to break away pieces of reef when hunting shells and this form of reef damage should also be added to the list. Inexperienced boat handlers grounding on the reefs can cause considerable physical damage to shallow areas, particularly at low tide. Finally, introduction of commercially valuable species may offer economic gain, but may have a substantial impact on the pre-existing natural system by displacing original species from their earlier habitats and increasing competition for food (Figure 3.18).

The Red Sea is also popular with its various seabird species and although the seabirds habitats may include some of the previously mentioned specific habitats, it is of importance to deal with the seabirds habitat as a separate specific habitat to explain their importance and how they may be affected by the development process.

3.2.7. Seabirds Habitat

The seabird fauna of the Red Sea is determined by a number of features. Its partial isolation from the open ocean, is considered the most important feature, as the sill and southern entrance is only 100 meters deep so that the deep water of the Indian ocean is prevented from entering. At the northern end, the gulf of Suez is connected to the Mediterranean through the Suez Canal. These two narrow entrances provide barriers to a number of marine organisms, including the pelagic species upon which certain seabirds feed. Pelagic sea visitors and petrels are thus poorly represented. The Red Sea has a seabird fauna dominated by coastal species, due to its high coast length to sea area ratio (Figure 3.19). The location of the Red Sea between the Mediterranean and the Indian ocean lends itself to receive immigration from both water bodies, also the Red Sea is an important route for sea and land bird migration moving south to Africa in autumn and returning north the following spring.

3.2.7.1 Distribution of seabirds in the Red Sea

The distribution of seabirds is affected by the physical oceanography. Upwellings to the surface of nutrient rich water arise where there are irregularities of the undersea topography, or where current systems meet, often resulting in plankton fronts and associated concentrations of predatory fish, marine birds and mammals.[52]

In the Red Sea, seaward from the coast lies the coral reef zone, with a depth of less than 50 meters, then shelves which vary in depth between 300-600 meters.

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[52] op cit., Red Sea; key environments, p. 317

Figure 3.19: The *Bridled Tern* is one of the most common species in the Red Sea, a summer visitor.

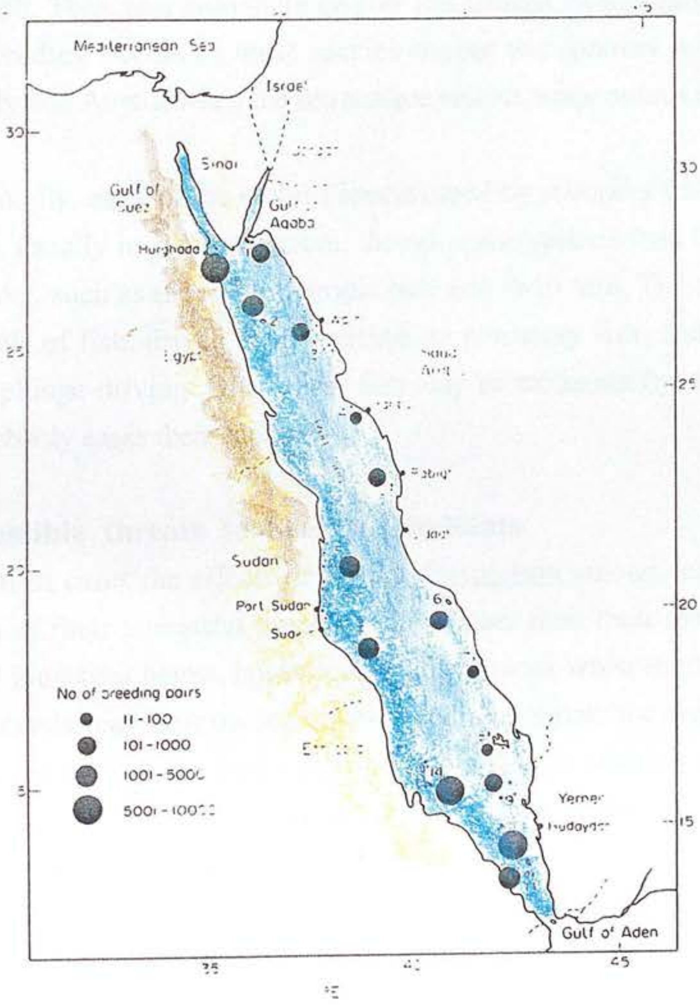

Figure 3.20:

Seabird colonies of the Red Sea, amalgamating data on all breeding species, from several sources. The numbered s are 1 – Tiran Island, 2 – Perim and Brothers Islands. 3 – Islands on the Wajh Bank, 4 – Islet north of Yanbu al Bahr, ddah and Rabigh, 6 – Janabiyat, 7 – Kutunbol, 8 – Farasan Islands, 9 – Islands near Al Hudaydah, 10 – Zubayr Island, Hanish Islands, 12 – Muhammad Qôl and associated islands. Mukawwar. Mayetib and Taila, 13 – Suakin Archipelago, 14 – Dahlak Archipelago, 15 – Islands near Hurghada (Mugawish, Om Qamar, Abu Mingar and Shadwan).

The area of the Gulfs of Suez and Aqaba is particularly rich in seabirds due largely to the shallow depths and narrow shelves, as well as to the existence of a relatively large number of islands in the area providing breeding grounds.

The Gulf of Eden zone also is very rich in seabirds, due to the existence of tidal streams, which may cause upwellings. These areas have relatively high levels of nutrients. In general, where nutrients are readily available, one may expect concentrations of plankton and fish, and with suitable breeding sites available nearby, these provide the ideal conditions for seabirds colonies (Figure 3.20).

3.2.7.2 The seabirds ecosystem

According to P. G. Evans (1987), two features distinguish the distribution and kind of seabirds along the coast of the Red Sea:(Table 3.2)

Firstly, most of the seabirds are shallow water fish feeders, which reflects the impact of the existence of shallow reefs associated with a high concentration of shoreline fish. They nest colonially on low flat islands, often associated with related species. Breeding occurs in most species during the summer months, particularly between July and August when the sea surface and air temperatures are highest.

Secondly, most of the seabird species feed by scooping fish from, or close to, the surface, usually in shallow waters, though some species feed further off-shore in deeper waters, such as the red-billetropic bird and swift tern. The terns and gulls will follow shoals of fish, driven to the surface by predatory fish, and taken by surface-dipping or plunge-driving. Often these fish may be momentarily stunned or confused and this probably eases their capture.

3.2.7.3 Possible threats to Seabirds habitats

In most cases the effects of habitat destruction among seabirds relate to the destruction of their terrestrial breeding sites rather than their feeding grounds. The building of industrial plants, hotels and holiday homes when sited along the shore or upon the islands may destroy important breeding habitats for seabirds.[53] As for the Red Sea these activities are increasing in many parts, for example around Jiddha, near Port Sudan and in Hurghada. Large seabird colonies may rapidly become threatened. Human disturbance from both egg collecting expeditions and by tourists can also lead

[53]ibid., p. 335

Species	Main Breeding Season	Clutch Size	Incub. Period	Fledging Period	Breeding habitat and coloniality	Feeding Methods and Habitat	Food	Sources
Audubon's shearwater (*Puffinus lherminieri*)	poss. Nov–Feb	1	44–60	62–100	Semi-colonial; holes, crevices, in rocks, amongst boulders.	Surface-dipping or diving; coastal.	Small fish and crustaceans.	Snow (1965a), Harris (1969).
Red-billed Tropic-bird (*Phaethon aethereus*)	April–August	1	42–44	80–90	Colonial; holes, crevices in rocks, boulders.	Plunge-diving; usually pelagic.	Fish and squid.	Stonehouse (1962b), Snow (1965b), Harris (1969b).
Brown Booby (*Sula leucogaster*)	March–August	1–3	39–48	85–103	Semi-colonial; steep sites, often on bare rock, also on slopes, flat ground sandy beaches, sometimes flanked by dense vegetation	Plunge-diving; usually inshore in v. shallow water.	Fish (+ squid and prawns).	Kepler (1969), Nelson (1978).
Blue-faced Booby (*Sula dactylatra*)	March–October	1–3	38–49	c.120	Colonial; scrape of bare sand, gravel or rock decorated with gravel	Plunge-diving; usually inshore.	Fish (+ squid).	Kepler (1969), Nelson (1978), Gallagher & Woodcock (1980).
Pink-backed Pelican (*Pelecanus rufescens*)	August–November	1–3	30	c.85	Colonial; well-built nest in tall trees beside rivers, lakes, sandy islands.	Surface-dipping; inshore shallow water.	Fish	Din & Eltringham (1974a,b); Gallagher & Woodcock (1980).
Socotra Cormorant (*Phalacrocorax nigrogularis*)	May–October	2–3	?	?	Colonial; scrape of bare sand or gravel, often on islands.	Surface-diving; inshore.	Fish	Meinertzhagen (1954), Gallagher & Woodcock (1980)
White-eyed Gull (*Larus leucopthalmus*)	June–September	(1–3)	?	?	Semi-colonial; scrape on bare sand, often surrounded by seaweed.	Plunge-diving; inshore and offshore.	Mainly fish; also crustaceans, molluscs and annelids.	Su-Aretz, S. (1980); Cramp & Simmons (1983).
Sooty Gull (*Larus hemprichii*)	June–September	(2–3)	?	?	Solitary; scrape of bare sand or gravel, usually under bushes, on islands or promontories.	Scavenging or plunge-diving, predatory or kleptoparasitic; inshore.	Fish, offal, birds' eggs, molluscs, and crustaceans.	Archer & Godman (1937), Fogden (1964).
Swift Tern (*Sterna bergii*)	June–August	1–2	25–30	38–40	Colonial; scrape of bare sand, gravel, coral or rock, often without shelter on low-lying islands.	Plunge-diving; usually pelagic.	Fish (+ crustaceans).	Archer & Godman (1937); Ali & Ripley (1969); Cramp & Simmons (1985).
Roseate Tern (*Sterna dougalli*)	June–August	1–2	21–26	27–30	Semi-colonial; scrape of bare sand or gravel, on sand-dunes or spits, shingle, coral or low rocky islands.	Plunge-diving; inshore shallow water.	Fish	Dunn (1972); Nisbet in Cramp & Simmons (1985).
White-cheeked Tern (*Sterna repressa*)	June–August	1–3	?	c10	Semi-colonial; scrape of bare sand on coral-girt islands, sometimes bare sand-flats.	Surface-dipping; usually inshore over coral reefs.	Small fish and invertebrates.	Archer & Godman (1937); Clapham (1964); Cramp & Simmons (1985), Nikolaus (pers. comm.).
Caspian Tern (*Sterna caspia*)	March–May	1–3	20–22	30–35	Semi-colonial; scrape of bare sand, gravel, or rock, on sand-dunes, reefs, islets, or skerries.	Plunge-diving; inshore near sand-spits.	Fish (+ invertebrates).	Su-Aretz, S. (1979); Cramp & Simmons (1985).
Lesser-Crested Tern (*Sterna bengalensis*)	July–October	1–2	21–26	32–35	Colonial; scrape of bare sand among dwarf, sparse vegetation, on sand-spits, coral reefs.	Plunge-diving or surface-dipping; often pelagic.	Small fish (+ crustaceans).	Archer & Godman (1937); Clapham (1964); Nikolaus (per. comm.).
Bridled Tern (*Sterna anaethetus*)	June–September	1–2	28–30	55–63	Colonial/semi-colonial; scrape in crevice under bush, ledge, protected by low scrub on sandy and coral islands.	Surface-hovering and dipping; pelagic often away from reefs.	Small fish, + planktonic crustaceans, molluscs.	Meinertzhargen (1954), Ali & Ripley (1969), Hulsman (1974, 1977), Diamond (1976), Trott (1952)
Little Tern (*Sterna albifrons*)	May–June	1–3	18–22	19–20	Semi-colonial; bare scrape on sand, shingle, or shell-beach.	Plunge-diving; usually inshore shallow water.	Small fish and invertebrates (crustaceans, insects).	Cramp & Simmons (1985).
Brown Noddy (*Anous stolidus*)	June–July	1	32–35	c.42	Semi-colonial; well-built nest in scrub, low trees, also on rock shelves, crevices or bare shingle.	Surface-dipping; usually inshore.	Small fish	Dorward & Ashmole (1963); Cramp & Simmons (1985); Watson (1908).

Table 3.2: Biology and Ecology of seabirds in the Red Sea. (After Evans)

to increased loss when parent birds have been disturbed from their nests leaving them unguarded and leading also to nest desertion. Other animals may be important predators to seabirds or their eggs and their effects may be considerably increased by man. In the Red Sea, Black Rats Rattus rattus are present , and they feed on birds eggs and young.

Human threats towards seabirds may also take different forms such as; the competition for food, since many commercial food fishes are an important part of the diet of seabirds especially in juvenile stages, the possibility exists of competition between man and seabird for food. As fish stocks come under increasing pressure, the threat to seabird populations may become significant. The evidence of the impact of this is scanty so far and it relates mainly to North Atlantic auks. There is no research data available at present for the Red Sea. Seabirds may be incidentally taken in fish nets. The use of long lines of gill nets to entrap shoaling fish such as tuna and halibut has in recent years resulted in heavy mortality amongst surface-diving seabirds, the areas that are worst affected are Greenland, the Monterey Gulf in California and east of Canada. In the Red sea, this type of fishing is commonly used in most fisheries, especially in Jiddha and Jizan.

Pollution and Poisoning have received considerable attention in the popular press especially after the Kuwait crisis. Birds are light and durable, with the tendency to float after death. Large numbers washed ashore are conspicuous evidence of mortality resulting for example from an oil spill. The Red Sea carries a heavy traffic of oil tankers and so the chances of oil spills are high. According to Peter Evans, fortunately there have been very few limited oil spills caused by ships. The area of the Gulf of Suez is extremely polluted with oil, and for this reason it is not considered suitable for tourism development. Toxic chemicals also have negative effects on seabirds. They enter the sea directly from factories or river systems in general. This phenomenon is increasingly noticeable in the North Sea. In the Red Sea, the dry climate and very low rain fall restricts the effects of inland terrestrial pollution by limiting fresh water input to the Red Sea from rivers. Industry has only been recently established but the phosphate factory in Al Qusier, south of Hurghada has already polluted the area. The problem will be to interpret levels of pollutants contained in seabirds and to identify any sub-lethal effects, which although falling short of killing adults may profoundly interfere with breeding and affect ecosystems food chains.

From the previous discussion we may conclude that the habitats of the Red Sea area are very sensitive and can be easily affected by human interference.

In the following part we shall name and discuss the activies taking place in the Red Sea coastal zone and their impacts -in theory- on the natural environment of the coastal zone.

4. The Existing Development Activities taking place in the Red Sea Coastal Zone and their expected Environmental Impacts

Development activity anywhere in coastal areas is a potential source of ecological damage to the coastal ecosystem. and environmental disturbances. The amount of damage that result depends on the characteristics and vulnerabilities of the specific ecosystem involved. There are three main types of development activities taking place on the coast at present, phosphate extraction, oil mining and tourism.

4. 1 Phosphate Extraction

Strip mining of phosphate for fertilizer in coastal water near the city of Al-Quseir causes special hazards of; turbidity, sedimentation and particularly the eutrophication that results when there is sufficient nitrogen in the water to combine with the excess phosphate released by the constant pumping of water from behind the extraction cofferdam. The location of phosphate extraction is very limited on the Red Sea coast, but the government is presently enlarging the phosphate factory in Al-Quseir (as was mentioned in Chapter Two) (Figure 3.21 a &b).

4.2 Oil, Mining and Gas Industries

All phases of oil and gas production , extraction, transport and refining can cause serious environmental impact on coastal ecosystems. Moreover, hazards to marine and shore life can be expected to increase as technological improvements permit oil extraction to take place at greater depths. The major potential environmental disturbances in the extraction and processing of oil and gas, in general, are:[54]

1) Pollution by oil spills from blowouts, pipeline ruptures and transport accidents.
2) Pre-emption or destruction of vital habitat areas and energy flows.
3) General disruption of the coastal environment.

The majority of the exploration and production along the Egyptian Red Sea coast is off-shore. Apart from the direct effects of spills and routine refinery effluent and oil rig discharges, oil developments can produce environmental stress during the construction and operation phases, notably around off-shore platforms and shore terminals.

[54]ibid., p. 437

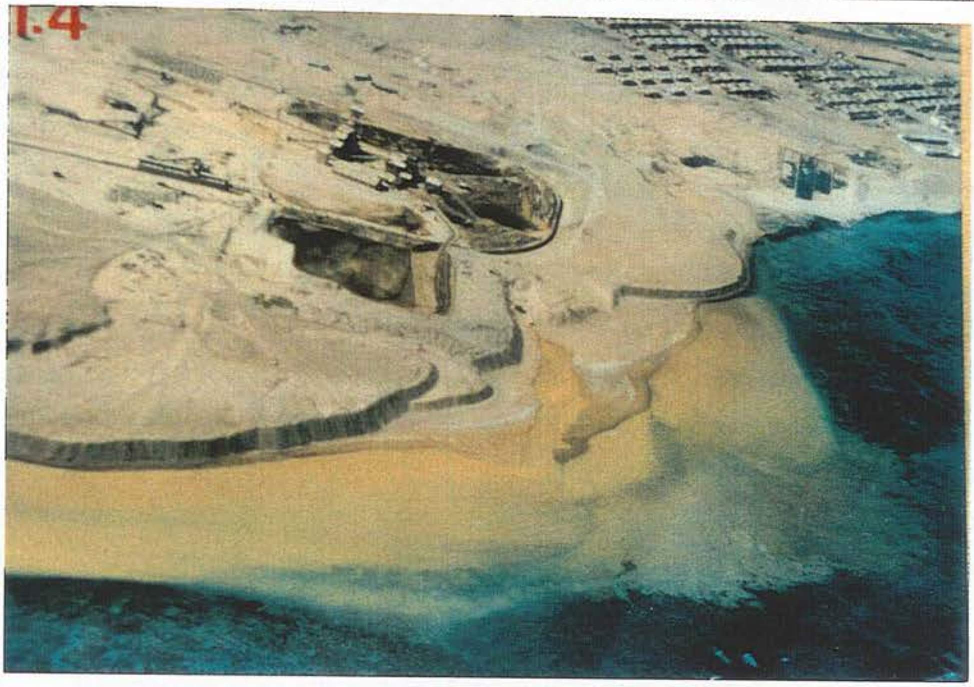

Figure 3.21 a: Pollution resulting from 'Phosphate Industry' near the city of Al-Quseir. 1991 (After T.D.A)

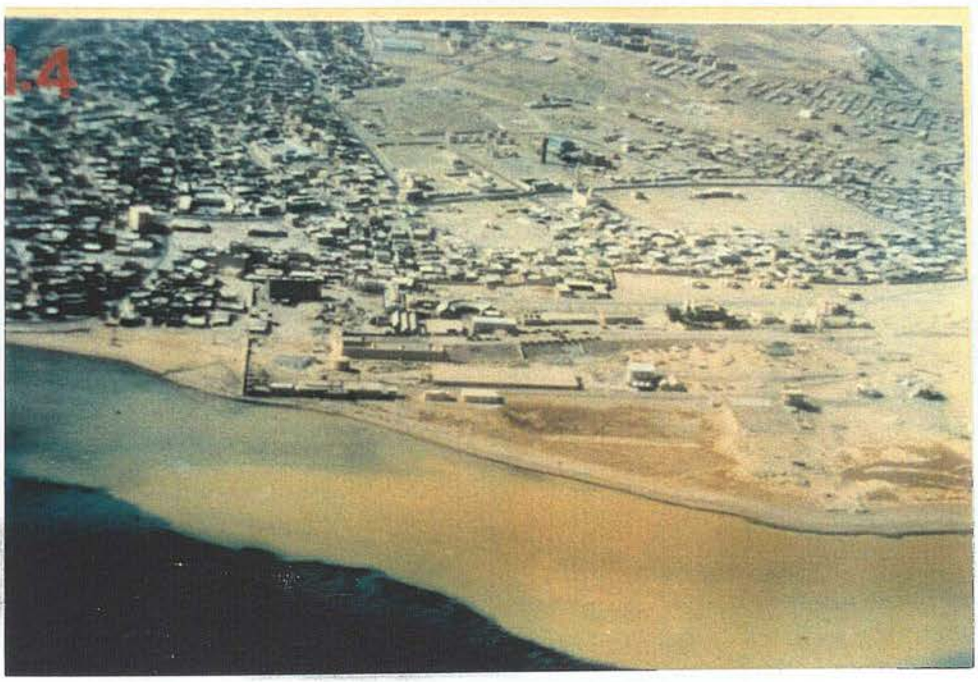

Figure 3.21 b: Pollution resulting from the phosphate industry is even destroying the coasts of the city. 1991 (After T.D.A)

These may result from a combination of oil discharge, sediment disturbance during construction of platforms, pipelines and jetties, coastal blasting and dredging, an artificial reef effect from marine fouling communities on structures, discharges of drill muds and rock cuttings, discharges of process and anti-corrosion chemicals and of sewage and garbage. The drilling of oil wells results in the production of sediments as rock cuttings, the volume of which depends on the diameter of the hole drilled. The cuttings are normally discharged to the sea immediately around the platforms. Fluids known as drilling muds are used during drilling to lubricate the drill bit and counteract formation pressures. These muds are usually oil (diesel, kerosene) or water based and contain a wide variety of additives which control lubrication and density properties. The muds are usually reclaimed, but a proportion -approx. 10%- is lost with the cuttings. A single off-shore platform may drill up to 40 or more wells and thus produce of the order 10,000 cubic metre of cuttings and lost mud, which would be deposited immediately around the platform and continuously distributed by water movements (Figure 3.22).

As will be discussed in Chapter Five, oil extraction was the most important development activity along the coast until recently when an agreement between the Ministries of Petroleum and Tourism was revealed to divide the whole coast between them.

Figure 3.22: The oil extraction 0ff-shore platforms, located to the north of Hurghada. The extraction in this area in particular is very near to the shore line. (8/1993)

4.3 Tourism

People want to live and play in the coastal zone because of its many natural amenities, yet the very presence of high density human populations threatens these attractions. Tourism is an integral development process, which is associated with many factors that might have a very adverse impact on the ecosystems and the environment in general (Figure 3.23), and which are then prime attractions for tourism. In every step in a tourist resort life cycle there are activities which have impacts on the environment. Some of these activities are as follows:

a) Dredging and filling; Dredging is the excavation of bottom material, while filling is the deposition of materials onto the bottom, for creating real estate or for deposition of by products produced during dredging. These are construction techniques used widely in coastal zones. The primary incentives to dredge and fill are financial, to create new real estate. Although the economic gain from such a process may be quite large, especially in relation to the investment, they also benefit a small segment of the population.[55] Dredge and fill activities can adversely affect the coastal ecosystems in various ways, such as: creation of long and short term changes in water currents, circulation, mixing, flushing, additional water salinity, turbidity, siltation, lowering the dissolved oxygen, and direct displacement of habitats. This activity is mainly the 'coastal ecosystems' enemy number one' as they produce all types of harmful effects upon the ecological carrying capacity. For example, the siltation it causes creates a number of environmental impacts, as it physically smothers the bottom-dwelling plants and animals; while suspended it can actually smother fish by clogging their gill structures. The fish and other mobile organisms not killed are usually driven from the area. The behaviour of remaining organisms can be severely modified. High turbidity reduces vision and can mask odours, both important to the survival of many fish. By increasing turbidity, the silt, which is suspended during dredge and fill operations or subsequently resuspended by water currents, decreases light penetration into the water. This in turn reduces photosynthesis and results in decreasing the productivity and lowering dissolved oxygen content.

The conditions that result from the dredge and fill activities create other long-term problems beyond the immediate direct impact. Under normal conditions, marine grasses and tidal marshes provide a number of benefits in addition to their enormous contribution to productive habitat. In addition to stabilization and binding the soil, this

[55]ibid., p. 611

vegetation provides a natural filtration system that removes silt, debris and serves to maintain water quality. This filtration process is dependent on the slow flow and extended contact of the water mass with the vegetation. The destruction of marshes, mangroves and sea grasses by dredge and fill results in the loss of these natural purifying systems. Once the vegetation is destroyed, conditions in broad areas of the coastal zone become unstable.

b) Discharge of sewage; Sewage is any waste material carried by sewers. As the capacity of the tourist resort increases, the amount of sewage increases. The accumulation of these wastes presents a real threat to the coastal ecosystems if they are not properly collected, treated and disposed of. Five major pollution problems from inadequately treated human wastes are:

1) Hazard to human health from pathogens in coastal water and shell fish.
2) Aesthetic offense.
3) Oxygen reduction of coastal waters from biological oxygen demand loading.
4) Eutrophication of coastal waters from release of dissolved nitrates.
5) Poisoning of coastal waters by pesticides, heavy metals and other toxins.

c) Construction of marinas and small boat harbors; The construction of marinas and small boat harbors is one of the most dominant features of coastal resorts all over the world. In summary, according to J. Clark, the results associated with the construction of marinas and even small boats ecologically may be:[56]

1) The continuing influence of bank and shore-protective devices on fresh water stream flow and coastal water pattern.
2) The release of pollutants, such as oil and gas from marina supply sources and operating boats.
3) Water turbulence and sediments suspension by boat traffic.
4) The disruption of the long shore movement beach sand replenishment.
5) The deposit of silt and sand on the bottom areas and submerged vegetation and shellfish.
6) The stimulation of eutrophic conditions due to inadequate flushing combined with over-enrichment by marina based nutrient contaminants.
7) Erosion scouring along the outer rim of bulkheads, jetties or breakwater structures.

[56] ibid., p. 407

8) Reduction in dissolved oxygen caused by fouling communities on the under surface of floats, on wooden pilings and on boat bottoms.

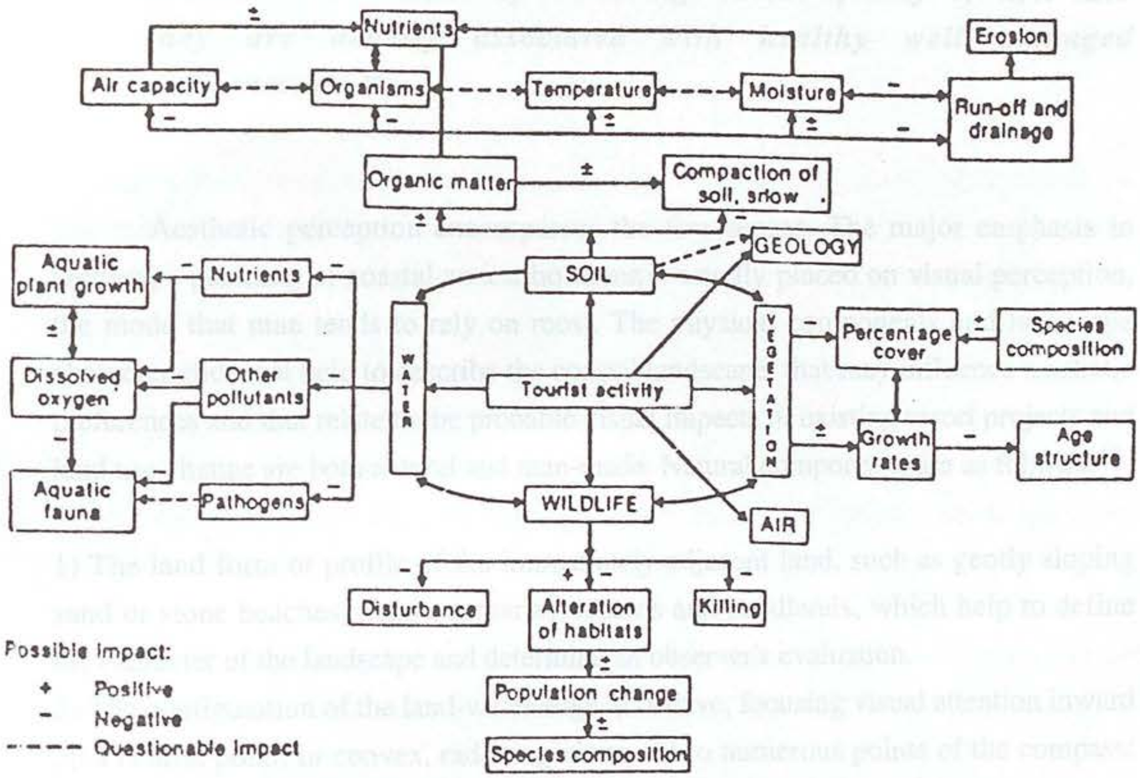

Figure 3.23: Tourism and the environment interrelationship impact. (After A. Al-Halafawy)

9) The toxicity associated with motor exhausts.

10) Concentrations of toxic copper in marina area water from boat anti-fouling paint.

11) The reduction of wildlife and waterfowl due to increased noise and human activity.

12) Turbidity and possible release of heavy metals and pesticides during dredging and subsequent maintenance.

d) Aesthetic values; According to Ervin H. Zube, the aesthetic values can be defined as:[57]

> ***" Those that enhance one's sensory satisfaction- that contribute to one's derivation of pleasure from the environment. They contribute to a sense of well-being- to the quality of life. And they are usually associated with healthy well managed environments."***

Aesthetic perception encompasses the five senses. The major emphasis in landscape planning of coastal zones, however,is usually placed on visual perception, the mode that man tends to rely on most. The physical components and landscape characteristics that help to describe the coastal landscape, that may influence aesthetic preferences and that relate to the probable visual impacts of existing resort projects and land use change are both natural and man-made. Natural components are as follows:[58]

1) The land form or profile of the immediately adjacent land, such as gently sloping sand or stone beaches, dunes, estuaries, islands and headlands, which help to define the character of the landscape and determine an observer's evaluation.
2) The configuration of the land-water edge, (concave, focusing visual attention inward on a central point; or convex, radiating views out to numerous points of the compass; or straight and linear.)
3) The vegetative cover; sparse/low vegetation, affording uninterrupted views in all directions, progressing to dense, high vegetation that screens and/ or buffers both vision and sound.
4) The quality of water; movement, rate, breadth, sound, colour and odour.
5) The existence of dramatic, rare, or unique natural features such as high rocky cliffs or island wildlife habitat.

Man-made components are:

1) The character and image of the landscape, in terms of highly intensive uses of the land, including large structures.

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[57]E. Zube, "Aesthetics and Perceived Values", in *Ibid.* , p. 557
[58]ibid., p. 559

2) The extent of man's activities on the coastal landscape and the resulting transformation of its enhancing, limiting or denying visual and physical access to the shoreline.
3) The existence of dramatic, rare or unique man-made artifacts and cultural features individually and collectively, such as light houses, promenades and parks.

Ervin H. Zube concludes that the probability of aesthetic impact either positive or negative, is highest when:

1) The development is located in an exposed position- a location not screened by topography and vegetation, an area visible to large numbers of people, and an area visible from both land and water, as exemplified by a location on a ridge line or shoreline.
2) The scale of the development dominates the existing environment.
3) The form of the development is in strong contrast with existing forms.
4) The character of the environment changes; for example becoming more man made.
5) The development intrudes on or destroys a dramatic, rare or unique natural feature or cultural artifact.

Before going on to consider the nature of tourism in the following chapter, a short note here on the concept of recreational carrying capacity is pertinent.

5. The Recreational Carrying Capacity of Resort Areas

Recreational carrying capacity is the maximum population size which an environment is capable of sustaining without an unacceptable degree of deterioration of the character and quality of the resource or of the recreation experience. Four separate types of carrying capacity; physical, economic, social and ecological may be distinguished. Physical carrying capacity is concerned with the maximum number of people (or activities, cars, boats...etc.) which can be accommodated or handled by a site. Economic carrying capacity relates to situations of multiple use of resources where recreation is combined with some other enterprise. Economic compatibility might be a better description because the term is concerned with getting the right mix of resource uses so that recreation does not reach a point at which interference with the non recreational activity becomes economically unacceptable from the management point of view. Social carrying capacity relates to the visitor's perception of the absence or presence of others at the same time, and the effect of crowding on their enjoyment and appreciation of the site. It may be defined as the maximum level of recreational use, in terms of numbers and activities, above which there is a decline in the quality of the recreation experience from the point of view of the recreation participant.[59]

Last of the four is the ecological carrying capacity, as mentioned earlier in this chapter, is concerned with the maximum level of recreational use, in terms of numbers and activities, that can be accommodated by an area ecosystem before an unacceptable or irreversible decline occurs. The concept has been the subject of controversy especially regarding the subjective judgment of what is unacceptable or irreversible decline. Any use of an ecosystem will result in some change and over-restrictive management could negate the recreation resource function altogether. It may be argued that an area's ecological capacity is reached when further recreational use will have an impact on the site beyond its ability to restore itself by natural means. Such point of view ignores the essential plasticity of the carrying capacity concept and scope for, and even the presumption of sound management practices to stretch carrying capacity beyond so called natural limits. Any estimate of ecological carrying capacity must take account of the nature of plant and animal communities upon which the recreation activity impinges, the nature of recreation activity and its distribution in space and time. According to Pigram 1983, the concept may be hypothetical in terms of managerial usefulness.

5.1 Procedure of Estimating the Recreational Carrying Capacity

In any analysis of recreational carrying capacity, it must be recognised that even extensive research in a particular environment will not explicitly determine the absolute carrying capacity for that area, because the environment is dynamic and varied; man, by his very presence, modifies his environment and man's attitudes and perceptions are constantly changing.[60]

Nevertheless, an assessment of the recreational activities pursued in an area, in terms of the spatial requirements of the activity, the resilience of the ecosystem to different kinds and levels of use, and the attitudes of recreationists to different levels of crowding will indicate the range of capabilities of the environment for recreation and related human activities. In order to reach an appropriate level of recreational use for the

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[59]J. Pigram, *Outdoor Recreation and the Environment,* p. 71

[60]Merler. Sowman, " A procedure for assessing recreational carrying capacity of coastal resort areas", *Landscape and Urban Planning,* 14 (1987), Elsevier science publications, Amsterdam, p. 331

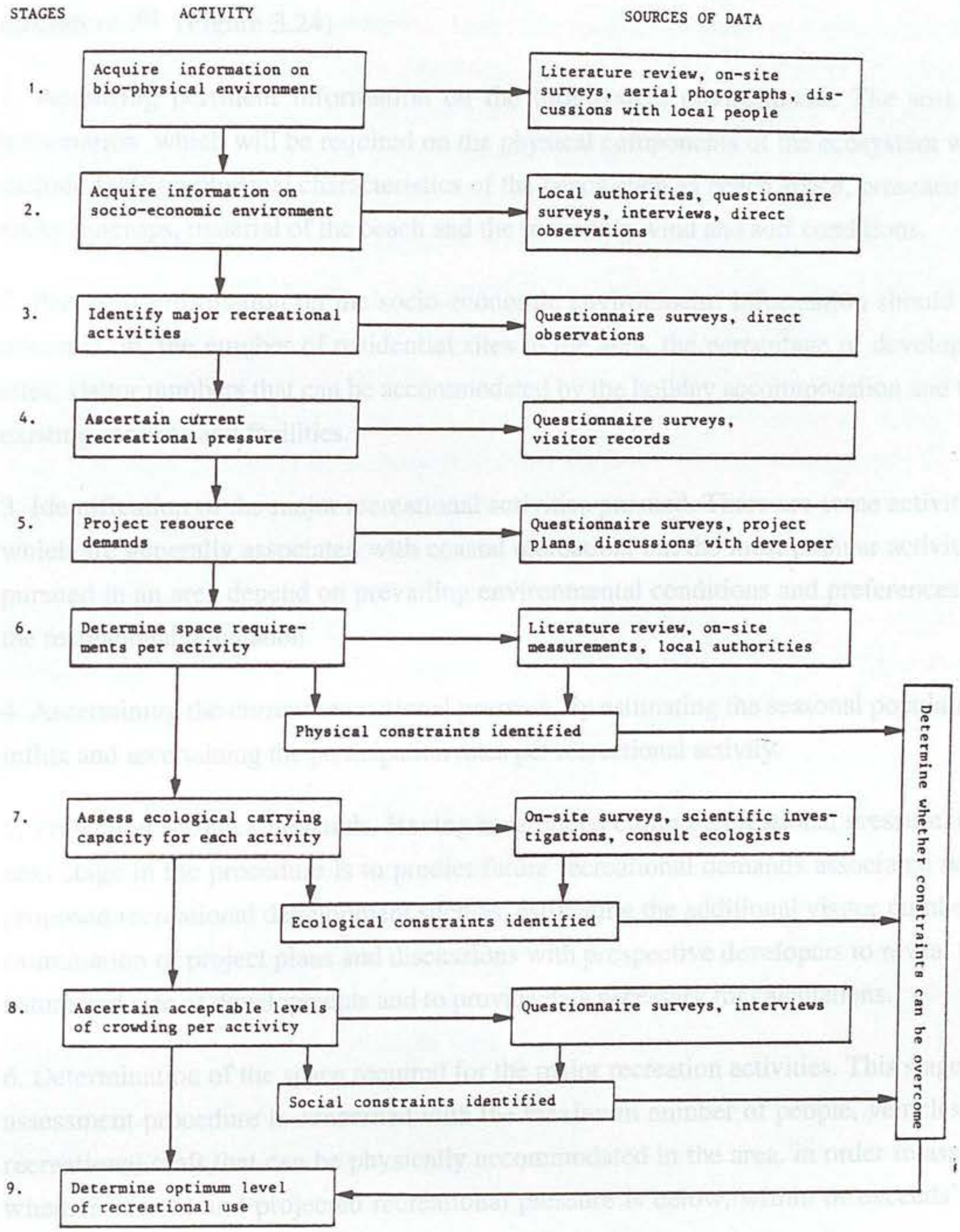

Figure 3.24: Sowman procedure for assessing recreational carrying capacity. (After Sowman)

area, while maintaining an ecological balance, Sowman proposed the following procedure :[61] (Figure 3.24)

1. Acquiring pertinent information on the biophysical environment. The sort of information which will be required on the physical components of the ecosystem will include facts on physical characteristics of the beach such as beach space, presence of rocky outcrops, material of the beach and the prevailing wind and surf conditions.

2. Pertinent information on the socio-economic environment. Information should be obtained on, the number of residential sites in the area, the percentage of developed sites, visitor numbers that can be accommodated by the holiday accommodation and the existing services and facilities.

3. Identification of the major recreational activities pursued. There are some activities which are generally associated with coastal recreation, but the most popular activities pursued in an area depend on prevailing environmental conditions and preferences of the recreational population.

4. Ascertaining the current recreational pressure, by estimating the seasonal population influx and ascertaining the participation rates per recreational activity.

5. Projecting resource demands. Having ascertained current recreational pressure, the next stage in the procedure is to predict future recreational demands associated with proposed recreational development such as, estimating the additional visitor numbers, examination of project plans and discussions with prospective developers to reveal the nature and size of developments and to provide data necessary for calculations.

6. Determination of the space required for the major recreation activities. This stage of assessment procedure is concerned with the maximum number of people, vehicles or recreational craft that can be physically accommodated in the area, in order to assess whether current and projected recreational pressure is below, within or exceeds the physical carrying capacity of the area.

7. While it is possible to recognise an ecologically degraded environment by assessing the ecological carrying capacity, the difficulty lies in predicting what level of recreational use or resource exploitation will lead to unacceptable ecological decline.

[61] ibid., p. 336

However, by definition, assessment of ecological carrying capacity requires that ecological thresholds be recognised. Once the ecological carrying capacity for the different recreational activities has been assessed, major ecological constraints associated with increased recreational pressure will become apparent. Ideally, strict ecological reserves (an important sub category in the conservation district) should be protected fully from any consumptive use. These areas should be managed as part of the natural heritage, that is, as parks or smaller reserves for the preservation of the ecosystems. It should be the aim to establish ecological reserves for all the major ecosystems of the larger area under development. Therefore, as much as possible, a complete spectrum of ecosystem examples should be left unconverted to other uses. In certain situations it may be possible to overcome ecological constraints by restricting access, by limiting use or by activity zoning. In some recreational settings, ecological constraints may impose severe limitations for further recreational development and may result in the rejection of the development application.

8. Ascertaining the acceptable levels of crowding for each activity, the aim is to ascertain the level of crowding that will be acceptable to the majority of re creationists. As each standard of tourist activity (1, 2, 3, 4, 5 stars) is associated with a certain limit of crowding.

9. Determination of the optimum level of recreational use, having systematically evaluated all the recreational activities pursued in the area, identified major physical, ecological and social constraints associated with increased recreational pressure, and considered the feasibility of overcoming these constraints, the final stage in the assessment procedure is to determine the optimum level of recreational use which will not exceed the carrying capacity of the area.

According to Sowman[62] , this procedure has been successfully employed in a study undertaken to assess the carrying capacity of the Kromme River Estuary for recreation craft. By following this procedure, it was possible to make predictions about future boating pressure associated with expanding recreational facilities and thus indicate whether the carrying capacity of the estuary would be exceeded or not at this increased level of usage. However, the procedure has some weaknesses, such as extrapolating recreation statistics (stage 3 & 4) and basing decisions on value judgments (stage 8). But still this procedure may act as a guide framework in practical decision-

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[62]ibid., p.342

making process. Additional steps may be inserted, activities may be modified according to the needs of each case, and alternate sources of data may be available.

6. Concluding Discussion

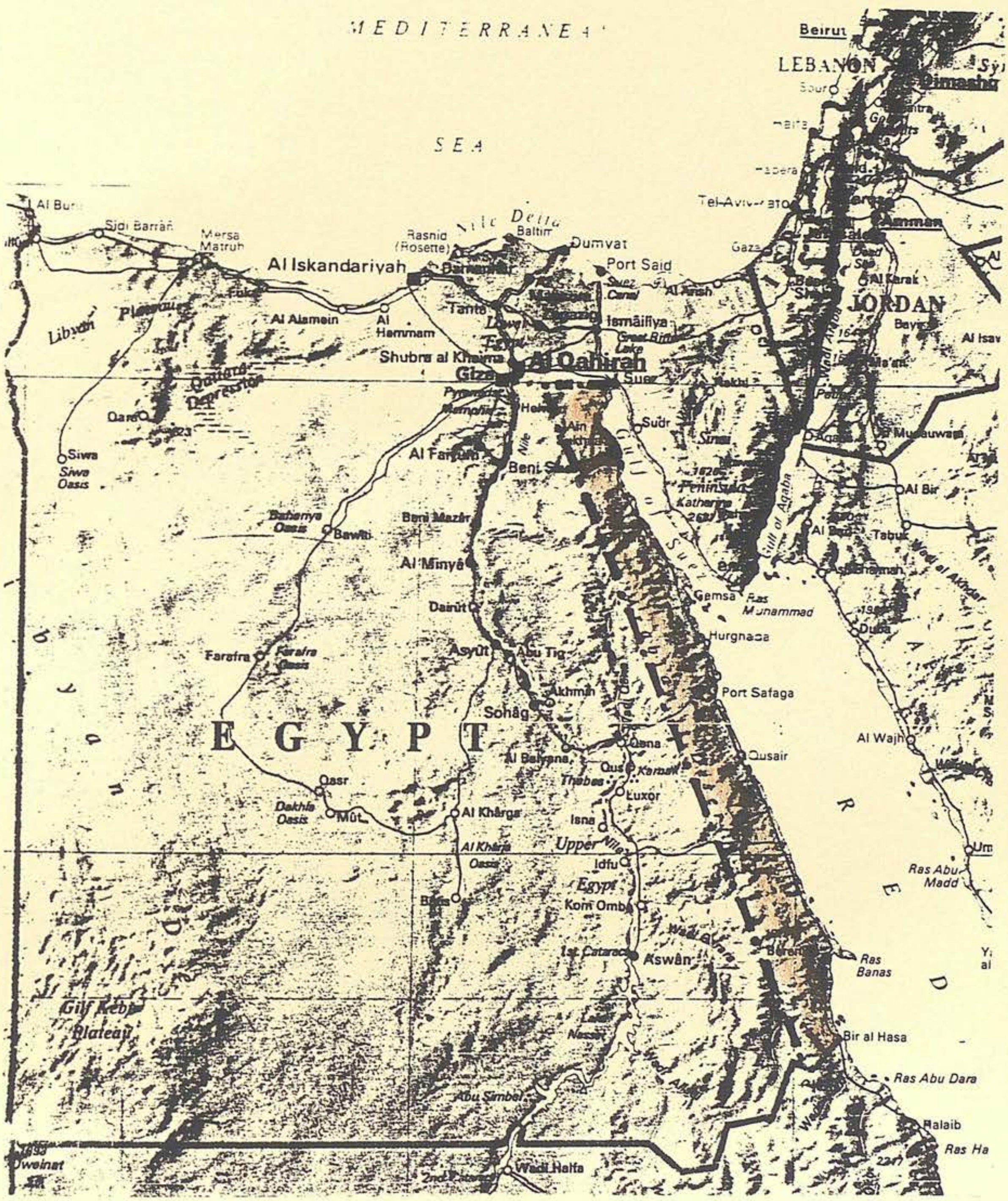
The aim of this chapter has been to give an outline of the environmental characteristics of the Red Sea Coast and of the extent to which they may be affected by human activities. From the previous discussion we may observe the following:

The Egyptian definition of the coastal zone is primitive compared to other countries. There is a great need for a refinement of the terms of this definition, so that the inventories of its physical, floristic and faunal characteristics may be precisely located in providing an accurate base for coastal zone planning.

Coastal ecosystems serve a number of important natural functions and typically also are used by human beings for a variety of activities and services, which could easily have adverse impacts on the well-being of such ecosystems. For example, dredge and fill activities result in transformation of water circulation and oceanography, turbidity and sedimentation damage and the loss of neighboring habitat leading to the exclusion of salt marshes, sea grass beds, mangroves and coral reef. Sewage disposal has various harmful impacts, as it may lead to lowering the dissolved oxygen concentration and the introduction of pathogens and other harmful microbes to marine life as well as human beings, causing great damage to ecosystems.

Today, existing activities along the Egyptian Red Sea coast are causing environmental damage to its surroundings. Phosphate extraction, creating many environmental hazards in the area of south Al-Quseir city, in the form of water sedimentation affecting most of the coastal ecosystems. Oil mining is mainly off shore in the Egyptian Red Sea, but it has some adverse impacts on the coastal environment. In the construction and operation stages of the off-shore platforms oil discharge, sedimentation coastal puffing and dredging may all exists. As for tourism in the form of coastal recreation, its impacts on the coastal environment are various. In each stage of tourism development, there is a direct or an indirect negative impact on the environment. In general during construction, habitat destruction may easily occur, either by dredging and filling or building structures on vital habitat areas. Discharge of sewage and the construction of marinas and small boats harbors are activities which always follow tourism and are destructive of coastal ecosystems.

Compared to tourism development, the rate of oil mining and phosphate extraction is very static. Tourism is invading the Egyptian Red Sea coast with a speed and in forms that the coast may be unable to bear. Chapter Four, will discuss tourism as an activity, highlighting its importance to the Egyptian economy in order to understand the rapidity of its development on the Red Sea coast. Chapter Five, will focus on the worldwide coastal management process by comparing and evaluating it in relation to the existing situation on the Egyptian Red Sea coast.



CHAPTER FOUR

CHAPTER FOUR

TOURISM; THE PROCESS AND ITS APPLICATION IN EGYPT

"Tourist development, of course, does not give rise solely to negative (environmental) impact. Much development, for the tourist at least, may enhance his appreciation of the environment..........More generally, tourism may be the means of preserving areas of scenic beauty or centres of historical interest by providing an economic or social rationale to reinforce purely environmental or historical considerations. Such considerations in the past have proved insufficient by themselves."[1]

This chapter gives an overall view of the meaning and values of tourism. It defines tourism, and the factors that it deals with. Furthermore, because tourism is regarded as international trade, the study of demand and supply is of real importance for achieving a complete understanding. Tourism is considered one of the main stays of Egyptian development, so its impacts economically, culturally and environmentally are of great concern. For purposes of later discussion, the second part of this chapter will deal with relevant aspects of tourism in developing countries.

The third part, is a descriptive study of the importance of tourism in Egypt, the potentials of the country in the field of tourism, the governmental strategies for tourism, their aims and objectives. In general, the division of Egypt into tourist regions will be discussed, their properties and potentials, focusing on the Red Sea region in particular. The aim of this chapter is to provide the reader with the whole image of tourism in Egypt, and to place that of the Red Sea in context.

[1]Douglas G. Pearce, *Tourist Development*, Longman, 1981, p.50

1. Definition Of Tourism:

Tourism is a human activity which is concerned essentially with recreation and mobility. It denotes firstly, the temporary, short-term movement of people to destinations outside the places where they normally live and work and subsequently their activities while at these destinations.[2] Much of this movement is international in character and much of it is also leisure. Tourism is a typical expression of modern life, one of the by products of industrialisation, the increase in leisure time and in the leisure industry, and which with increasing success has turned "non work" into a profitable business. Between 1970 and 1990 tourism increased in gross visitor numbers on a world scale by a factor of three. It is expected to grow by half again before the end of this century. Tourism is the largest of all employers, employing some 112 million people worldwide.[3] In 1992 the W. T. O (World Tourism Organisation) reported that world receipts from an estimated 450 million international tourist arrivals amounted to $ 278 billion, and forecast an increase in the number of arrivals by 1995 to 515 million with $ 343 million receipts (Table 4.1). By all accounts tourism is set to become the world's biggest industry.

	FORECASTS		SHARE OF WORLD TOTAL	
	1995	2000	1995	2000
WORLD				
ARRIVALS (MN)	515	637	100	100
RECEIPTS ($BN)	343	527	100	100
AFRICA				
ARRIVALS (MN)	23	32	4.4	5.0
RECEIPTS ($BN)	10	14	2.9	2.7
AMERICAS				
ARRIVALS (MN)	103	128	20.1	20.1
RECEIPTS ($BN)	95	146	26.9	27.8
EUROPE				
ARRIVALS (MN)	294	338	57.2	53.0
RECEIPTS ($BN)	152	206	43.0	39.0
ASIA/OCEANIA				
ARRIVALS (MN)	95	140	18.4	21.9
RECEIPTS ($BN)	86	161	24.4	30.5

Source : World Tourism Organization (WTO)

Table 4.1: International Tourism Forecasts and Shares by Region. (1995-2000)(After WTO)

2 Burkart, A. J , *Tourism,* William Heirnmann Ltd., 1981 p 12

3 World Tourism Organisation, *Year Book of Tourism Statistics*, 1992

Gasbare (1977) [4] distinguished the two most important components of tourism as the travelling to and from (dynamic component) and the staying (the static component).

Today Tourism has become an important factor in world trade and a major element in the international economy. Tourism generates wealth and employment, it makes use of resources that might not be used otherwise, in particular the unemployed labor in developing countries with few or no alternative sources of employment, as well as helping in redistributing wealth. Too often Tourism has been defined only in terms of travel or mobility. It is in fact part of a major landscape industry. It is completely involved with the environment in its widest scene, unlike many other recreational activities which require an environmental response but with a main emphasis on an activity rather than a setting. An Italian economist recently went as far as to define tourism as an industrial process which transforms a raw material, namely natural resources into a final tourist consumer product and by a series of costly transformations.[5] Tourism has by such definition therefore not only economic significance but also, social, cultural and environmental impacts. It is essentially and typically based on a journey to and from a special destination, outside the normal place of residence and usually for a relatively short period of time.

1.1 Tourism and its Operation

In order to have a complete understanding of tourist development, we should first describe its mechanism as being one which responds to the supply and demand of a market (Figure 4.1).

Demand, may be prompted by physical attractions, climate, low cost travel, goods services, political stability, cheap accommodation, cultural and historical attractions. It may also be affected by; incidence of terrorism, natural hazards, high crime rate, unstable economy, unpopular government or regime, over exploited and over commercialized locations and bad publicity.

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[4] ibid., p.13

[5] Francesco Ferario, *The Tourist Landscape: a method of evaluating tourist potentials,* Univ. of California, 1977.p. 45

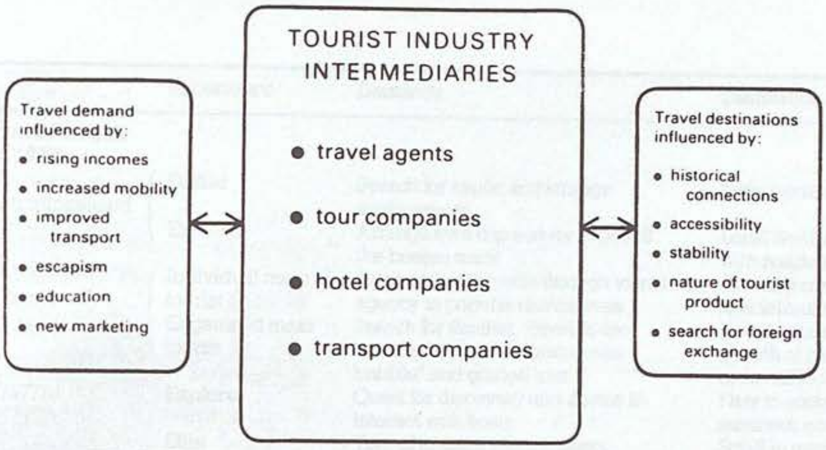

Figure 4.1: Primary elements of the international tourism industry. (After Cohen)

Supply : is concerned mainly with the services and facilities required to meet the user's demands that is; accommodation, transportation and servicing in all its aspects.

There are some detailed factors that affect tourism demand and supply. Al-Halafawy had summarised these factors as;[6] firstly, the quantity and quality of natural resources, cultural resources, financial backing public and private, the availability of efficient labor to perform the high performance that tourism services require, social attitudes towards tourism and lastly, laws and legislations and their application and power in supporting or hindering development.

1.2 Definition of Tourists and their Classification

A Tourist may be defined as a transient visitor to a place. There have been several methods used to classify the typology of tourists; the well known ones are the classifications of Cohen, Smith and Plog. They have grouped them into two general categories: interactional types and cognitive-normatives (Table 4.2).[7]

Cohen (1972) classified tourists according to the degree they seek familiar or strange settings and whether or not they were willing to be organised in their travel.

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6 Al-Halafawy, A, *Sea Side Resorts Life Cycle*, Ph.D. Thesis , Cairo University. 1991, p. 18

7 Murphy, Peter, *Tourism, A Community Approach*, Methuen Inc., 1986, p.24

	Experience	Demands	Destination impacts
Interactional models			
Cohen (1972):			
Non-institutionalized traveler	Drifter	Search for exotic and strange environment	Little because of small numbers
	Explorer	Arrange own trip and try to get off the beaten track	Local facilities sufficient and contact with residents high
Institutionalized traveler	Individual mass tourist	Arrangements made through tourist agency to popular destinations	Growing commercialization and specialization as demand grows
	Organized mass tourist	Search for familiar, travel in the security of own "environmental bubble" and guided tour	Development of "artificial" facilities, growth of foreign investment, reduced local control
Smith (1977b):	Explorer	Quest for discovery and desire to interact with hosts	Easy to accommodate in terms of numbers, acceptance of local norms
	Elite	Tour of unusual places, using pre-arranged native facilities	Small in number and easily adapted into surrounding environments
	Off-beat	Get away from the crowds	Minor because willing to put up with simple accommodation and service
	Unusual	Occasional side trips to explore more isolated area or undertake more risky activity	Temporary destinations can be simple but support base needs to have full range of services
	Incipient mass	Travel as individuals or small groups; seeking combination of amenities and authenticity	Numbers increasing as destination becomes popular; growing demand for services and facilities
	Mass	Middle-class income and values leads to development of a "tourist bubble"	Tourism now a major industry, little interaction with local people beyond commercial links
	Charter	Search for relaxation and good times in a new but familiar environment	Massive arrivals; to avoid complaints hotels and facilities standardized to western tastes
Cognitive–normative models			
Plog (1972):	Allocentric	Adventuresome and individual exploration	Small in number, board with local residents
	Mid-centric	Individual travel to areas with facilities and growing reputation	Increased commercialization of visitor–host relationship
	Psychocentric	Organized package holiday to "popular" destinations	Large-scale business, with facilities similar to visitors' home area
Cohen (1979a): Modern pilgrimage	Existential	Leave world of everyday life and practicality to escape to "elective center" for spiritual sustenance	Few participants who are absorbed into community, little impact on local life
	Experimental	Quest for alternative lifestyle and to engage in authentic life of others	Assimilated into destination areas because of small numbers and desires
	Experiential	Look for meaning in life of others, enjoyment of authenticity	Some impact as destination provides accommodation and facilities to "show" local culture
Search for pleasure	Diversionary	Escape from boredom and routine of everyday existence; therapy which makes alienation endurable	Mass tourism with large demand for recreation and leisure facilities; large impact because of numbers and commercialization
	Recreational	Trip as entertainment, relaxation to restore physical and mental powers	Artificial pleasure environment created; major impact on local lifestyles

Table 4.2: The grouping of tourist typologies into two general categories. (After Murphy 1986)

Smith's (1977), more detailed breakdown incorporates recent market developments such as the social implications of a highly structured charter business.

Smith like Cohen, views explorers and elite travelers as having little impact upon indigenous cultures. Their small number requires little in the way of special accommodation, and their desire to gain insight into local customs is aided by a sympathetic attitude to the local way of life. In contrast the charter tourists travel in their own environmental bubble, viewing everything from the security of their pre-paid and price guaranteed packaged tour. To accommodate the large numbers and organisational structure of charters a community must become commercial in its dealing with tourists, and often needs to import foreign capital and expertise.

Cognitive normatives, (if one must adopt such appalling academic sociological jargon) fall into two groups: those who follow centric mass market values and those who prefer to be more independent and allocentric, (Plog 1972).

Plog suggests that tourist destinations are attractive to different types of visitors as they evolve from untouched discoveries to popular resorts. A community can enter the tourism business with the arrival of a small number of adventurous allocentrics, but their impact would be small because no special facilities would be desired or required for this type of traveller. As the area becomes more accessible, better serviced and more widely known an increasing number of mid-centrics would visit. They in turn give way to large numbers of centrics as the destination becomes popular and the resort dependent on foreign investment and labor. The new visitors are made to feel at home, with a full range of facilities and attractions that may now be divorced from the things which first attracted the allocentrics.

Cohen elaborates on this theme making further reference to people's spiritual centre, whether religious or cultural- the centre which for the individual symbolises ultimate meanings. Those traveling on vacation believe there is some experience available elsewhere which cannot be found at home and which makes travel worthwhile. The spiritual centre of this quest may be purely hedonistic, such as in the case of diversionary and recreational travel, or it may be a new type of pilgrimage, with travelers seeking answers through experiential, experimental or existing forms of travel. Cohen notes that these three levels of tourism represent different depth of meaning for the individual, but unlike traditional pilgrimages they involve movement away from the centre of the tourist's culture towards an "elective centre", which he has chosen or converted to.

The accurate identification of types of tourist is essential in planning for tourism. In Egypt, most of the previously mentioned tourist types exist, but in the Red Sea in particular, the mass tourist, the charter, and the explorer, are the commonest types of tourists.

2. Tourism Impacts on Developing Countries

Tourism accounts for more than 6% of international world trade. The most rapid growth of this industry in recent few years has been in the developing countries (Figure 4.2). As it is an invisible export, with the unique property that the purchasers of its product have to travel to a foreign destination, in person, to consume them, tourism results in a complex series of economic, environmental and social impacts on the host country. There is perhaps no other international industrial activity that involves such critical interplay among economic, political, environmental and social elements as tourism. Assessing these costs and benefits in developing countries is complicated by difficulties in measurement and lack of local control over the industry.[8]

2.1 Tourism Impacts on the Economy

In both developed and developing countries government authorities have identified tourism as a means of generating employment and income in vulnerable economies. For example in Gambia, in West Africa, the government has placed tourism as a major component of their economic strategy; whilst within North America and Europe, tourism has been perceived as an important means of urban renewal in decaying waterfronts and inner city areas. In developed countries such as, the UK, the English Tourist Board in 1987 published its planning document 'Vision of England'. Under these plans, a public sector investment of £ 570 million was planned to develop a total investment of £ 4 billion by 1992, with an additional 250,000 jobs to be created.[9] The main economic significance of tourism, namely that money earned in places of normal residence is spent in places visited, is common to all kinds of tourism whether international or domestic. Each year large sums are transferred from the earning economies, to the receiving economies. (Figure 4.3)

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[8] Lea, J., Tourism *and development in the third world*, Roulledge, 1988 p. 26

[9] Chris Ryan, *Recreational Tourism, a social science perspective*, Routledge, 1991, p. 65

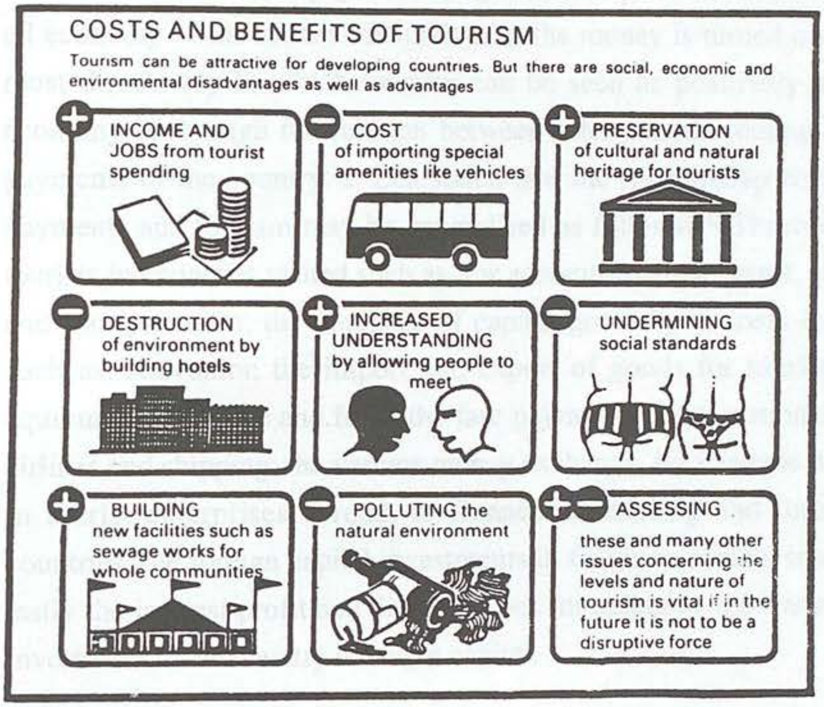

Figure 4.2: Costs and benefits of tourism to developing countries.(After UN Environmental Programme)

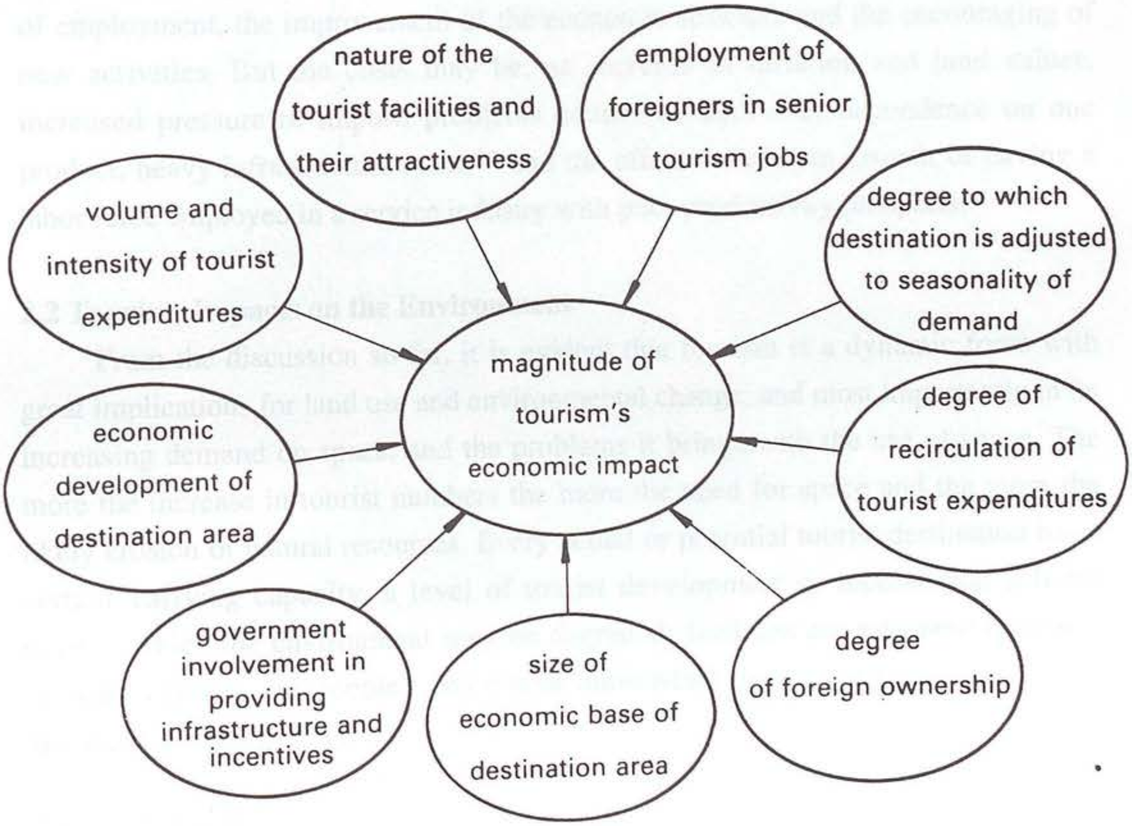

Figure 4.3: Factors governing tourism's economic impacts. (After Lea)

The flow of money generated by tourist expenditure finds its way into the over all economy of the tourist destination, as the money is turned over and re-spent. The most direct way in which tourism can be seen as positively acting on a nation's economy is through the relation between international tourism and the balance of payments of the country. J. Lea stated that the relationship between the balance of payments and tourism may be generalised as follows:[10] The current expenditure by tourists in countries visited such as, for accommodation, meals, shopping, local crafts and transportation; the purchase of capital goods by tourists in the country visited such as, souvenirs; the import and export of goods for tourism purposes such as equipment, furniture and food; the fare payments to international carriers principally airlines and shipping; the various money exchange, for example, by nationals working in tourist enterprises abroad, to finance advertising and tourist offices in other countries; the foreign capital investments in facilities, mainly in accommodation; and lastly the interest profit and dividends on; for example, the transmission of return on investment to the country of origin capital.

From the above relations according to Lea, we can deduce some of the benefits and costs of tourism on the economy. The benefits may be summarised as the contribution to foreign exchange earning and the balance of payments, the generation of employment, the improvement of the economic structure and the encouraging of new activities. But the costs may be: an increase in inflation and land values, increased pressure to import, problems connected with over dependence on one product, heavy infrastructure costs,[11] and the effect on tourism growth of having a labor force employed in a service industry with poor productivity prospects.

2.2 Tourism Impacts on the Environment

From the discussion so far, it is evident that tourism is a dynamic force with great implications for land use and environmental change, and most importantly in its increasing demand on space, and the problems it brings with the use of space. The more the increase in tourist numbers the more the need for space and the more the likely erosion of natural resources. Every actual or potential tourist destination has a certain 'carrying capacity, a level of tourist development or recreational activity beyond which the environment may be degraded; facilities are saturated (physical carrying capacity) or people's enjoyment diminished (social carrying capacity) as discussed in Chapter Three.

[10]ibid., J. .Lea, p. 28
[11] ibid., p. 28

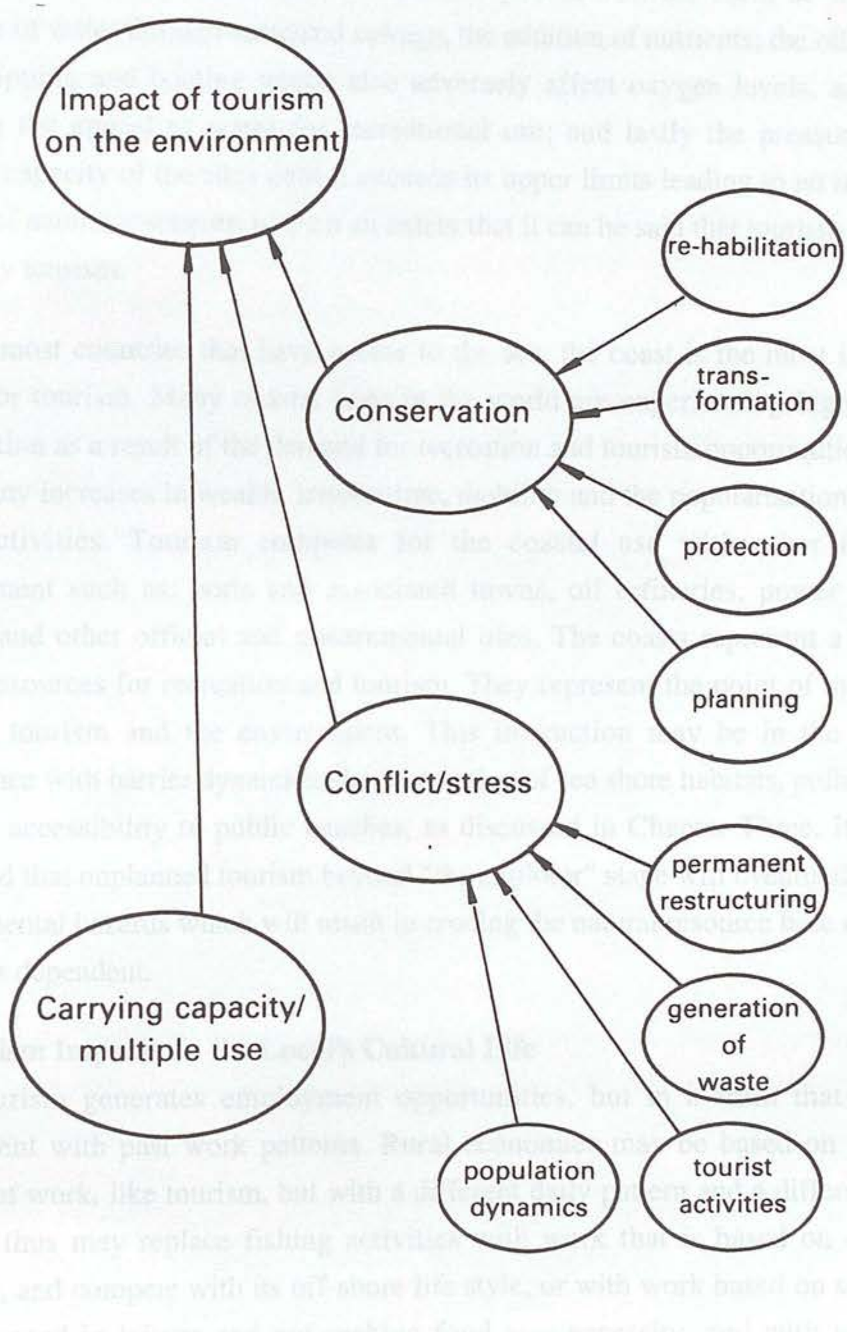

Figure 4.4: Tourism impacts on the environment. (After Burkart)

Some of the most recognised impacts of tourism on the environment are: (Figure 4.4) the removal of large quantities of land from its underdeveloped status as natural habitat; permanent environmental restructuring; this comes as a result of major construction activities like a resort complex or a high way; the harmful effect on the populations densities of biological species; the generation of waste products; the rapid increase in the amount of residual products in the form of waste; the pollution of water through untreated sewage, the addition of nutrients; the oil products from shipping and boating which also adversely affect oxygen levels, as well as reducing the appeal of water for recreational use; and lastly the pressure on the carrying capacity of the sites until it exceeds its upper limits leading to an increasing erosion of natural resources, to such an extent that it can be said that tourism threatens to destroy tourism.

In most countries that have access to the sea, the coast is the most important source for tourism. Many coastal lines in the world are experiencing high rates of urbanization as a result of the demand for recreation and tourism opportunities. These accompany increases in wealth, leisure time, mobility and the popularisation of water based activities. Tourism competes for the coastal use with other forms of development such as, ports and associated towns, oil refineries, power stations, defence and other official and governmental uses. The coasts represent a stock of natural resources for recreation and tourism. They represent the point of interaction between tourism and the environment. This interaction may be in the form of interference with barrier dynamics, the destruction of sea shore habitats, pollution and reducing accessibility to public beaches, as discussed in Chapter Three. It may be concluded that unplanned tourism beyond "the explorer" stage will eventually lead to environmental hazards which will result in eroding the natural resource base on which tourism is dependent.

2.3 Tourism Impacts on the Local's Cultural Life

Tourism generates employment opportunities, but in a form that may be inconsistent with past work patterns. Rural economies may be based on seasonal patterns of work, like tourism, but with a different daily pattern and a different pace. Tourism thus may replace fishing activities with work that is based on on-shore buildings, and compete with its off-shore life style, or with work based on service to those engaged in leisure and not seeking food as a necessity, and with work that continues into the late hours rather than that based on the rising and setting of the sun. It thus affects people's ability to maintain past patterns of life. In addition, the tourist may indulge in behaviour patterns that the host society may find shocking.[12]

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[12] op cit., Ryan, p.140

MacNaught listed the negative themes about the cultural impacts of tourism as follows:[13] Tourists do little or nothing to promote international understanding; the strains of hospitality eventually become intolerable; employment in the tourist industry is often dehumanising; tourists have undesirable 'demonstration effects' on residents; tourism debases local forms of cultural expansion and the tourist industry adversely affects community life (Figure 4.5).

C. Ryan, after Butler, rather pompously adopts a life cycle theory formed of five stages to describe the effects of tourism on the culture of a society, assuming that the society will be subject to a revitalisation process. [14]

The first stage is a so called Steady State; in which social and cultural forces exist in dynamic equilibrium whereby change does take place, but does so within the society, which retains its integrity and is able to handle any stress.

The second stage Ryan refers to as The Period of Increased Stress; the society has been put out of equilibrium due to some external event such as, rapid tourism development. The previous existing culture can no longer satisfy the needs of its members. The opportunities and demonstrations of tourism may create a process of conflict within individuals as they seek to reconcile the developing changes within a frame work of values that relate to a previous social and cultural setting.

Ryan's third stage is a Period of Cultural Distortion; is characterised by piecemeal attempts to restore equilibrium and so reduce stress, and the conflict between community members that is now being expressed. Special interest groups emerge, either seeking a restoration of previous ways, an establishment of new consensus, or some other form of adaptation. Generally however, such effects are initially ineffective.

Ryan's fourth stage is a Period of Revitalisation; which takes place with the realisation that the community's culture is maladaptive but for the society to be successful a number of changes must occur. From the processes of cultural distortion, there must arise a 'blue print' for a changed society, in order to reduce stress. The new 'blue print' acquires followers who both defend and enforce the new code.

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[13] MacNaught, T. J., "Mass tourism and the dilemmas of modernisation in Pacific Island communities", *Annals of Tourism Research*, 1982, Vol. 9, pp. 359-381
[14] op cit., Ryan, pp. 132-137

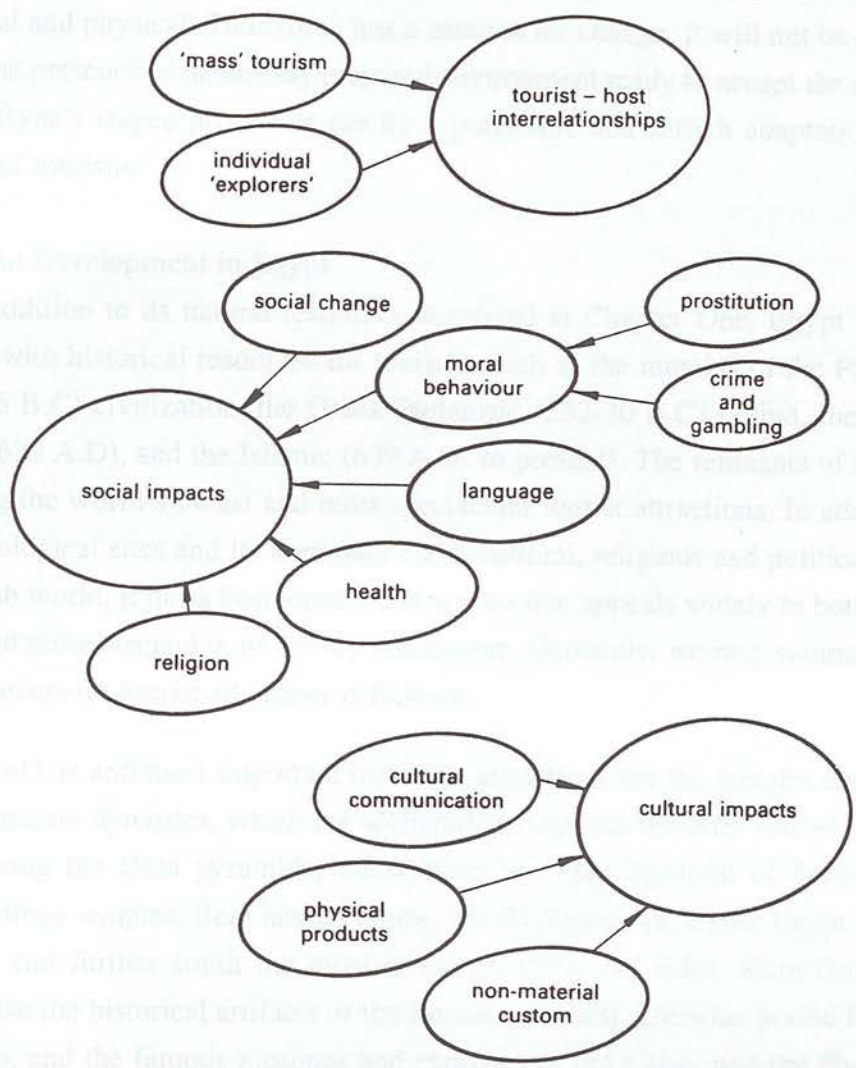

Figure 4.5: The social and cultural impacts of tourism. (After Lea)

The movement must also be made routine so that the new culture can establish its own methods for handling change.

The fifth and last stage is The New Steady State; this occurs when social disorganisation and personal stress return to tolerable levels and a new dynamic equilibrium is evolved.

It has to be stated that not all societies may complete the whole cycle, as even tourism cannot change the culture of the society on its own. Culture changes because the environment within which the culture exists changes, an environment which is both social and physical. Tourism is just a catalyst for change. It will not be effective without the presence of an already prepared environment ready to accept the changing process. Ryan's staged process is really a pragmatic and selfish adaptation to the demands of tourism.

3. Tourism Development in Egypt

In addition to its natural resources discussed in Chapter One, Egypt is richly endowed with historical resources for tourism, such as the remains of the Pharaonic (3200-526 B.C) civilization, the Greek Ptolemaic (332-30 B.C) period, the Roman (30 B.C- 639 A.D), and the Islamic (639 A.D- to present). The remnants of this past are among the world's oldest and most spectacular tourist attractions. In addition to its archaeological sites and its importance as a cultural, religious and political centre of the Arab world, it has a cosmopolitan character that appeals widely to both casual visitors and those steeped in its history and culture. Generally, we may summarise the Egyptian assets for tourist attraction as follows:

The oldest and most important historical attractions are the temples and tombs of the Pharaonic dynasties, which are scattered through out the Nile valley: the most famous being the Giza pyramids, the Sphinx, the Step Pyramid of Sakkara and temples, Minya temples, Beni hassan tombs, Tel Al-Ammarna, Upper Egypt temples of Luxor, and further south the monuments of, Esna and Edfu, Kom-Ombo and Aswan. Also the historical artifacts of the Roman and early Christian period found in Alexandria, and the famous mosques and churches of old Cairo, and the Pharoanic, Islamic and Christian museums.

As mentioned in Chapter One the two major landscape features which appeal to tourists are: firstly the Nile which remains a major tourist attraction. (Not only does this greatly enhance the cities bordering it, but in recent years the Nile cruises have become very popular for the scenic beauty mentioned in Chapter One in all the cruise it is like an open air museum) secondly, beach oriented tourism in Egypt along the Mediterranean coast 560 km and the Red Sea coast 1480 km. (Both beaches have very high potential for tourism development, the Mediterranean is famous for being the oldest summer resort in Egypt -since 1900- while the Red Sea began to flourish in the late seventies.

The climate also is very conducive to all year round tourism. Throughout greater part of the Nile valley and along the coasts it is mild and rarely rains. The summer temperature is rather high, but low humidity makes the heat bearable. Along the coastal Mediterranean areas in winter and the Red Sea coasts in summer, strong coastal winds may cause sand storms, but the climate is mainly an asset to tourism development.

Compared to other tourist destinations, Egypt is quite favorably located at the crossroads of most air and sea routes to Europe. Egypt receives flights from all over the world into Cairo international airport and some charter flights to Luxor, Alexandria and Hurghada. Navigation transportation is received through the ports of Alexandria, Port Said, Suez, and Aqaba. The country also has a domestic transportation services by air, rail and road. Some other potentials for tourism in Egypt are, the cheap prices compared to other countries in the area, a stable political regime, and the relatively very low crime rate.

In order to focus on the importance of tourism to the Egyptian economy we must first summarise the state of the Egyptian economy first.

3.1. The Policy of The Egyptian Economy

Egypt is an underdeveloped country burdened by over-population. Between 3 and 4% of the national territory is currently populated, the rest lies largely unused in spite of its undoubted potentials. Actual population density within the inhabited area is about 727 inhabitants per square kilometer, one of the world's highest densities. Over many years, Egyptian economic policies relying on central planning, extensive state ownership, pervasive intervention by the government in the market, setting prices below economic levels, providing large subsidies and distorting capital formation stifled productivity, efficiency and economic growth. These policies have stimulated consumption beyond the country's ability to support goods and services, leading to inflation, unemployment, shortage of foreign currency and the accumulation of foreign debt.

In full recognition of the need of fundamental reform to overcome much economic hardship, a comprehensive economic reform and stabilization program was agreed upon in May 1991 with the IMF. This was to cover all areas of the economy and to emphasise the supply side through adjustment of policies to be based more on an increased reliance on free market forces, and on price flexibility, reflecting the true scarcity of all economic factors including foreign exchange and domestic credit.

Creating conditions to encourage competition and investment by private capital, and to stimulate and widen exports by simplifying fiscal legislation -these are also part of the government's reform intentions.

Control of inflation is also a major national economic goal through the reduction of aggregate demand in proportion with the country's reduced capability to finance imports and produce goods and services. The government policy also stresses the gradual privatization of state ownership; with limited absorptive capacity of the capital market due to the long years of its inactivity, these can be one of the most effective tools in speeding up the achievement of the reform objectives in increasing the supply side through better efficiency and productivity. Such a process will maintain a link between savings and investments and consolidation of the fiscal budget, providing new jobs, increases in production, and long term economic growth. By providing these policies, the Egyptian government is trying to speed economic recovery.

Tourism is considered the third most important item in the exports account, just below cotton and labor, and the third largest source of income to the country after the Suez Canal and cotton exports.[15]The government is therefore not surprisingly trying to implement comprehensive reform in the tourism sector by establishing strong private sector investments.

3.2 The Role of Tourism in the Egyptian National Economic Plan

While over the last five years, tourism has grown world-wide at an annual rate of some 5.9 %, in Egypt it has grown at a rate of 13.6 %t per annum.[16] World tourism is expected to continue to grow at an annual rate of about five percent towards the end of the century, with Egypt's share reaching over five million visitors by the year 2000.[17]Tourism has been the fastest growing sector in the Egyptian economy over the last five years, reaching a peak during the first half of 1990. Between 1985 and 1990, the number of international arrivals grew on average by 13.6% per annum, from 1.5 million in 1985 to 2.5 million in 1989. Egypt's share of world tourism during the same period increased by over 30%. Based on the 1989 statistics, Europe is the major source of tourists to Egypt, comprising 47.6% of total

14 Ministry of Economy and Foreign Trade, *Annual Report*, 1991, Cairo pp. 126-132

16 Ministry of Tourism Statistics, 1992

16 Sultan, F (The Minister of Tourism and Civil Aviation), "Tourism Development in Egypt", *Alahram Newspaper*, 12/ 6/ 1992

arrivals; the Middle East comes second with 29.2% followed by Africa at 9.5%, the Americas at 8% and Asia at 5.7%. (Table 4.3)

Seasonal fluctuations in travel affect tourism in Egypt. The high season spans from July through October, with the off-peak months being January through June, November and December of each year. The average length of stay of tourists in Egypt exceeded 8 nights in 1989 and accommodation has increased from 24,502 rooms in 1985 to 47,598 rooms in 1991 a 94% increase. (Tables 4.4, a, b, c & d)

The government has evaluated the performance of the tourism sector in the previous economic program 1987-1992, in summary as follows: [18]

The plan aimed to raise the number of tourists to 2.5 million by the end of 1991, this was achieved and the number of tourists reached 2.8 million by the end of 1990. The plan also was to increase the number of tourist nights to 17.5 million nights, and according to the official statistics this number exceeded 18 million during 1990. Traveler receipts were planned to reach 1.7 billion dollars, but by the time of the Gulf War it had only reached 1.1 billion dollars.

During the years of this plan (1987-92) the country started development programmes for the tourism industry in South Sinai and the Red Sea coast. All the indicators demonstrate favorable tourist trends and highlight successes achieved in the development of tourism as a part of Egypt's ambitious intention to diversify its tourism industry, however, the exposure of the country's natural resources in the long term has to be considered. The national program seeks to double Egypt's share of the world tourism market by the next decade.

17 Ministry of Economy & Foreign trade, *"Evaluation of the government plan 1987-92"*, Evaluation Report, March 1992 pp. 432

(In Million US$ of receipts and percentage)

COUNTRY	TOURIST ARRIVALS		RANK		AV. ANNUAL GROWTH RATE	% SHARE OF RECEIPTS IN MIDDLE EAST		% SHARE OF RECEIPTS WORLDWIDE	
	1990	1980	1990	1980	1980/90	1990	1980	1990	1980
EGYPT	1994	806	1	2	9.48	40.19	23.20	0.78	0.79
SAUDI ARABIA	1884	1344	2	1	3.44	37.97	38.69	0.74	1.31
JORDAN	500*	431	3	3	1.50	10.08	12.41	0.20	0.42
SYRIA	244*	156	4	6	4.57	4.92	4.49	0.10	0.15
BAHRAIN	110*	150	5	7	-3.05	2.22	4.32	0.04	0.15
KUWAIT	80	377	6	4	-14.36	1.61	10.85	0.03	0.37
OMAN	69	-	7	-	-	1.39	-	0.03	-
IRAQ	55	170	8	5	-10.67	1.11	4.89	0.02	0.17
YEMEN	20	24	9	8	-1.81	0.40	0.69	0.01	0.02

* Preliminary estimates

Table 4.3: Middle-East main earners from tourism between 1980-1990. (After WTO)

PROFESSION	No. of Visitors
PROFESSIONAL	927,004
BUSINESSMAN	44,344
STUDENT	152,037
HOUSE WIFE	35,898
RETIRED	69,684
UNEMPLOYED	6,335
NOT SPECIFIED	876,325

Table 4.4, a: 1991 Distribution of tourists visiting Egypt according to their profession. (After TDA)

ACCOMODATION	No. of Tourist Nights
TOURIST VILLAGE	400,034
HOTEL	5,554,325
PENSION	169,245
YOUTH HOSTEL	138,473
HOSPITAL	138,473
FRIENDS	1,169,332
OWNED APT.	1,723,226
FURNISHED APT.	4,246,520
OTHER	1,846,313

Table 4.4 b: 1991 Distribution of tourist nights in Egypt according to type of accommodation. (TDA)

PURPOSE OF VISIT	ARABS	EUROPE	AMERICAS	OTHERS
PLEASURE	2,926,806	2,604,471	509,290	406,143
MEDICAL	1,061,261	14,401	2,216	29,910
STUDY	1,593,460	11,656	85,161	102,193
CONFERENCE	78,161	38,311	17,232	20,156
VISIT RELATIVES	1,321,037	174,477	64,806	101,363
WORK	442,423	334,275	144,197	171,507
BUSINESS	437,268	214,111	67,852	34,680
INCENTIVE	2,000	53,851	15,155	5,924
CULTURE	36,542	1,219,028	121,318	84,777
OTHER	261,438	353,015	42,096	81,976
NOT SPECIFIED	815,455	8,877,689	1,369,349	4,323,450

Table 4.4 c: 1991 Distribution of tourist nights in Egypt according to nationality and purpose of visit. (After TDA)

AREA	ARAB	EUROPE	AMERICAS	OTHERS
GREATER CAIRO	6,369,780	1,954,015	630,824	723,139
LUXOR	30,772	1,015,472	123,088	61,544
ASWAN	46,158	507,736	76,930	30,772
ALEX.+ N. COAST	1,107,788	153,859	46,158	30,772
RED SEA	15,386	492,350	30,772	30,772
NORTH SINAI	30,772	61,544	15,386	30,772
SOUTH SINAI	15,386	200,017	30,772	30,772
OTHER	538,508	738,525	107,702	107,702

Table 4.4 d: 1991 Distribution of tourist nights in Egypt according to nationality and area visited. (After TDA)

3.3 The Aims and Objectives of the 1992-1997 Economic Program for the Tourism Sector

In a report published by the Tourism Development Authority, setting out the aims and objectives for tourism in the next decade may be summarised as:[19] the establishment of a national strategy for tourism development including identification of priorities, and formulation of comprehensive plans for priority areas and guidelines for investors; to decrease the scope of the public sector in tourism development by limiting its role to the essential tasks of regulating and monitoring tourism and providing infra structure services which are either part of the overall national systems (roads, electricity, and communications) or which cannot be developed by the private sector; providing efficient coordination among the various authorities and agencies involved in the tourism industry and simplifying the regulatory framework for tourism development projects; taking the lead role in promoting Egypt's diversified tourist development opportunities (cultural, leisure, conferences) through out the world; protecting and conserving the unique cultural, natural and visual resources in areas with potential for tourism development including historical and archaeological sites, prime agricultural land, coastal areas, and wildlife habitats; promoting tourism investment opportunities and a greater role for the private sector, and easing the availability of funds and long-term financing for tourism development activities; and lastly and most important of all, constituting essential data bases and effective means for communicating and exchanging of critical information.

Such objectives are aiming to: increase the number of tourists to 4.3 million by the end of 1997; increase the number of tourist nights to 9 nights per person so that the total number of nights will be 39 million by the end of 1997; increase the traveler exchange to around 2.6 billion dollars; increase the hotel capacity to carry 39 million nights by the end of 1996; and to provide employment for 50.000 job opportunities by the end of 1996. Thus, the amount of investment in tourism will be about 5.7 billion Egyptian pounds by the end of the plan.

During the period of this research, by the mid of 1993, the tourism sector in Egypt suffered a reduction in the number of tourists visiting the country of between 35 to 55% of the total estimation. This was due to the increase of terrorist operations directed towards tourists and also the October 1992 earthquake in Cairo. (Appendix D & E)

[19] T.D.A, *Guidelines for tourism projects*, April 1992, pp. 4-6

3.4 Tourism Strategy to Achieve 1992-97 Programme Aims and Objectives

Among the strategies which have been formulated to achieve the aims and objectives mentioned above are the following:[20]

a) Changing the role of the public sector in tourism: that is, the role of the public sector will be changed from one of promoter owner and operator to one of planner and regulator. This strategy is being pursued by the Ministry of Tourism through the following actions: providing improved means of integrating and coordinating efforts of the government agencies with the private sector; determining the investment priorities needed for implementing the national tourism program; divesting government of hotel ownership and other tourist facilities; preparing regional plan and master planning concepts for all newly established or designated tourist zones; providing technical assistance to private investors in identifying properties, preparing projects and evaluating proposals for tourism development which are consistent with master plans developed for tourist zones; and finally making available medium and long term finance in both local and foreign currencies for tourism-related investments.

b) Protection and conservation of natural resources that tourism depend upon: by establishing and enforcing minimum standards for basic services (water supply, sewerage and solid waste disposal) within all tourist zones; by developing and enforcing minimum standards for health and safety for the tourism industry; and by implementing and enforcing guide-line regulations for tourism-related operations within the tourist zone (inland water ways).

c) Improvement of the regulatory environment: by providing public funding for infra structure improvements in under developed or undeveloped locations as a mean to attract private investment in the new tourist centres; and in addition obtaining long term, low interest loans from international financial institutions to provide an additional source of funding for essential infra structure improvements.

d) Marketing and Promoting Tourism,: Proper marketing is essential for the growth of tourism. While private sector investors will continue to market and promote their products, the government will enhance these efforts through a comprehensive plan which includes: improving the procedures for obtaining visas, travel permit and customs clearances at all points of entry; organising conferences and seminars in both

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[20] op cit., T.D.A, p. 12

Egypt and abroad to promote tourism; promoting and encouraging domestic tourism. Promoting incentive tourism including extending invitations to executives of large international concerns to visit Egypt; developing and expanding education and training opportunities in hotel management, catering and other tourism related occupations; encouraging marketing efforts for combining cultural and leisure tourism to increase the length of stay of tourists; participating in international tourism fairs, organisations and exhibitions; developing a centralised system for information, collecting and distributing tourism data from various private and public sources, and making this data available to all interested parties, local or foreign.

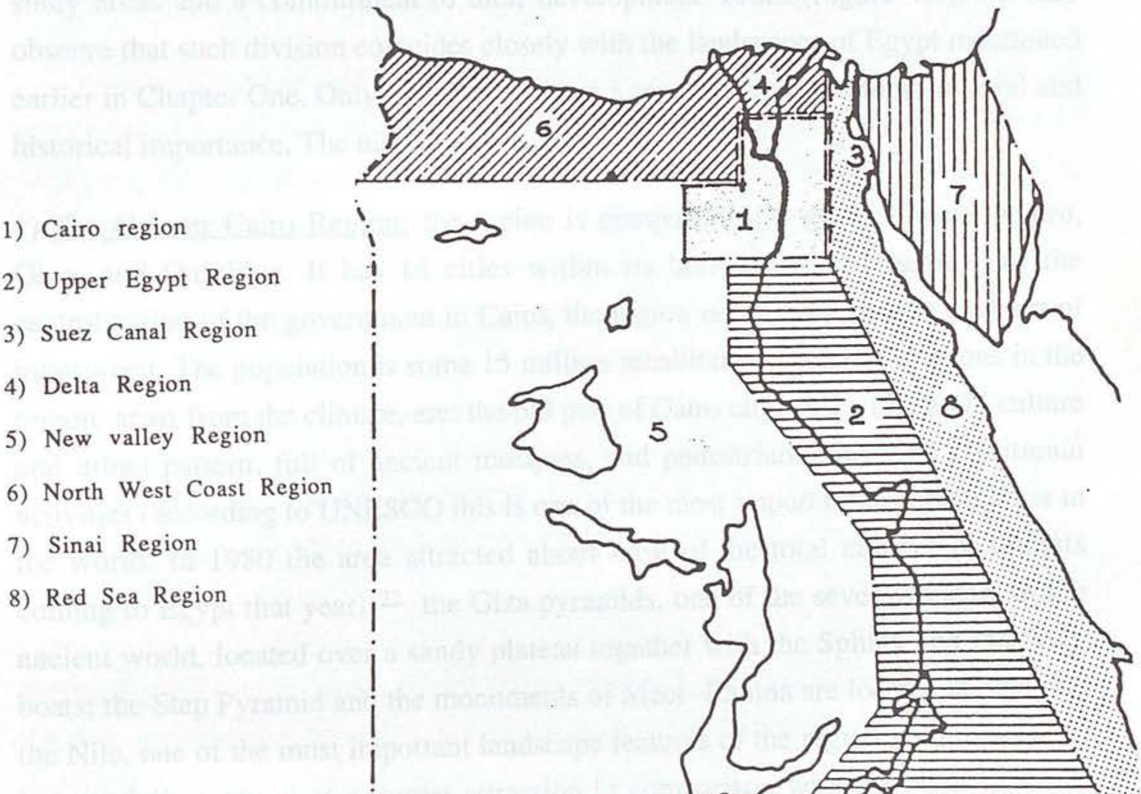

Figure 4.6: The division of Egypt into tourist regions. (After Ministry of Tourism)

3.5 The Egyptian Planning Approach for Tourism

In order to assess the potential demand for tourism and the need for infrastructure support, a hierarchical planning approach has been adopted by the Ministry of Tourism. This approach means that conditions for development are examined up and down, that is from the largest spatial planning unit to the smallest, and with the object of defining the most cost-effective level for infra-structure planning. The first level is the 'National' level, which is all of Egypt, where all decisions must take into account the national objective and policies that affect tourism development as well as prevailing national, social and economic conditions. The next level is the 'Regional' level, and for this the Ministry has divided the country into 9 regions. Planning at this level involves basic strategy as to where to apply national resources for development which, in this case results in a definition of study areas and a commitment to their development. From (Figure 4.6), we may observe that such division coincides closely with the landscapes of Egypt mentioned earlier in Chapter One. Only Cairo is added as a separate zone due to its cultural and historical importance. The nine regions are:

1) The Greater Cairo Region: the region is composed of 3 governerates[21] Cairo, Giza, and Qalubiya. It has 14 cities within its boundaries and because of the centralization of the government in Cairo, the region is the main pole in any sort of investment. The population is some 15 million inhabitants. Tourist attractions in the region, apart from the climate, are; the old part of Cairo city, still with its old culture and urban pattern, full of ancient mosques, and pedestrian areas with traditional activities (according to UNESCO this is one of the most important historical areas in the world. In 1980 the area attracted about 45% of the total number of tourists coming to Egypt that year);[22] the Giza pyramids, one of the seven wonders of the ancient world, located over a sandy plateau together with the Sphinx and the Solar boats; the Step Pyramid and the monuments of Meet -Rahina are located at Sakkara; the Nile, one of the most important landscape features of the region with its islands, but not fully realised as a tourist attraction in comparison with the other features. The greater Cairo region's tourist accommodation capacity is about 276 hotels with some 12481 bedroom. Most of these hotels are in Cairo.[23]

[21] Egypt is divided administratively into 26 governerate, each governerate has a governor and a private budget that is distributed from the country's main budget, still the system in Egypt is centralized in spite of this division. The Egyptian Governing system is shown in the Appendices.

[22] Ministry of Tourism, *Annual Statistics,* 1991

[23] The Egyptian statistics, 1984, pp. 136

2) <u>The Upper Egypt Region</u>: (Figure 4.6) This region includes the following governerates, Sohag, Qena, Aswan, The Southern parts of the Red Sea governerate (from Ras Gemsha till the Sudanese borders) and the city of Luxor. The region is a major pole of tourist attraction in Egypt. The weather is hot compared to other parts of Egypt, that is why Aswan is always selected as the best place for winter seasonal tourism, the temperature varying between 39 degrees C. maximum in summer and 18 degrees C. maximum in winter. The major cultural attractions include: the temples of Sitti the First, and Ramses the Second, churches like St. Michael, Soter, the Seven Mountains nunnery, and the mosques of Prince Hassan, Al Shaykh Alaref, and the Chinese mosque. In Qina there is the temple of Dendara, while in Luxor the most important Pharonic temples are the temples of, Al-Karnk, Luxor, Al-Dair Al-Bahary, Habo City, those of the Valley of the Kings and Queens, the Ramsuom, Esna and the valley of the Nobles.

Aswan is located 904 km from Egypt. It can be divided into five zones of attractions; The islands of Fiala and Kalabsha, Wadi Alsboe, Amda (temples of Amda and Benot), Abou Simble, which is 280 km south of Aswan, 60 km to its west there is the Karkr oasis, about 570 feddans. Edfo temples 23 km north of Aswan on the western boarders of the Nile. There are also some other attractions like, the plants island, Aswan museum, the Tomb of the Agha Khan and the High Dam and Lake Nasser.

The number of hotels in the region is about 120, most of them are located in the cities of Aswan and Luxor. The number of beds is around 7789 which is 12.4 % of the total number of beds in the tourism sector. The region provides about 20% of the national tourism income.[24]

3) <u>The Suez Canal Region;</u> (Figure 4.6) Ismailia, Suez, Port Said, and Sharkia are the four governerates included within the boundaries of the region. It is located in the North-Eastern borders of Egypt, situated between the Sinai peninsula in the east, the Delta region in the west, the Mediterranean Sea in the north and the boundaries of the Red Sea region in the south. The region is characterised by the existence of a relatively high number of lakes; lake Temsah, the Bitter lakes and lake Manzala.

24 op cit., Ministry of Tourism, p. 211.

The attractions are mainly the coastal fringes of the lakes, and the Suez Canal. The length of the Suez beaches is about 75 km but very few parts may be used for recreational activities as it is heavily polluted by nearby petroleum extraction and the ship wastes. Lake Temsah is located south of Ismalia city with a total area of 12 km, and length of shore of 23 km (including lagoons). It is triangular in shape with sandy beaches, palm, mango and gazorina trees, and the physical carrying capacity of the area according to the government is about 35,000 persons/ feddan. The Bitter lakes are located between Suez and Ismailia, with a total area of 240 km, the area under tourism development being about 1059 feddans with a total length of shore of 28 km and width of between 250-350 meters on average. The city of Port Said has a shore length of around 15 km. It is not noted for its recreational tourism but as being a commercial centre, as it is the only free zone in Egypt. Sharkia governerate has the least potential in the region with a swamp noted for hunting wild ducks.

Tourism development has not been marked in this region as it has the war borders between Egypt and Israel between 1967 and 1973. Government priorities have been to re-establish housing and urban development in those cities which were badly damaged during the war.

4) <u>The Delta Region:</u> (Figure 4.6) is located in the north of the country in the shape of a triangle. The head is Cairo, the base is the Mediterranean and the sides are the two branches of the apex of the Nile. The region is formed from 5 governerates, Dakhalia, Gharbia, Monofia, Damietta and Kafr Alsheykh, having about 37 cities within its boundaries, the most famous being Tanta, Mansoura, Shebien alkom, Mahala and Menouf.

The region is characterised by agricultural lands. Tourism attractions in this region are relatively poor for international tourism compared to the other parts of the country and that is why its main concern is domestic tourism. The beaches of Ras albr, Baltim, and Gmasa are third class in their classification when compared to the other beaches of the country because of the pollution of the sea water with the silt from the Nile, so they function for domestic tourism, mainly for the people living in the surrounding areas. There are also very famous mosques, such as Al-Sayed Al-Badawy and Al-Desouky. People come to visit these places for blessings (an old cultural tradition). Also the region attracts with sports tourism such as wild duck hunting and there are several horse ranches famous for their breed.

5) The New Valley (Oasis region) : (Figure 4.6) is located in the heart of the Western Desert parallel to the Nile valley at distances varying between 150 to 400 km. It starts south west of Aswan the distance of 150 km extended to the north passing by the oasis of Dakhla, Kharga, Al-Bahria, and Al-Farafra, forming from them a huge valley of an area of 10 million feddans (40.8% of the total area of Egypt)

As mentioned in Chapter One, the climate is a hot desert climate. Very hot in the morning , very cold at night but, due to the existence of the oasis, the humidity is very low helping to decrease the effect of the temperature, and increase the attractiveness of the region. The potentials of the area are limited to safari adventure tourism and study of the people living in the oasis and their traditions. The services are very limited and the kind of tourism the area attracts is characterised by tourists preferring to stay with the native people.

6&7) The North West Coast and Alexandria Regions: (Figure 4.6) are located in the north of the country extended to the west of the Delta with a length of about 600 km. The climate has a very Mediterranean-like style, the temperature varies between 32degree C. maximum in winter and 8 degree C. minimum in winter. The main tourism attractions in these regions are the famous 3 (S) sun, sea, and sand, as in other Mediterranean coastal resorts.

The coast is divided into 4 main parts: Alexandria to Al Ameed, (60 km sandy shores, very straight no bays and lagoons); Al Alameen to Ras Alheekma (130 km full of sand dunes); Mersa Matruh (20 km one of the most attractive coasts in the area); and Negilla to Saloom (with the same features as the preceding area). The services in the Alexandria region are relatively high, as Alexandria is the second biggest city in Egypt. However, the standard of service development in the North West Coast is less than needed to match the rapid development of tourist resorts in the region.

8) The Sinai Region: (Figure 4.6) as mentioned in Chapter One, is located in the North East part of Egypt. It is a triangular desert mountain island, surrounded by the arms of the Red Sea, and the gulfs of Suez and Aqaba. Its base is the Mediterranean with a coast some 700 km long, its area of 61000 km representing 6% of Egypt's total area. Due to its desert mountains, the climate is mainly hot, the maximum temperature in summer being 36 degree C. While the minimum in winter is 10 degree C. Some parts of the high lands have a temperature below 0 degree C. in winter, and are the

coldest part of Egypt. Sinai is one of the most important assets added to the tourism sector in Egypt.[25] The region may support five kinds of tourism: Culture and Religious (Moses mountain, Moses road out of Egypt, St. Catherine Cathedral and Hours Road); Historical, as there are some ruins from the first stone age; Health Resorts (Hammamat Pharoan, the mineral wells for health treatment); Recreation, as the region has one of the best diving spots all over the world, the beaches are appealing, with the coral reefs surrounding the coasts; and finally safari adventures and mountain climbing.

Also the region has the most famous Egyptian Marine national park, Ras Mohammad.[26] The potential of this region is very high and that is why development programs are being developed for its coasts and will be discussed in Chapter Five.

9) The Red sea Region: the region has been discussed in detail in Chapters One, Two and Three.

In summary for Egypt as a whole, it can be said that, there are regions which are already stable with sufficient services to match thier tourism potential as in, Cairo and Upper Egypt; and regions poorly matched as in, the Delta, the Suez canal and the New Valley. Finally there are three regions that can easily increase their tourism as, the Red Sea, the Sinai and what is left of the North West coast regions. Well developed planning is a must for these regions in order to achieve sustainable development.

The Ministry of Tourism has evaluated the development potentials of the previous regions and identified 'Priority Development Zones'. Priority development zones are defined as planning units perhaps 200 to 400 kilometers in length encompassing more than one homogeneous sector. A zone should have consistent tourism resources for which magnitudes of demand can be established for the short, medium and long terms and for which overall infrastructure requirements can be assessed accordingly. The 'Priority Development Zones' selected by the government are as follows:[27]

25 Sinai was liberated from Israeli occupation in April 1982, after the peace treaty in 1978

26 Ras Mohammed national park, was the main cause for the recognition of the environmental authorities in Egypt, and the rise in interest in environmental knowledge, a description of the national park and its management system is given in Chapter Five.

27 op cit., T. D. A. p. 16

1) Gulf of Aqaba (Sinai Region)
2) Hurghada-Safaga sector (Red Sea Region)
3) Nile Cruise Tourism (Upper Egypt Region)
4) Fayoum (Cairo Region)
5) Siwa Oasis (Oasis Region)
6) Yachting Tourism (Red Sea Region)

3.6 Planning Schemes for the Red Sea Region Tourism Development

The planning approach adopted has divided the Red Sea region into three sectors (Figure 4.7): Hurghada-Safaga, Safaga-Mersa Alam and Mersa Alam-Ras Banas. According to the T. D. A, a 'Sector' is defined as an area with homogenous characteristics about 30 to 70 kilometers in length, usually, encompassing, an established community and more than one smaller area suitable for development as 'Resort Centers', which is a specific tract of land encompassing several sites for hotels, tourist villages, recreation activities and a central amenity core.[28]

Studies of the market for tourism in the Red Sea show an increase of demand for development areas in the region, particularly in the Hurghada-Safaga sector, and that is why the sector was given a priority development strategy. The strategy's main objectives are to increase the total number of tourist nights to reach about 2.6 million nights in 1995 and about 16 million nights by year 2005 in the Hurghada-Safaga sector. Such objectives will be achieved through the development of three 'Resort Centers', South Hurghada, Sahl Hasheesh and Ras Abu-Souma (Table 4.5). The centers will function as focal points for the distribution of social and infra-structure support to their surroundings as well as for tourism activities. Each center lends itself to ownership and management by a single development organisation that would master plan the project, promote private investment, and arrange for or supply infra-structure to serve all the hotels and other facilities within the center. In Chapters Six and Seven, a description and evaluation of each tourist center and its impacts on the surrounding environment will be made.

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[28]ibid., p. 3

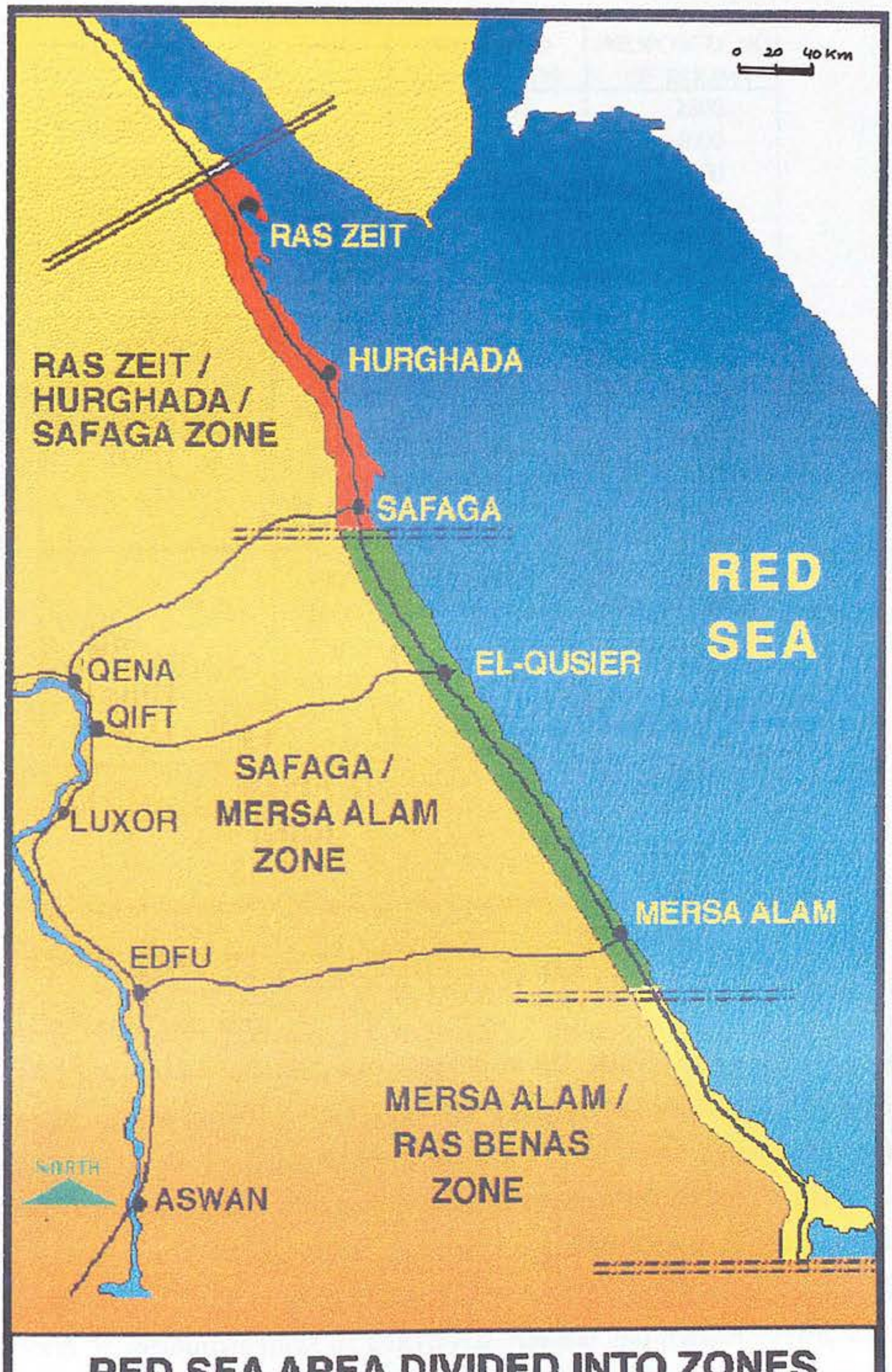

Figure 4.7: The division of the Red Sea coast into tourism sectors. (After TDA)

CENTER	YEAR	PROPOSED NO. OF BEDS	PROPOSED NO. OF ROOMS
SOUTH HURGHADA	1995	5000	2500
	2000	8000	4000
	2005	10000	5000
	2010	12000	6000
	2015	13500	6750
	2020	14500	7250
SAHL HASHEESH	1995	6000	3000
	2000	20000	10000
	2005	35000	17500
	2010	45000	22500
	2015	70000	35000
	2020	80000	40000
RAS ABU SOMA	1995	4000	2000
	2000	13000	6500
	2005	20000	10000
	2010	23000	11500
	2015	32000	16000
	2020	40500	20250

Table 4.5: The projected number of beds for the three centres planned for development in the Red Sea Coast. (Hurghada-Safaga Sector) (After TDA)

4. Concluding Discussion

This chapter has attempted to give a synoptic review of tourism as an industry in Egypt; of its growth and immediate planned future; and of the degree of dependence upon it of the nation's economy. For many countries and regions, tourism represents a real alternative to other more obviously detrimental forms of development. However, if tourism is to be truly beneficial to all concerned, -to the owners of the industry, employers, tourists and hosts- and is to be sustainable in the long term, its resources must be conserved. Natural and human environments must be protected, and tourism must be integrated with other activities so that it provides real benefits to the local communities. For tourism to be sustainable it requires due reference to the broader economic, political and social environment. It can not be isolated from other forms of economic activity. Thus, tourism must take its place as part of programmes for integrated development of local economies and should not dominate wider programme objectives.

The tourism industry must ensure that it conserves the resources on which it depends. One of the major principles in order to achieve sustainable tourism is to integrate tourism development into a national and strategic planning framework, which undertakes environmental impact assessment to increase the long term viability of tourism. Such properly planned tourism enhances values placed on environmental assets, provides incentives for conserving threatened species and ecosystems, and brings improvements to local communities.

However, in practice, tourism development is rarely balanced with other sectors, such as local industries, which can provide invaluable resources in the form of equipment, transportation, and foodstuffs. These sectors can in turn benefit from the tourism market. Where tourism is not integrated with other sectors and balanced through strategic planning, it can result in uncontrolled and rapid expansion, which often has disastrous consequences. The next two chapters will be discussing coastal planning experiences worldwide and will focus on the Red Sea coast in particular, as well as observing the consequences of unplanned tourism on the cities of Hurghada coast.

CHAPTER FIVE

CHAPTER FIVE

PLANNING AND MANAGEMENT OF COASTAL ZONES; WORLDWIDE EXPERIENCES WITH RELEVANCE TO THE EGYPTIAN RED SEA COASTAL PROGRAMME

"The war is about the best use of coastal resources. It is a war that society fights with itself as it seeks to both develop and conserve its coastal resource." [1]

The coastal zone probably ranks higher in importance than any other recreational resource because of its diversity of landscape. Coastal recreation planners and decision makers are confronted with two conflicting forces : on one hand there is the challenge of responding to meet the demands of an increasing recreational population by expanding existing facilities and providing additional outlets along the coast; on the other hand the need to conserve coastal resources in order to maintain those scenic qualities and natural attributes which annually attract holiday makers to the coast. The task facing coastal planners is to achieve a creative balance between development and conservation under the various pressures that impinge on his task (Figure 5.1). Large scale tourist developments produce considerable pressures on the environment and on the local populations. These include destruction of the natural landscape and of its vernacular man-made accretions, congestion in transport, and pollution of the air, land and water. Such problems are most acute in the rapidly developed mass tourist resorts. All municipal authorities in areas of large scale tourism are likely to come under pressure to limit tourism development for environmental reasons. Their ability to do so depends greatly on the precise distribution of power between central, regional and local government in each country.

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[1] Dorcey, A. H. j , *Bargaining in the Governance of Pacific Coastal Resources: Research and Reform. Westwater Research Centre*, University of B. Colombia, 1986, p. 219

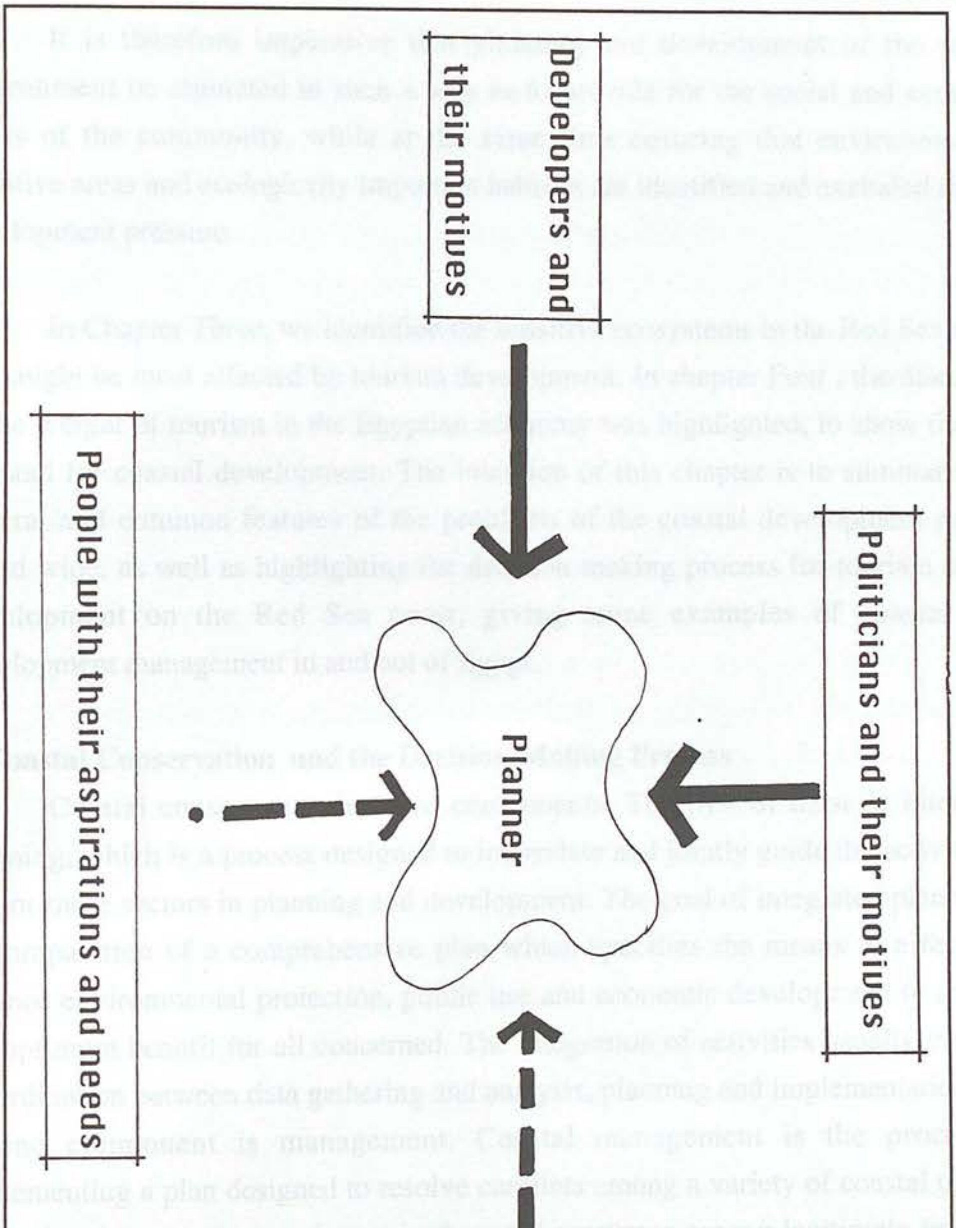

Figure 5.1: The pressure cross that either facilitates or complicates the professional task of the planner, the bold arrows indicate where greater pressure comes from during project planning. (After R. Carpenter)

It is therefore imperative that planning and development of the coastal environment be regulated in such a way as to provide for the social and economic needs of the community, while at the same time ensuring that environmentally sensitive areas and ecologically important habitats are identified and excluded from development pressure.

In Chapter Three, we identified the sensitive ecosystems in the Red Sea region that might be most affected by tourism development. In chapter Four , the discussion of the weight of tourism in the Egyptian economy was highlighted, to show the high demand for coastal development. The intention of this chapter is to summarise the general and common features of the problems of the coastal development process world wide, as well as highlighting the decision making process for tourism coastal development on the Red Sea coast, giving some examples of coastal zone development management in and out of Egypt.

1. Coastal Conservation and the Decision-Making Process

Coastal conservation has two components. The first of these is integrated planning, which is a process designed to interrelate and jointly guide the activities of two or more sectors in planning and development. The goal of integrated planning is the preparation of a comprehensive plan which specifies the means to effectively balance environmental protection, public use and economic development to achieve the optimum benefit for all concerned. The integration of activities usually involves co-ordination between data gathering and analysis, planning and implementation. The second component is management. Coastal management is the process of implementing a plan designed to resolve conflicts among a variety of coastal users to determine the most appropriate use of coastal resources among legitimate interests. Management is the actual control exerted over people, activities and resources. Public participation plays a key role in both planning and management.[2]

How can one judge whether a given area or habitat is suitable for certain kinds of development ? This question leads to a consideration of the approaches of land assessment. These vary greatly depending on the people involved. All too often the approach is merely an economic vision, and one also in which relatively few economic considerations are taken into account. Land assessment then becomes pure guesswork. Such guesswork, while saving money at the inception of a project, can

[2]Lowrence P. Hildebrand, *Canada's Experience with Coastal Management*, 1989, p. 10

become very costly in the long term. A proper ecologically based land assessment should be taken into account. It is important to conserve wild species and their habitats, but the question rises as to what the planner can do about it . His conservation task reduces to two important steps: firstly, ensuring that the development area is evaluated on an ecological basis, followed by the institution of a zoning scheme with categories that include conservation districts and guidance in ways of using and protecting natural areas within the conservation area. Land evaluation on an ecological basis requires a survey of the existing ecosystems, the aim being to assess the long term capability of the area for sustainable uses and benefits without seriously damaging their ecosystems. The conservation responsibility of the planner, as outlined is burdened with many complexities. One of these comes through the socio-economic pressure that is exerted on the planner and the technical nature of the process itself.

Development is a continuing aim of humanity. Ineffective development may arise for a number of reasons. One important reason is poor use of resources and the scarcity of them in relation to the demands upon the carrying capacity of an area. Steady, appropriate and organic development is based on satisfying material needs safely so that a population becomes free to put its energies into cultural and social values. Development usually proceeds in 3 stages; firstly the construction of access and provision of basic services, followed by settlement and then thirdly conservation of habitat.[3]. Conservation of habitats usually results in an enhancement of the human environment. Accelerated habitat conservation and lateral expansion without any precautions for saving natural habitats, inevitably will lead to degradation and destruction. Rapidly changing human environments can take two extreme directions that will lead to destruction. In the first extreme, planning is involved, but it is the kind of planning that only focuses on what is technologically possible. It is now technologically possible to cut down and fill swamps and shorelines. In the hands of Man, it can be a destroyer of resources or it can be a blessing for its own technological merits. If the bulldozer is used carefully and with regard for the local ecosystems, it can be used advantageously. The bulldozer more usually becomes an alien force removing other more gradually evolving indigenous technologies. The only effective way to balance the persuasive import of foreign technology is for the planners to set demands. These demands should include requirements for ecosystem

[3]Richard Carpenter, *Natural Systems for Development; what planners need to know*, Macmillan pub., London, 1983, p. 27

knowledge, which should be delivered or paid for by a technology importer. A specific demand might be to supply a proper ecologically based land evaluation prior to negotiating the permit for a specific development project.

The planner should always be on top of the list in the decision making process, but unfortunately this is a rare case in our times.[4] Today the planner's greatest challenge is at bottom level to move the development from merely the bulldozer response to planning with good conservation policies. Only this development direction will achieve habitat enhancements that will out weigh the losses. As one coastal planning researcher has commented:[5]

> **"... Planning and regulatory processes capable of anticipating and averting unwanted consequences of land use and development decisions should help the private sector meet its needs to minimise future uncertainty."**

2. Coastal Development Programmes

The following examples show some of the coastal planning programmes in different countries. The examples are chosen according to the following: they represent different governing systems (centralised and decentralised); and available data. The first two cases are of general coastal development programmes, as for the third and the fourth they deal with tourism coastal management programmes in particular.

2. 1. The Federal Coastal Management in the United States of America

The U.S.A has one of the oldest coastal management programmes in modern times. Coastal management arose as a response to pervasive conflict between the increasingly well recognised environmental values of the coastal zone and various development activities. Situations of conflict between diverse forms of economic development and equally diverse environmental values were extremely common through out the U.S.A.'s coastal territory. The setting of specific standards at federal level to resolve such conflicts would have been a formidable task; politically, it would have meant offending powerful development interests and endorsing a massive federal intrusion into an area -the regulation of private land use- that was traditionally

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[4]ibid., p. 35

[5]Scott, Stanley, book review of "Coastal resource management", *Coastal Management Journal* , 4, 3: 1985, p. 337-354

the domain of state and local government. The framers of the 1972 Coastal Act, were faced with how to deal with states which had already had begun aggressively to address coastal problems, others had done nothing. The Act was explicit about procedures which states should follow in setting up their coastal management programmes, but it gave them considerable leeway in programme content, not only in the relative weight they could apply to environmental and development values but also in how the balance between them would be struck. American coastal programmes therefore exhibit a large number of permutations in:

1. What tools have been used to allocate the coast among alternative uses.
2. Who actually makes which decisions and which parties, including developers, environmental organisations, local governments and individual citizens.

This flexibility has made it possible for states to incorporate their existing legislation and programmes affecting coastal resources into a comprehensive programme without necessarily changing any of the components.[6] The range of conflicts in the coastal zone management process has varied depending on each state's physical characteristics and development pressures, partly on the geographic scope of its legally defined "coastal zone" and on how each state has defined "development" and identified "coastal resources". Two extreme cases have been California, which has not only defined a very broad geographic limit for its coastal zone, but also defined the scope of coastal concerns to include such topics as farm land protection, historic preservation and the provision of low-income housing. Towards the other extreme are states such as Rhode Island, which initially extended the regulatory authority of its Coastal Resource Management Council only to the water area of the coastal zone and to a limited range of land-based activities potentially affecting tidal waters.

2.1.1 Methods used to balance development with environmental protection in the U.S.A coastal programme

According to Robert Healy,[7] the principal tools that have come to be used in coastal management are regulatory permit systems, comprehensive planning, land use designations by zoning and subdivision ordinances, selective land acquisition and restoration, promotion of desirable coastal development, and the negotiation of federal and state consistency. These may be examined in more detail as follows:

[6] Robert G. Healy and Jeffery Zinn, "Environment and Development Conflicts in Coastal Zone Management", *APA Journal*, Summer 1985, pp. 299-305
[7] ibid., p. 309

a) Permit systems. Requiring a permit for various types of coastal development has proved extremely popular as a coastal management tool, for two reasons. First, state and local governments traditionally have found permits useful in both land use and environmental regulation. Both the regulated and the regulators, as well as state courts, are accustomed to permit systems and accept their legitimacy. Second, many of the state coastal programmes are combinations of special purpose permit programmes, particularly those requiring permits for dredging, using state-owned tidelands, depositing fill material, building bulkheads, installing water supplies and sewage disposal and modifying wetlands and dunes. Coastal development has been affected in two ways other than through outright denial of permits. First, planned projects, including some extremely large projects that can be identified specifically, were never submitted to the coastal local government commissions, because denial was considered likely. Second, a large proportion of the projects, including virtually all the projects approved on appeal by the state commission, were subject to conditions ranging from various environmental protection features, too deep cuts in project density.

b) Comprehensive planning. Comprehensive planning, in various forms is a coastal management tool in almost all states and territories with approved programmes. The level of government responsible for initial planning, or for developing general guidelines, and level of government responsible for detailed planning varies among states. In recent years, a hybrid of comprehensive planning called "special area management planning" (SAMP) has appeared referring to anticipatory planning for an area where many competing uses and values are concentrated, undertaken before decisions must be made that incrementally affect the area. The SAMP process is supposed to conclude with a plan that reflects trade-off between development and environmental protection. All the important players (permitting agencies, development agencies, and environmental protection agencies) are involved in the planning process, so the result, if successful, is an informal agreement to allow the pattern of activities described in the plan. If development proposals are submitted that exceed the plan, for example, a larger area of land fill, several participants are likely to oppose the proposed action. According to the Federal Coastal Management Office, 18 states have proved the successful use of this tool.

c) Zoning and subdivision controls. Before the introduction of the coastal zone management process, two old tools -zoning and subdivision controls- has been used in the implementation process. These tools were used as ways of implementing the coastal policies newly introduced into local comprehensive plans. Some states require their use in sensitive shoreline areas. For example, Maine State requires local governments to have zoning and subdivision controls on all shore lands within 250 feet of the normal high-water mark. Delaware State prohibits "heavy industry" in underdeveloped portions of its coastal zone, while Hawaii has divided the entire state, including coastal areas, into broad land use categories.[8]

In theory, zoning and subdivision controls can promote development by reserving land for specified development uses and preventing parcel divisions that would interfere with these. In practice however, we must count those tools as primarily neutral or somewhat pro-environment, because they generally have been used to limit rather than promote the intensity of development in sensitive areas.

d) Acquisition and restoration. The tool that probably is most unambiguously protective of the natural environment is acquisition of land by state and local government. Use of this tool has been promoted extensively, states being given matching grants to acquire and operate estuarine areas as natural field laboratories. Often a portion of a sanctuary is already in protection status, and the designation is used to expand the area under protection or to develop user programmes that show the public the value of these protected resources. By the mid eighties, 15 sanctuaries have been designated.[9]

e) Promotion of development. A modest, but by no means insignificant tool, was the promotion of certain uses of coastal zones that are considered desirable. This effort often has involved assisting development that would aid those uses. The California Coastal Conservancy has initiated several urban water front projects, including a restoration of an important recreation pier in Santa Barbara. It also has accomplished more than 100 beach access improvements. As far as this sort of activity does not affect the environment in an adverse way, it is encouraged to enlarge and promote within certain environmental boundaries in order not to give any other sort of activity a chance to exist in the area which might cause environmental disasters.

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[8]ibid., p. 310
[9]ibid., p. 310

f) Negotiation. Coastal zone management has had the unofficial effect of encouraging negotiation between proponents and opponents of development. Negotiation among staff members of various state agencies almost certainly was foreseen. This negotiation frequently occurs between agencies that are likely to be pro-development. Another, probably less well-anticipated, type of negotiation is a result of a large amount of public participation built into some coastal programmes. This has brought developers and environmentalists into contact with each other , in planning and regulatory hearings, not just in the courts after a decision has been made. On balance, increased negotiation should benefit the environmental interests, because previously their views had no place in the decision process. The city of Long Beach, California, created a committee with representatives from 29 environmental, development, and other groups to seek consensus on the local coastal programme mandated under the state coastal act. Given the growing popularity of environmental negotiation as a means of reducing conflict about environmental issues, negotiation may prove to be an increasingly important function of the relatively open planning processes that are associated with coastal zone management.[10]

g) Federal consistency. Beside all the normal planning tools, coastal zone management has one unique tool -federal consistency- which allows states to reject certain activities that are undertaken or permitted by federal agencies within or affecting defined coastal zones if those activities are not consistent with provisions of the state's approved programme.

According to Robert Healy the implementation of these seven tools may offer the best hope for replacing "win -lose" situations, in which "balancing" environment and development means one interest gains at the other's expense, with "win-win" situations, in which both sets of interests can be accommodated more efficiently.[11] The American system reflects high levels of public understanding from vociferous and well organised pressure groups, but there are also great weaknesses in the policing and enforcement of management objectives, and the American planning system in general allows far too much violating by default, of environmental design criteria.

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[10]ibid., p. 312
[11]ibid., p. 312

2. 2. Canada's Experience with Coastal Development Management

Recognition of the need for an integrated coastal management programme usually requires that the use of coastal resources and environments has to exceed some threshold wherein there are either: evident signs of a decline in a valued resource, a perceived use conflict (usually multiple use conflict) or a destruction from a natural hazard. The planning and management of shore areas has been largely an ad hoc process in Canada. There have been a number of piecemeal steps by both federal and provincial governments towards management, including: the control of pollution from some urban and industrial areas; the reservation of some valuable marshlands for particular uses in recognition of their special value; and investigations to determine the probable effects of some proposed developments.

However, an overall frame work has never been apparent. By the late 1970's it was becoming increasingly obvious to some people within the government that such ad hoc responses to specific problems were inadequate. Further, in the absence of a more comprehensive policy, important ecological, historical, cultural and aesthetic values would continue to be degraded in small increments through individual abuses. There is also a socio-economic and political side which dictates the need for coastal management. The basic problem of managing coastal resources is one of allocation among competing uses to provide the greatest social benefit. Canadian society relies to a large extent upon market forces to apportion resources among competing uses.[12] In spite of the growing concern over the use and abuse of coastal resources in recent years, Canada has no clear and well-defined set of coastal management programmes, with no legislative focus through a national coastal management act or successful policy for management of coastal resources. Instead, policies and institutions have evolved from the existing legislative framework, responding to opportunities and needs as they have arisen. According to Hildebrand[13] there are four components to coastal management in its present-day context in Canada: area-specific initiatives, activity-specific approaches, compatible policies and supporting tools. The area-specific initiatives are fully developed coastal area plans which are now being implemented. They represent coastal management in practice in Canada. The activity-specific approaches and coastal-oriented policies are compatible in their intent, provide public and political support for improved planning and management in the coastal zone, and are useful components which could be added to other initiatives to

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[12] op cit., Hildebrand, pp. 13-14

[13] ibid., p. 81

form a more rational approach to coastal management in Canada. The supporting tools are useful aids for achieving the goals of coastal zone management. Any comprehensive approach to coastal management in Canada will have to integrate these existing elements into a strategic action plan. The need for government involvement to resolve outstanding issues becomes apparent. Governments become involved in coastal management because of the need to maintain the bio-physical integrity of the resources at a national scale, and the inadequacy of the free-market system in such instances.

2.2.1 The problems facing Canada in implementing a coastal management plan

Hildebrand listed several reasons or problems associated with implementing a National Coastal Management plan for Canada. These may be summarised as:[14] Lack of agreement on a satisfactory definition of the coastal zone; political boundaries vs. ecological boundaries; coastal zone being treated as a common property resource; lack of awareness of coastal zone problems, and no clear motivation for a coastal management plan; administrative fragmentation, and lack of clearly stated goals; dominance of short term management over long term planning, due to inadequate information on which to base decisions; and finally running against political and economic currents.

2.3. Specific Examples of Tourism Coastal Development Management

Tourism development is invading the world coasts. In the next examples we shall focus on tourism as a worldwide coastal development activity, and end by discussing the existing situation of the Egyptian Red Sea coast.

2.3.1. The Spanish experience in dealing with sustainable tourist development

Few areas of the world have experienced mass tourism on the scale seen on the coasts of Spain over the past thirty years. Franco's " Plan Nacional de Establization" unveiled in 1959, established a policy of growth at any price, opening the floodgates on construction that has left the Spanish coastline ravaged by the concrete blight of short sighted development projects. According to A. Gamero,[15] the Balearic Islands, in particular Ibiza and Mallorca, have long been the favored destination of over 5 million sun seekers each year, and have some of the worst excesses of the tourist construction boom. However, their understanding of

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[14]ibid., pp. 26-36

[15]A. Gamero, " Legislation for sustainable tourism Balearic Islands", *Beyond the Green Horizon*, WWF, 1992, p. 49

"sustainable tourism", is quite surprising, as well as the passage of a series of laws by the Balearic Parliament in 1991, which have imposed sustainable new limits on further construction, and which marks a significant turning point in attitudes towards planning and conservation in a region renowned for its flagrant disregard for such concepts.

The rational principle behind the strict legislative constraints on development is to improve the quality of the "tourist product" which has deteriorated under the weight of over-construction. The consistent campaigning of a local environment group, (GBO), has been decisive in stimulating an environmental consciousness both within the Balearic government and amongst the population as a whole. Initial indications that change was on its way became apparent during the mid-1980s. Limits were introduced in 1984 requiring new developments to meet a minimum provision of 60 sq. meters per bed, subsequently increased to 120 sq. meters per bed in the following year. Despite these restrictive measures and the introduction, in 1988, of the controversial Ley de Costas legislation, prohibiting construction within a 100 meters protection zone adjacent to the sea, a group of enterprising government ministers decided the only way to ensure the long- term survival of the Balearic's tourism industry would be through the formulation and implementation of tougher legislation independent of the central authorities. So far their endeavors are proving to be relatively successful and most significant, the new measures have elevated the issue of environmental protection from the margins of debate to the top of the political agenda.

Legislation; Under the legislation, one third of Mallorca's surface area is now protected from future development.[16] Even land that falls outside the designated "protected areas" must comply with the 120 sq. meter per bed restrictions, thus preventing developers from exploiting those areas not encompassed by the new laws. The protective legislation itself is classified into three separate categories according to existing and future potential land use:

1. Natural areas of special interest, including those areas deemed to be of outstanding natural value and ecological importance.
2. Rural areas of scenic interest, including the primarily traditional land use activity, but still deemed of special scenic value.

[16]ibid., p. 50

3. Areas of settlement in a landscape of interest, including areas of a primarily urban nature although declared of an exceptional scenic value.

The implementation of the law; In these areas no new construction will be permitted except in cases of " Justified need" according to existing land uses, and public works on infra structure requirements. In the heavily concentrated areas of tourist construction, millions of pounds (£ 8 million in Magalluf alone)[17] are being spent on urban regeneration projects which include the demarcation of green zones and traffic free areas. Rigorous inspections have led to the closure of up to 250 hotels (primarily 2&3 stars). Others that fail to comply with the new standards will not be granted licenses to operate, but forced to close. This includes those buildings that fall within the 100 meters protection zone prescribed by the Ley de Costas. In the majority of cases the municipal authorities are responsible for the approval of building licenses, granting of permits and infrastructure provision. As a result they are empowered to decide alternative uses for those hotels forced to close down. Nevertheless, the public administration also recognises that on some occasions infrastructure deficiencies may require resources beyond the scope of these local authorities. In such a case the Balearic government has proposed to undertake a joint venture within the relevant municipal authority assuming 60 % of the cost of each project in accordance with the special plan for investment and improvement in tourist areas. Although new EEC directives in favor of consumers will increase the pressure for higher standards and tour operator liability, the Balearics legislation is far more comprehensive. Similarly the EEC directives recommend that a minimum of 7% of surface area must be protected from further construction, whereas in the Balearics approx. 35% of the surface area is already protected.

At a time when other parts of Spain, particularly the Costa del Sol, are still battling against the developers, the Balearic government has certainly proved far more progressive in attempting to demonstrate that mass tourism can play a more symbiotic role with the environment, natural and man-made. Despite opposition from landowners who felt that they stood to lose the most from building restrictions, the proponents of the legislation held the conviction that if something was not done soon not only would the islands' environment suffer further destruction, but the long term survival of an industry that is the life-blood of the island, would be severely at risk. The new legislation and the changing nature of tourist preferences is shifting the focus, albeit at steady pace, towards more sustainable forms of tourism in the

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[17]ibid., p. 51

relatively "undiscovered" parts of the islands, like the adventurous schemes encouraging more tourist involvement in preserving the natural environment, such as Earth Watch, who are encouraging visitors to spend time working and monitoring wildlife in the recently created wetland at Albufera.

However, there is still a degree of controversy and debate within the islands, particularly over the creation of the first national park in the Balearics, and plans to develop more golf courses on Mallorca. Many in the tourist industry feel that it is unfair to limit access entirely to the island, and that tourists are often held disproportionately responsible for the damage of the landscape.

Areas where similar legislation urgently needs to be applied are the over developed coastal regions and island destinations, where tourism is the dominant industry. Above all, such areas must realise, as the Balearics have done, that tourism can not destroy the environment without ultimately destroying itself, and must therefore learn to co-exist with the scarce resources upon which their very survival depends. A. Gamero summarises this phenomena by saying,[18]

> **"Many parts of the Balearic Islands remain untouched by tourism and thankfully under the directives of the new law will remain so. Five years ago it was inconceivable that environmental consciousness and restrictive legislation could exist in a region that had all but sold itself to the tourist dollar. The tourist product on offer is now changing in response to environmental concern, although some areas will still continue to cater for the sun, sea and sand market. The authorities feel that the Balearics have the capacity to absorb different types of tourism. Neverless capacity will be reduced at the lower end of the market and increased at the luxury end."**

2.3.2. Israel planning programme for coastal tourism

Tourism is an important sector of economic development in Israel. Foreign tourists to Israel totalled nearly 1.4 million in 1987, staying an average of 12 nights each, with an average expenditure of $790 per tourist. Development for tourism

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[18]ibid., p. 52

included 34,000 hotel rooms by 1986, largely concentrated in the urban centres as well as on the Mediterranean coastline (190 kilometres long).

The coastal region in Israel has received little attention by planners and policy makers during the last four decades. The region was considered a wasteland and part of a "desert" lying in the backyard of densely populated centres.[19] Coastal neglect resulted from a lack of clear authority over coastal resource use. Decision-making was decentralised among different agencies and ministries, was difficult to co-ordinate, and in some case limited in scope. For example, in the case of sea water pollution, existing laws limited enforcement to oil pollution only, and numerous plans were prepared independently by various interests, often for the same site. Plans for tourism, conservation, outdoor recreation, and for facilities to serve local or state-wide needs were prepared with little co-ordination. They were developed to achieve a narrow objective, often serving only a single interest. The coast as a resource region did not have an effective administrative identity.

Administration of the coastal planning programme

Reliance on the existing set-up was made possible by the selection of the Planning and Building Law of 1965 as the cornerstone of implementation strategy.[20] In addition to the regulation of land use, this law through its linkage to other laws, may be instrumental in pollution control and abatement of nuisances. It gives planning agencies the power to control development and land use activities. Israel's new physical planning programme is to be implemented by two agencies; the Planning and Building Commission and the Environmental Protection Service. They both have power to refuse or issue permits for any type of development.

Coastal management programmes

The guidelines of the Israeli programme were intended to protect coastal natural resources and environmental quality. It is stipulated that the use of the coast, as a fragile resource, is to be based on the capacity of its natural systems to withstand changes in their conditions without deterioration. This principle implies that the coastal land use programme did not have to supply all projected demands at any cost to the environment. To secure the conservation of coastal resources the plan defines a

[19]Shaul Amir, "Israel's Coastal Programme: Resource Protection through Management of Land Use", *Coastal Zone Management Journal,* Volume 12, Numbers 2/3, 1989, pp. 189-191
[20]ibid., p. 208

"coastal zone" and proposed uses for each section of the coast. It is an important contribution to the plan to have a legally binding definition of the coastal zone.

The boundaries of the coastal zone were decided on the basis of existing land forms, resources, activities and to a large extent on the existing conditions of land use.[21] Two sub zones were delineated for planning and resource conservation objectives. Plans were developed for a 100 meter wide critical zone near the water line and for a second sub-zone which constituted the remaining area beyond the first zone. In the beach zone, 190 km of the entire coast were designated for existing and new uses as follows: 98 km for bathing beaches, 30 km for nature reserves and National Parks, 15 km for ports and power generation and 47 km as beach reserve lands. The second sub zone beyond the tourist zone will include all other uses which were in existence before the plan was in preparation or for tourist and commercial facilities which support the activities proposed for the waterline (Figure 5.2).

The main principle adopted for resource management for tourism activities is that of "level of development".[22] The main determinant of the type of recreation experience is the level of the intensity of development of the site and its surroundings. For example, a natural underdeveloped swimming beach offers a totally different experience from an urban beach with multiple visitor facilities. Similarly, overnight accommodation at a village camping site is a different experience from accommodation in a central urban hotel, that is applying the carrying capacity methodology. Thus in the master plan, levels of development are defined according to the site capabilities. To minimise the amount of construction on beach land the guidelines direct the construction of most recreation related building activities to an inland zone. They also prevent development on the coast of new industry and power plants or any pollution generating activities, and set limits on the further expansion of existing activities. Any new development project is required to submit to the following in order to get approval for processing:

1. Refrain from construction within 100 meters of waterline.
2. Prepare an environmental impact statement for the area of the plan.
3. Adhere to design guidelines and present instructions to minimise or eliminate negative visual impact.

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[21]ibid., p. 199
[22]Israel National Planning and Building Board, *Israel Coastal Development Plan*, 1984, p. 23

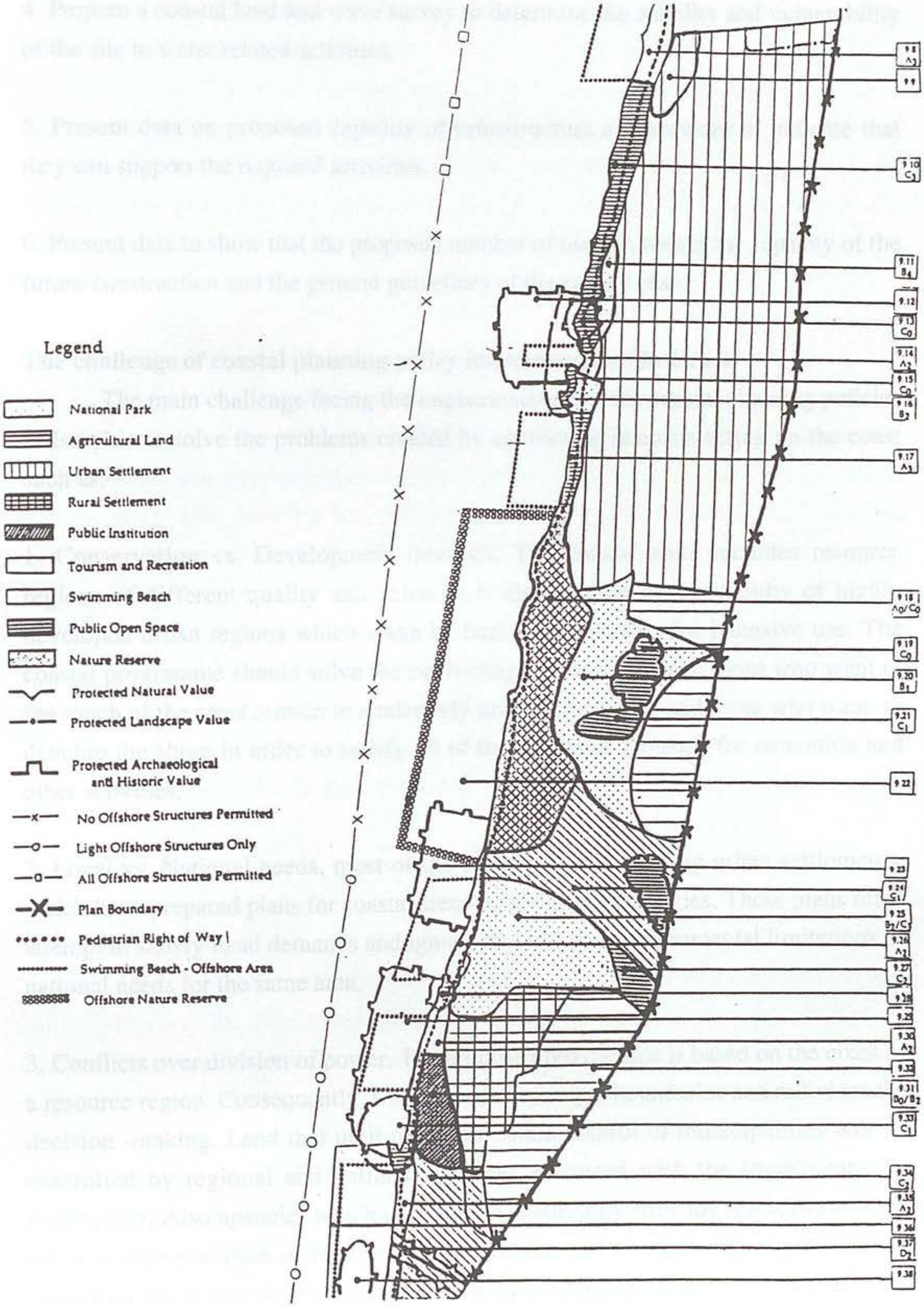

Figure 5.2: Israel coastal management programme. (After S. Amir)

4. Prepare a coastal land and wave survey to determine the stability and vulnerability of the site to water related activities.

5. Present data on proposed capacity of infrastructure and services to indicate that they can support the required activities.

6. Present data to show that the proposed number of users is within the capacity of the future construction and the general guidelines of the coastal plan.

The challenge of coastal planning policy implementation in Israel

The main challenge facing the implementation of the coastal planning policies in Israel is to solve the problems created by conflicting interests acting on the coast such as;[23]

1. Conservation vs. Development interests. The coastal zone includes resource regions of different quality and value. It is also located in the vicinity of highly developed urban regions which make its land more valuable for intensive use. The coastal programme should solve the conflicting interests between those who want to see much of the coast remain in a relatively undeveloped state and those who want to develop the shore in order to satisfy all of the available demands for recreation and other activities.

2. Local vs. National needs, most of the coast is within existing urban settlements, which have prepared plans for coastal areas within their boundaries. These plans often attempt to satisfy local demands and ignore physical and environmental limitations or national needs for the same area.

3. Conflicts over division of power. The proposed programme is based on the coast as a resource region. Consequently, it transcends municipal boundaries and redivides the decision -making. Land that until now was within control of municipalities will be controlled by regional and national agencies entrusted with the implementation programme. Also agencies which until now had authority over the sea because of its value as transportation or fishing areas would have to share it with environmental protection and conservation agencies, which have a broader approach to management of resources.

[23]op cit., Shaul Amir, pp. .216-219

3. Egypt's Coastal Planning Approach

The Egyptian government has recognised that its coastal zones were being degraded and damaged by improper use, and by the impact of pollution and neglect. In response to this, the government has started implementation of a national parks and protected areas system. The national law concerned with development and management of national protectorates, **law number 102**, was approved by the People's Assembly in June 1983[24]. The law, among other provisions, stated some rules and provisions, among them:

> **"The definition of the protected area its justifications and purpose. Designation and delineation of protected areas is to be declared through a decree from the Prime Minister, upon recommendation from the Egyptian Environment Affairs Agency (EEAA), and will forbid actions that will lead to the destruction or deterioration of the natural environment, or harm the biota (terrestrial, fresh water or marine), or which will detract from the aesthetic value of the protected area or its constituent elements. Governing activities forbidden outside the protected area within a definite perimeter, activities which could be more intensive than those within the protected area itself, but less intensive at any rate than those outside that perimeter, and will establishment of a special fund to be used in promoting protected areas."**

The only tool used in coastal development management programmes is acquisition and management through National Parks. The law has declared the areas that fall under the category of protected or national parks (Table 5.1). From the table we may see that Sinai has achieved 4 protected areas out of 13, while the Red Sea has only 1, which is the Elba mountain group. Sinai peninsula was the first to have an applied coastal management scheme while tourism was developing on its coasts. It might be of importance to compare how tourism development management is taking place in and out of the national parks in Sinai. Within the National Park the development is under the control of the Egyptian Environmental Affairs Agency, while the development over the Sinai coasts is carried through the Ministry of Tourism and the private investors under the control of local governments.

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24 All the laws in Egypt have to be approved by the People's Assembly which is equivalent to the Parliament in Britain. This particular law was submitted only in 1983 after Egypt had regained Sinai and discovered that the area of Ras Muhammad was already designated as a national park by the the IUCN.

Compared to the previous coastal management programmes, the Egyptian programme restricted its capabilities and tools into one aspect which is the National Parks. Increasing the number of tools that a programme can possess should give more flexibility in decision making and planning for environmental protection.

	Name of Protected area or Park	Nature of the area	Location
1	Ras Mohamed, Tiran and Senafir Islands	Marine National Park	South Sinai
2	St. Katherine	Natural and Cultural and Heritage site	South Sinai
3a	Lake Bardawil in the Zarancik Area	Migratory Birds Sanctuary	North Sinai
3b	Coastal Ahrash (El Arish to Rafah)	Terrestrial Birds and Mammals	North Sinai
4	Ashtoum El Gamil and Tannis Island/Lake Manzallah	Migratory Birds Sanctuary	Port Said
5	Omayed Area	Biosphere Reserve	Matrouh
6	Elba Area	Forests, Mangroves, Mammals	Red Sea
7	Salouga and Gazelle Island	Vegetation	Aswan
8	Lake Karoun and Wadi-el-Rayan	Bird Sanctuary, Mammals	Fayoum
9	Hassana Dome	Geologic features	Giza
10	Petrified Forest-ElMaadi	Petrified forest	Cairo
11	Wadi el Assiuty	Genetic Bank, Resource Replenishment	Assiut
12	Wadi el Allaqi	Vegetation	Aswan

Table 5.1: The declared "Protected Areas" in Egypt. (After EEAA)

3.1 Coastal Tourism Development Management in South Sinai

The Sinai peninsula separates two fundamentally marine basins.[25] The Gulf of Suez is a shallow body of water, in depth varying between 60 - 70 meters. The Gulf of Aqaba is a deep, narrow trench which prolongs the Red Sea rift valley and has a maximum depth of 1892 meters. Coral reefs have developed all around the peninsula, but while alluvial plain borders the southern part of the Gulf of Suez, the Gulf of Aqaba coastline is mountainous. On the Gulf of Aqaba side, the eastern Sinai shoreline is mostly very steep, often with rock faces plunging abruptly down underwater deep into the rift valley. Beaches are found only in pockets between rocky spurs and on the few alluvial fans of wadis. Ras Mohammad forms the southern tip of the peninsula. Ecologically the Gulf of Aqaba has high coral diversity, about 129

[25]See Chapter One for the physical features of Sinai.

species of hermatype corals and almost 120 species of soft corals[26]in addition to a wide range of fish species, which forms the major attraction for divers from all over the world. Also in the Nabq area, a large mangrove swamp extending for more than 5 kilometres.

Kathy Hansen described the landscape of the area by saying,[27]

> **" Ten years ago, the sand swept along a pristine coast. The shore gave way to a shallow fringing reef filled with tide pool life, its outer wall plunging 200 meters into the clear, indigo waters. The few settlements along the coast played host to scattered visitors, mostly divers who had heard of the wonders beneath the sea. The red mountains which thrust up through the sands lured those who wanted to keep their feet solidly on terra firma. The monks at St. Catherine contemplated their God with only an occasional visitor to walk around the walls and gaze at the icons. The Bedouins, since the area was littered with land-mines, from the Egyptian -Israeli wars, offered to guide visitors and supply camels for treks to the interior...........The Bedouins welcomed visitors into their homes and villages, or trekkers camped under the clear Sinai stars."**

These landscape potentials became a major economic factor. Accordingly, marine related tourism in the south Sinai area became rapidly one of the main economic resources of the whole country.

3.1.1 Evaluation of the state of present tourism development in South Sinai

The tourism development in the Aqaba sector can be divided into the following zones: Ras Mohammad to Nabq, Wadi Khabila to Nuweiba and Nuweiba to Taba (Figure 5.3). At present there are eleven existing hotels in the Sharm El Sheikh area with a further nine under construction. Total projected development foresees 40 hotels in this area. Dahab is an urban centre serving an important Bedouin population. The Bedouins have either remained isolated from tourism developments or have participate actively in their inception. Dahab is currently split into two development zones, the first controlled by Bedouin and outside operators catering primarily to the

[26]EEAA, *Environmental impact assessment for tourism development activities in south Sinai*, September 1990,p. 2
[27]Kathy Hansen, "Spoiling the Sinai", *Cairo Today*, April 1992, Vol. 13/4, pp. 71-76

backpacking tourist, and the second planned to consist of 3, 4 and 5 stars hotels. Taba has a Hilton complex, one hotel and an attached resort.

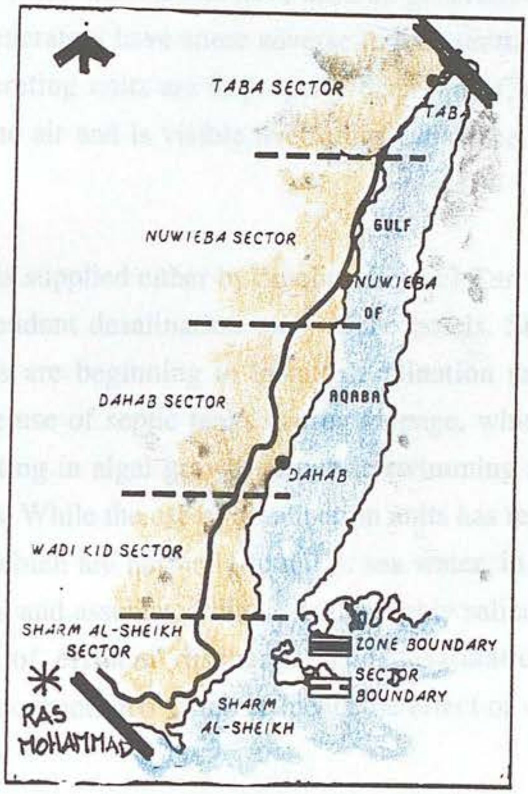

Figure 5.3: The South Sinai development sectors. (After TDA)

The impact and effects of the development can be summarised as follows:[28]

a) Sewage: The development and urban areas in Sharm El Sheikh are serviced by a centralised sewage system that transports waste to settlement and oxidation ponds located between Sharm El Sheikh and Naama Bay. The pipes leading from Naama Bay to the facility are undersize and as such the system backs up and frequently overflows causing localised beach pollution, smell and concomitant health risk as well as destruction of the marine ecosystems in the area. In Dahab, in spite of a centralised system leading to the settlement and oxidation pools that has been constructed, there is still visible evidence of seepage of sea water. As for the Nuweiba - Taba zone, there is excessive use of sewage sludge- which is toxic- as fertilizer without adequate isolation, putting public health at risk.

[28]op cit., EEAA, pp. 6-10

b) Electrical power: Most tourism developments are connected to a central generating facility which is currently undergoing maintenance and upgrading as the generating capacity is not sufficient to meet the rising demand. Power cuts are common, and as a result most hotels have back up generators to supply their essential systems. These generators have some adverse impact on the environment; the waste oils from all generating units are improperly disposed of, exhaust from the central facility pollutes the air and is visible over a great distance, and there is also a high noise level.

c) Water: Water is supplied either by pipeline from El Tur, by a central desalination unit, or by independent desalination units at the hotels. Shortages are common at present and hotels are beginning to install desalination units to supplement their requirements. The use of septic tanks causes seepage, which contaminate brackish water wells, resulting in algal growth in public swimming areas with an associated health risk to users. While the use of desalination units has resulted in high absorption of heavy metals, which are normally found in sea water, in higher concentration by invertebrates, coral and associated fauna, as the highly saline water is returned to the sea at the point of effluent discharge. The desalination units using thermal desalination have concentrated saline effluents the effect of which is compounded by lethal temperatures.

d) Solid waste (Garbage) disposal: Garbage disposal in the Sharm El Sheikh area is less than adequate. Since disposal is not centralised, private contractors dispose of refuse at the disposal site in a haphazard manner. At the disposal site garbage is sorted but not contained. Wind picks up loose items and distributes these over a large area. Considerable quantities impact on coastal areas resulting in visible coastal pollution. The situation in Dahab is no better than Sharm El Sheikh, as garbage disposal is all but non existent in Dahab. Levels of litter onshore and on beaches far exceed any other location in the Gulf of Aqaba. Reef areas are also covered by abundant litter that has resulted in increased coral mortality. In the Nuweiba to Taba zone, the disposal of domestic garbage is either by incineration or by dumping in Wadi areas some distance from each hotel. Neither of these is satisfactory. Although this does not pose a problem at present since all facilities have low occupancy rates, it will become more acute later.

e) Sociological effects: Social problems include displacement of local populations, and the values of those who displace them. There begins to be a conflict between traditional Bedouin land use practices and developers; also a loss of available grazing land and the right of free passage and a reduction in fishing grounds available to local fishermen. Public access to coastlines and diving sites has become very difficult for the native people. The loss of identity and culture of the Bedouins is reflected in a perceptible decrease in number of people wearing the traditional Bedouin costume.

f) General effects

Tourism development sites in Sinai are often improperly located and subject to adverse weather, sea conditions and tidal influence. All the sites in the line with the flood plain from the Wadi leading to Dahab require flood control measures to protect them during storm conditions. Also some of the sites do not have direct access to deep water, which means they start seeking land filling or solid structures.

Degradation of inland desert areas is caused through increased use (desert safari), quarry operations to supply building aggregates to construction sites, military operations, dumping areas. Tourist resorts construction sites cause air pollution through burning of tyres to melt bitumen.

Beaches become overcrowded, which affects the standard of the beach carrying capacity. The balance between man-made structures and the environment is extremely poor and some resorts use high walls around the developments, which interfere with , and prevent proper enjoyment of the coastal scenery.

In the previous article of K. Hansen, today's landscape is described as follows:[29]

> **"The government tourist village at Dahab has burgeoned and a plush Pullman now caters to beach buffs. Gone is Gafy Camping, replaced with rooms by the government order, and you must camp at safety land below the cliff at Sharm El-Sheikh..........The development has pumped a healthy flow of dollars and deutsch marks into the local economy, the new breed hotels are clean, and their service approaches that in other parts of the world............Nor are the corals the only victims of the flood of tourists. The monastery of St. Catherine hosts**

[29]op cit., K. Hansen, pp. 74-76

nearly 30,000 visitors a year........Garbage stands in piles across the desert floor, mute pyramids to man's appetites. The wind rips their plastic constituents and scatters them, festooning the acacia trees and blowing them into the sea where they stifle the reefs and wash up onto the beaches. Sewage from a leaking pipe pools behind the Gazala (resort) and runs directly towards the Hilton's desalination plant. The landscape is littered with skeletons of half finished hotels started and abandoned, testimony to the vagaries of finance..........Although the beaches are public land, access has been effectively closed. Soon, perhaps, diving will be reserved for the wealthy guests of the hotels.............More development seems inevitable. Gone forever are the days when a few hard-core divers lugged gear by bus and jeep to the premier diving sites of Sinai. Only time will decide if man can control development well enough to avoid ruining the spectacular beauty of the desert and the sea.........A decade ago, the Sinai was handed back to Egypt as a result of the Camp David accords. But are tourism and development spoiling the environment as war never did?"

We can conclude that the various aspects of recreation resource management are not applied in the implementation phase of the development process in Sinai and there is a general absence of adequate ecosystem management, defining ecosystems and their boundaries and determining possible effects of human use; hazard management, and the reduction of potential natural and man made hazards associated with recreation use; landscape management, designed to assess the visual impact of development on the aesthetic appeal of landscape; site management, manipulation of developed sites to maintain the quality of the resource setting and rehabilitate it where necessary and finally vegetation management practices related to the management of intensive use areas, such as roads, site developments and around water bodies.

This is the situation outside the boundaries of the National Park and of what may said to be under no environmental control or legislation.

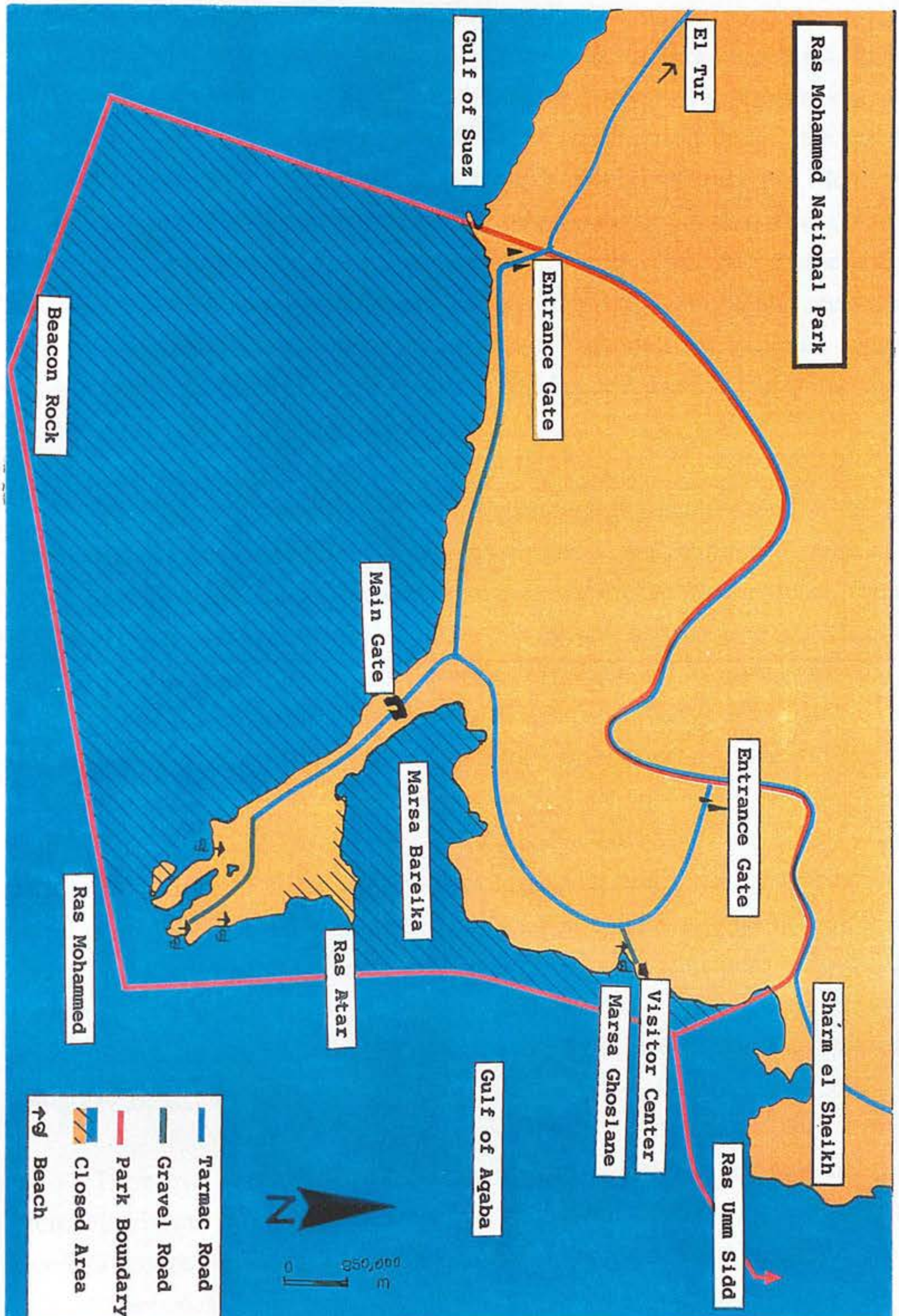

Figure 5.4: The boundaries of Ras Mohammad National Park. (After EEAA)

3.2 Management of Ras Mohammad National Park

Ras Mohammad National Park is located on the southern tip of Sinai (Figures, 5.4 and 5.5). The area was designed a national park in 1983 . The territories included in the park were declared by law 102 of 1983 and which clearly defined the activities that could be carried out within the protected area. During 1989 the Ras Mohammed protected area began a period of phased development and was classified a National Park. This designation is given to an area to "protect natural and scenic areas of national or international significance for scientific, educational and recreational uses".[30] The National park development programme seeks to strike an equitable balance between conservation and economic development while retaining the value of the park as a National Heritage area.

The Park contains examples of most geological features found in the south Sinai: uplifted coral reefs, alluvial plains, wadis, granite and sandstone mountains and dunes. Together, they contribute to create rich and varied desert ecosystems. The Park is fronted by the shallow (95m) Gulf of Suez to the west and the deep (1,800 m max.) Gulf of Aqaba to the east. Present coastlines were uplifted over long periods. The Park contains marine fossils ranging from 20 million to 75,000 years old. The latter can be seen as rocks close to the water. Most of these animals are still found on present day coral reefs. The Park contains representatives of all 1,000 fish species found in the Red Sea. The majority of fish species are closely associated with the coral reef and include the wrasse, grouper, snapper, butterfly fish, dam shellfish and parrot fish. These live and breed in the reefs. Other species such as, the shark, tuna, caranx and barracuda come to the reef to feed and also sometimes to breed. Also present and breeding are turtle species such as the hawksbill, the green and leatherback turtle. In addition to the above, the Park also contains a stand of the mangrove <u>Avicenia marina</u>.

Terrestrial habitats contain a large number of different animals and plants. More visible are birds both resident and migrating. Osprey (<u>Pandion haliaetus</u>) breeding groups are increasing in number. These are undisturbed on a section of the Gulf of Suez coast. Migratory birds of importance include the white stork (<u>Ciconia ciconia)</u> and the Black stork (<u>Ciconia nigra</u>) both of which are endangered species. Large numbers of raptors such as falcons, buzzards and kites follow these migrations.

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[30]EEAA, *Ras Mohammed National Park*, International press, Egypt, pp. 4-10

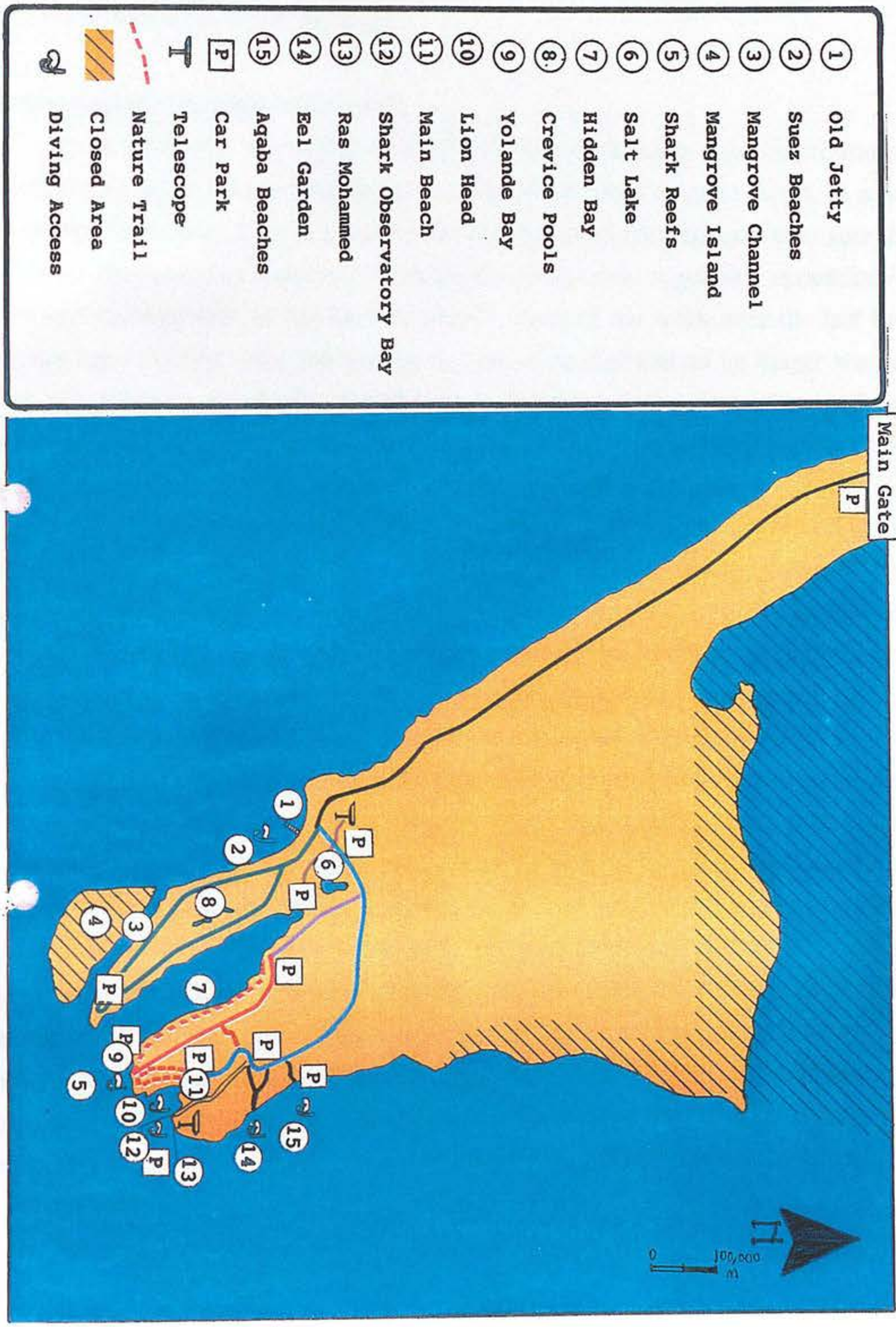


Figure 5.5: Detailed design of the National Park. (After EEAA)

There has been a large increase in bird numbers since the park was created, assisted by a complete hunting ban in the Sinai.

The management process of the park

As a result of increasing tourism in the south Sinai and international recognition as an area of outstanding beauty, Ras Mohammed is under threat. In order to encounter this threat, an area management plan has been implemented to ensure the survival of the resources contained in the park.(management regulation appendix F). Under the management of Michael Pearson[31], most of the work over the last few years has been discreet. Now the drilling rigs are controlled and oil no longer washes up on the beaches. Gradually the old oil is breaking down, but other garbage continually washes in from the Red Sea and requires monthly clean ups. But the effort shows results. Visitors now deposit their trash in the bins the park provides. The mangrove trees, their roots freed of trash, not only look healthier, but are increasing in number. The rangers have marked the roads unobtrusively with stones. Colour-coded arrows now direct visitors, helping them avoid unintentional detours, so that the visitors no longer have to feel their way across the sand and gullies, groping toward the dive sites and beaches. Due to the intensive diving activity, management policy extends underwater as well, where rangers have designed and signed under water interpretative trails. As on shore, park rangers are relegated to garbage collection, for the same trash which washes onto the beaches also snags onto the reefs. Installation of permanent anchors allowing dive boats to tie up without harming the sea bottom, and a limit of one boat per mooring controls the number of divers at a given area and helps minimise the diver damage to the reefs. The park has not more than half a dozen rangers, their job as well as looking after the park, is to teach the visitors how to deal with the corals and the vulnerable ecosystems of the area. The park, although not remotely qualifying as a national park, provides an example of how to build tourism associated activities without harming the environment along the coast. The park will also house a research centre, library and a restaurant, carefully designed to fit within the environment.

[31]Michael Pearson, marine biologist, a consultant expert to the E.E.C and is an advisor to the Egyptian Environmental Affairs Agency, (EEAA), which is in charge of managing the National Park

The successes of the Ras Mohammad National Park have drawn comment including an article by Kathy Hansen, who wrote an article about the issue in the Cairo Today magazine (one of the few English magazines published in Egypt).[32]

> **" Pearson's programme seems to be working. Foxes, ospreys and ibex have returned. Eels and sea turtles, now protected from human disturbance during breading and nesting, are increasing. It may be too soon to tell, but perhaps Pearson's vision of man's interaction with nature will work."**

3.3 The Duel between Development Authorities on Land Ownership and Development Processes in the Red Sea Region

Until 1991, all tourism development projects , were under the control of the local government of the existing settlements of the Red Sea region. The conflict between the tourism and petroleum sectors was also at its peak. Which sector was in charge of specific land depended only on the power of the Minister of each sector in the cabinet. This was due to the fact that the only law governing the ownership of the desert land **law number 7, year 1991** stated that the authorities which have the right to deal with any kind of activities concerning the desert lands are; the Ministry of Agriculture, the Ministry of Housing and New Communities, and the Ministry of Tourism. According to the law, the desert lands were defined merely as any land which is not suitable for agriculture and out of any city boundaries.

Accordingly, the Ministry of Tourism started forming the Tourism Development Authority (T.D.A), a project financed by the World Bank. Under the **law number 374, year 1991**, the main objective of the T.D.A is to help in marketing, and controlling development plans and facilitating the co-ordination between the various sectors involved in any tourism development schemes. The authority started directly listing the potentials of tourism development in various places all over Egypt. Concerning the Red Sea region, the authority started listing the sites which are under the control of the Ministry of Tourism, according to the **law number 173, year 1982**. These sites were not of interest to the Ministry of Agriculture, but still of concern to the Ministry of Petroleum. In June 1991, the Ministry of Petroleum called for international bidding for the extraction of petroleum between the various international petroleum companies (Figure 5.6). By June 1992, The T.D.A succeeded in reaching

[32]Kathy Hansen, " The Transformation of Ras Mohammad", *Cairo Today*, April 1992, Vol. 13/4, p. 77

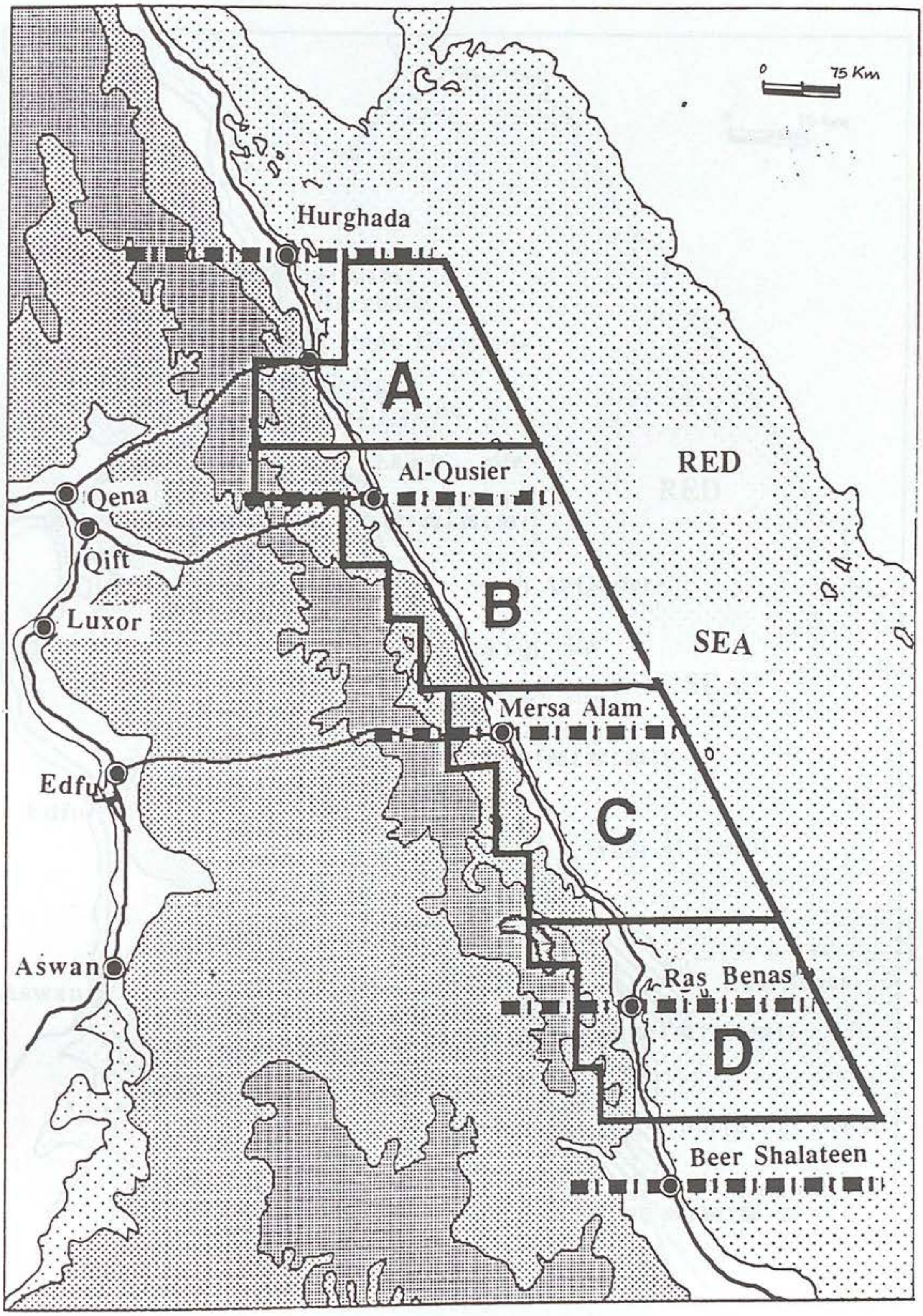


Figure 5.6: The sectors announced for international bidding for petroleum extraction by the Ministry of Petroleum, June 1991. (After TDA)

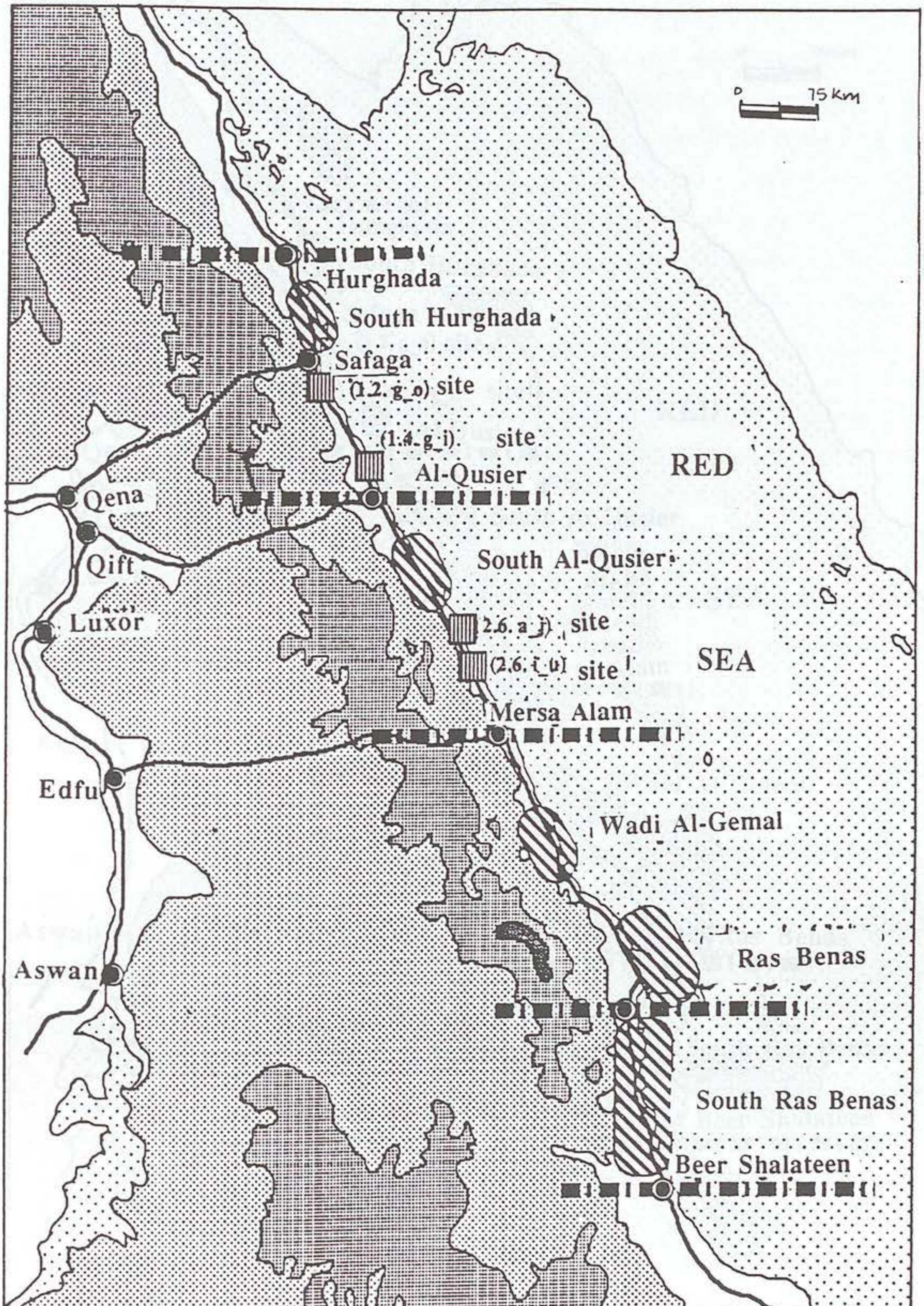
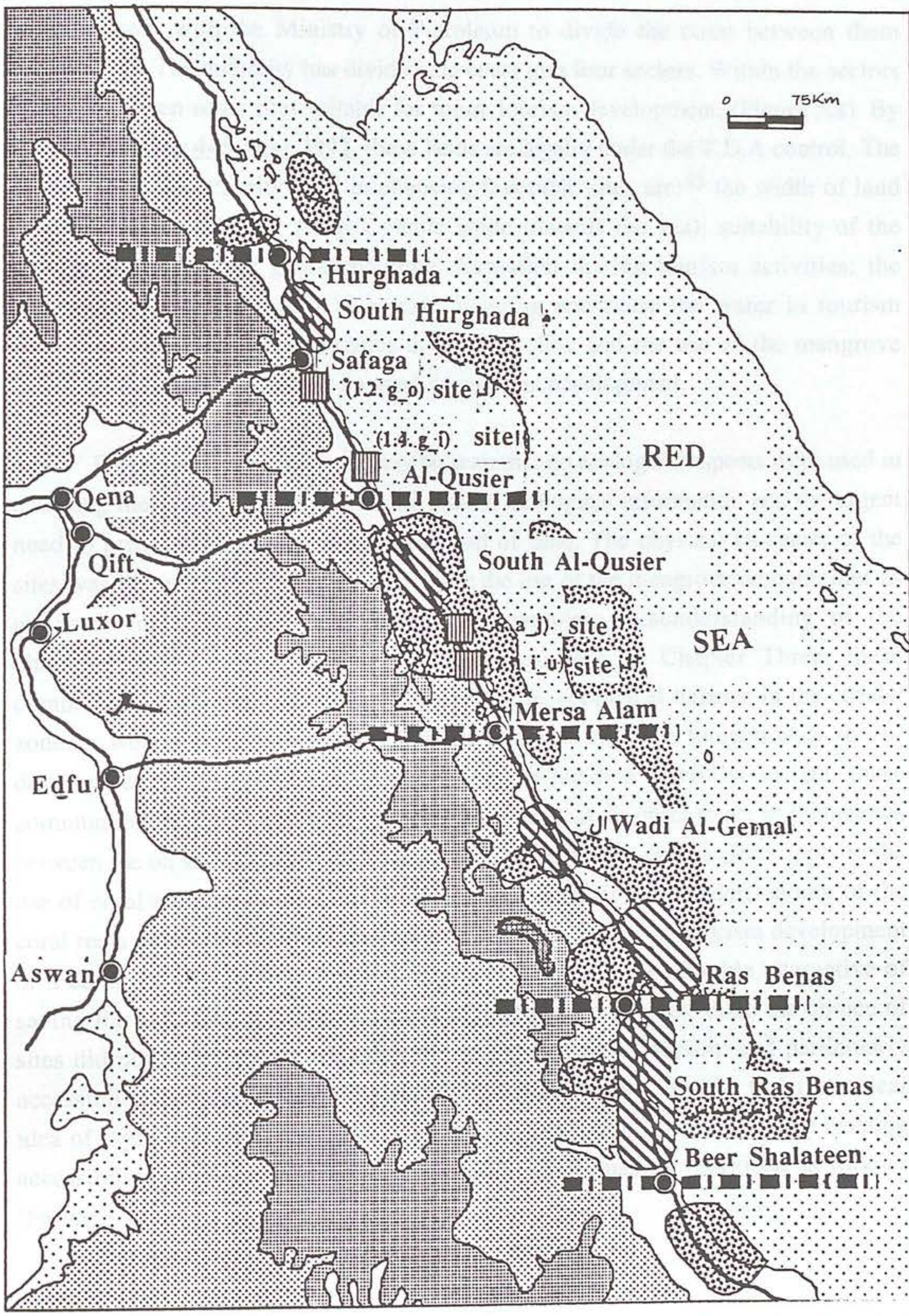


Figure 5.7: The chosen sites for tourism development by the TDA, June 1992. (After TDA)



Sites for Tourism Development Sites for Petroleum Extraction TDA Suggested

Sites for Tourism

Figure 5.8: The interference between tourism development and petroleum extraction. (After TDA)

an agreement with the Ministry of Petroleum to divide the coast between them (Figure 5.7). The authority has divided the coast into four sectors. Within the sectors they had chosen some sites suitable for future tourism development, (Figure 5.8). By the **law number 445, year 1992,** these lands are legally under the T.D.A control. The criteria that the authority used in choosing favorable sites are:[33] the width of land suitable for tourism use, (with a gentle slope towards the sea); suitability of the surface (top soil) and geomorphologic formation for the tourism activities; the drainage system; the power to control flooding and reuse the water in tourism activities; the visual characteristics of the shoreline and the use of the mangrove communities and coral reefs as an asset for tourism development.

From the above criteria, it may be seen that no ecological aspects were used in choosing the sites, probably due to the lack of ecological information and the urgent need to provide these sites in a short period of time. The physical character of the sites was the main element of choice, while the use of the mangrove communities as an asset for site development, shows a complete misunderstanding of the characteristics of these communities. As discussed in Chapter Three, these communities have many functions to maintain the ecological balance in the coastal zone, as well as their odor which might have adverse effect on tourism. Any sort of development near these communities should be handled carefully. In fact, these communities might be usefully used as conserved areas, in order to act as boundaries between the on shore stretches of tourism development. The same aspects apply to the use of coral reefs as a criteria of choice reflecting either a misunderstanding of the coral reefs properties and how they might be badly affected by tourism development or a complete understanding which means that this is the preferable alternative of saving the corals from being destroyed by petroleum activities. Also the choice of sites did not take into consideration the various needs of tourism; and particularly accessibility, infrastructure, and methods of transportation. In order to have a clear idea of these criteria in particular, we need to describe the situation of the existing accessibility and infra structure of the region, which may be described as follows (Figure 5.9).

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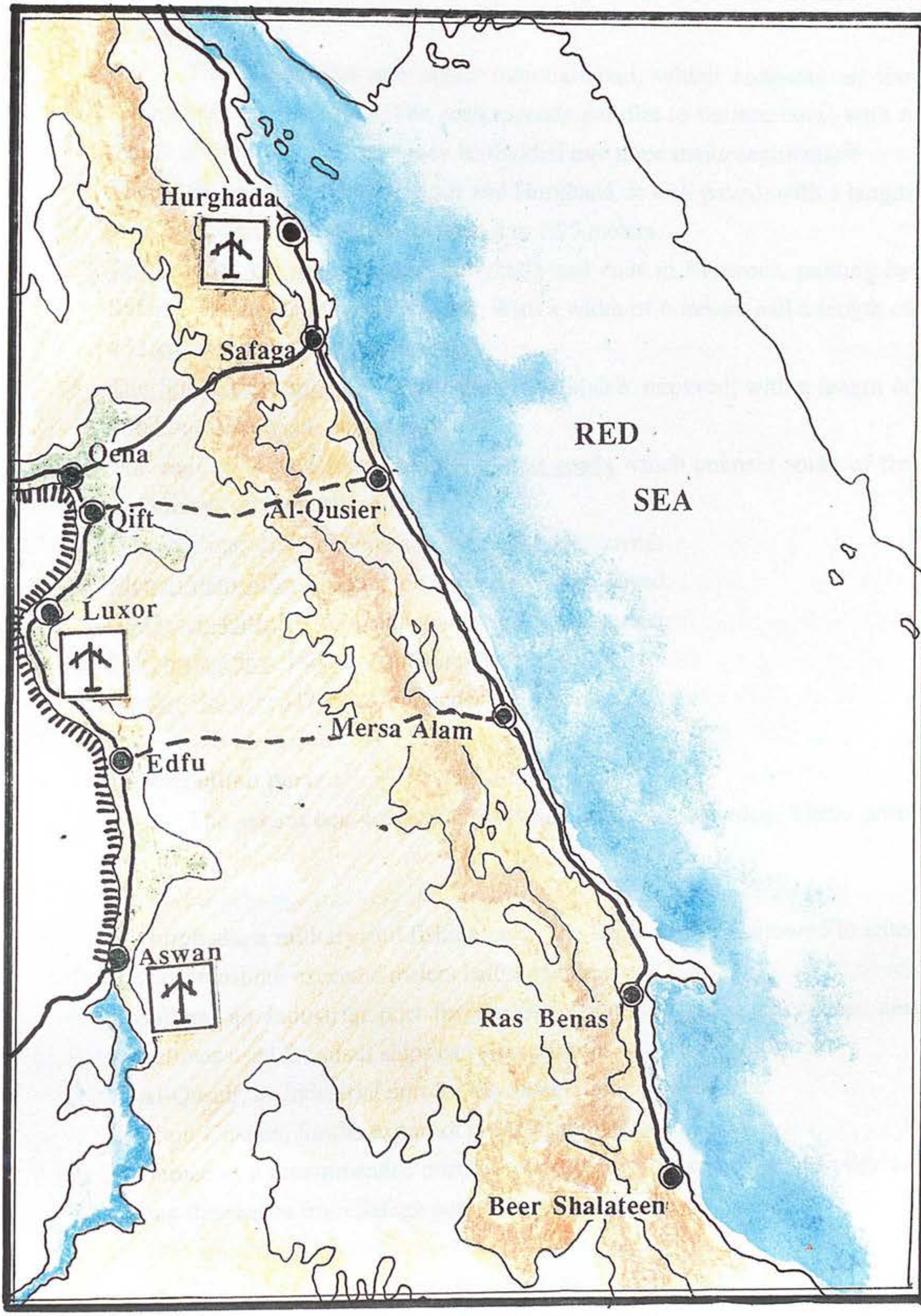
[33]Dr. Sameh Al-Alayly, *Tourism Development of the Red Sea Western Border Located Between the City of Suez and the Sudanese Borders,* (T.D.A), 1992, Arabic reference



Airport Regional Road Railway Unpaved Road

Figure 5.9: The Red Sea Region transportation network. (After Red Sea Governerate)

a) Road network

The region has one major national road, which connects all the settlements of the region. The road extends parallel to the sea coast with a length of 1100 km. The road may be divided into three major segments:[34]

The North segment, between Suez and Hurghada, is well paved, with a length of 275 km. and width varies between 6 to 7.25 meters.

The Middle segment, starts at Hurghada and ends in Berneece, passing by Safaga, Al-Quseir and Mersa Alam. With a width of 6 meters and a length of 452 km. Its paving conditions varies.

The Southern segment, from Berneece to Halaieb, unpaved, with a length of 380 km. and a width of 8 meters.

The region as well has some horizontal roads which connect some of the settlements with the Nile Valley:

Qina-Safaga, 160 km, long and 8 meters wide, paved.

Mersa Alam-Idfo, 220 km, long, 6 meters wide, paved.

Al-Quseir-Qift, 149 km, long, 6 meters wide, unpaved.

Hurghada-Qina, 180 km, long, unpaved.

Aswan-Halaieb 347 km, long, under construction.

b) Navigation ports

The region has 4 existing ports and one recommended. These ports are:

1. Hurghada, a military and fishing port. The depth of ships allowed to enter the port must not exceed 5 meters below sea level.
2 Safaga, an industrial port for the exportation of crude phosphate and sometimes used for small ships carrying pilgrims.
3. Al-Quseir, an industrial port for the exportation of phosphate.
4. Abou-Ghsoun, for the export of crude Eliminate ore.
5. Berneece, a recommended port, in order to absorb the pressure of pilgrims during the season from Safaga port.

The only two ports that can fulfill the tourism demands are Hurghada and Safaga, as they are well established with acceptable standards of facilities.

[34]Urban Planning Authority, *The City of Hurghada Development Plan*, 1991, p. 10

c) Airports

The region has only one civil airport, at Hurghada. It is the only airport which fulfills the international aviation requirements. It was redeveloped in order to be able to receive charter flights directly without the need to stop at Cairo airport (the trip takes 50 minutes from Cairo to Hurghada).

d) Railways

There is hardly any rail network except the industrial railroad from Safaga to Qina, which is only used to transport industrial goods from the mining areas. Considerable improvements would have to be undertaken in order to be considered an asset for tourism.

e) Infrastructure

The region suffers from the lack of infrastructure. The major problem is drinking water, as there is only one pipe-line Qina-Safaga, with a diameter of 200 mm. and which supplies the settlements of Hurghada, Al-Quseir and Safaga: all the other settlements depend on underground aquifers, and which are not satisfactory. There is no sewage system any where in the region, except small treatment small treatment plants and pits. For their electricity supply, most of the settlements depend on gas generators, however by the end of this year, the region should be linked with the national network.

In general the region is very deficient in services necessary to support tourism and has very poor access except in the north. The selection of tourism sites in the southern parts was therefore guided by political motives, to direct the private sector investments to the remote areas as a national objective, and also to stimulate decentralisation from Cairo.

In 1991, the T.D.A. started looking for sources of finance for the development projects in these areas. Fortunately, the World Bank agreed to support the introduction of infrastructure facilities in the area of the Hurghada-Safaga sector (about 65 km) which will contain 3 major tourism centres, with a total capacity of 50,000 rooms costing some 130 million dollars. In addition the TDA sold the sites of Sahl-Hashish and Ras Abu Soma as the first tourism centres to be established under the T.D.A's policies to private investors, who had already submitted a master plan for development of the area. Both sites will be discussed in detail in Chapter Six.

While the T.D.A continues its policies for marketing and developing the sites under its control, surprisingly the government has launched a new law concerning the boundaries and limits of the Red Sea region cities- which until now have been very flexible as they were not defined- **law 236, year 1993**. The law taking into consideration the proposal submitted by the secretary of the Red Sea governerate,[35] gave the cities boundaries and limits which vary between 240-270 km., (Figure 5.10). Applying this law, will be very complicated, as it means that the land ownership of the T.D.A is reduced to only 10 km between Hurghada and Safaga, 30 km, between Safaga and Quseir, and 20 km, between Quseir and Mersa Alam. This neglects completely the previous law of the division of sectors and choice of tourism development sites. In general, the length of boundaries of any desert city in Egypt does not exceed 40 km.

In order to understand the irrationality of such a law, we shall describe the main features of the existing settlements to show that there is no need to extend their boundaries to such limits.

3.3.1 The main features of the Red Sea Cities (settlements)

The settlements of the Red sea region may be classified into five categories according to their population number.[36]

1) Settlements with more than 10, 000 inhabitants, the city of Ras Ghareb north of Hurghada with a population of 14, 155 inhabitants and the city of Al-Quseir with 12,548 inhabitants. They represent about 48.18 % of the total population of the Red Sea region.
2) Settlements between 5 to 10, 000 inhabitants, represented by the city of Hurghada. Which forms about 14.12 % of the total population.
3) Settlements between 1 to 5,000 inhabitants, the majority of the Red Sea settlements fall in this category, Safaga 4,175 inhabitants, Hamatta 2, 209 inhabitants, Aum AL-Houitat 4,746 inhabitants, Al-Owaqa mine 1,822 inhabitants and Abraq 1,763 inhabitants forming 33% of the total population.

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[35] Abd Al-Rahmman Aql, " Haphazardness and tourism development" , *Al-Ahram International* newspaper, 22/4/1993, p. 4 (Arabic article)
[36] Egypt General Statistics, *Year Book*, 1986

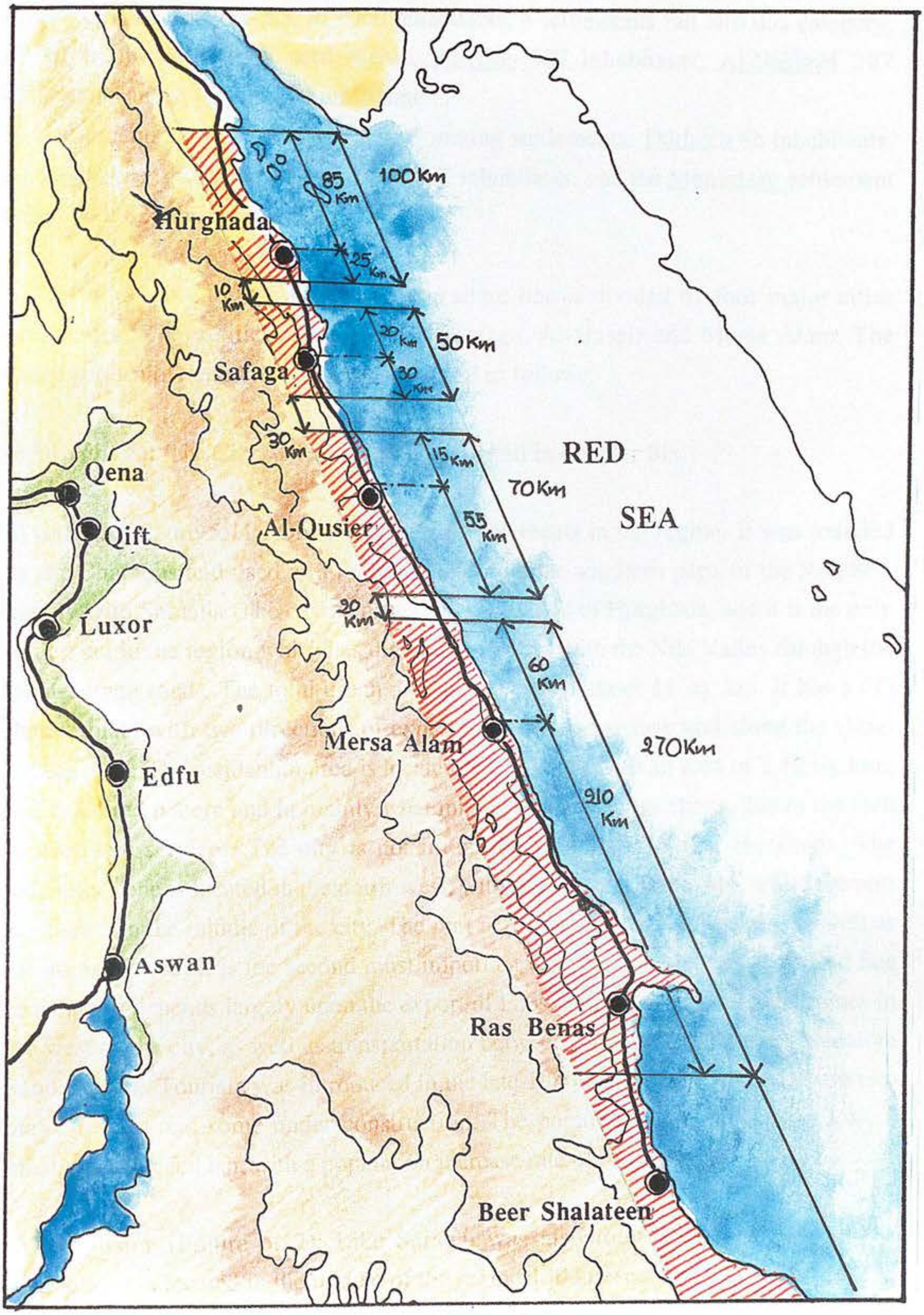

Figure 5.10: The new Cities boundary according to law 236, 1993. The depth of straight line forming the boundary ranges between 30 to 35 Km. (After Al-Ahram Newspaper)

4) Settlements between 500 to 1000 inhabitants, 3 settlements fall into this category, all of them are mining settlements, Al-Bida 907 inhabitants, Al-Nakheel 727 inhabitants and Al-Sakry 611 inhabitant.
5) Settlements up to 500 inhabitants, 3 mining settlements, Darheeb 86 inhabitants, Al-Fawakheer 49 inhabitant, Al-Atshan 77 inhabitants, and the Monastery settlement with about 82 inhabitants.

According to the law, the coastal shore line is divided by four major cities boundaries. These cities are, Hurghada, Safaga, Al-Quseir and Mersa Alam. The urban pattern of these cities may be described as follows:

a) Hurghada: The City will be discussed in detail in Chapter Six.

b) Safaga (Figure 5.11): One of the oldest settlements in the region. It was founded by the Pharaohs and used as a port for trade with the southern parts of the Red Sea, mainly with Somalia. The city is located 65 km., south of Hurghada, and it is the only settlement in the region which has direct connections with the Nile Valley through the Qina-Safaga road . The total urban area of the city is about 11 sq. km. It has a (T) shaped plan, with two directions of expansion; the coastal strip and along the Qina-Safaga road. The residential area is located in the south, with an area of 2.19 sq. km., in a scattered pattern and in mainly what might be described as slums, due to the lack of adequate services. The city is not in any better condition than Hurghada. The industrial zone is located in the north-west, with an area of 2,53 sq. km, while the port is situated in the middle of the city. The port is for international navigation as well as for domestic use. It is the second most important after Suez in the Egyptian Red Sea coast and it depends largely upon the export of Phosphate extracted from the mines in the west of the city, as well as transportation between Egypt and the port of Jiddah in Saudi Arabia. Tourism was introduced in the late 1980's to the city, and there are two major resorts and some under construction. The population density is very low, 5 inhabitants per feddan, with a population increase rate of 4% per year.

c) Al-Qusier (Figure 5.12): Like Safaga, was also founded in the time of the Pharaohs. It is located in the middle of the region 150 km south of Hurghada and 135 km north of Mersa Alam. It is semi connected with the Nile Valley by an unpaved 180 km road, between Al-Quseir and Qift. Like most of the coastal cities, it is narrow having a length of 9 sq. km. and a width 1.25 sq. km. The residential area represents

Figure 5.11: Showing the T-Shaped City of Safaga with the port. (After TDA)

Figure 5.12: Showing the City of Al-Quseir, pollution from the phosphate industry can be traced in the water covering almost all of the city's fringing reefs. (After TDA)

31% of the total urban area, with an area of 3.72 sq. km. The industrial area is located in the south, with an area of 2.16 sq. km. representing 18% of the total. The port in the north-east, is mainly an industrial one. The economic base of the city is phosphate and iron mining, as more than 55% of the population work in that sector. The illiterate make up 35% of the total population,[37] which is comparatively low compared with the other settlements. Like the other cities there is a deficiency in facilities and infrastructure.

d) Mersa Alam

According to the map of the law number 236 year 1993 (Figure 5.10), the boundaries of the Mersa Alam sector extends from the city itself to the southern parts of Egypt up to the Sudanese border. Within these boundaries four settlements exist, these are: [38]

1. Mersa Alam, which is an industrial settlement located 135 km to the south of the Quseir city, with 611 inhabitants, mainly working in the mining sector especially Alsakry gold mine.

2. Abou Ghosoun, which is a mining settlement , 83 km. to the south of Mersa Alam, with 2209 inhabitants working in the Hammatta mine for extraction of iron.

3. Berneece, a Bedouin settlement, located in the far south of Mersa Alam, 135 km. It is dominated by military camps, located at the Ras Banas headland facing Alzabargad islands, one of the best sites for tourism development in the whole Red Sea region.

4. Mersa Halaieb, which is a very small village, with a population of some 150 people, mostly of Sudanese origin. It is located 260 km away from Berneece to the south on the southern wadi of the Elba mountains national park. The area is now under scrutiny, as it is the major point of conflict between the Egyptian and Sudanese governments as it being located on the border between the two countries.[39] It's only connection with Berneece is an unpaved road.

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[37]ibid., p. 34

[38]It was very difficult to find maps or take photograps for this sector because of the existance of military camps in this area in particular along the coast.

[39]The issue of Halaieb started after the separation between Egypt and Sudan by the British government during the occupation. This conflict is never raised when the relationship between the two governments is harmonious, but whenever conflict breaks out the Sudanese government claims it's right to have the area within its borders.

From the above description of the settlements and their conditions, we may observe that they do not need any extension of their existing boundaries because even in the long term the rate of expansion of these cities will never reach an extent of over population and crowdness at present rates. This may prove, that Law 236 (1993) does not have any planning grounds for extending the cities limits but is the result of a political decision. The battle for land ownership will never stop as long as there is a conflict between personal and national interests. If these lands are owned by the cities, this means that all the profit from selling and maintaining will be directed towards the local government, which stands to gain. But, if the tourism development authorities are in charge of developing the land, possibly the benefits form the selling and maintaining will be divided among the local government and the Ministry of Tourism, so at the end it is a struggle of power between two governmental bodies.

4. Concluding Discussion

This chapter has highlighted some of the coastal management schemes worldwide as well as those of the Egyptian Red Sea coast. The coastal schemes of such countries were chosen because they all have different decision making systems which affect the application of the management process. The American management system is a combination of a centralised and a decentralised decision making system represented by the Federal government and the local state governments. The coastal management programme success is a reflection of high levels of public understanding from vociferous and well organised power groups:the implementation of a wide range of tools; regulation by permit; zoning and subdivision laws; comprehensive and specific planning; acquisition of land; and formal and informal negotiation among affected parties which has given the decision makers more flexibility to apply environment/ development balanced schemes.

Although Canada's governing system is similar to the U.S.A it has not achieved a successful coastal management programme. Lack of knowledge has played an important role in the failure of coastal schemes, as a clear definition of the coastal zone was not reached from the beginning. Such failure in having a well defined coastal zone was backed by administrative fragmentation and a struggle over land possession with no respect to ecological unity.

Spain is one of the countries which relies on tourism as an important source of the national income, and thus is keen to provide an up to standard 'tourism product'.

The success in applying a coastal management plan in the Balearic islands came from the unification of interest between the government and the public, reflecting once again the importance of the high level of awareness about 'sustainable tourism' among all levels, that is, public, private, government and common people to apply a well managed coastal development programme.

The coast line of Israel is a very valuable long term resource because of its very small length. The central government tried to structure an environmentally friendly coastal plan by trying to integrate development and conservation. But for the struggle for administrative power, the battle between development and conservation interests, and the opposition of national needs to local needs have all been obstacles against the progress of coastal management plans.[40]

Egypt's experience with coastal planning programmes is relatively recent, and started only in the early eighties. As mentioned in Chapter Three, the Egyptian definition of the coastal zones must be changed in order to have a broader perspective in confronting coastal planning problems. Despite the fact that the only tool used by the coastal planning programme is 'National Parks', it has proved to be effective in managing the natural resources along the Sinai coasts. In spite of this the situation on the Red Sea is depressing. Conflicts over land ownership and power are the main features of the coastal management process. There is no clear motivation for a coastal management plan, because of the lack of knowledge about coastal zones problems. Decisions are based on inadequate information leading to the dominance of short term plans which lack sustainability.

There are situations where only government intervention can resolve user conflict in the coastal zone, particularly where the resolution of such conflicts can not be based on a compromise between the parties involved. Procuring long term solutions to the problems in the coastal zone is highly dependent upon an adequate understanding of the physical and biological systems involved. A lack of knowledge of the dynamic forces acting between land and water can lead to wasteful actions resulting in only short term solutions. In the Red Sea case there was seen to be an urgent need for government intervention to end the struggle which has been going on between the various parties involved in coastal development. The Israeli case was

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[40]While evaluating the coastal management plan of Israel we have to consider that the area is a 'War Zone' and politics plays an important role in stating the priorities for either development or conservation.

seen to be very similar to the Egyptian, in facing almost the same problem of conflict over the decision-making and power to develop the coast.

Such then is the coastal development of the Egyptian Red Sea at the present time. Chapter Six (the case study), will discuss and evaluate coastal tourism development in the Hurghada tourist centre. Development here was done through the local government in co-operation with the Ministry of Tourism. Chapter Six will also evaluate the Sahel Hasheesh and Ras Abu Soma tourism communities development master plans, which are examples of another method of coastal development through the private sector. It will focus on the impact of the on going development in Hurghada and the future expected development upon the environment.


MEDITERRANEAN
SEA
EGYPT
Al Iskandariyah
Al Qahirah
Giza
Port Said
Ismailiya
Suez
Beirut
LEBANON
JORDAN
Siwa
Siwa Oasis
Bawiti
Farafra
Dakhla Oasis
Mut
Al Kharga
Asyut
Sohag
Luxor
Aswan
Abu Simbel
Wadi Halfa
Hurghada
Port Safaga
Quseir
Al Wajh
Tabuk
Gulf of Aqaba
Gulf of Suez

CHAPTER SIX

CHAPTER SIX

TOURISM Vs THE ENVIRONMENT: A STUDY OF THE IMPACT OF TOURISM DEVELOPMENT ON THE COASTAL RESOURCES OF THE HURGHADA DISTRICT

" One of the penalties of ecological education is that one lives alone in a world of wounds, much of the damage inflicted on the land is quite invisible to laymen. An ecologist must either harden his shell and make believe that the consequences of science are none of his business, or he must be the doctor who sees the marks of death in a community that believes itself well and does not want to be told otherwise."

Aldo Leopold, Round River[1]

The main objective of this chapter is to focus by example on the tourism development process and its various impacts on the environment of the city of Hurghada and its coastal zone. The chapter is divided into three parts; the first gives a descriptive study of Hurghada city's general features; the second deals with the tourism developments represented by the coastal resorts and their different impacts on the various ecosystems of the zone; and the third gives a description and analysis of future tourism developments on the coast between Hurghada and Safaga represented by Sahl-Hasheesh and Ras Abou Soma tourist communities south of Hurghada.

[1]Ehrlich, Paul R., *Ecoscience*, W. H. Freeman and Co., 1977, p. 247

The choice of Hurghada

Tourism development in the last two decades has been growing rapidly on the borders of the Egyptian Red Sea Coast, both on the borders of the Sinai peninsula and the western Red Sea borders. The case study area was chosen for several reasons. Firstly, tourism development in Hurghada has been taking place for the last twelve years, with a noticeably fast rate of development. Secondly, Hurghada is a very typical case of poor planning with even the EEAA commenting on it as follows:[2]

> **" It is difficult to imagine that in the last quarter of the 20th century, given the wealth of information readily available concerning resort planning and development, that Hurghada has become what it is. Hurghada could easily become a classic case study of poor planning, coastal management and destruction. Sustainable development policies and environmental protection measures are conspicuous by their absence."**

Furthermore, the development in that area has been done through the local government authorities and under the supervision of the Ministry of Tourism that is, in effect under the control of the Egyptian Government. A Sinai rather than a western Red Sea case study would have involved political considerations, as much of the planning here was done under Israeli supervision. Hurghada also offered the advantages of its size over those of Sinai, and also a rapidity of development freed from political constraints which still affect Sinai.

Procedure of the study

Tourism has a potential for both good and bad. The World Tourism Organisation in 1983, identified five situations where tourism might harm the environment, these being:[3]

a) alteration of the ecological situation of regions where the environment was previously in good condition both from the natural, cultural and human viewpoints.

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[2]EEAA, *Environmental impact assessment for tourism development in the South Sinai and the Red Sea*, September 1990, p. 20

[3]Ryan, Chris, *Recreational tourism, a social science perspective, Routledge*, 1991, p. 104.

b) speculative pressures leading to destruction of landscape and natural habitat.

c) the occupation of space and creation of activities producing irreconcilable land-use conflicts.

d) damage to traditional values in the zones concerned and a lowering of standards on the human scale in existing developments.

e) progressive over-capacity, which drains the environmental quality of the area concerned.

There are at present mainly two procedures for examining the relationship between tourism and the local environment. The first; is the study of the "carrying capacity", in terms of ecological issues. The concept has attracted much attention, holding out, as it does, some notion of being able to measure the ability of an area,for example to sustain a given number of tourists without posing a threat to ecological or social systems. The process of measuring the carrying capacity as described by Showman was previously discussed and as mentioned before, so complex is the measurement of carrying capacity in a country like Egypt -where adequate data is very hard to get- that an alternative approach might be required.

The second procedure is the undertaking of an impact study, although it might be said that such studies are often complementary to, and not alternative to, those of carrying capacity. The idea behind impact studies is to examine development projects with the purpose of identifying the potential environmental impact. Having identified such impacts, the initial proposals may then be modified to minimise the negative impacts.

The main constraint in adopting the "Carrying Capacity" approach at Hurghada was a lack of available data on the number of tourists coming to each resort separately. Ecological information about the area is also very primitive, and unhelpful in applying the models of carrying capacity. Ecological reports were very fruitful in the period of the fifties and mid sixties, through the work of Dr. Al-Kassas and others. But after that, because the area was considered a front line zone during the Egyptian-Israeli war period

(1967- 1979), very little was achieved. Another important constraint on such study was the length of time needed, and which might extend to more than five and perhaps to ten years. The second approach is therefore used in this research.

The decision to study the impact, rather than the carrying capacity was also because it can be traced relatively directly through personal observation. Observation of impacts used in the study depended mainly on personal observation and interviews, with the help of a questionnaire in listing the sociological impacts of tourism, and also data drawn from some of the reports submitted to the World Bank for financing. During a three year search for other reliable information about the area, very little was found due partly to the defensive attitudes of those promoting the tourism but also lack of public interest and lack of funds to support useful environmental research.

The field work for studying tourism impacts was divided into the following stages:

1. The first visit was in July-August 1992. During that period, meetings with officials in charge of the planning and tourism development were held, as well as a visit to the site, where observations and interviews were made with some of the planners in the local government.

2. The second visit was in August 1993, to provide an opportunity for discussions with people responsible for the decision making process such as, the Minister of Tourism, The Chairman of the EEAA, Consultants of the T.D.A, Owners of some tourist resorts in Hurghada, and also The Secretary of the Red Sea Governerate. Evaluation of the development process was done on site during a three weeks visit to the city of Hurghada. Personal interviews were arranged with some of the people working in the tourism development process, such as site managers, architects, travel agencies, shop owners, as well as some of the local people of the city, in order to have a clear understanding of the general impacts of tourism on the city of Hurghada.

1. The General Features of the City of Hurghada

The city of Hurghada has undergone considerable development, particularly in the last few years. Increasing tourism has been the mainstay of development, making it the capital of the Red Sea governerate and the most important tourist centre in the whole region. Hurghada is attractive to both local and international visitors. Seasonal variations exist; local tourists predominate in summer (May to October), during annual holidays.

There is an emerging new social class in Egypt which has come to adopt some aspects of the western life style. One aspect of this life style is week ends or long week ends out of town, which have become commonplace for the upper and upper middle social classes. The Northern coast and the Mediterranean sea has already preceded the Red Sea in providing resorts for this purpose. The Red sea and Hurghada in particular is currently more fashionable.[4] Egyptian tourists therefore visit Hurghada throughout the year. The school mid-year holiday in January may become a busy period. Some Egyptians own private villas, whilst others stay in hotels. For the foreign tourist, the demand is stronger in winter than summer because the warm climate of the area attracts tourists from colder countries. The Red Sea area is also increasingly included in tourist packages to Luxor and Aswan.

The city of Hurghada is located on the western coast of the Red Sea. It is situated between The city of Suez 391 Km to the north and the city of Safaga 61 km to the south. Its eastern and western boundaries are the Eastern desert, (the Red Sea mountains) and the Red Sea. According to the latest law 236/1993 the total area of Hurghada is 150 sq. km, while the area under development is only 22 km. The city is located in a coastal wadi, which varies between 8 - 25 km in width. The city extends longitudinally between two limestone plateaus, the eastern one between the city and the shore, reaches about 55 meters high, while the western reaches 41 meters. The soil is mainly limestone, in spite of the wadis, as the soil is sandy. Hurghada's climate is affected by the general features of the Eastern Desert, as mentioned in Chapter Two, and evaporation exceeds rain fall. Air currents from the sea affect the general temperature of the city and help in cooling it during most of the winter period.

[4]E.C.G Engineering consultant group, "South Hurghada, Sahel Hasheesh and Ras Abou Soma water, waste water and solid waste facilities", Environmental assessment, May 1992

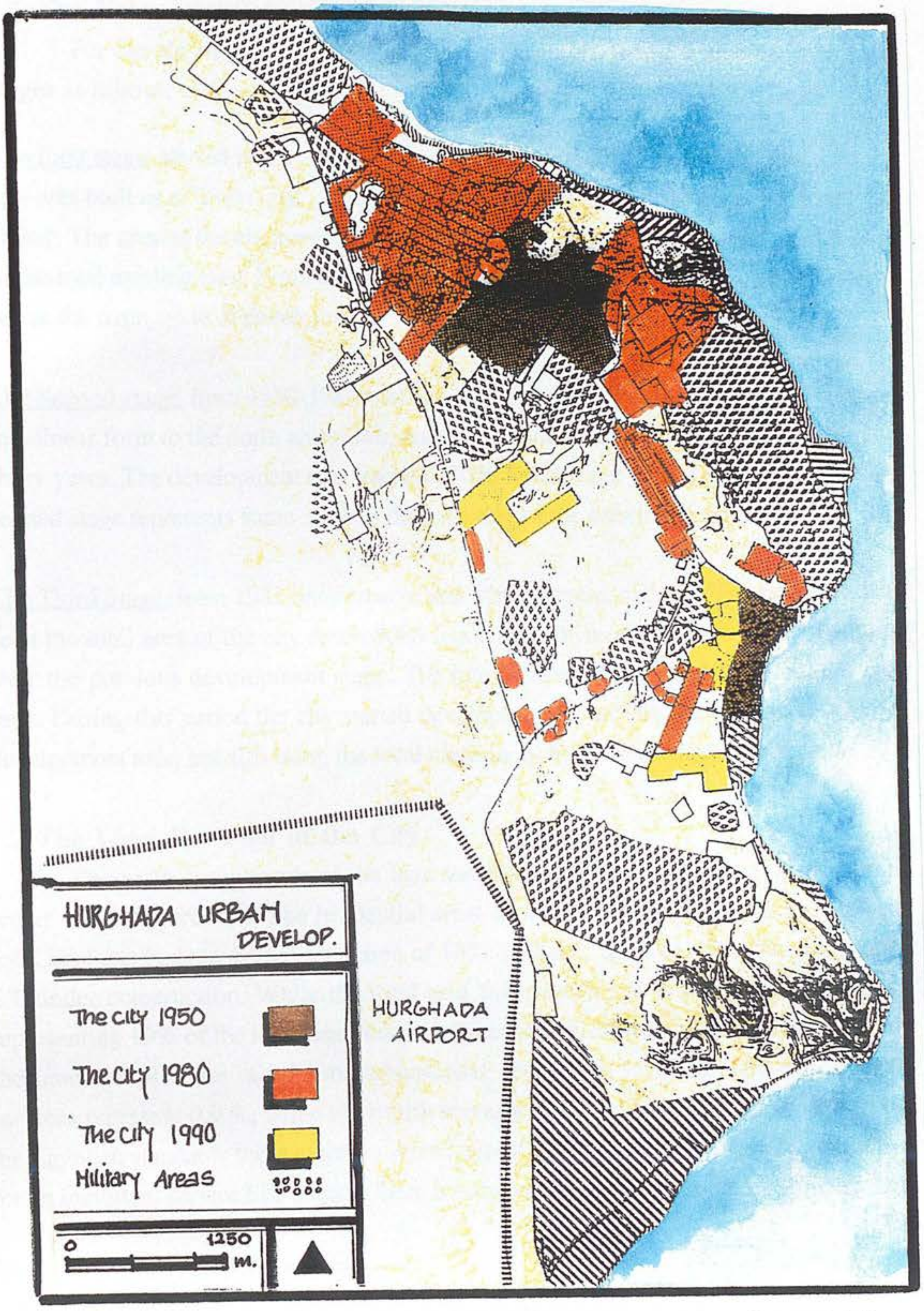

Figure 6.1: The urban development of the city of Hurghada. (After Ministry of New Communities)

1.1 The Urban Development of the City

For convenience, the evolution of the city of Hurghada may be divided into three stages as follows: (Figure 6.1)

The First stage, started in the early 1900's and extended until 1950. During this time the city was built as a "Twin city", divided into two main zones, Almina (the port) and Al-Dahar. The area of development at that stage reached about 495.5 feddans[5], about 22% of the total existing area. From Figure 6.1 it may be seen how the city was related to the sea as the main spine of development.

The Second stage, from 1950-1981 was one in which the city extended during this time in a linear form to the north and south, reaching a total area of 722.2 Feddans in almost thirty years. The development rate reached 73000 feddans per year. The total area of this second stage represents some 32 % of the total area of the existing city today.

The Third Stage, from 1981 until present and which we can call the "Tourism era", has seen the total area of the city reach 8086 feddans, with an increase of 7363,8 feddans over the previous development stage. The rate of development is 69000 feddans per year. During this period the city started developing not only on the old North - South development axis, but also using the local roads as an East - West development axis.

1.2 The Land Use Plan of the City

The main components of the land use plan of the city are the residential and resort areas (Figure 6.2). The residential areas as of 1993 represent some 16% of the total land use budget, with a total area of 1331 feddans, 10 % existing dwellings and 6% under construction. While the total area for tourism use is about 1528 feddans, representing 19% of the total land budget.[6] Other activities, which represent the rest of the land use plan are mainly the educational and health services. The educational services represent 0.9 %, while the health services represent 0.2 %. Even according to the Egyptian standards these numbers show , a lack in such services in the city, specially for an important service like Health (there is only one hospital in Hurghada) which is an

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[5]One Fadden is equal to 4200 square meter.

[6]Due to changes occurring in the laws dealing with the city boundaries it is very hard to estimate the real figures, but definitely the tourism area according to the new law, as well as Hurghada -Safaga coastal development plans, will exceed this number and will represent more than the figure mentioned.

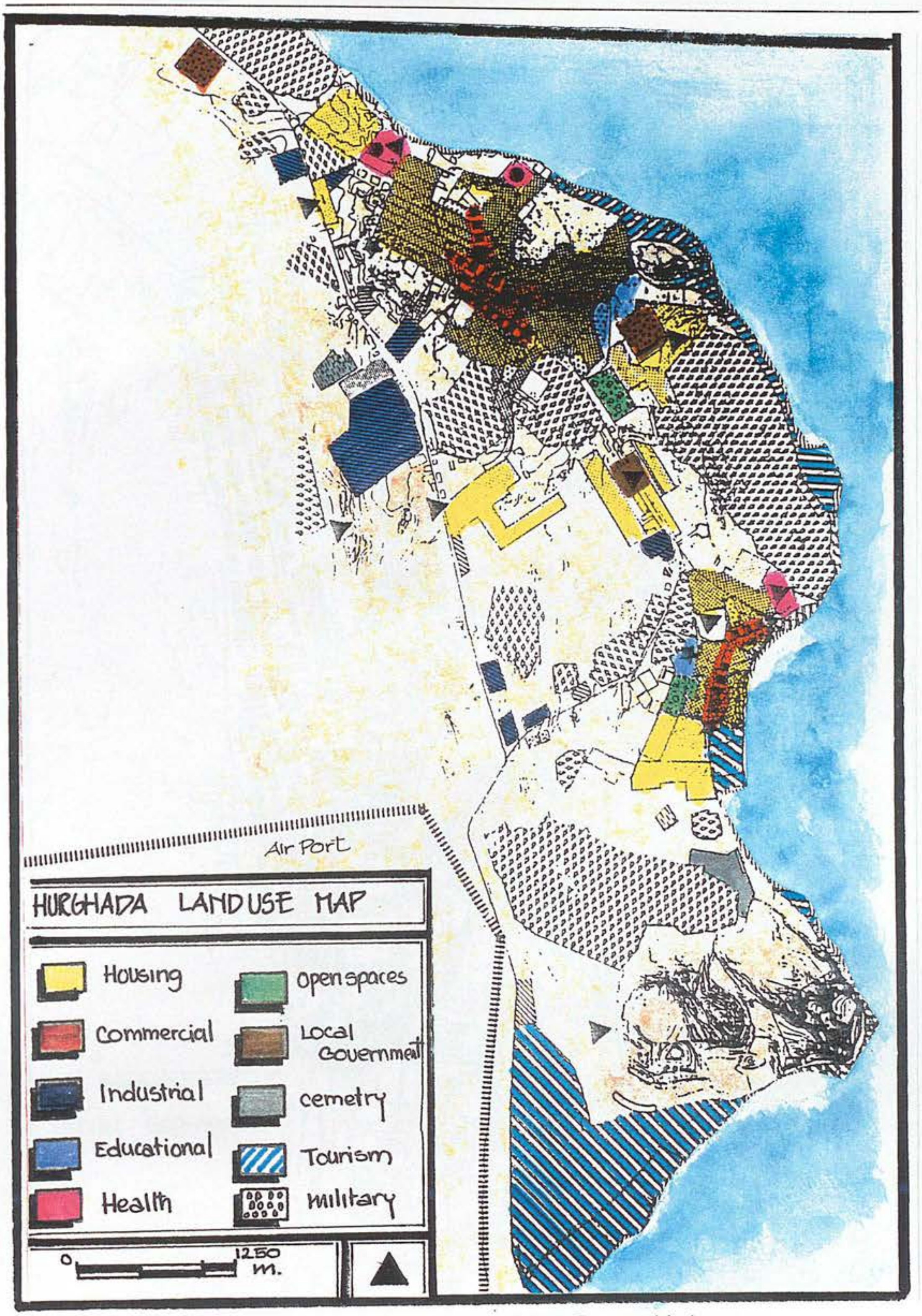

Figure 6.2: Land use map of Hurghada. (After Ministry of New Communities)

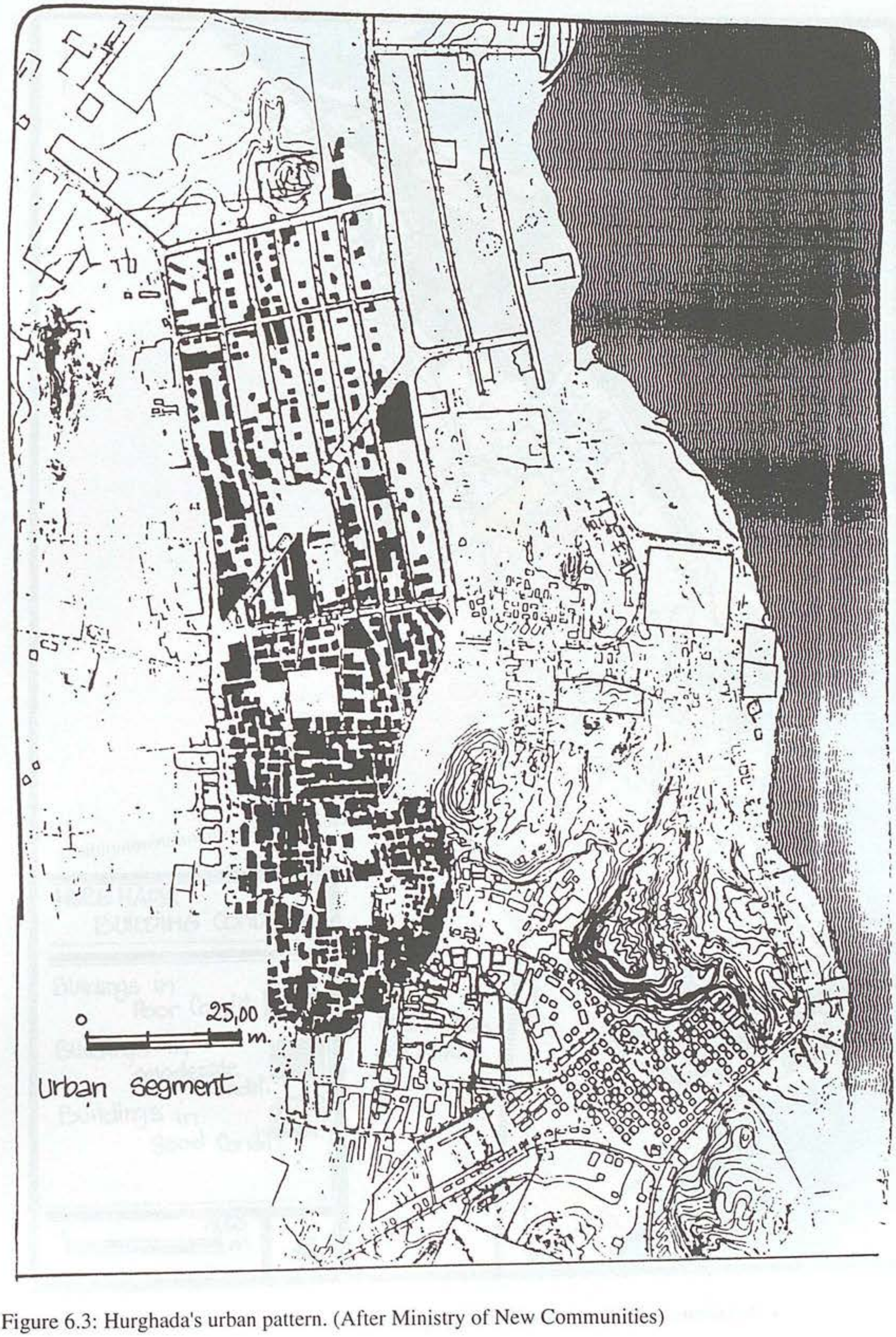

Figure 6.3: Hurghada's urban pattern. (After Ministry of New Communities)

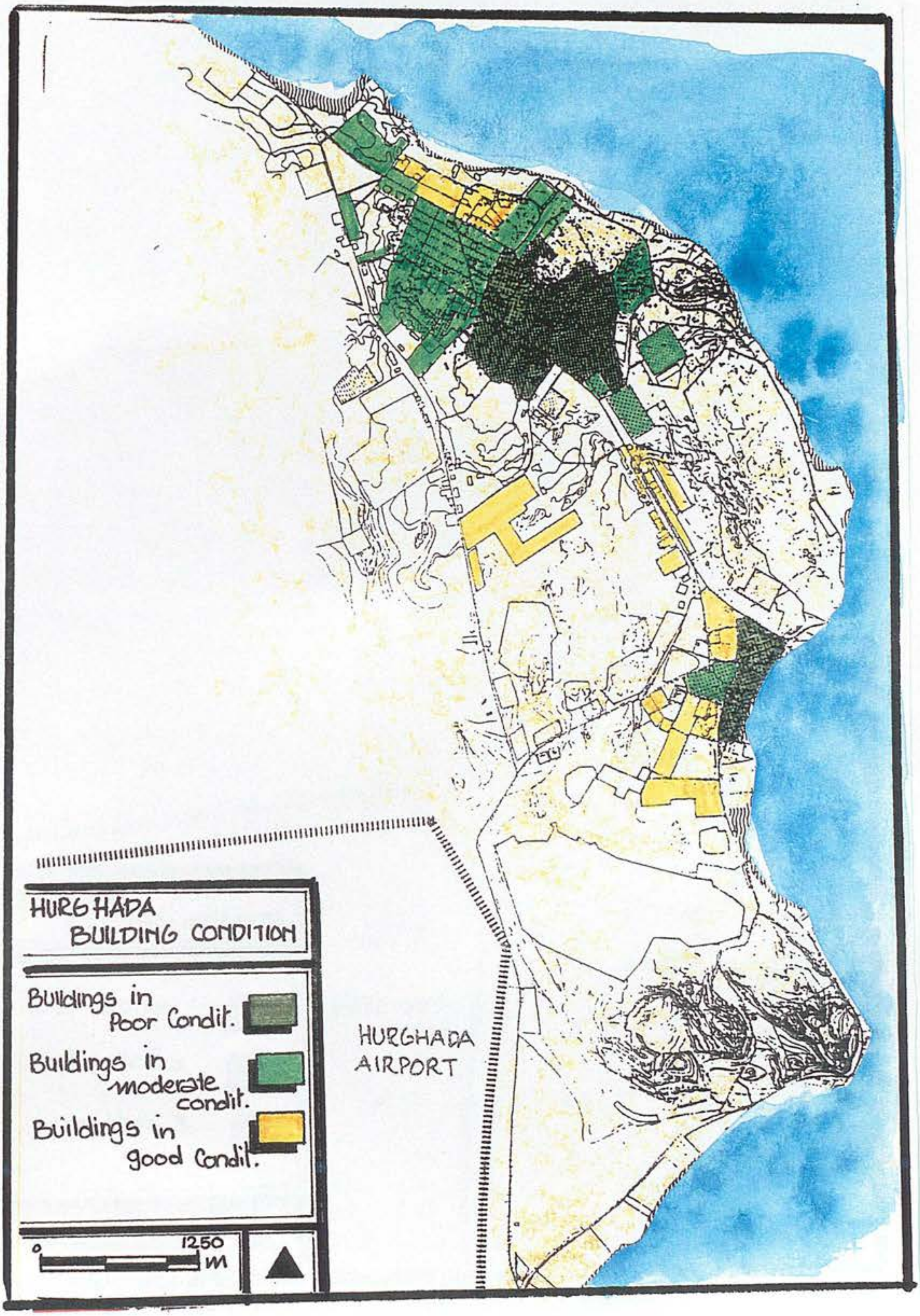

Figure 6.4: Hurghada's building condition map. (After Ministry of N. Communities)

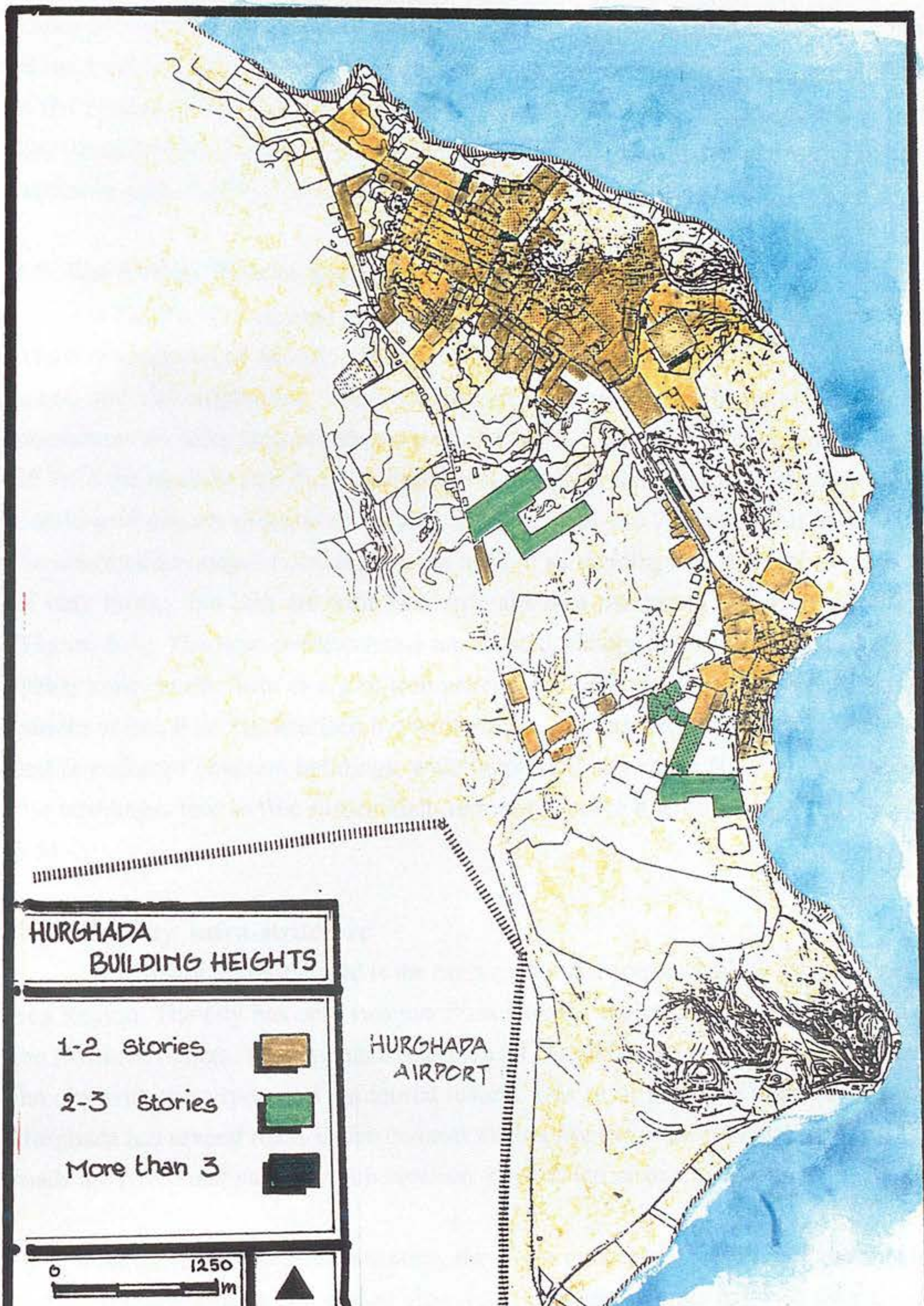

Figure 6.5: Hurghada's building heights. (After Ministry of N. Communities)

important service to support tourism activities. The commercial zones represent 0.5 % of the total area, mainly located on the main road and the Cornische area. As Hurghada is the capital of the Red Sea Governerate, the administrative use forms 1.6 % of the city's land budget. Industrial activities, which are mainly related to petroleum industry, represent some 8.8 % of the total area.[7]

1.3 The Urban Pattern and City Character

The city is composed of several urban patterns (Figure 6.3), distinctive of the stages of evolution of the city. The main features of the old city Al-Dahar and Al-Saqala areas, are the unplanned, very narrow streets, surrounded by peasant low rise, maximum two story high houses made of clay brick. Such an area, represents more than 25 % of the existing city. Surrounding this old nucleus, representing 25 % of the city, is a semi-grid pattern with streets varying in width from 4 to 7 meters. This area features the intermediate stage of development as most of its buildings are made of stone instead of clay bricks, but still are load bearing walls to a maximum height of two stories (Figure 6.4). The new developments are located mainly at the extensions of the Al-Dahar zone, in the form of a gird iron pattern. Like all other cities where this kind of pattern exists, it is characterised by; wide streets, varying between 8 to 12 meters wide and re-enforced concrete buildings, which represent more than 50 % of the city. High rise buildings- four to five stories high- represent a mere 8 % of the total city.[8] (Figure 6.5)

1.4 The City infra-structure

The regional coastal road is the main road and it connects all the cities of the Red Sea Region. The city has only two junctions with the regional road, -the Southern and the Northern outlets. The city main roads are all parallel to the regional road connecting the city with the airport and the tourist resorts. Due to its grid-iron pattern, the city of Hurghada has several roads which connect the sea front with the regional road. All these roads are paved and vary in width between seven to ten meters. (Figure 6.6)

As for the transportation system, the city is connected directly to Cairo by plane from Hurghada airport; the airport also receives charter flights from all over Europe.

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[7]Ministry of Development and New Communities, *Hurghada Structure Plan,* April 1992, p. 25
[8]ibid., p. 32

The bus transportation system is the major connection between Hurghada and the rest of

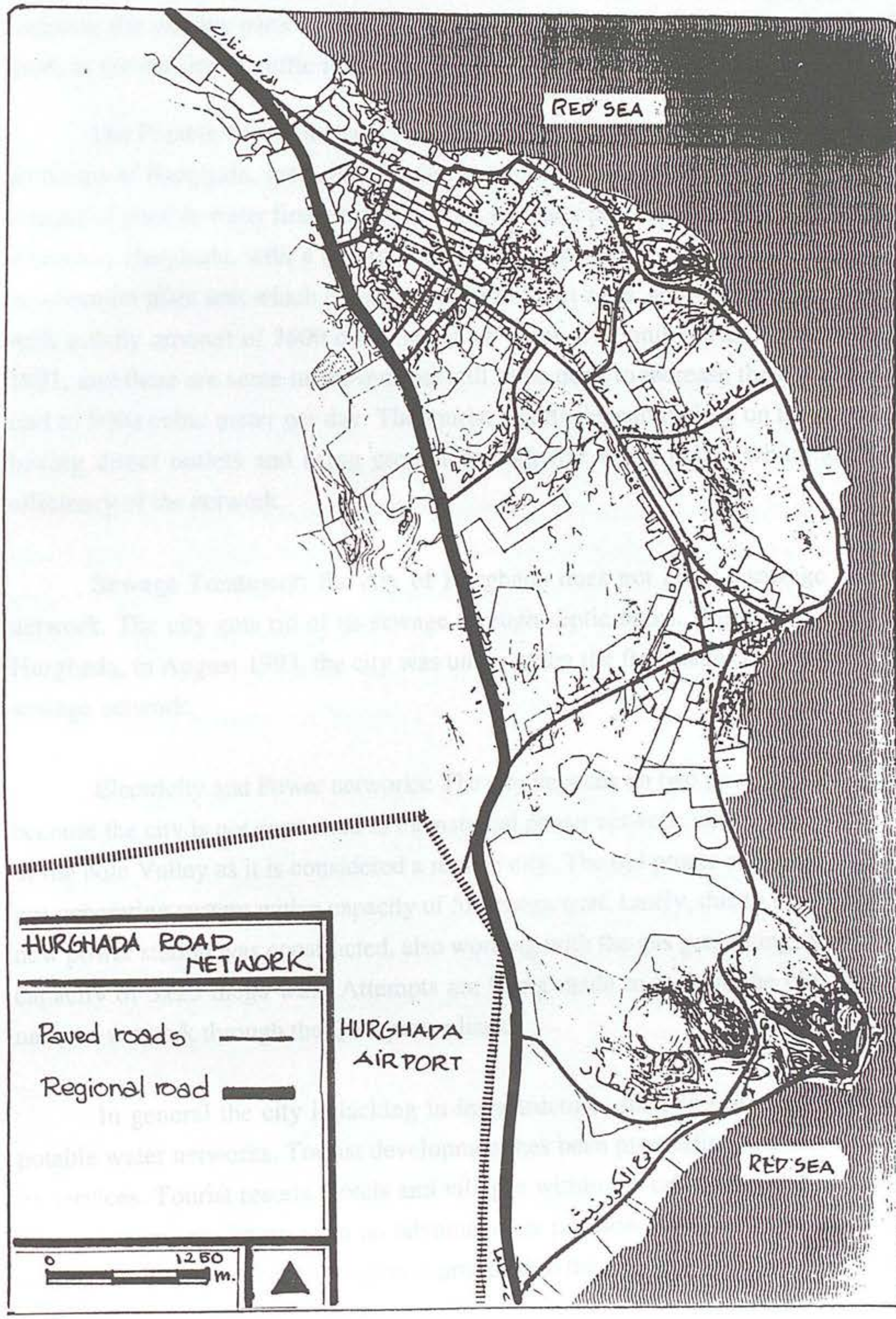

Figure 6.6: Hurghada road network. (After Ministry of New communities)

Egypt, due to the lack of railway systems. The bus is also the most dominant mode of transport for domestic local use. The only transportation within the city is by taxi, which connects the various parts of the city. In general the city does not suffer from traffic-jams, as the density of traffic is not very high.

The Potable Water Network: as a desert city , potable water is one of the major problems of Hurghada, specially after the new tourism expansions. There are two main sources of potable water firstly the river Nile, by water pipe line from Qina to Safaga till it reaches Hurghada, with a capacity of 6000 cu. meter/ day. The other source is the desalination plant unit which is located in the old port zone, and which supplies the city with a daily amount of 3600 cubic meter of water. The unit started working only in 1991, and there are some improvements still to be done to increase the capacity of the unit to 5000 cubic meter per day. The tourist resorts depend mainly on the pipeline by having direct outlets and using ground or high rise water tanks, which affects the efficiency of the network.

Sewage Treatment: the city of Hurghada does not have a sewage treatment network. The city gets rid of its sewage through septic tanks. During my last visit to Hurghada, in August 1993, the city was under going the first stages of implementing a sewage network.

Electricity and Power networks: The city depends on two power stations. This is because the city is not connected to the national power network like the rest of the cities of the Nile Valley as it is considered a remote city. The old power station depends on a gas generating system with a capacity of 5x4 mega watt. Lately, due to tourism needs, a new power station was constructed, also working with the gas generating system with a capacity of 3x25 mega watt. Attempts are being made to include the city within the national network through the Qina power lines.

In general the city is lacking in infrastructure, such as sewage treatment and potable water networks. Tourist development has been proceeding at a rate faster than its services. Tourist resorts, hotels and villages within the urban boundaries and those close to them, are however in an advantageous position since they can make use of available services. Water from Qina is provided to the city, but, this is not adequate for the city's needs. A waste water system at present is under construction in the city of Hurghada. Many streets have been paved; the road system inside the city is better than any other city in the governerate. The city will always have privileges of all kinds of services as long as it hosts the governor and the administrative body of the governerate.

1.5 Population and Employment

The city of Hurghada has a lower population density and is smaller than other cities in Egypt in spite of the tourism boom. The population size has however been increasing in line with current development and has now reached 43,000 inhabitants, 30% of whom are between the ages of 6 to 65 (labor force).[9] Most of the inhabitants are of Upper Egyptian origin, Qina being the most important source of labor to the Red Sea region. Some workers also come to the city from Qusair to the South but usually they are daily commuters, because of the proximity of Qusair to Hurghada. The original occupations of the populations of the city were fishing, quarrying and herding. The latter activity is now virtually non-existent because the Bedouins are only to be found in their small communities out side the city. Fishing and quarrying are still carried on, but on a limited scale compared in earlier times. Upper Egyptians are the main labor force for quarrying. These traditional activities have all been receding in the face of tourism and the growing market for employment it provides. Tourism and related services have come to replace most other activities.

The development of tourism in Hurghada may be divided into three stages: the period 1964-1980 during which only one hotel was built (Hurghada Sheraton); the second period 1980-1989, when tourism reached its greatest development with more than 15 tourist resorts; and 1989-till present, with further development of resorts associated with the introduction of new jobs, such as diving and fishing instructors, as well as under water photography. The number of tourist resorts is at present 24 with 16269 employees, 12 hotels with 9285 as well as associated activities with 215 employees.[10]

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[9]Egyptian Annual Statistics, *Red Sea Governerate Final Report*, 1992
[10]ibid., pp. 33-35

2. General Impacts of Tourism Development on the Environment of Hurghada

The first stage in planning tourism should be an audit of resources, of markets and of competition. It may be argued that there is almost a symbiotic relationship between tourists and tourist resources. Certain types of tourists will be attracted towards certain tourism areas. Hurghada's main attractions are its sea environment in general, which is a very ecologically fragile zone. The economic health of a Hurghada tourist facility depends largely on the condition of its primary resource: the environment. Environmental protection and sound environmental management during resort planning, construction and operation are therefore the most critical investments that a developer will make over the life of a particular facility. At a practical level, environmental protection at the tourist resort will only occur where the management makes it a high priority. As discussed before in Chapter Three, tourism has various impacts on the environment. Construction and operations associated with tourist development affect the environment through various discharges, and direct disturbances. The potential impact of each component is determined by the nature of the component and the site environment.

Those main impacts of tourism may be identified as: those at the time of the choice of sites; those connected with the general planning of sites for the special needs of the tourist resorts; those related to the detailed resort design, its landscape "fit" and its servicing and environmental "fit", and finally the after development impacts of tourism, such as the sewage treatment, solid wastes, associated activities (snorkeling, diving and fishing trips), as well as their impacts on the every day life of the local people.

2.1 The Impacts of the Choice of Sites Suitable for Development

The first site chosen for development in the early stages of development was the Hurghada Sheraton hotel. The site was chosen in a sandy location. Adjacent coral reefs are not noticed around the site. The site has all the potentials of an environmentally harmless location. From figure (Figure 6.7), we may see that the developments to follow were all located to the south of the Sheraton. Unfortunately most of these sites have adjacent shoreline coral reefs, except Magawish which is located in a sandy headland beach. The most, and only important criteria by investors for choosing the

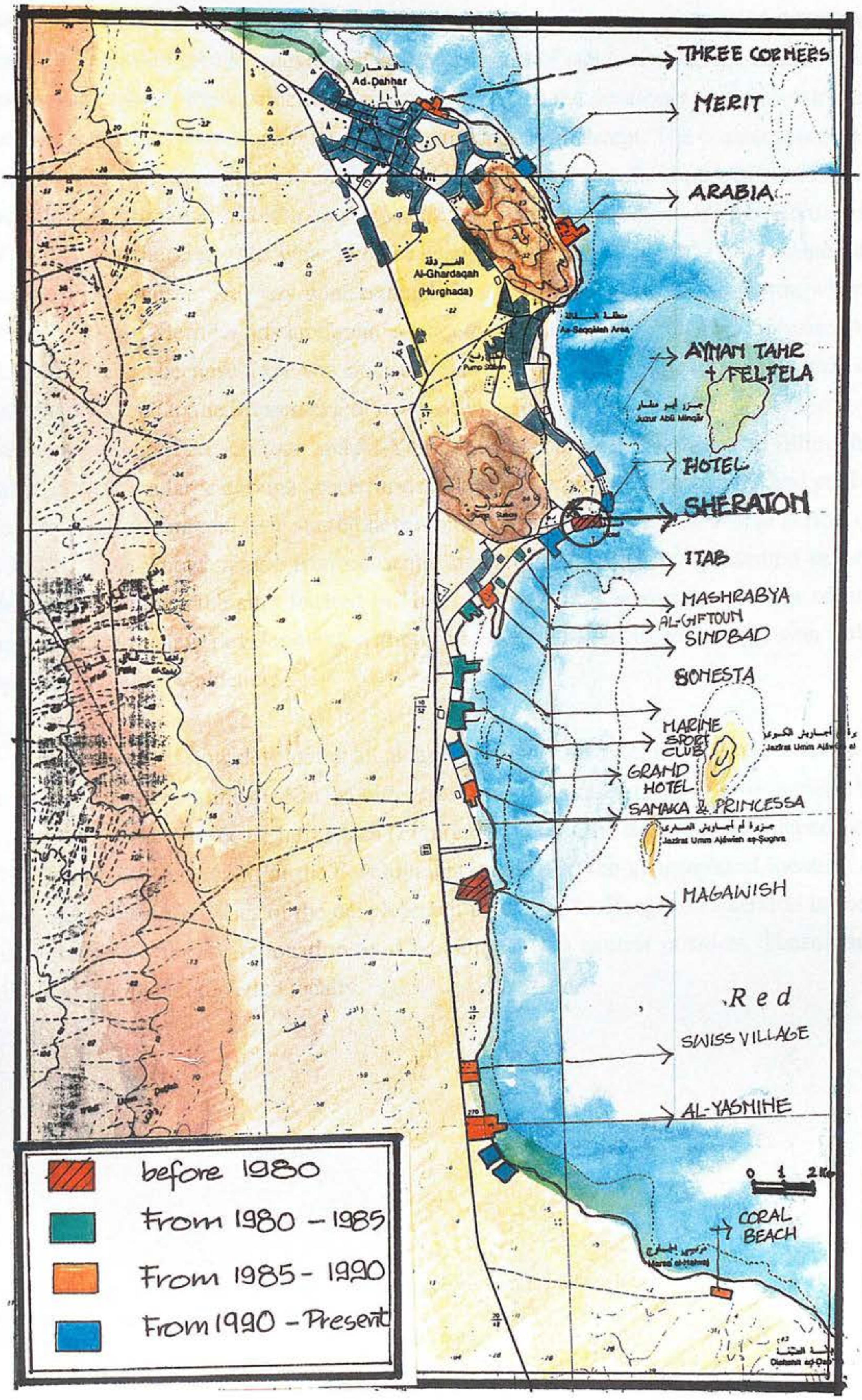

Figure 6.7: The historical development of the tourist resorts..

development sites, was the distance from the city centre, assuming of course that the site had the necessary tourism development requirements of sand, sun and sea access. The local government responsible for giving the license for the developer to start work was not concerned with having any rational coastal planning concept. The coastal resources were not of concern to the government. Their only concern at the time was whether or not the investor could afford to buy the land chosen for development. If he could then it was his, and he could do what ever he wanted with it and with no environmental constraints whatsoever. Very good examples are the sites located in the North, where the Arabia and Merit resorts are found, as they are recently developed sites compared to the rest. This is because there was no available land for resorts at the time development started. But, due to the importance of being near the city, the owner of the Arabia resort (also the owner of AL-Giftoun and Al-Yasmine resorts as well), started land filling the site till he had a large enough space for development, which he then bought and paid a fine for land filling and then started developing the site.[11] During the whole period of 1970 to 19 85 not a single environmental impact assessment was presented before developing any of the sites located in Hurghada district, because the process of not approving any new development without an environmental impact study was only applied in the early nineties.

Tourism is now developing all along the coast of the Hurghada district coastline, which extends for some 40 Km. In order to simplify the information to the reader, the study will divide the coast into zones (Figure 6.8). The zone divisions will depend on the historical background of the development, mainly on the geographical location as well as the characteristics of the development process. The Hurghada Sheraton is used as a landmark due to its location as it lies almost in a central position. These zone divisions are also referred to locally.

[11]A very well known story in Hurghada, many people who are either involved or not involved in the tourism development sector confirmed it.

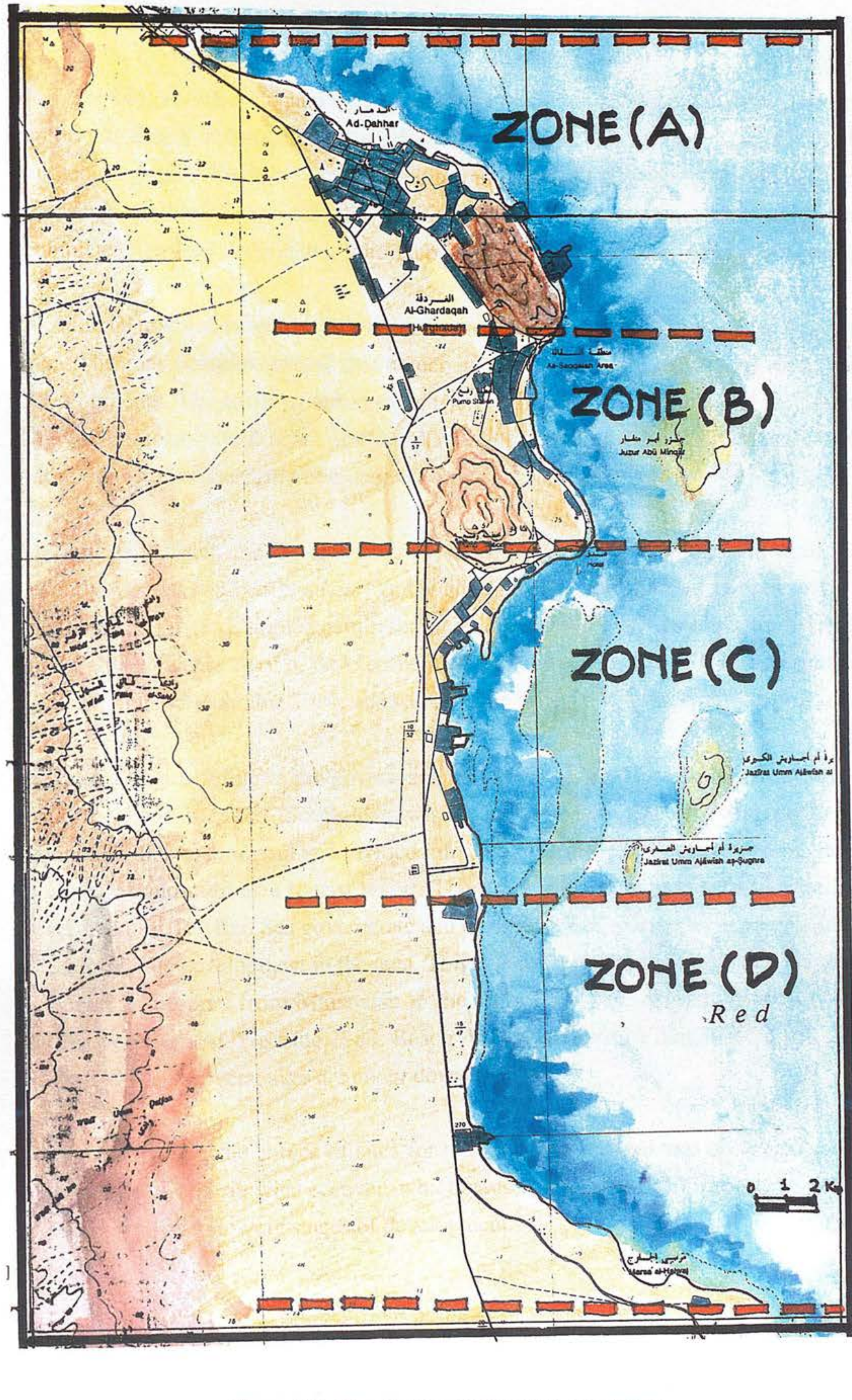

Figure 6.8: The division of the coast into zones.

Its division is summarised into four zones as follows (Figure 6.8):

1. Zone (A): which is located between Al-Dahar and Al-Saqqalah suburbs. The zone is formed mainly of three resorts, Arabia , Merit village and the Three Corners. Arabia was constructed in the late eighties, back filling the shore (sea) with new developments. Merit was opened to the public in 1992 while constructions were still going on to complete the rest of its facilities. The Three Corners was developed in the mid-eighties.

2. Zone (B): which is situated between the north of Hurghada Sheraton and Al Saqala area. The zone contains several sites under construction, mainly extensions for existing developments. The existing developments are mainly two star hotels and restaurants. They were constructed in the mid and late eighties with no direct connection to the shore. Lately, however, there has been massive expansion .

3. Zone (C): from the Sheraton south to Magawish village. Magawish until very recently was the southern boundary of the city of Hurghada. The zone contains most of the tourist resorts in Hurghada, representing the actual three phases of the tourist boom in Hurghada. The history of development in the zone started in 1981 with Magawish, Ghiftoun 1984, Mashrabia 1987, and so on. Some sites are still under development.

4. Zone (D): according to the governmental references, as was mentioned in Chapter Four, this zone is called "South Magawish". The zone is in the form of a bay. It was planned by the government and divided into twenty strips, each strip was to be sold to an investor and used as a tourist resort. There was a lot of debate between the local government of The Red Sea governerate and the ministry of tourism as to who would be in charge of the development in the area. This was the main reason the city of Hurghada extended its borders from Magawish to the end of the bay. Already there are three resorts working - Al-Yasmine 1988, Beach Al Batros (Swiss Village) 1992 and Coral Beach 1991- and several sites are under development.

In General, the choice of sites for tourism development was not based on any environmental criteria what so ever, which caused many harmful impacts as well as problems for the following stages of development.

2.2 Site Preparation impact

Landfill and dredging is the most damaging visible activity in the tourism development process along the coast. It is a phenomenon which has been going on, little by little, since development started. As mentioned in Chapter Three, landfill will result in the total destruction of near shore shallow area habitats and ecosystems. Mortality of coral and invertebrate species has resulted from suffocation due to sediment loads, blasting of reef areas to provide easy access to swimmers, altered current patterns and over use. Sediments from these disturbances tend to move in a southerly direction and the areas of effect extend beyond the landfill sites. The main purposes of land filling at Hurghada may be summarised as:

1. The northern, southern and western boundaries of any resort are the only boundaries of interest to the government. According to the agreement between the government and investors, each investor is only allowed to have a front seashore elevation of 1/3 of the total width of the total land designated for his ownership, measured from the regional road axis[12] (a maximum of 100 meters). That is why if we look at some of the resorts layouts, we notice the variations in distance from the shore line to road boundaries of each resort (the eastern - western boundaries). The shore line is the only limit which has no accurate maps and according to the law there must be 30 meters between the nearest building to the shore. Development of the resort has no other alternative except to expand towards the sea. The fine for such is minimal and by then the environmental harm has been done and the land subjected to development.

2. In order to develop safe bathing facilities along the near shore flat plateau with very shallow water depth followed by very steep sea bed slope and considerably deeper water.

3. To develop berthing facilities for boats, to visit diving spots and for recreational purposes.

[12]Ministry of Tourism Planning regulations of 1982

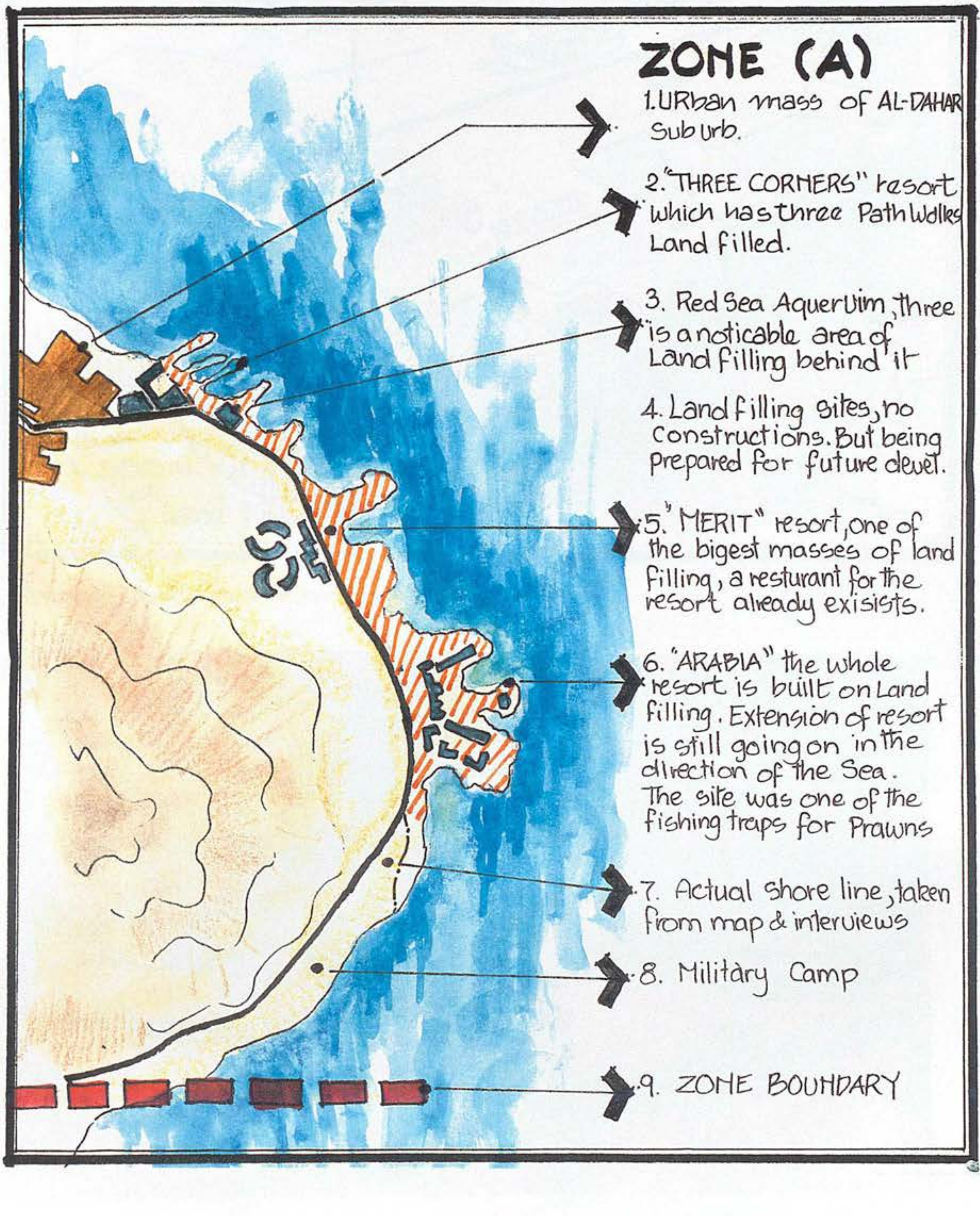

Figure 6.9: The survey sketch of zone 'A'. (8/1993)

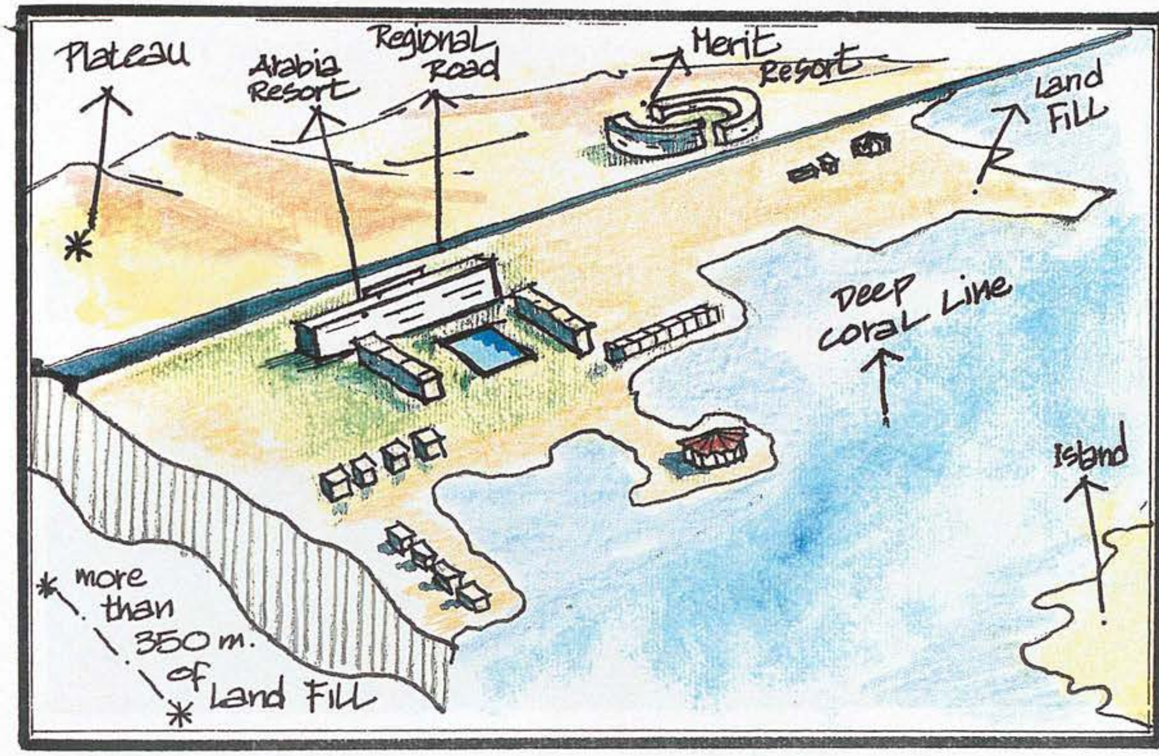

Figure 6.10: Sketch to show the general land fill features of zone 'A'.

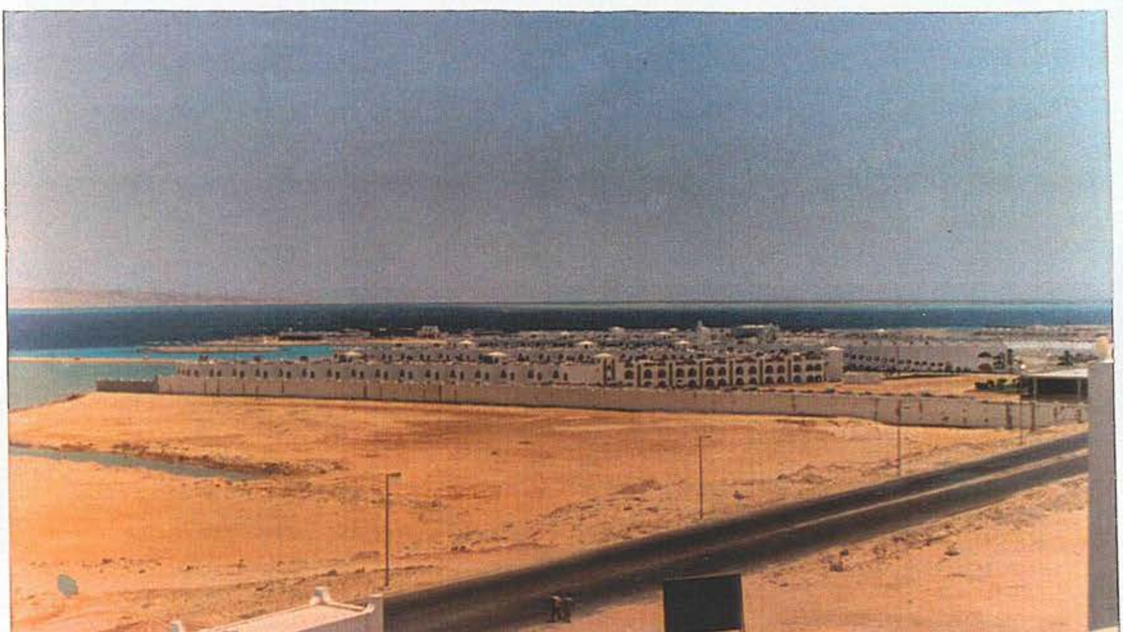

Figure 6.11: The location of 'Arabia Resort' showing landfill extent to the dark blue line of the coral edge. (7/1992)

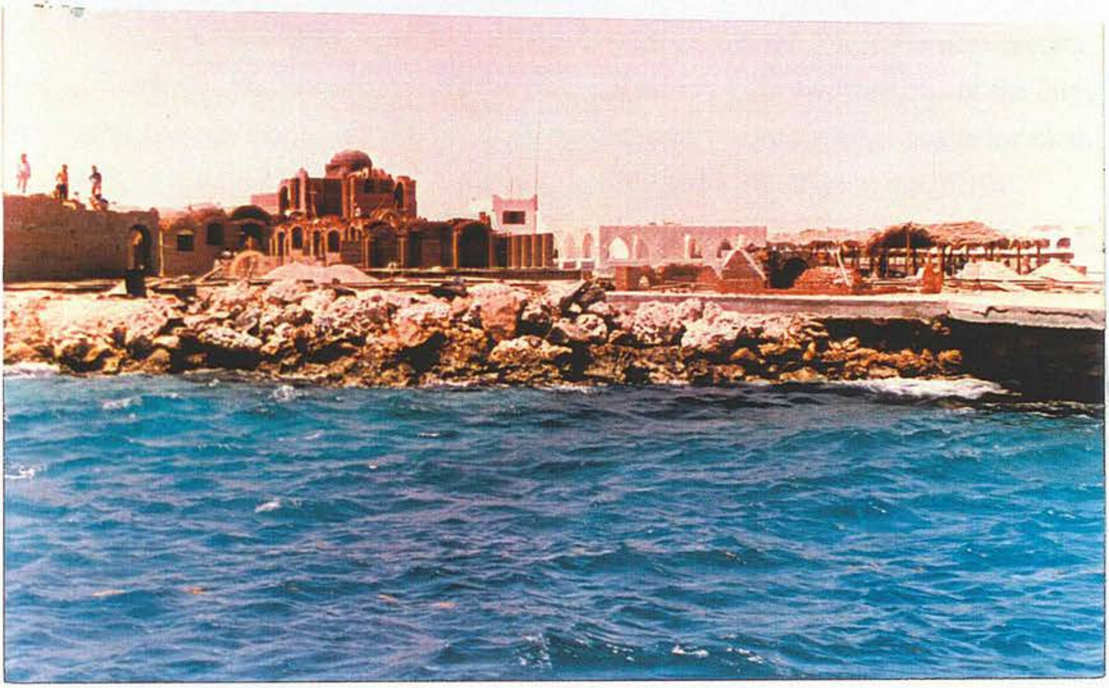

Figure 6.12: Showing the material used in land fill in most sites. (7/1992)

Figure 6.13: Arabia resort showing the land fill reaching the deep coral slope.(7/1992)

Zone (A):

Three resorts form the first zone, Arabia, Merit and the Three Corners resorts. They are located in the mid-north of the city, just between the two suburbs of the city, Al-Saqala and AL-Dahar. The three resorts are different from each other in site location. The three resorts were observed as follows, in 1992 and 1993.(Figure 6.9, 6.10)

Arabia Tourist Village

Arabia tourist village site is not shown on maps earlier than 1981.[13] Figure 6.11, showing that the resort was built on a large amount of land fill extending seaward some 300 meters. Development was in stages. The first stage the main building and the accommodation chalets. The second stage saw the building of land fill for the swimming pool and the formation of two lagoons separated by a pedestrian walkway, leading to a restaurant and constructed on a man made peninsula. Land fill is still going on, as the resort is expanding to the south and east by land filling the sea. Figures, 6.12, 6.13, show: firstly, land filling is carried on by sand and gravel blocks. They also show that the land filling has already reached the deep slope of the reef top, and from this edge the off-shore islands are seen easily by the naked eye.

Merit Tourist Resort

The choice of site for the Merit resort was in a way environmentally protective, as it was located at the back of the regional road (Figure 6.14). The resort does not have direct connection with the coast as the road acts as a barrier. During the first site inspection the location of this resort seemed to be the environmental solution for eliminating the land filling process. But unfortunately the second inspection showed this to be wrong. As the choice of site was already wrong as the sea shore was directly adjacent to the road which meant that there is no shore what so ever for this resort. The developers used this excuse to land fill in front of the resort. The land filing exceeds 500 meters, reaching the deep coral slope (Figure 6.15). In an interview with engineer Mohammad Al-Adly, the site construction manager, he confessed that they have already exceeded the land filling limits, the governerate inspect the site regularly

[13]This information was confirmed by the local people as well as the local planners in the Governerate.

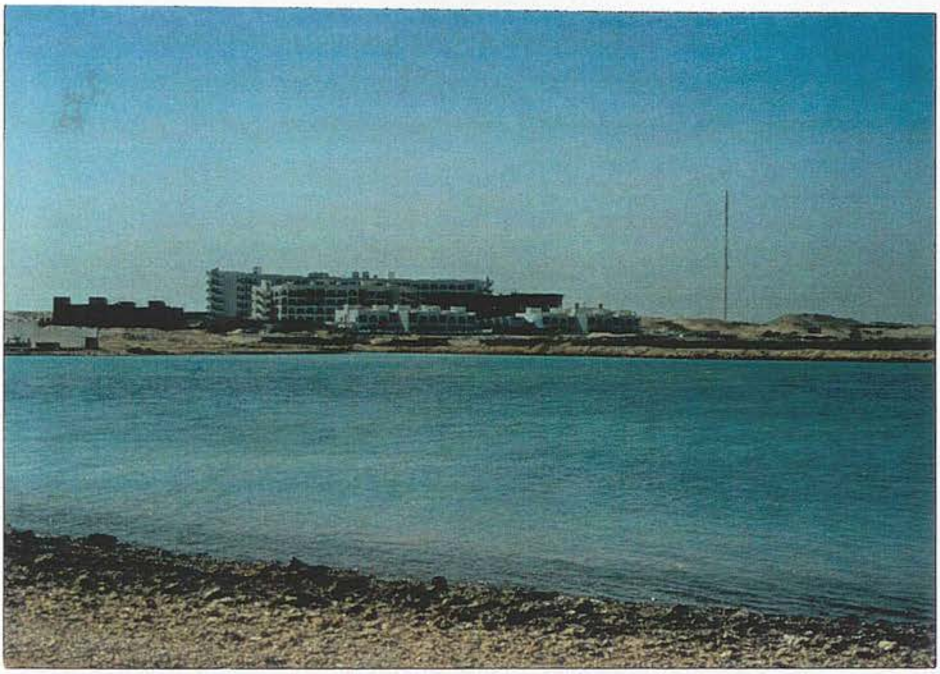

Figure 6.14: The location of 'Merit Resort'.

Figure 6.15: Showing the land fill reaching the deep coral slope (the dark blue line in the Photograph) in 'Merit' as in 'Arabia' resorts. (7/1992)

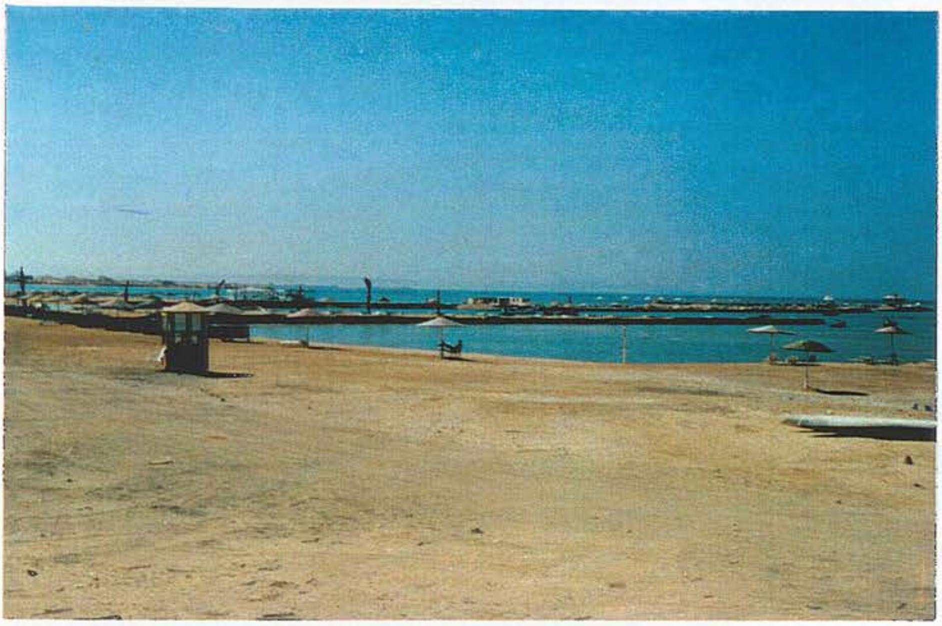

Figure 6.16: The 'Three Corners Resort', showing the land filling in the form of pedestrian walks. (8/1993)

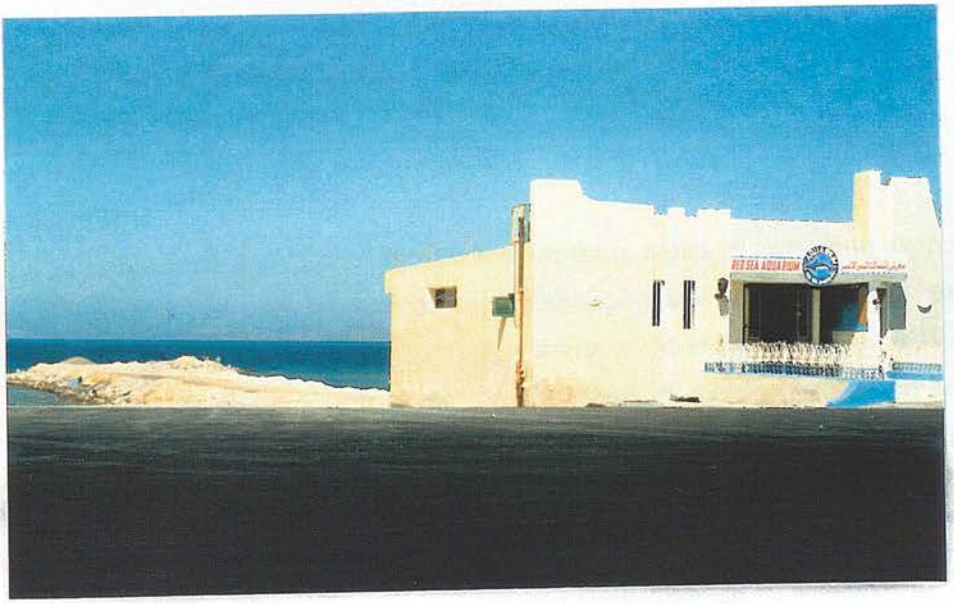

Figure 6.17: The Red Sea Aquarium with its share of land fill. (8/1993)

and they only fined the developers 100 Egyptian pounds, which is nothing compared to the value of the land gained. According to the engineer, there will be only light construction on the land filling.[14] The workers on the site proudly stated that they were the only resort with such a large quantity of land filling, and which reflects the sad ignorance of the local people about the damage being done.

The Three Corners Resort

The resort is located in a mainly sandy area. There were very few patches of coral reefs found at the site. The natural beach of the site is very wide and there was no need for land filling. However, as it is fashion also to do so, the resort has three extending pedestrian walk land filled sites (Figure 6.16). During the meeting with the Belgian owner of this resort, his opinion about the land filling issue was that, first, they had to do something in design to match the name of the resort. Secondly, they thought that the corals found on the site were already dead with no function to any living organism, and his last comment was "Why blame me? if the local developers are not careful of their own native environment why should I be? this is a market and big business issue."[15]

Unfortunately, the Red Sea Aquarium which is owned by the government is located in the first zone as well. Even the Aquarium is land filling a site behind its building for no good reason, the excuse given " being for scientific purposes ! " (Figure 6.17)

Zone (B) :

This zone is different from the other three zones in two main aspects: it is not occupied by tourist resorts and has distinctive physical morphological features. This zone is located between two plateaus. According to the early maps before 1970, the road was directly adjacent to the shore line. It could be easily recognised as there is a variation of slope between the road and the land filling sites that reaches from 5-7 meters. Also the slope variation on the strip between the plateaus and the road is noticeable.

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[14] During my second field trip, there was already a restaurant built as well as some sports grounds
[15] Interview with Mr. Dedee took place at Ayman Taher's office in Cairo.(October 1993)

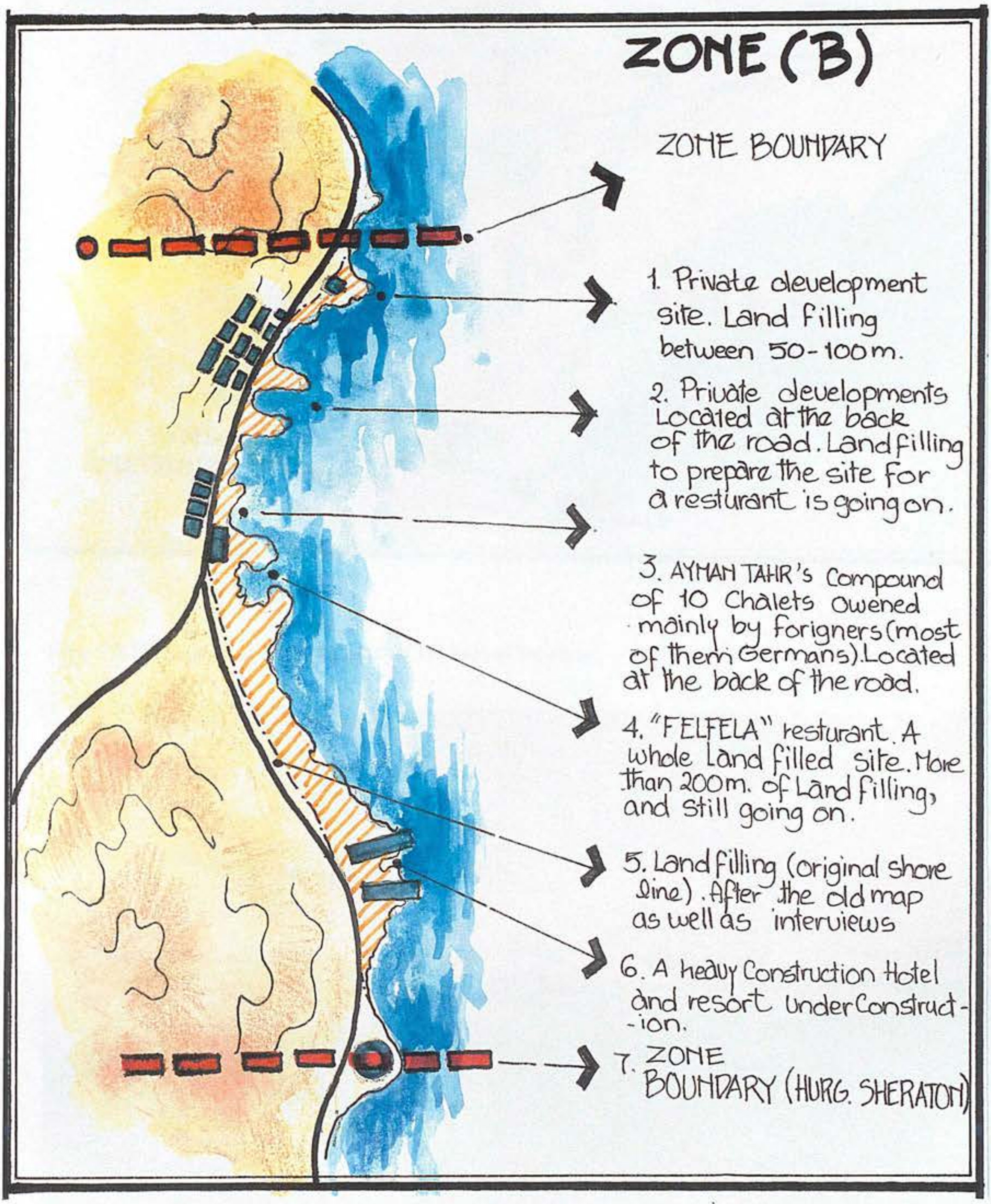

Figure 6.18: Survey sketch of zone 'B'. (8/1993)

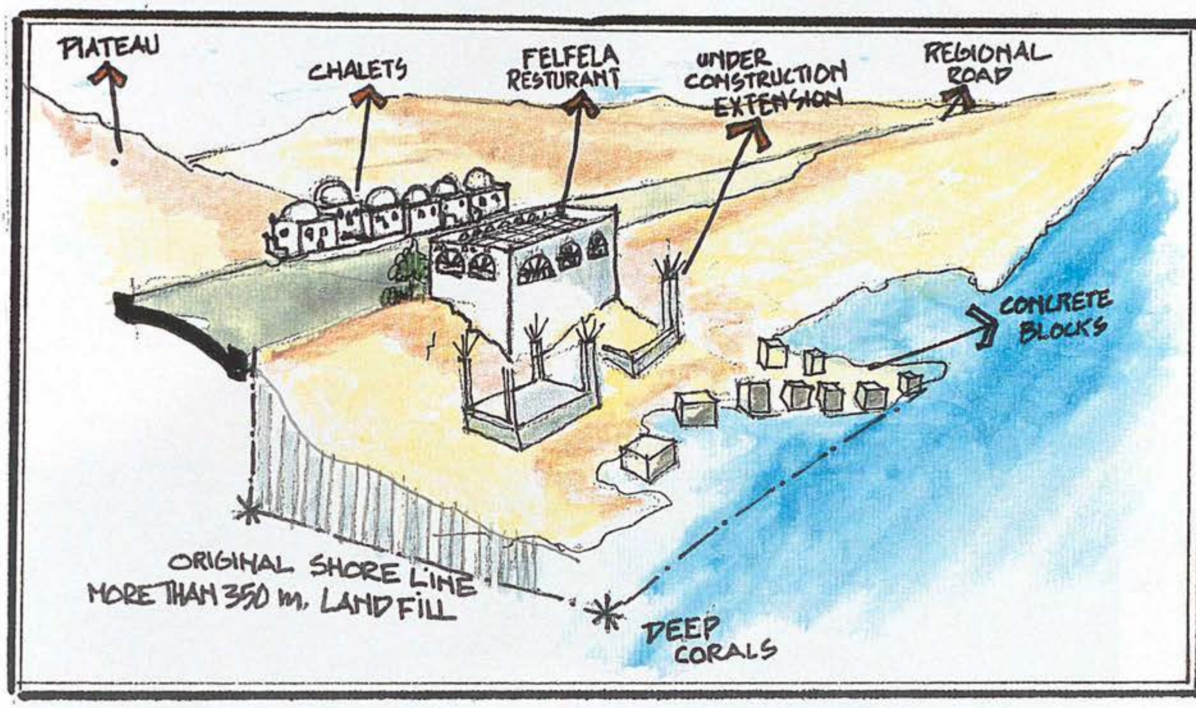

Figure 6.19: Section to show the general features of the zone.

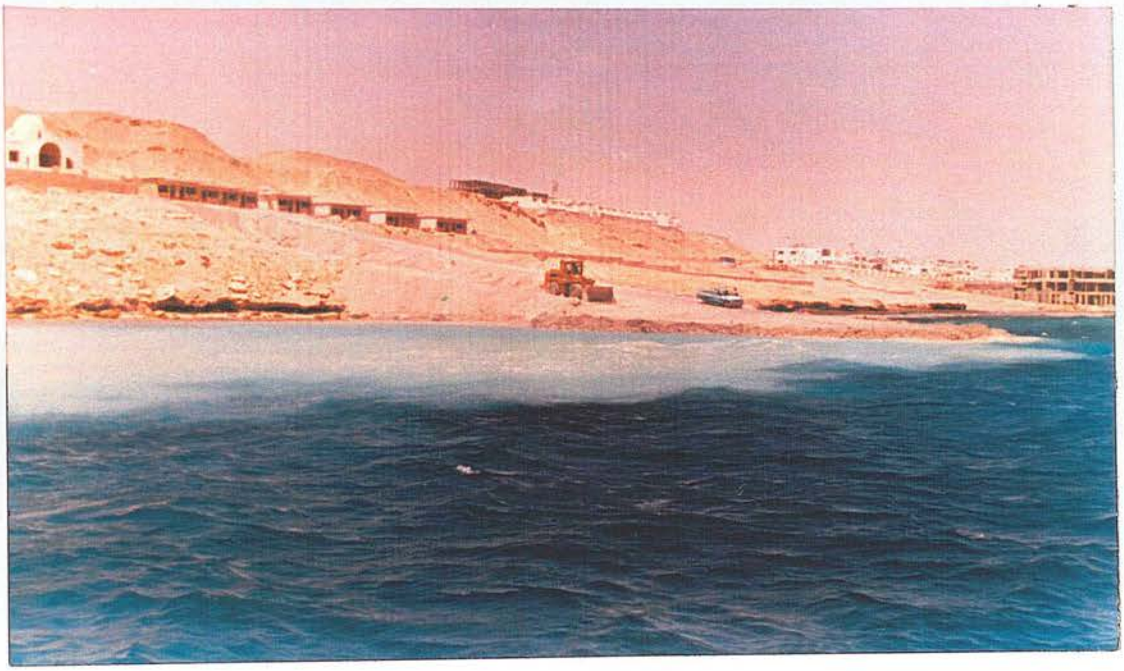

Figure 6.20: The zone is characterised by having its land fill in a slope form. (7/19920)

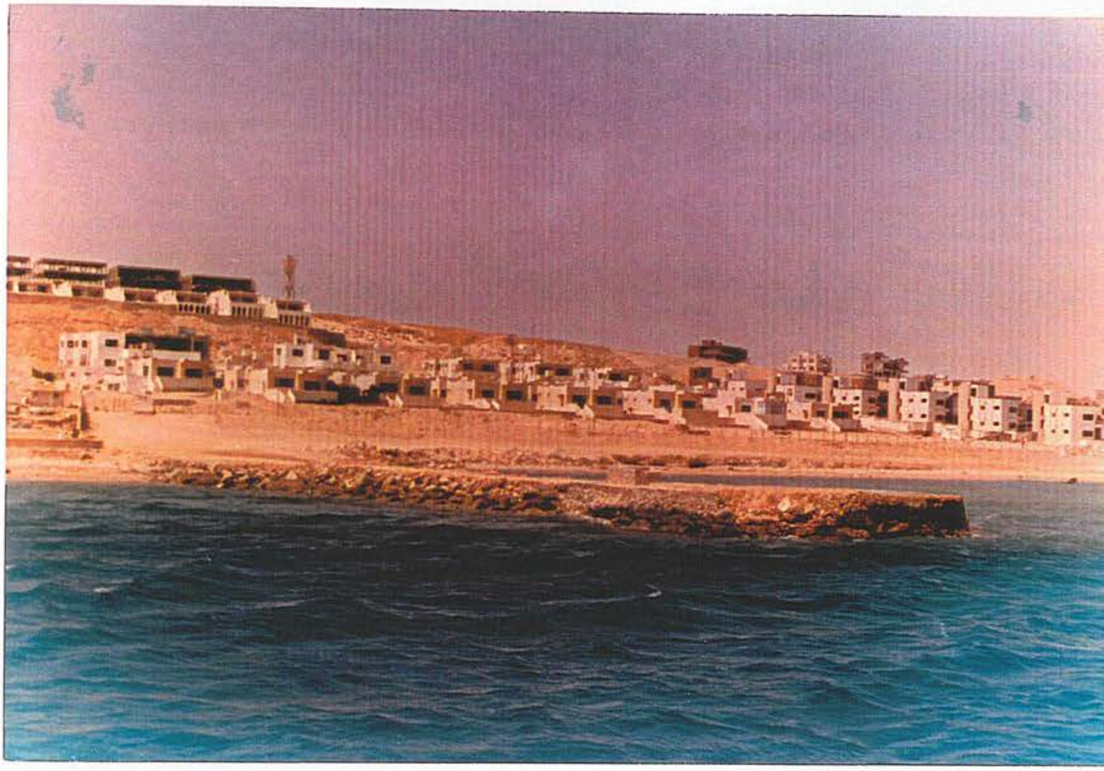

Figure 6.21: Land filling infront of the private chalets to create a 'Private Beach'. (7/1992)

Figure 6.22: 'Ayman Tahr' chalets compound, showing an earlier stage of the land filling process still without a beach. (7/1992)

Figure 6.23: 'Felfela' restaurant, photographed in August 1992, the shore is already land filled.

Figure 6.24: 'Felfela' restaurant, photographed in August 1993, showing the seaward extension of the building (on new land filling).

Figure 6.25: Showing the gross siltation of the water as a result of the land fill process. (Felfela Site 7/1992)

Figure 6.26: August 1993, concrete blocks and red bricks forming land filling to create the man-made bay at Felfela site.

Figure 6.27: Heavy constructions on the already land filled site, the new extension of 'Felfela' restaurant. Note bay extending to the reef edge. (8/1993)

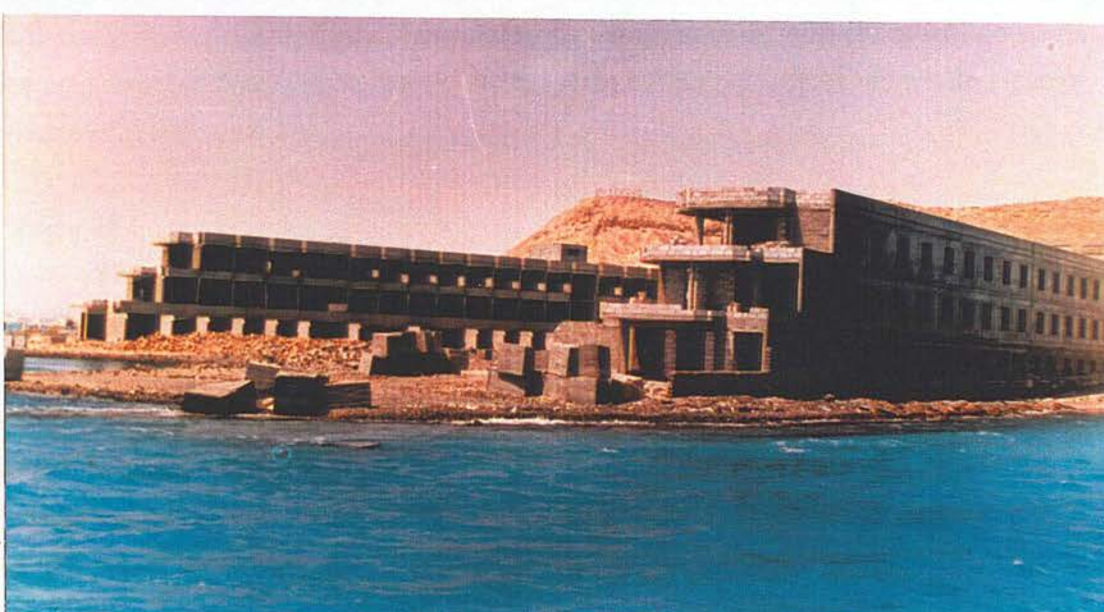

Figure 6.28: 'Safeer' Hotel, heavy construction on a land fill site. Indicating more to be for beach activity. A gross violation of the development process. (7/1992)

plateaus and the road is noticeable, which gives advantage to all developments located at the back of the road by having an excellent view of the sea coast (Figure 6.18, 6.19, 6.20).

The northern parts of the zone are occupied with several private developments. They are not in the form of a complete resort, just privately owned chalets. Most of them are located behind the road with no direct access to the sea, and which has led to several attempts at land filling the areas infront of them to have a beach access (Figure 6.21). There are no regular beaches formed up to the moment, only sites under construction. At "Ayman Tahr" (Figure 6.22) compounds of 10 chalets have the same problem of no direct access to a beach but so far no attempts have been made to backfill.

Two of the worst environmental blunders on the whole coast exist on the southern part of this zone. The first is **Felfela** restaurant which is located on a land fill site. During 1992 it was still under construction, while on the second inspection of the site in 1993 the restaurant was already working and construction was still going on using land filling to have a private road on the coast and for several buildings to have the advantage of the slope (Figures 6.23, 24, 25, 26, 27). The other site is the **Safeer hotel** a huge construction projecting as far as the sea. Construction of the building is still going on indicating further land filling processes to come as there is still no space for associated activities to be built while the main building occupies the whole piece of the land fill (Figure 6.28).

Zone (C) :

This zone is located between Hurghada Sheraton in the North and Magawish resort in the south (Figure 6.29). Most of the tourist resorts in Hurghada are located in this zone. While surveying these resorts permission to take photographs was not given, consequently, most of the photographs were taken covertly (Figure 6.30). The northern tip of the zone has the **Hurghada Sheraton Hotel**, which as mentioned before, is one of the few developments in the area with no land filling activities due to the planned choice of site (Figure 6.31). Below it as we go southward, is an under construction site for the **Itab Hotel** (Figure 6.32). The site is in the form of a rectangular land fill with a path walk reaching the reef slope. Constructions are still going on with indications of further land filling to come.

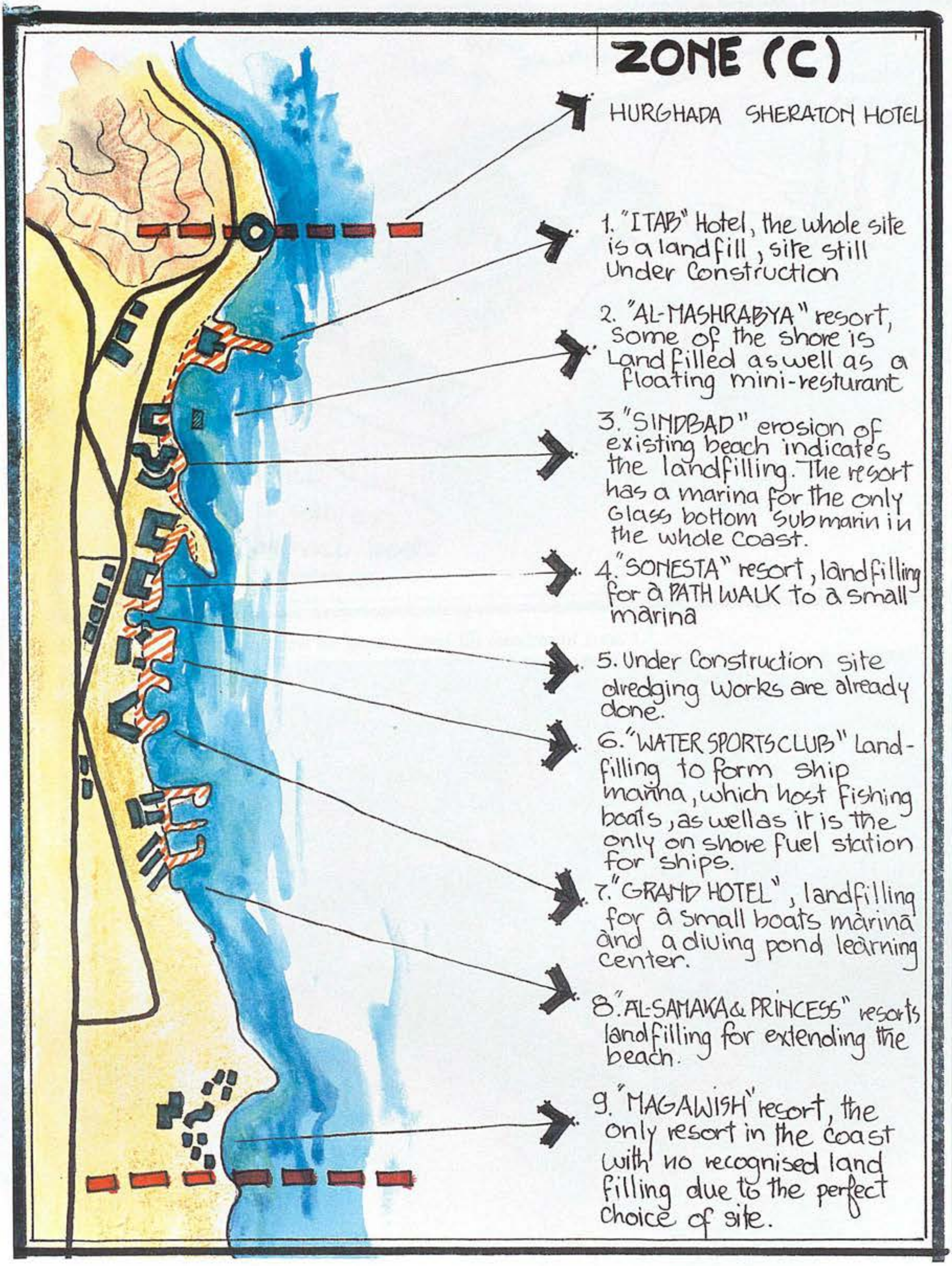

Figure 6.29: Survey sketch of zone 'C'. (8/1993)

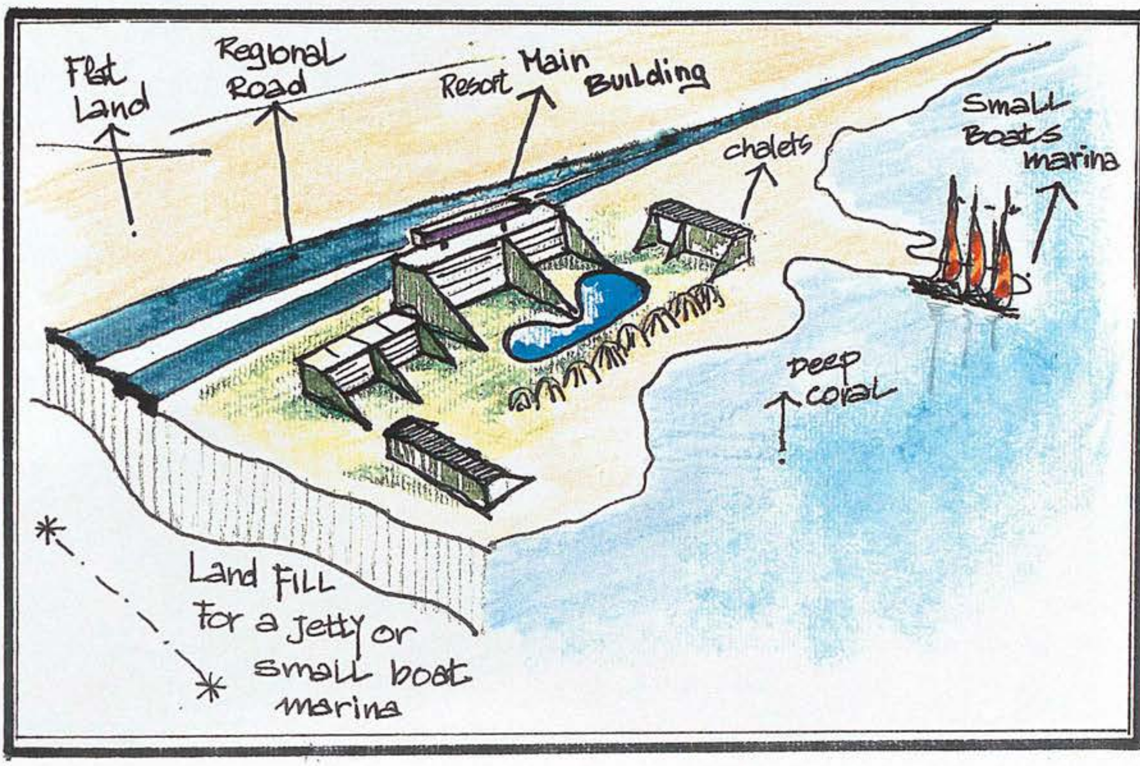

Figure 6.30: Section to show the general land fill features of zone 'C'.

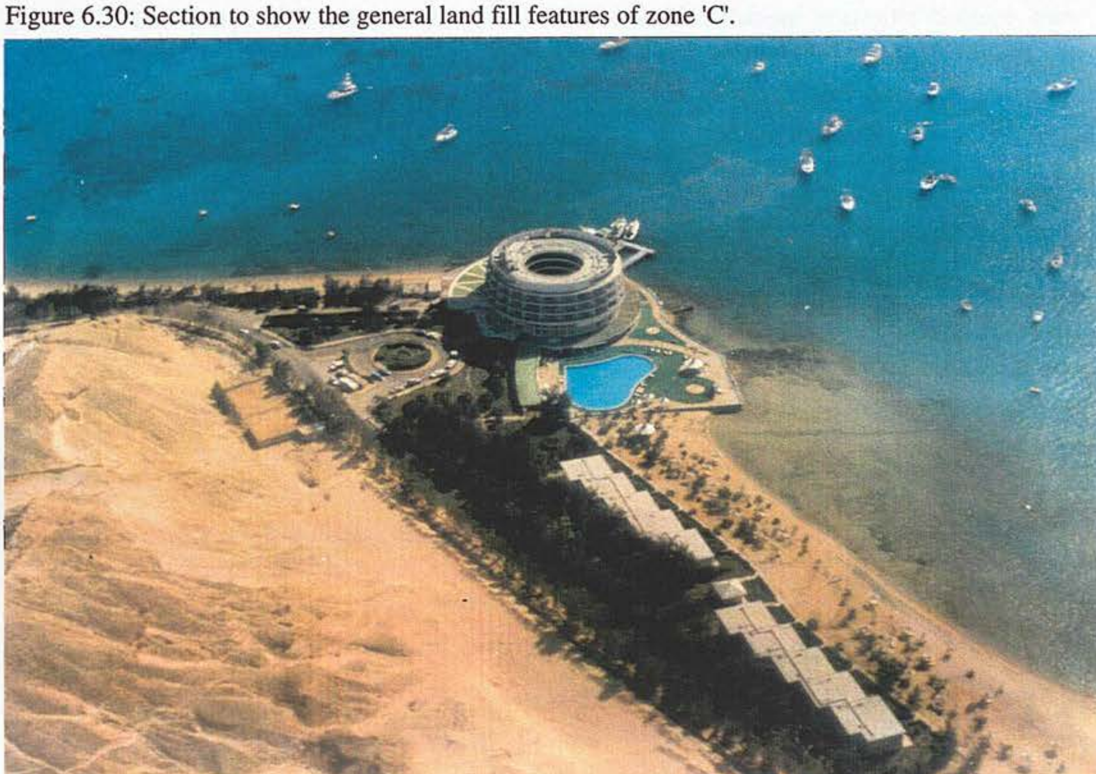

Figure 6.31: The Hurghada Sheraton Hotel. The site was an already existing headland. (7/1992)

Figure 6.32: 'Itab' Hotel, land filling in the form of a 'Rectangular Plateau' in middle distance, tree plantation in foreground is by 'Sheraton'. (7/1992)

Figure 6.33: 'Mashrabya' resort. The off-shore restaurant is under construction at left. (7/1992)

The **Mashrabya** resort is different from the rest as it does not have much land filling. It does however, have a floating restaurant.

At the neighboring **Sindbad** resort, land filling is indicated by the erosion of the beach (Figure 6.34). The resort has the only glass bottom boat, which meant it had to prepare a suitable marina for it on the adjacent coral reefs.(Figure 6.35)

Sonesta and **Al-Giftoun** resorts are similar in their land filling aspects, both are land filled in order to have a small boats marina and a small jetty (Figure 6.36). A construction site is located on the southern borders of the Sonesta. The site has two damaging activities; the cutting of palm trees to free more space for the concrete blocks (Figures 6.37, 6.38) and dredging to form a lagoon.

The **Marine Sports Club**, is to follow the previous site. The club has no beach like the rest of the resorts. It consists of a main building and a small group of chalets (10 to 14). The club has the only ship's fueling station along the coast. That is why its land filling is in the form of a plateau to reach the deep water so that the marina will be suitable for receiving fishing boats and private yachts. The shore is very polluted due to ship disposals.

Between the Marine Sports Club and the Grand Hotel resort, a site is under construction. Like the rest the image is clear, and is based on land filling and dredging. The **Grand Hotel** has two breakwaters which consist of a revetment on top of a concrete toe. The basin between the breakwaters is dredged to several depths, varying between 3 to 5 meters (Figure 6.39).

The compound of the **Al-Samaka**, **Al-Princessa** and **Hour Palace** resorts includes a considerable land fill to form four bathing basins separated by several headlands protected by a seawall, as well asjetty and a berth (Figure 6.40).

Lying at the southern borders of the zone, is **Magawish** resort. It is located in a sandy location in the form of a natural bay, which has given it the privilege of no need to land fill. The resort is one of the few in the whole coast which causes minimum negative environmental impact (Figure 6.41).

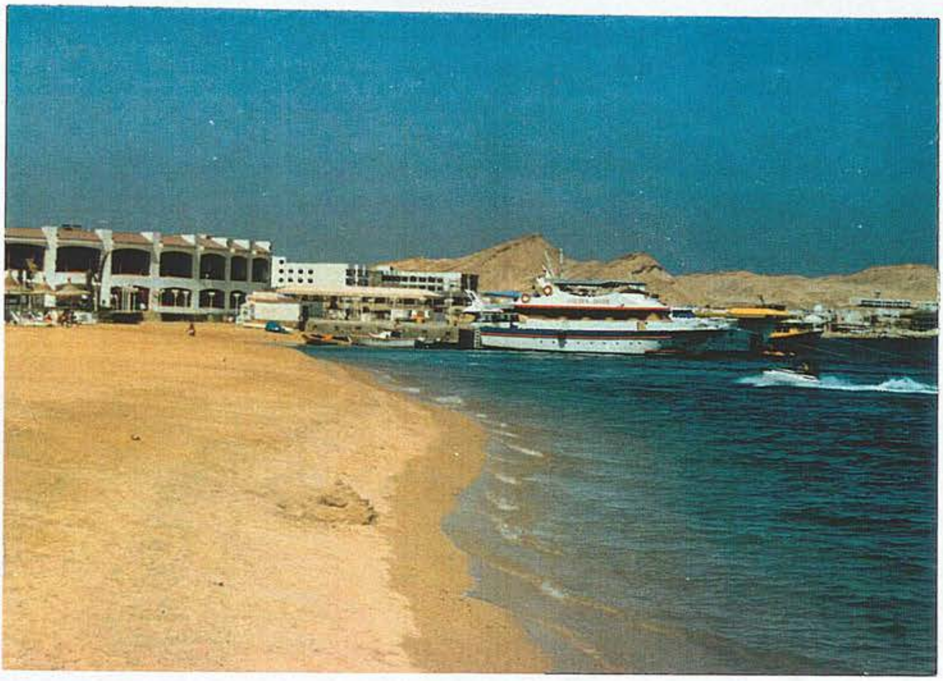

Figure 6.34: 'Sindbad' resort, the small marina for a 'Glass Bottomed Boat'. (8/1993)

Figure 6.35: Erosion undercutting of shore line indicating the land filling. (Sindbad Resort 8/1993)

Figure 6.36: Aerial photo showing 'Sonesta' and 'Al-Giftoun' shore line. Showing also the coastal road.(7/1992)

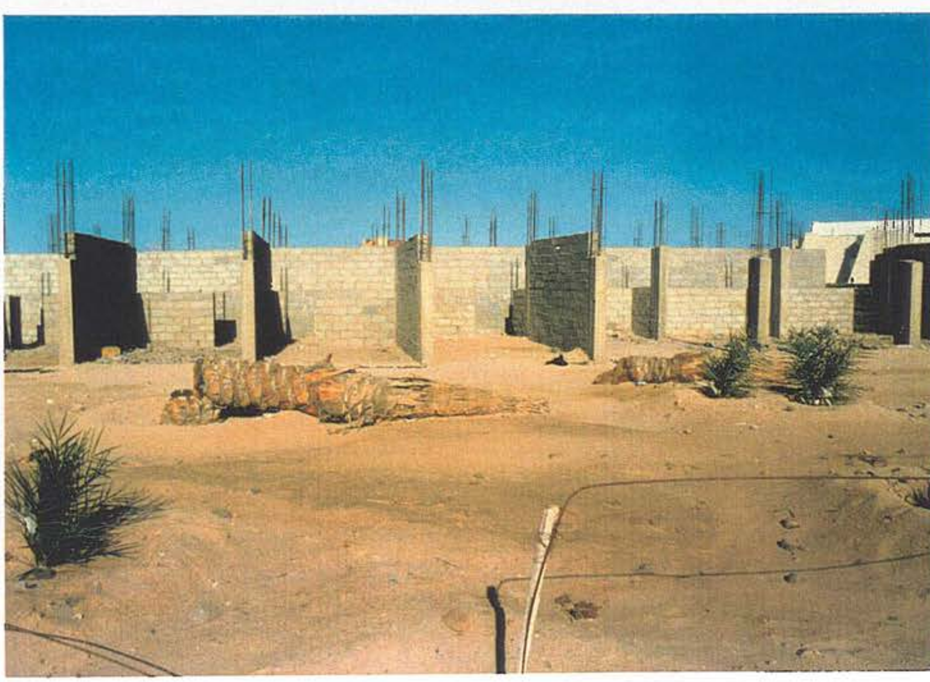

Figure 6.37: The new scenery of the coast, a 'Concrete Wall', no respect for site characteristics. (8/1993)

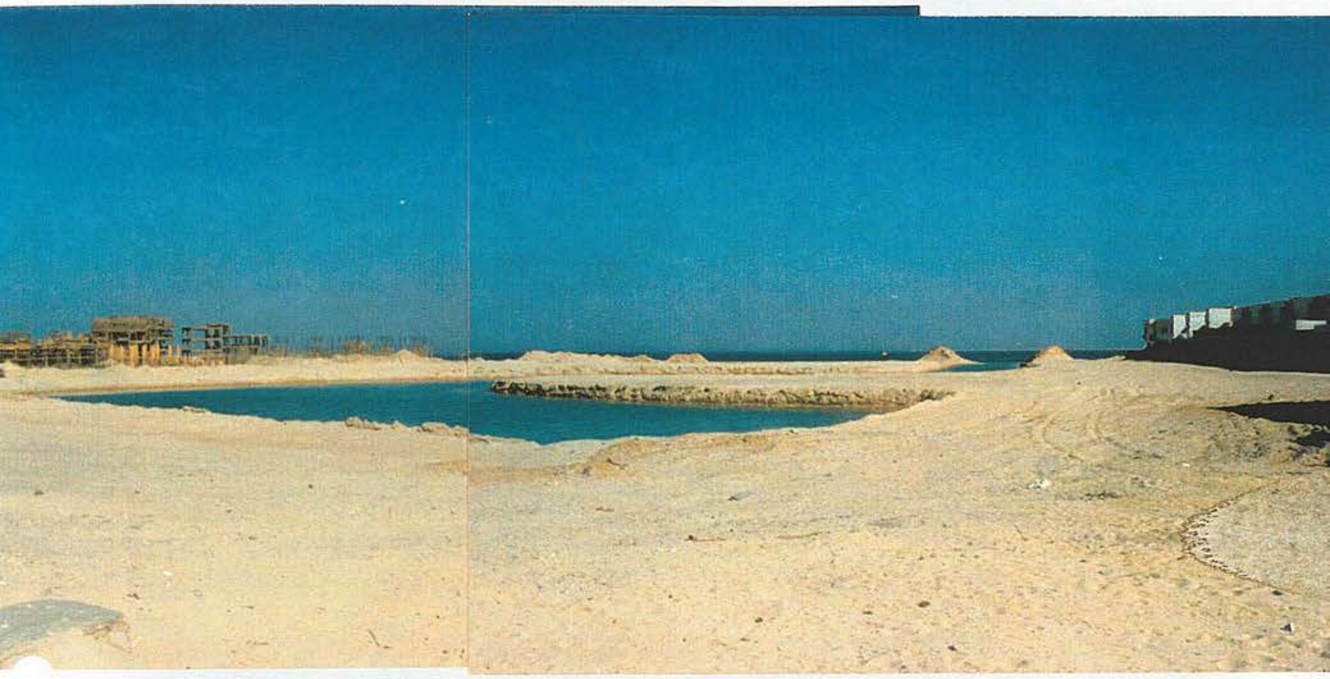

Figure 6.38: Under construction site with dredging for site preparation in the form of a lagoon. (8/1993)

Figure 6.39: Showing the 'Grand Hotel' shore line. Land fill reaching the reef edge. (7/1992)

Figure 6.40: Showing the amount and shape of land fill of 'Al-Samaka' and 'Al-Princessa' shore line. The amount of land fill noticeable, reaching like the rest the reef edge. (7/1992)

Figure 6.41: 'Magaweesh' resort, the only site with no land filling. (7/1992)

Zone (D) :

South Magawish zone is divided into twenty areas as mentioned before. The zone stretches in the form of a bay as shown Figure 6.42. The three main developments are the Swiss village, Al-Yasmine and Coral beach resorts. The three sites were visited during the second inspection in 1993 and observations were as follows:

Swiss village: The marine works of the Swiss village consist of two breakwaters; a main northern breakwater and a secondary southern one (Figure 6.43). The breakwaters consist of a revetment on top of a concrete toe. A block type berth is constructed along the southern side of the main breakwater. The basin between the breakwaters is dredged to different water depths; 3 meters in the area facing the berths and 2.25 meters for wind surfing and in a shallower stepped bathing area. The dredged materials are dumped as landfill.

Al-Yasmine village: The village consists of a large landfill area extending up to about 250 meters offshore. Two bathing basins connected to the sea by a channel are developed in the landfill (Figure 6.44, 6.45). The channel entrance is protected from siltation by two short groins. Groins are also constructed to reduce the erosion of the landfill by wave and current action. A vertical wall type marina is constructed at the southern part of the landfill resulting in reflection of waves and therefore increasing the wave agitation along the village coast and landfill. To the north of the landfill, accretion has resulted from the movement of the landfill and deposition to the southward prevailing littoral drift. This area behaves as a garbage trap and requires continuous cleaning by garbage collection. To the south of the village a rubble-mound groin is constructed to protect the planned extra landfill for future extension.

Coral Beach village: the resort consists of a considerable amount of landfill, forming two bathing basins separated by a headland protected by a seawall. A berth and a jetty were constructed on the landfill to the east of the southern basin. An approach channel through the offshore coral reef barrier has been developed by damaging the coral. Although garbage traps are placed to the west of the northern basin, accumulation of fine sediment and garbage occur in the bathing basins, specially in the northern one (Figure 6.46).

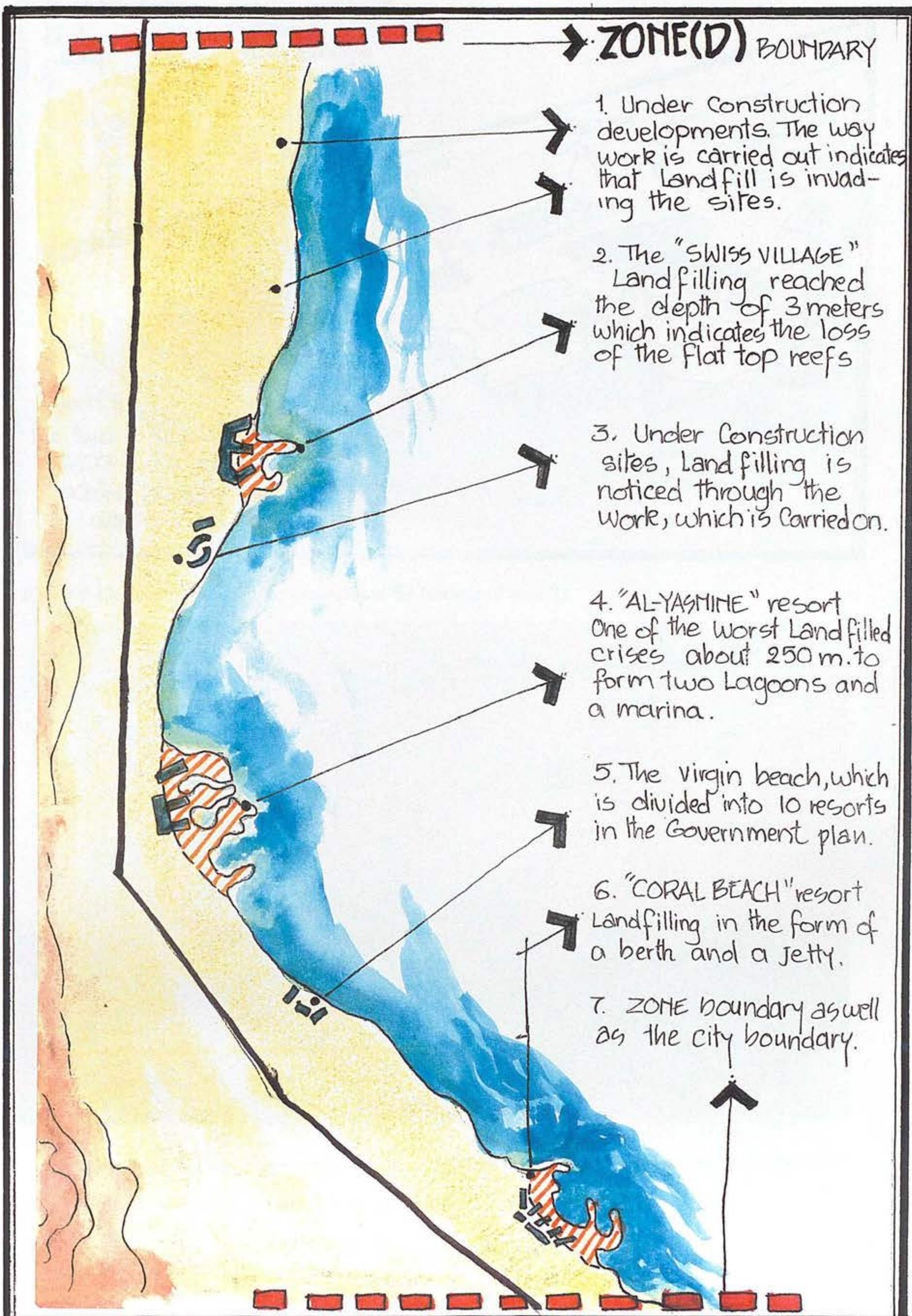

Figure 6.42: Survey Sketch of Zone 'D'

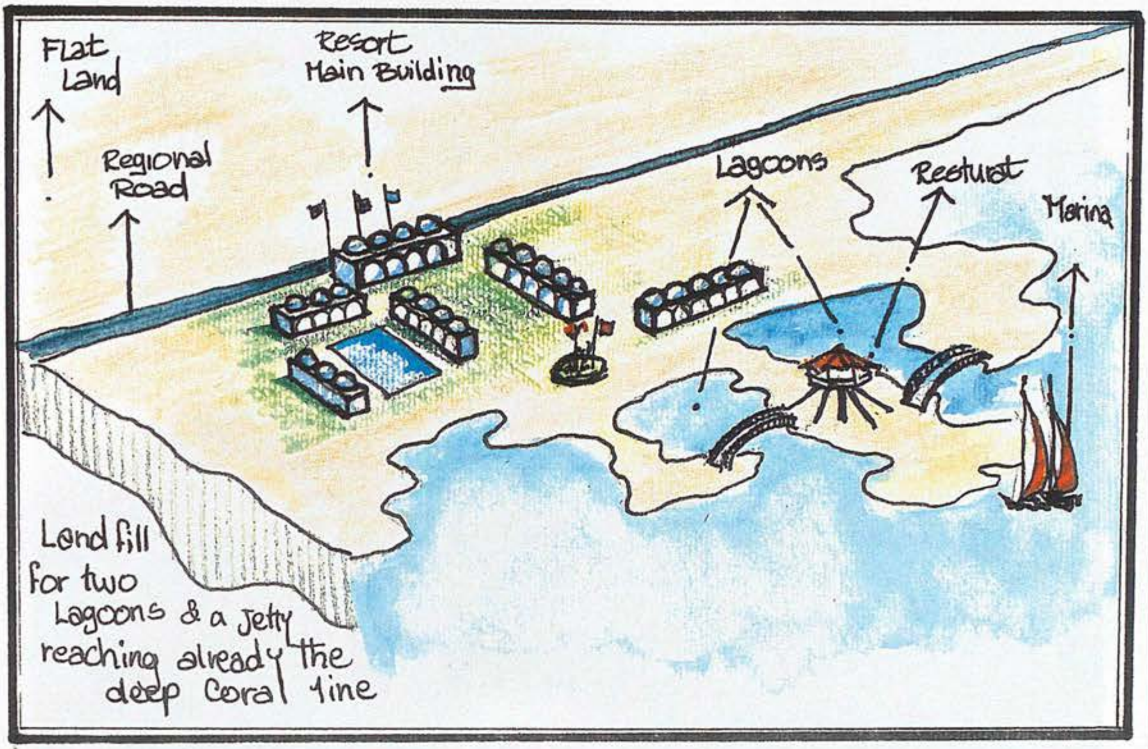

Figure 6.43: Section showing the general land fill features of zone 'D'.

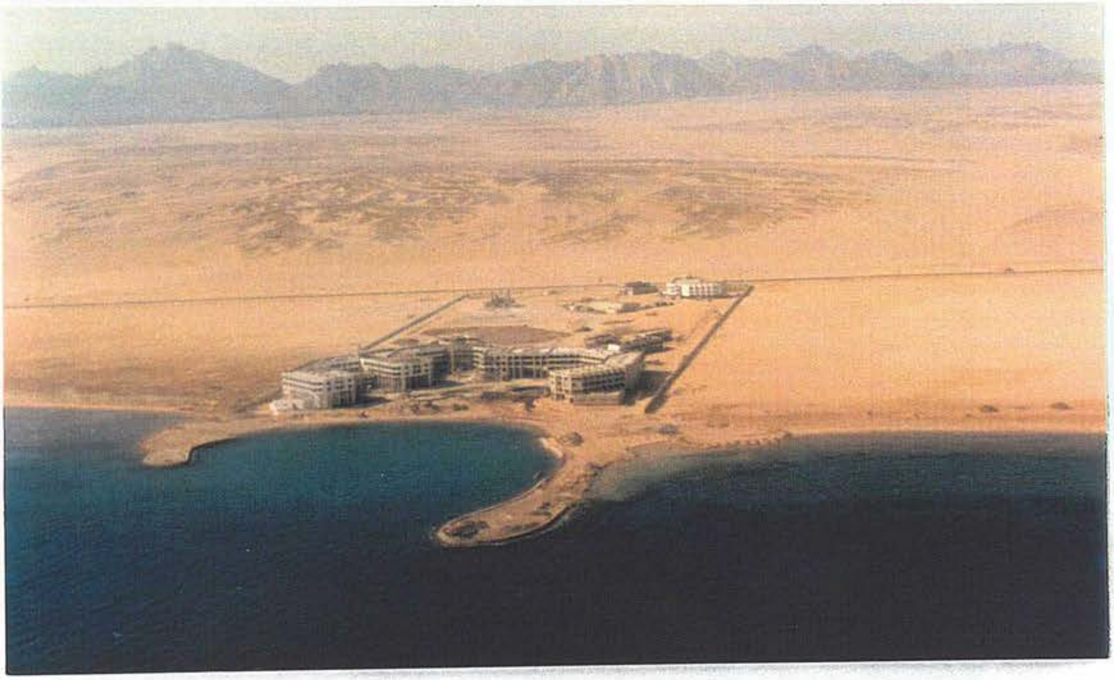

Figure 6.44: The natural shoreline has been artificially extended by two man-made breakwaters projecting well into the coral. (7/1992)

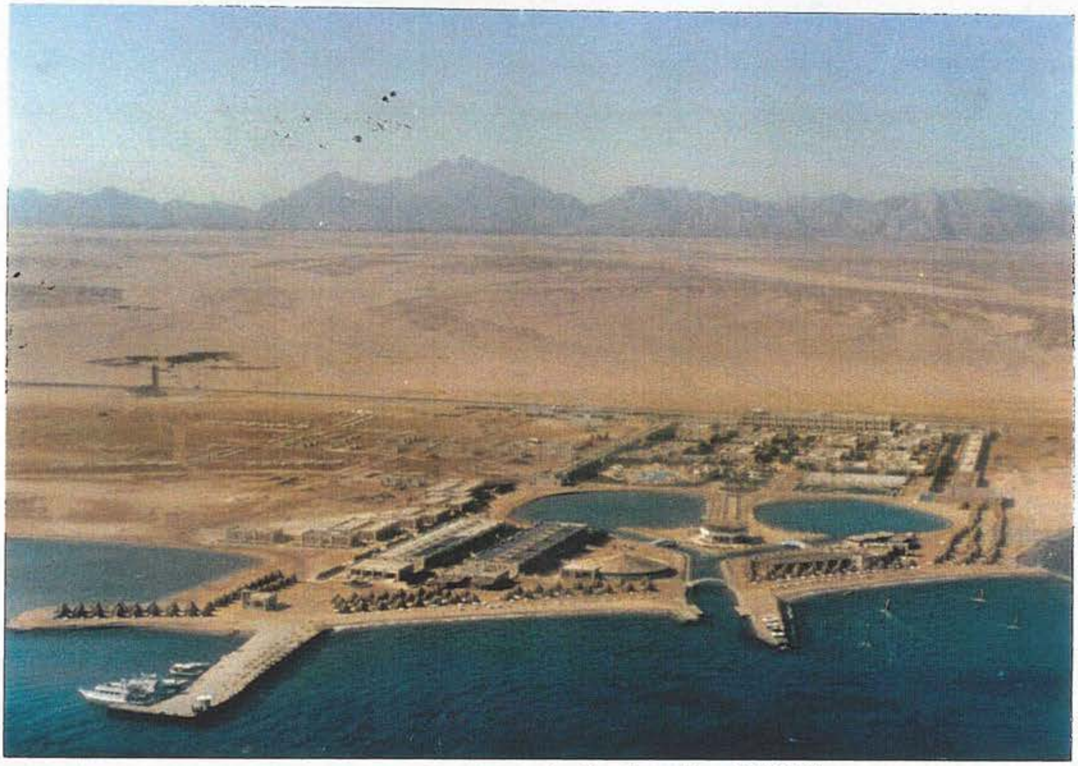

Figure 6.45: 'Al-Yasmine' resort, massive changes in the shore line. (7/1992)

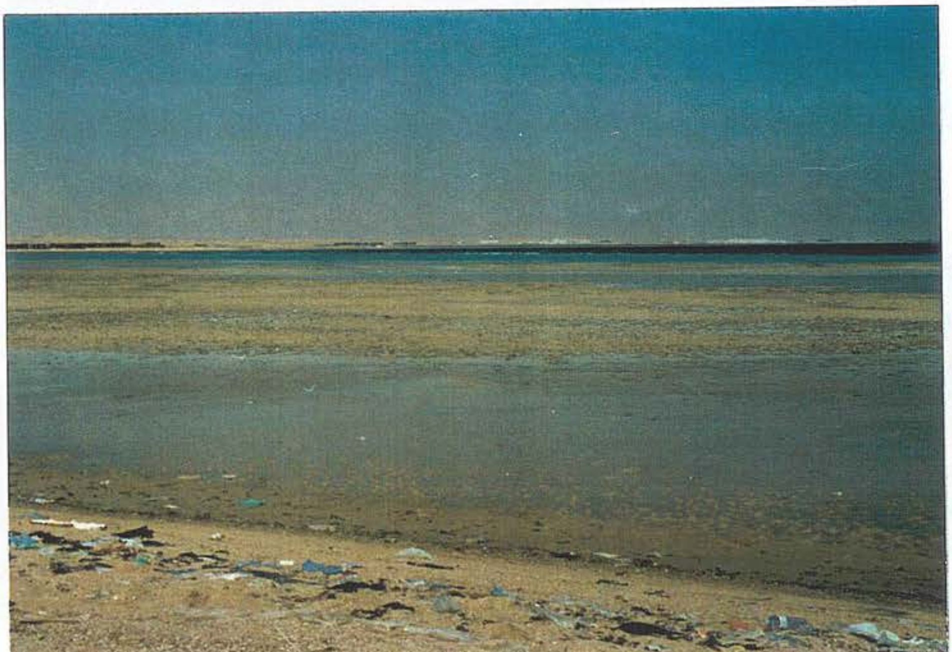

Figure 6.46: 'Coral Beach' resort, with garbage and sediments trapped between the shore and the reef. (8/1993)

According to Dr. Abadaer, due to the impacts of the land filling process and the formation of artificial beaches, all tourist resorts built on such land are in danger of being destroyed by erosion within the next ten years .[16]

From the preceding observations it may be seen that the regional road does not act as a boundary for planned development as most of the planning theories state, but, to the contrary, it acts merely as a provocation for development extension. When the road was constructed in the early sixties, there were no assumptions of tourism development. The road was constructed adjacent to the shore as close as the slope would allow. This is the main reason why the land filling process is at its maximum at the first, second and fourth zones where the road is comparatively near to the original shore line, leaving only a very narrow strip for development. The third zone remains the one with the least land filling as there was a reasonable coastal strip here suitable for development.

2.3 Impacts of Detailed Design of Resort

The designer of a tourist resort is confronted with a host of decisions throughout the design process. The task of the resort design team is a challenge because they must balance a number of sometimes conflicting priorities such as:

- Fulfilling the wishes of the developer, which are mainly concerned with , providing the maximum number of units within the defined land, providing a facility which can be operated economically, as well as providing a unique architectural style but still within the construction budget.

-While on the other hand, the design has to follow the governmental regulations which limits the design to 100 meters as the width of the seashore frontage; and only 25% of the total land area is allowed to be built on and the maximum height for any building is 12 meters.

As well as these constraints, an important aspect in water resort design is the relation between the guest and the sea. Most people prefer to see the seashore, even when they are lying in their beds.

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[16] A. Abd Al-Lattif, R. Saad, "Save the Red Sea Corals", *Al Ahram international*, 31/10/1993, p. 13

Resort layout

The following detailed factors appear to have influenced the designed resort layouts as follows:

1. Merit resort (from Zone A) (Figure 6.47) the designer has tried to achieve as much as possible, by having compact circular-shaped buildings surrounding two main courtyards. The height of these buildings is almost four stories (exceeding the 12 meters limit) in order to achieve a high density design avoiding the building capacity regulation and making fullest use of the frontage.

2. Magaweesh resort (from zone C) (Figure 6.48) the resort has privileges which are denied to any of the other resorts, mainly in the width of the seashore elevation (almost double allowed to the rest) as well as being the only resort which has used the contour lines and variation of levels in design. These assets have given the designer freedom to escape most of the constraints mentioned before, by applying a scattered chalet plan designed in an organic form around a central activity main building, restaurant and amphitheater. Magaweesh is the only resort which has succeeded in avoiding the feeling of a too compact design or of overcrowding. Compared to Al-Mashrabya (Figure 6.48) Magaweesh building capacity is relatively very low.

3. Coral Beach resort (Zone D) the resort is in the form of "V" shaped clusters in order to meet the previous constraints as much as possible, and with special orientation towards the sea shore. Most of the chalets have a sea view (Figure 6.50).

Although all of these designs are fulfilling various design concepts, however, the only environmentally suitable concept is still missing, which is the design around a courtyard concept. It is a central feature of many passive cooling systems in hot, arid climates. Not only does it have beneficial effects by itself, but it allows an optimum combination of many of the well known passive cooling techniques. One characteristic of hot, dry places is that the night air cools quickly. This effect increases with height. In the early evening, the courtyard is filled with warm air from the day, while the above is cooler. This temperature difference allows courtyard air to rise and be replaced by cooler air from above. The surrounding buildings lose their heat to the courtyard. Over the course of a night, air temperatures in the courtyard and surrounding rooms can drop significantly.

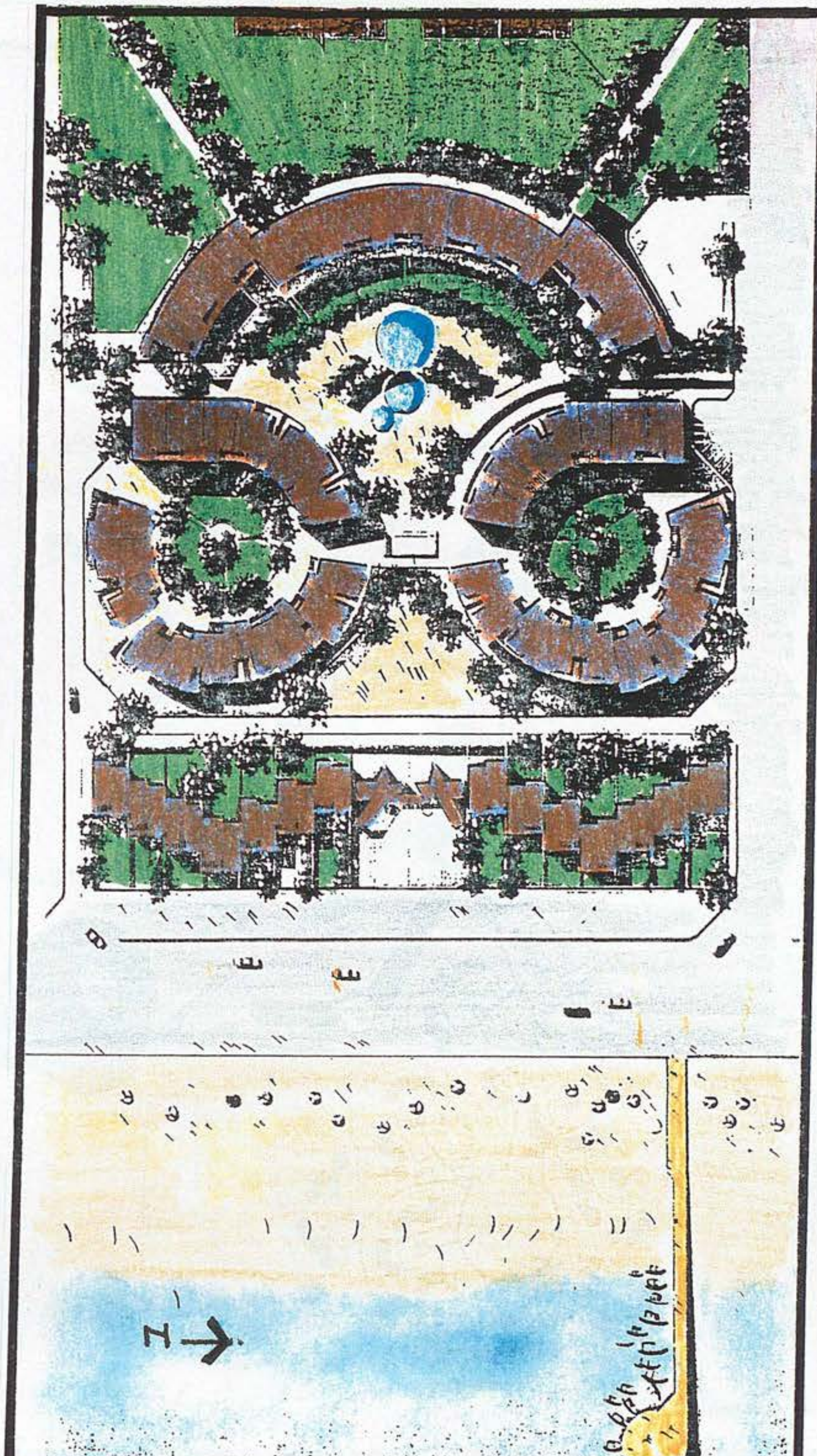

Figure 6.47: 'Merit' resort lay out. Poor use of convected coastal breeze, good screening to West from low setting sun.

Figure 6.48: 'Magaweesh' resort lay out. Siting of buildings allow good circulation of sea breeze but spacing is monotonous and responds to circulation pattern rather than to contour.

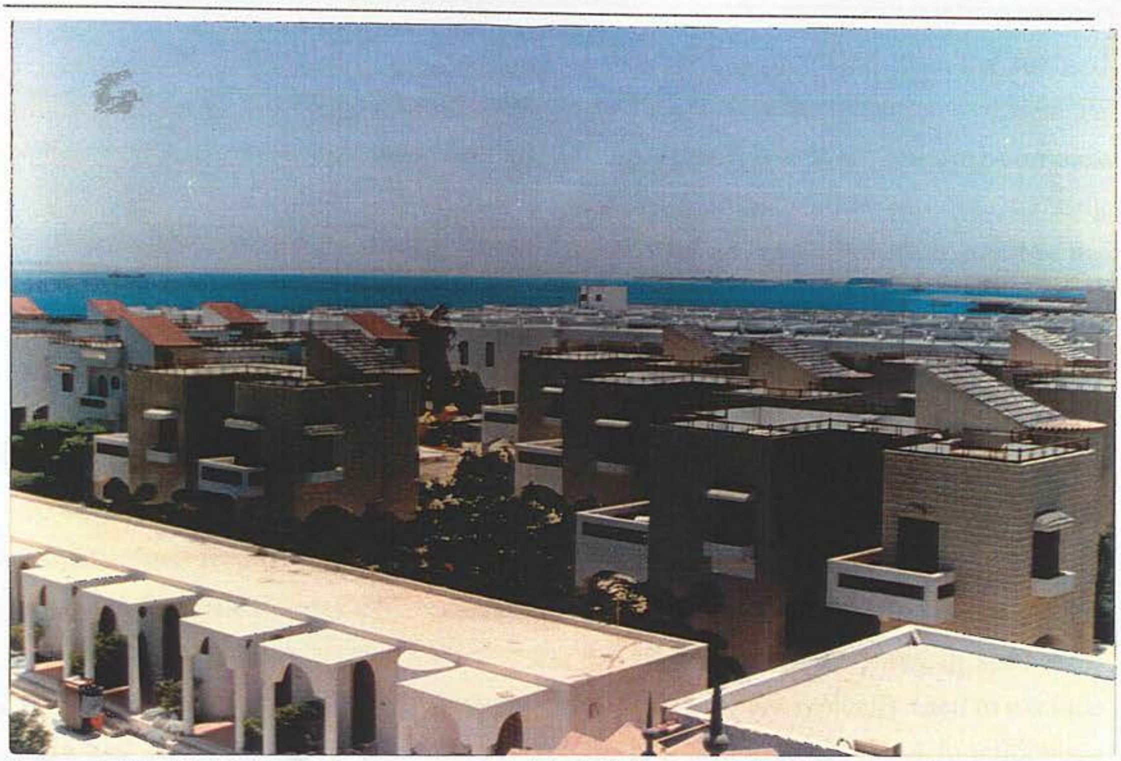

Figure 6.49: 'Al-Mashrabya' resort, very high building capacity. Dense and monotonous development.(7/1992)

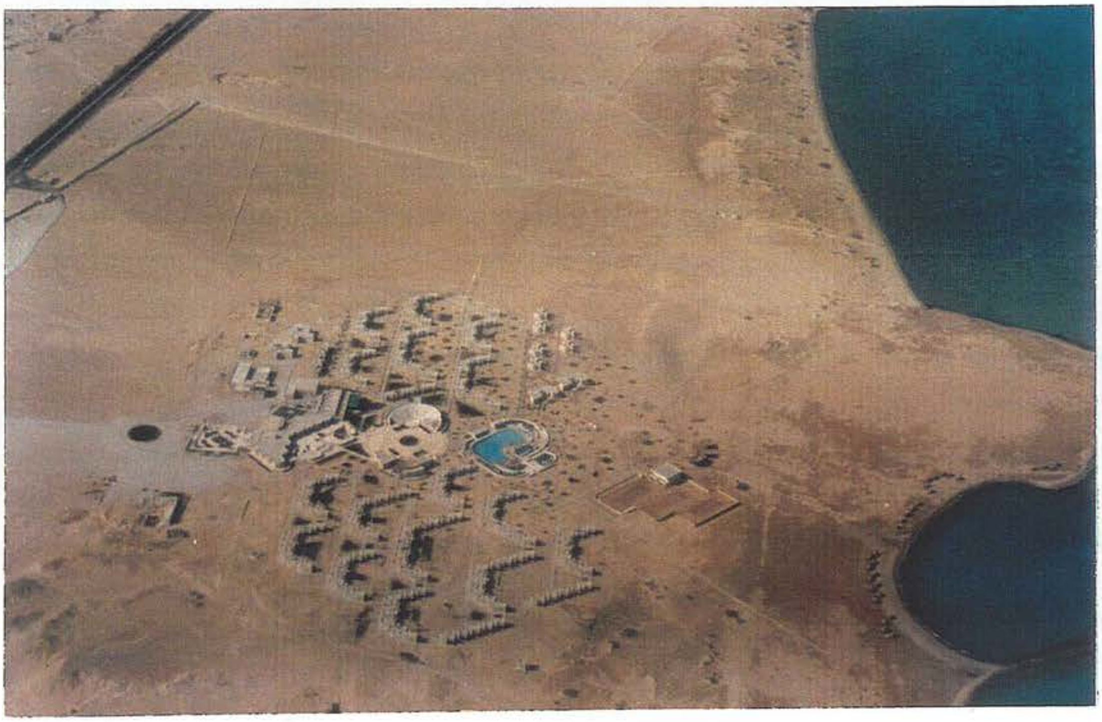

Figure 6.50: 'Coral Beach' resort good use of ground fall to give sea views and circulation. (7/1992)

In the morning, the courtyard warms slowly: it is protected from the sun and wind, and the air it contains is cooler than the air above. Now the temperature difference acts to keep the cool air in the courtyard. The final result is that the building complex cools quickly and warms slowly. But it has to be mentioned that without orienting buildings and courts to fit with the convected sea breezes it will be hard to achieve the previously mentioned balance.

Building configuration

In such a hot environment it would be unfair to ask the designers not to supply the resorts with heat pump air-conditioning. It is very hard to enjoy your holiday in over 40 degrees centigrade in summer, specially when as mentioned before, the majority of tourists come from places which are not used to such a hot climate. But still there are some environmental aspects of design that might be of help in minimising the use of air-conditioning as much as possible; also the use of central conditioning in split units which are more environmentally friendly. Solid walls also are typically used to exclude light and air as well as to maintain privacy. In hot, arid regions, those functions are sometimes separated or modified. One example of these is Mashrabya (Figure 6.51), which combines the functions of a wall, a ventilator and a light source, and adapts them to fit an environment chracterised by harsh light and large ventilation needs. Domes and vaulting act in many ways to improve the comfort in the building. They increase the roof area, which decreases the net gain per unit area and thus the rate of heat transfer to the interior air. The height of the interior is increased, allowing the hottest air to collect at greater distance from building inhabitants. Curved surfaces speed up the air moving across them, making roof top breezes more effective in carrying heat away from the building. Their shape results in natural convection air currents within the space, even if there is no outdoor air movement (Figure 6.52). Optimum orientation of a building in a sunny, arid climate minimises the sun's effects on the building, and maximises the benefits of prevailing wind. Wind benefits can be released by other means, simplifying the orientation problem to one of solar consideration only. In that case the optimum orientation is to align the long axis of the building with an east-west line. With such an alignment, the east face is exposed to the summer sun only from dawn till noon, and thus is the first building face to cool. This makes the east side of the building the best

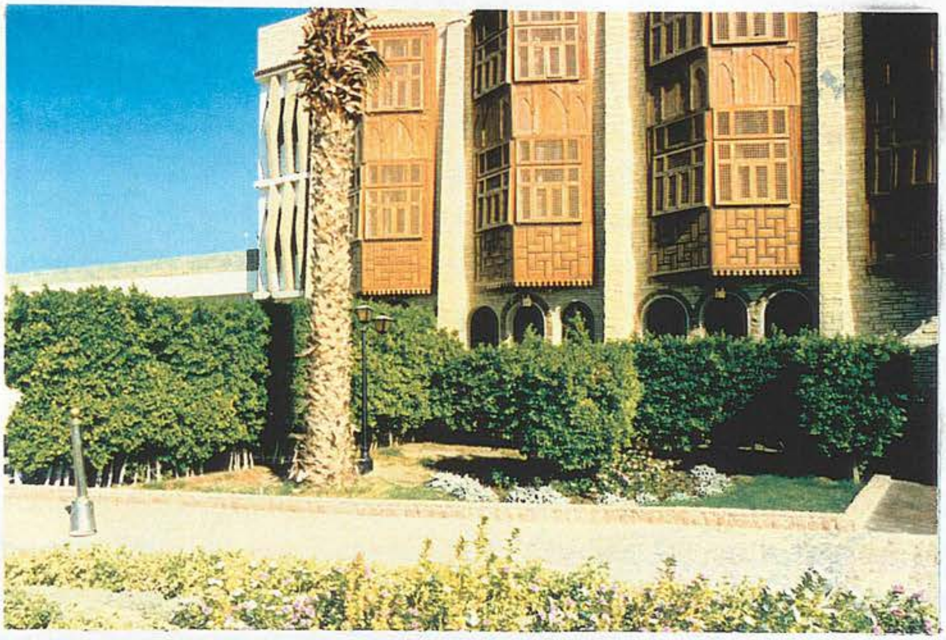

Figure 6.51: The use of 'Mashrabya', as a functional and decorative element. (Mashrabya Resort, 8/1993)

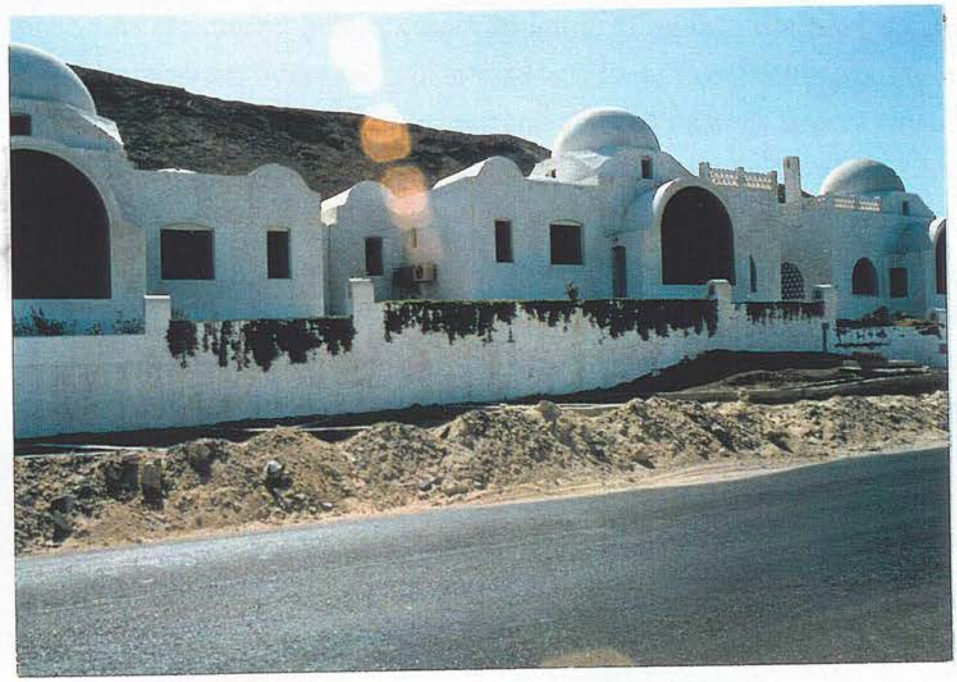

Figure 6.52: In spite of the use of domes and passive cooling, air conditioning is still used, but it has reduced the use into a split unit instead of central cooling system. (8/1993)

side for locating bedrooms. The west face is exposed to the sun from noon till sunset, the hottest part of the day. If however the east-west axis is chosen as the longest axis, there may be difficulties in making fullest use of the eastward coastal frontage. This fact, combined with the low angle of the sun towards sunset, makes it difficult to protect western rooms from heat and direct sunlight without eliminating windows. But as this would face the road anyway there is little difficulty in designing the west elevation of the building form to be as windowless as possible. Storage and utility rooms are good candidates for this side of the building. The north face of the building likewise is exposed to the summer sun in the morning and evening, but only obliquely, that is, at an angle within 35 degrees of parallel to the face.[17] Windows placed in the north face will admit mild, even light to the building interior. Living rooms are typically placed on this side. The south face is exposed to the most sun. During the summer, however, the sun is so close to vertical that this side of the building can easily be protected from direct sunlight by using screening including planting, which will provide deep or open shade as well as adding to the ambiance of the area (Figure 6.53). Unfortunately, such orientation does not correspond with the seashore view.

As mentioned before, resort design in Hurghada has been dominated by an intention to ensure fullest use of allocated land for as many units as possible, preferably 'western' in character, oriented to sea and also with a very largely controlled indoor environment. In Chapter Three we discussed the harmful impacts of the massive use of mechanical cooling systems as well as the power generating process near the coastal shore which might damage marine life. The introduction of passive cooling is essential in future designs (referring to the use of design, structure and environmental processes to cool buildings). Unlike active cooling, passive cooling uses no external power sources such as electricity or fossil fuels. Instead, it makes use of naturally occurring phenomena such as shading, wind, evaporation, and convection. As well as minimising environmental danger, a resort incorporating passive cooling will be comfortable most of the time, regardless of whether there is electrical power available, or whether there have been mechanical equipment failures. While a resort not based on passive cooling quickly becomes uncomfortable when the air conditioning system breaks down or when electrical power is not available.

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[17]Ministry of Electricity and Power, "A guide for preliminary planning and assessment of energy efficient and environmentally tourist villages in remote areas.", *Final Report*, 1991

Figure 6.53: The use of plants to provide shade is unfulfilled in Sonesta Resort. A token use, stuck on afterwards. (8/1993)

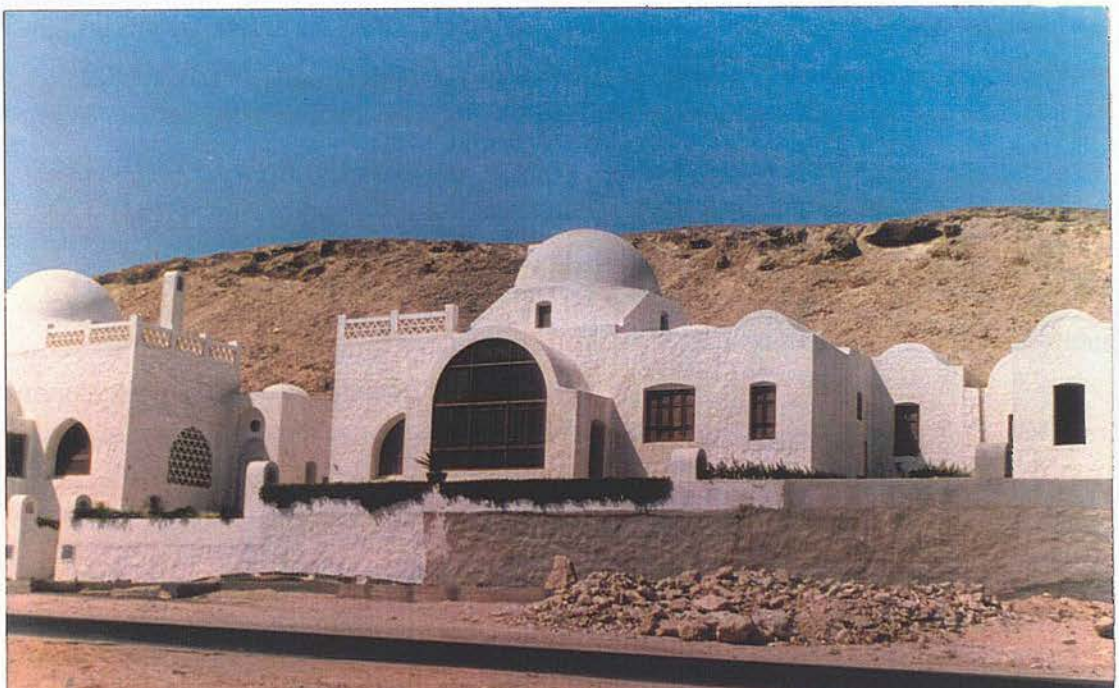

Figure 6.54: 'Ayman Tahr' compound is a good example of the harmony between passive architecture and the surrounding environment, still plants play no effective part for providing shade. (8/1993)

Passive architecture exhibits harmony with its environment that is largely absent from modern buildings (Figure 6.54). The simplicity, elegance, and effectiveness of passive architecture, coupled with its present day economic attractiveness, have inspired a resurgence in its use. Modern design, construction, and materials have been effectively integrated with ancient passive strategies, frequently with stunning results, but not so far in Hurghada.

Ground shaping and planting design

Ground shaping and planting design of the resort developments is a necessity in offering a wide range of advantages and adding to the overall quality and visual excitement of a resort. The main problem of the landscape design in the Hurghada resorts - like the rest of Egypt - is professionalism. The design is mainly carriedout by either architects or civil engineers. The design is developed in three dimensions only, the lack of the fourth dimension, time, in landscape design is sadly obvious. As mentioned previously, two of the most important aspects of the resort design are providing a maximum built environment capacity, as well as orientation towards the sea (View). This leads to improperly designed spaces, planting tends to be without concept and poorly related to spaces (Figure 6.55). As a result, plant selection and design does not follow any rational scheme; haphazardness and lack of function are the main characteristics of the landscape design in the area, except perhaps in two or three resorts (Grand Hotel and Sonesta) (Figures 6.56, 6.57). The planting also tends to ignore the basic design aspects for arid regions, such as using native water conserving plants. Some of the general features of the existing landscape design aspects are:

- The minimum use of plants indigenous to the region and which have a low water requirement (Figure 6.58).
- Plants tolerant of high salinity are very poorly employed (Figure 6.59).
- Selection of hard materials done without maximizing the use of native desert elements, such as the use of local stones and hard mulches (Figure 6.60, 6.61).
- Excessive use of turf areas (green grass carpets), which needs large amounts of both water and soil improvement with very large amounts of imported soil conditioners and fertilizers (Figure 6.62, 6.63, 6.64, 6.65).

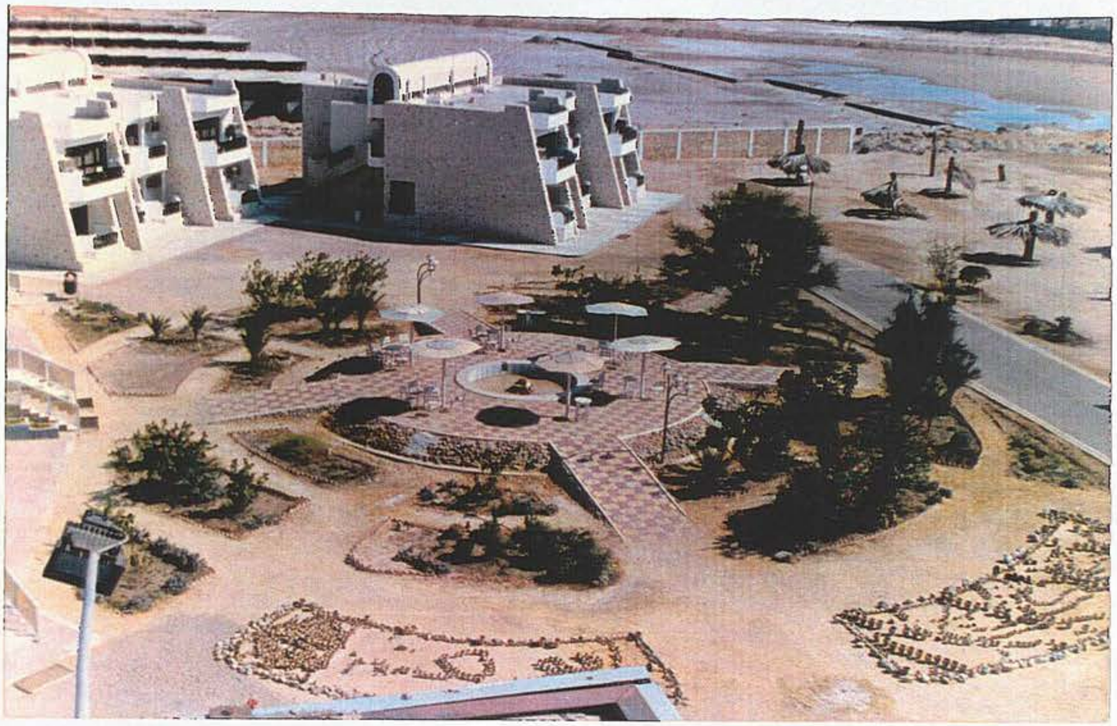

Figure 6.55: The outdoor spaces poorly relates to indoor spaces, to general circulation and detailed planting. (Marine Sports Club, 8/1993)

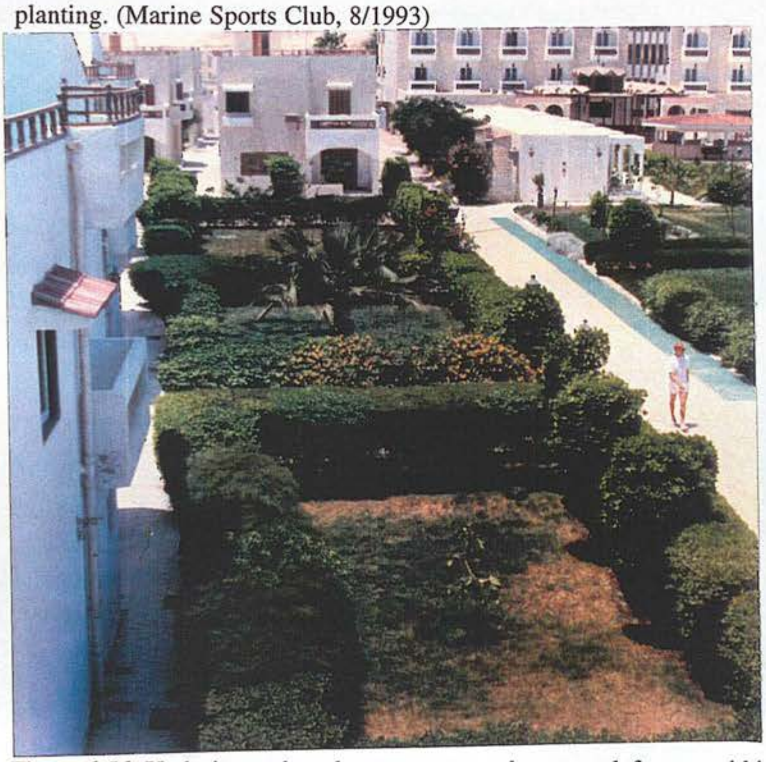

Figure 6.56: Undesignated outdoor space treated as green leftovers within design process and consuming unacceptably large amounts of water. (Mashrabya resort 7/1992)

Figure 6.57: One of each, stamp collection planting to no obvious purpose and without any relationship to surrounding spaces. (Marine Sports Club 8/1993)

Figure 6.58: The main space with no overhead structure planting to provide any source of shade. (Sonesta Resort 8/1993)

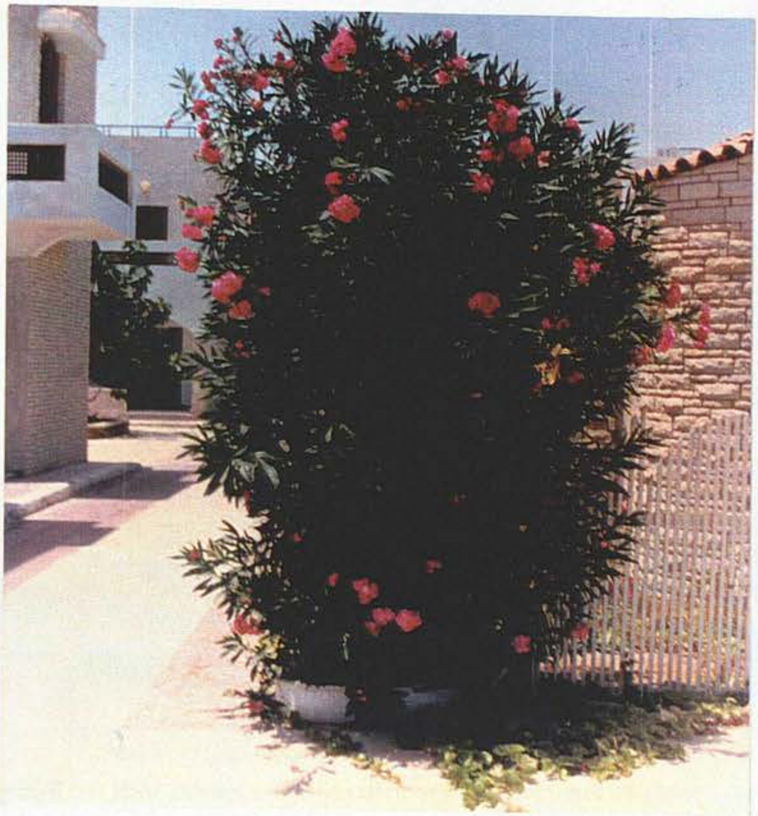

Figure 6.59: Nerium oleander, a moderately drought resistant suitable plant for the region but, does not offer any useful shade for pedestrians or buildings. (Sonesta resort 8/1993)

Figure 6.60: Construction work is poor, and the design has no clear purpose. (Arabia Resort)

Figure 6.61: Poor attempt in the use of design elements, still no shade is provided. (Magaweesh Resort)

Figure 6.62: Manual irrigation leading to bald grass patches with poor maintenance, still no shading is supplied to the main space in the resort lay out. (Mashrabya Resort 7/1992)

Figure 6.63: Trying to cover the bald patches by striping. Shade a primary requirement using indigenous or compatible species. (Arabia Resort 8/1993)

Figure 6.64: No surface treatment and no useful shade. (Al-Giftoun Resort 8/1993)

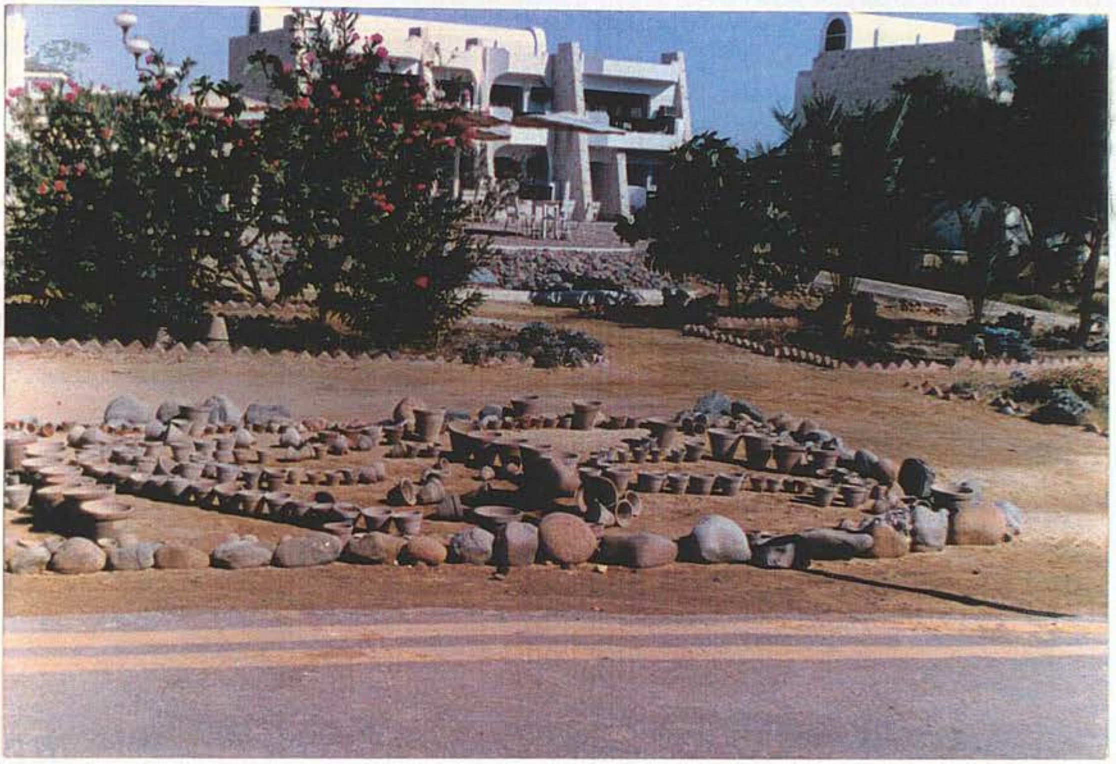

Figure 6.65: Poor attempt to use native materials as design elements. (Marine Sports Club 7/1992)

Figure 6.66: A patch of useful shade but unrelated to buildings or useful adjoining open spaces. (Al-Giftoun Resort 7/1992)

- Maintenance is very poor. No maintenance plans have been suggested or proposed (Figure 6.66).
- Lighting design schemes were not worked out beforehand, and have been added later with embarrassingly arbitrary results (Figure 6.67 a & b).

Water consumption is dependent upon the design and the type of plants used. At Hurghada this typically requires approximately 250 to 450 liters of water per guest room per day, which accounts for 20 percent or more of the total water required for a resort.[18] Lack of water is also accompanied by very poor choice of species as well as very inappropriate kinds of planting (Figures 6.68, 6.69, 6.70).

In addition, unlike other water consuming applications in the tourist village, water used for planting cannot be reclaimed through the water treatment system. However, it does not require potable water and presents an excellent opportunity for the use of treated waste water. For health reasons, untreated water should not be used for any sort of irrigation. Unfortunately, the water used by most of the Hurghada resorts is partially treated sewage effluent; this was very obvious in Mashrabya, Al-Yasmine, Three corners, Arabia and Sonesta by its smell. The gardener in charge in Mashrabya confessed that due to the lack of water, and need to reduce the expense of providing the soil with fertilizers, they use the sewage water in irrigation during the night as this helps to overcome the problem of the smell (Figure 6.71). Nothing was said about the public health aspects of this in the use of the irrigated areas themselves.

As for irrigation systems, none of the modern methods are used, manual irrigation is the only method used in the resorts, and which indicates that there were no advance landscape design plans prepared for the resort. Manual irrigation has several drawbacks, mainly the inequality in distributing the quantity of water, which is very obvious by the appearance of bald patches with the grass ground covers.[19]

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[18]Ministry of Electricity and Power, *A guide for preliminary planning and assessment of energy efficient and environmentally tourist villages in remote areas* , 1991

[19]Drip irrigation is recommended as more effective than surface and spray methods. Drip irrigation is a frequent, slow application of water at the subsurface, that is, directly to the plants roots, administered by means of a network pipes. In arid climates, this method is preferred since it reduces evaporation, thereby conserving water. Another advantage of drip irrigation is that it does not absorb the suspended residual pathogens in the air.

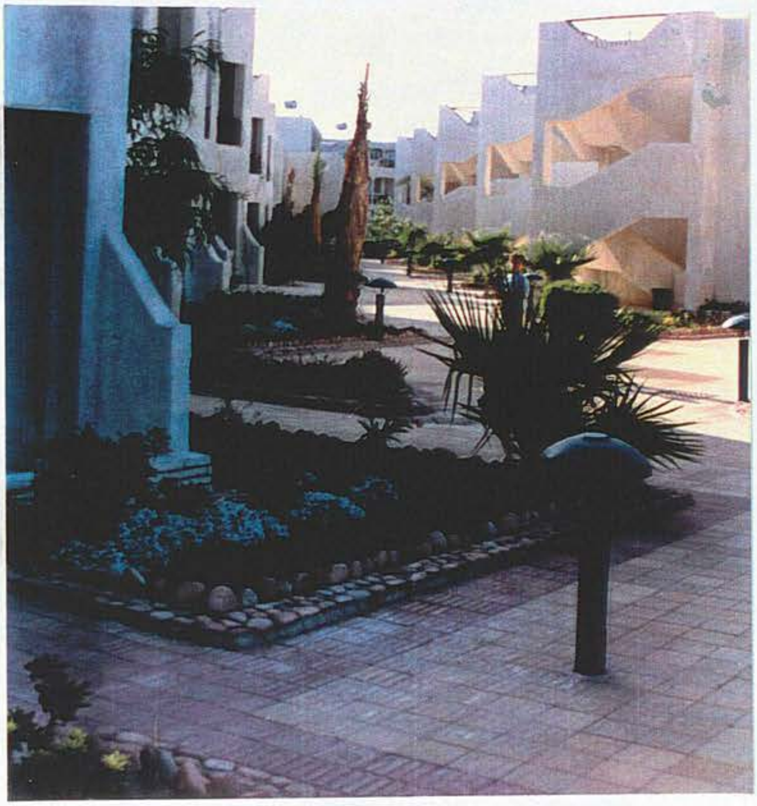

Figure 6.67 a: Embarrassingly inept planting and lighting. (Sonesta 7/1992)

Figure 6.67 b: The wrong planting in the wrong places and with circulation and lighting very poorly related. (Mashrabya Resort 8/1993)

Figure 6.68: Disease probably related to irrigation with partially treated sewage effluent (Sindbad Resort 8/1993)

Figure 6.69: Random and over use of plants resulting in an uneconomical overcrowdness- although this density of plants is achieving some shade for pedestrians and buildings. (Mashrabya 8/1993)

Figure 6.70: Courtyard treatment is too grand for the scale of the surrounding buildings. (Mashrabya Resort 7/1992)

Figure 6.71: The use of poorly treated water in irrigation, is common in all resorts. It is obvious from the colour and smell of the irrigated water. (Al-Yasmine 8/1993)

2.4 The After Development Impacts

Waste disposal: The growth of tourist resort communities along the Hurghada coast is dependent on the maintenance of a high level of environmental quality. A lack of reliable water and waste water systems will have a serious effect not only on public health and safety of the permanent and transient population, but also on the perceptions and attitudes of tourists. Tourists have already started complaining about noxious smells and polluted sea water and beaches fouled by inadequately designed or malfunctioning septic tanks, on-site sewage treatment units, oxidation ponds, sea outfalls and land based sludge disposal sites. In 1992 a sampling study programme was set up to give a true picture about the waste water characteristics as generated by the different resort area activities by Prof. Dr. Samia Saad of Alexandria University.[20] The study took samples from resorts in the Third and Fourth zones in our division, there being no samples readings available from the second zone as there are no resorts with direct access to the shore. No reason was given why samples from the first zone were not collected. A composite sample was collected from each site every 3 hours starting at nine o'clock in the morning. Four composite samples were collected from each site to show possible expected range of variability in the organic polluting loads as generated at the site under investigation. The five sites under test were:

1. Hurghada Sheraton (Zone C)
2. Al-Mashrabya village (Zone C)
3. Magawish village (Zone C)
4. Al-Yasmine village (Zone D)
5. Coral Beach village (Zone D)

In general the characteristics of the combined wastes of the five surveyed sites were as follows: (the characteristics of each site is in Appendix G)

[20]Ministry of Tourism, T.D.A, *South Hurghada, Sahl Hasheesh and Ras Abu Soma water, wastewaster & solid wastes facilities*, Vol. 3, Egypt, May 1992

pH Values

The effluent generated at these sites had pH values ranging between 7.0 -7.1 and was quite satisfactory.

Solid Parameters

The total solids values varied slightly between 1024-1379 mg/l. There was a variable range of organic and inorganic loads contributed by the different sources in the villages. The total volatile solids varied between 1075-510 mg/l and settleable solids from 4.5-5.5 ml/l.

Sulphides

The presence of sulphides at a value between 9.3-9.8 mg/l indicates the accumulative effect of anaerobic decomposition of liquid wastes in the collection system and the manholes.

BOD and COD Values

These two parameters are within the medium to high range of domestic waste. The ratio of phosphates to BOD and volatile solids can support the biological treatment of the combined liquid wastes generated at all sites. The presence of BOD ranges between 650-467 mg/l and COD between 600-1224. According to a study by Dr. Khalled Abou Aisha[21] in 1985 the average phosphate concentration recorded at the city of Hurghada was 0.32+0.03 ug- at P/I, which is very close to the value reported by Morcos in 1970. Compared with the figures we have today, the phosphate concentration average is almost double that recorded in 1985. According to Khalled Abou Aisha there is a direct factor between tourism and the increase in phosphate concentration.

Organic Nitrogen and Ammonia

Organic nitrogen varied between 16.2-21.8 mg/l, with ammoniates ranging between 6.8 and 15.2 mg/l. The presence of ammonia at the above concentration indicates the need for a longer period of aeration during the biological treatment.

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21 Khalled Abou Aisha, A study of the pollution in the Red Sea , Ph.D. 1992.

Dr. Samia Saad's report recommended that the waste generated at these sites be collected and biologically treated and further re-used in irrigation. One of the drawbacks of this decision is the need for a larger area for the proper treatment facility site. To have more appropriate tertiary treatment by adding one or more ponds in series to a conventional treatment plant, in addition to such "polishing ponds" is a suitable means of upgrading the waste water-treatment plant so that the effluent can be used for irrigation. But there should be no discharge whatsoever to the sea even after treating the effluent, to prevent any possible eutrophication which can ruin the near by beach, as well as any environmentally sensitive area. This means in all cases studied a failure to correctly assess the impact of these services during the planning process.

During my inspections, I was never allowed to examine any of the treatment plants of the tourist resorts. They were regarded almost as a security secret. But while visiting the Arabia tourist resort I did manage to interview some of the people who worked there. They confessed that some of the treated sewage is being discharged out to the neighboring shore as it is a restricted military area and no one has access to the beach. During my site visit, a pipe with some liquid leakage was found, and the next day a sign mentioning that this liquid was the swimming pool's water was put by the village authorities (Figures 6.72 &73). In a personal interview with Mr. Deddeae de Champs[22], the owner of the Three Corners village, he stated that they had been trying to apply a new system which would be able to return the sewage water to its pure state before treatment, but unfortunately they had not yet succeeded, as the enzymes required for such a process are on the government list of banned imports. In general, the inadequacy of water and sanitation facilities is a serious constraint to tourism development and an inhibiting factor in private sector investment decisions. Investors' confidence is severely affected by the absence of public infra structure and the perceived need to finance and operate on-site compact treatment plants, as part of the regular hotel management operation. Hotel management and their limited maintenance staff cannot be expected to operate the complex technical water and waste water system at standards expected from dedicated public or private sector services. The establishment of comprehensive water and waste water management programmes is critical to the

[22]Mr. De Champs is a Belgian investor. He runs an international carpet business with his family. In Egypt they own several tourist resorts in the Red Sea as well as Sinai. The interview took place at the office of Ayman Tahr (the famous under water photographer and an international diver) in Cairo, October 1993.

development of such tourist communities and in particular the environment.

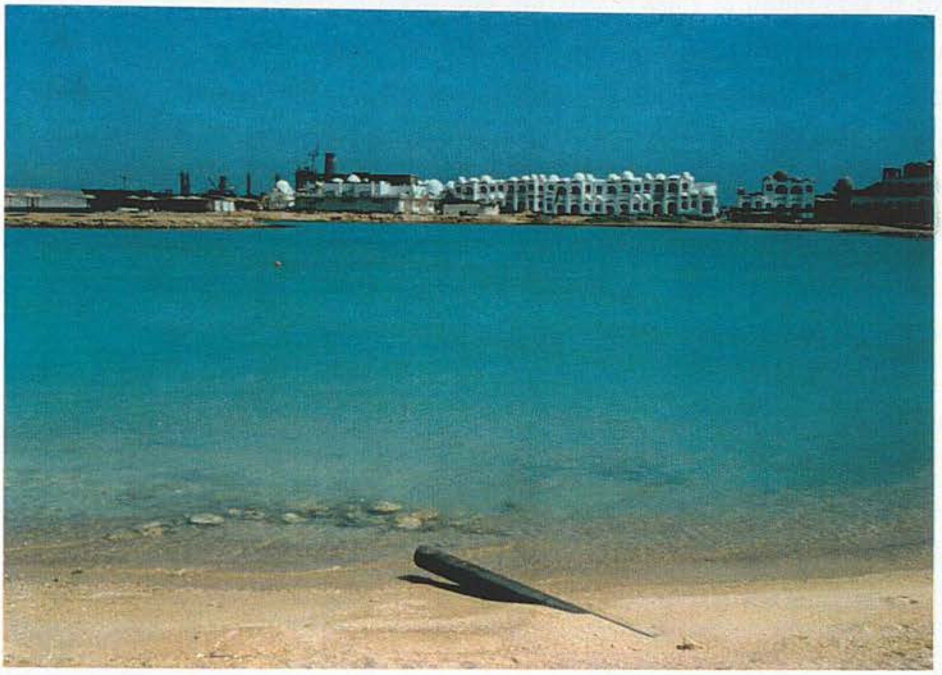

Figure 6.72: A pipe was observed discharging liquids into the sea on 28/8/1993 at Arabia Resort.

Figure 6.73: On the second visit to the site 29/8/1993, a notice had been put up stating that this liquid was the swimming pools discharged water.

Garbage disposal:

A large quantity of trash and garbage wastes is generated at tourist resorts. These wastes include degradable items such as, food, paper, and non-degradable items, packaging, plastics and metals. A lack of sorting and recycling of such waste greatly increases its volume. Lack of moisture extends the life of even degradable wastes. Trash dispersed on land, floated on water or beaches, and cans and bottles deposited on reefs will degrade the environment that attracts tourists to the region. In addition trash is ingested by fish, and marine mammals, and can be lethal. Flies and other pests associated with wastes are a very unpleasant nuisance, and a potential health hazard, which may certainly affect tourists and discourage them either from returning or recommending the site to their friends. Thus management of disposal trash is of great concern for tourist development.

Two development sites stand out in being surrounded by garbage and shore pollution. The first site is in the second zone; due to the use of concrete blocks being used in land fill to form a small bay, and with the effect of water currents, a garbage trap is formed. Algal bloom also may be observed in the site, indicating the garbage trap has been there for some time (Figures 6.74 & 75). The second site is located in the fourth zone just north of Coral Beach resort, all sorts of wastes were observed in this site. The site is similar to the first site but it varies in scale, as the first bay is very narrow (less than 1 Km), while the second is about 10 Km. The impact of land fill is still noticeable, as was mentioned earlier in this chapter, the Coral Beach resort having about 100 meters of land fill (Figure 6.76). In addition, a report by the EEAA published in September 1990 observed the following[23]

> **".....oil discharge in the water, floating garbage, waste oil disposal on public walk ways, raw sewage disposal directly into the sea. Faeces and toilet paper were seen to be floating past and impacting swimming beaches in the vicinity of the Giftun Hotel, Also the beach showed signs of heavy organic loading with anoxic sediment layers only 1.5 to 2 cm. below the surface, with destruction of coral reefs areas resulting from overuse and poor anchoring techniques."**

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[23]op cit., EEAA, p. 21

Figure 6.74: A garbage trap in one of the land filled bays in Zone 'B', garbage composed of bottles and all other sorts of wastes. (8/1993)

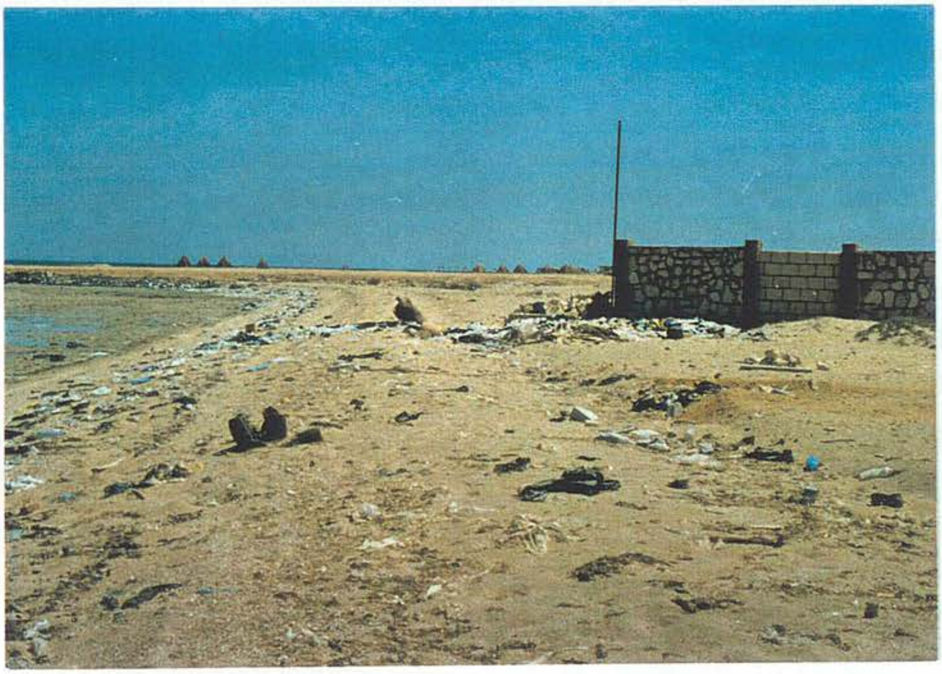

Figure 6.77: Garbage is traced to the North side of the 'Coral Beach' Resort, polluting the beach. (8/1993)

In an interview with Mr. K. Al-Saban, the assistant manager of the Mashrabya resort,[24] garbage collection system in Hurghada depends on a private company which is in charge of collecting the waste bags from the resorts every morning and dumping them in a specific place in the mountain area.[25] The garbage dump is too close to development areas, but disposal methods seem to contain the material effectively. Garbage collection programmmes were not assessed in detail but litter is abundant in the area of Hurghada.

Marine sports and activities

Marine life in Hurghada is the major attraction for tourists in the area, especially the coral reefs. This has led to the demand of each resort to have its own small boat marina as well as sufficient boats. As was mentioned before, the construction of marinas was one of the main purposes behind the land filling activities. On every tourist resort brochure one of the most important activities mentioned is a one day trip (minimum) to a nearby island and a visit to a well known diving spot in the area in order to cater to the needs of tourists interested in snorkeling and diving.

Each of these water activities has an impact on the environment. Boats joining the sea trips are either yachts or small boats. The yachts are mainly for deep sea activities such as, professional diving and competitive fishing (Figure 6.77). The small boats are mainly fishing boats which turned to tourism activities after the tourism boom. They are old and in need of maintenance, and most of them should be retired from use on such trips (Figure 6.78). Inexperienced boat handlers are causing coral damage by their method of using anchors. Every time a ship has to stop, the anchors are thrown onto one of the coral patches causing needless destruction to the reefs through anchor dragging. During such trips, it is not uncommon for the boat handler to deliberately tear off that part of the reef attached to the anchor and sell it to tourists. A boat operator's reply was typically to say that "according to the law we are allowed to park our ships wherever we like, but we are not allowed to take any corals back to shore". Another more civilised and environmentally friendly way was used to pull the anchors, by just diving and gripping the anchor, causing the least possible damage. According to the boat handlers it is a personal attitude, there is no law to force the boat handlers to treat the corals in such a careful way (Figure 6.79).

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[24]Meeting took place in the resort the first week of August 1992

[25]Eccess to this site was not permitted, as it is run by a private company. Its impacts on the surrounding areas was not traced.

Figure 6.76: Large yachts are directed towards the deep sea for diving and fishing activities. These discharges are not monitored. (8/1993)

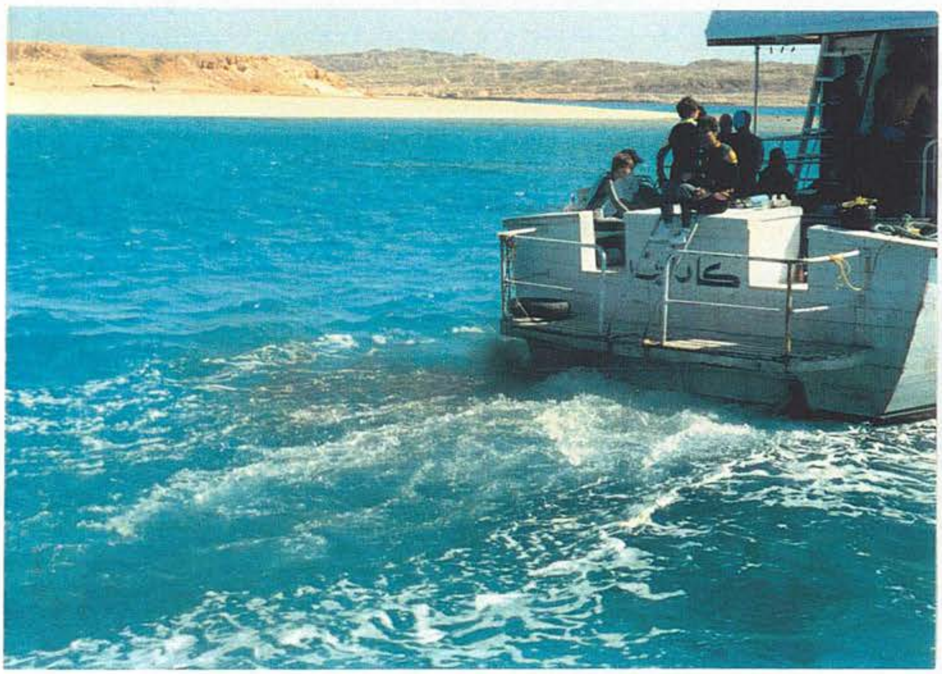

Figure 6.77: Small boat pollution from diesel and sewage discharges. (8/1993)

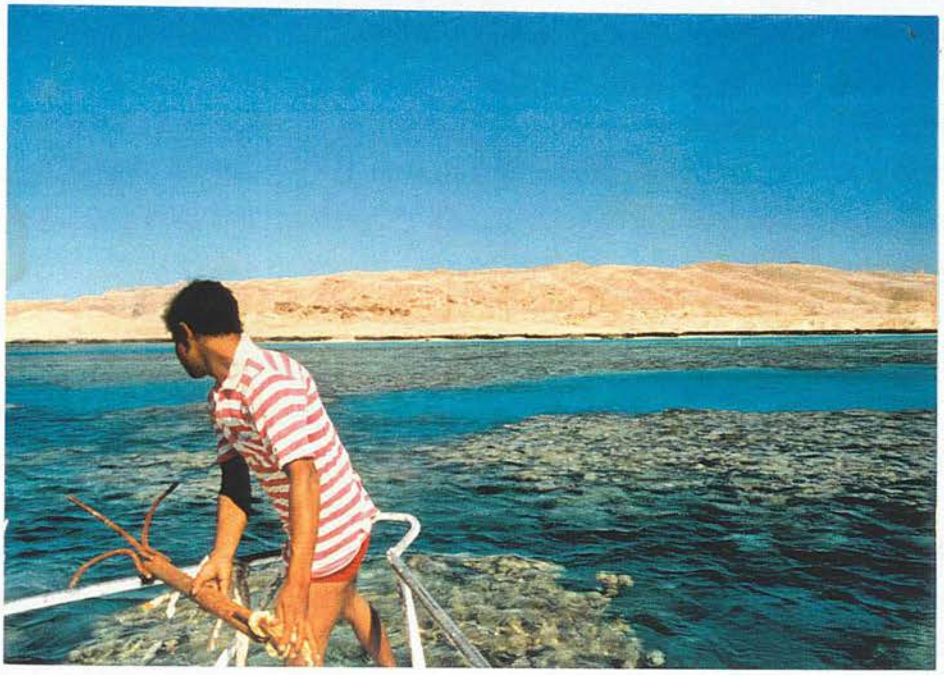

Figure 6.78: Anchor damage due to manual use of anchors on coral locations. (8/1993)

Figure 6.79: Trip anchors are pulled up damaging a coral patch. (8/1993)

According to international diver and diving instructor Ayman Tahr, almost any diving operation results in minor -even if it is unintentional- damage to corals and other reef biota; at frequent diving sites this damage is becoming significant and leading to the loss of the fragile species. Reef walking at low tide is a very popular method for reef viewing and inevitably causes physical damage due to trampling on the corals, as well as moving or overturning boulders to view reef life beneath them; most of the boulders are not replaced and these organisms are likely to die, as mentioned in Chapter Three and (Figure 6.80 & 81). Tourists' impact on the reefs varies from one person to another as no guidelines are given to divers or snorkelers as to how to treat the corals. A recent Grand Hotel brochure, did indicate the comment **"please be friendly to the corals"**.[26] But no advice was given as how to be 'friendly'.

Fortunately the off-shore islands are still not badly affected. They have their own protective defence, as most of them are surrounded by corals from all sides, and the boat skippers refuse to go near them. The ones under pressure are the sandy cays, which are small barren deserts.[27] These at present do not have any structures on them, except light wooden bungalows. They give shade from the sun and are sometimes used for barbecuing purposes (Figure 6.82). The government is not allowing construction of any sort of facilities on the islands. But still, garbage is found in some places due to the waste left behind by tourists and also washed up from the Red Sea shipping (Figure 6.84). The only island under real danger is Abu-Minkar island, the bird national park, as it was sold to an Arabian prince to transform it into a tourist resort. Egyptian environmentalists are trying to form a lobby to prevent this from happening.

As mentioned in this chapter, fishing as an occupation is declining in Hurghada. But fishing as a sport is increasing. The city hosts an annual fishing championship for different kinds of deep sea fishing. The most popular type is trawling, which may cause severe local damage to seabed communities and in particular to stocks of young fish.

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[26]Grand Hotel resort brochure, September 1993, Hurghada
[27]See Chapter Two for figures and detail.

Figure 6.80: Snorkeling and anchors on a coral patch near the islands leading to the incremental destruction of live coral. (8/1993)

Figure 6.81: Tourists are neither supplied with adequate information nor equipment to deal with corals while, snorkeling. Trampling has led to a steady decrease in the number of live corals in certain spots near the islands. (Under Water Photo by Hisham Al-Sawy 8/1993)

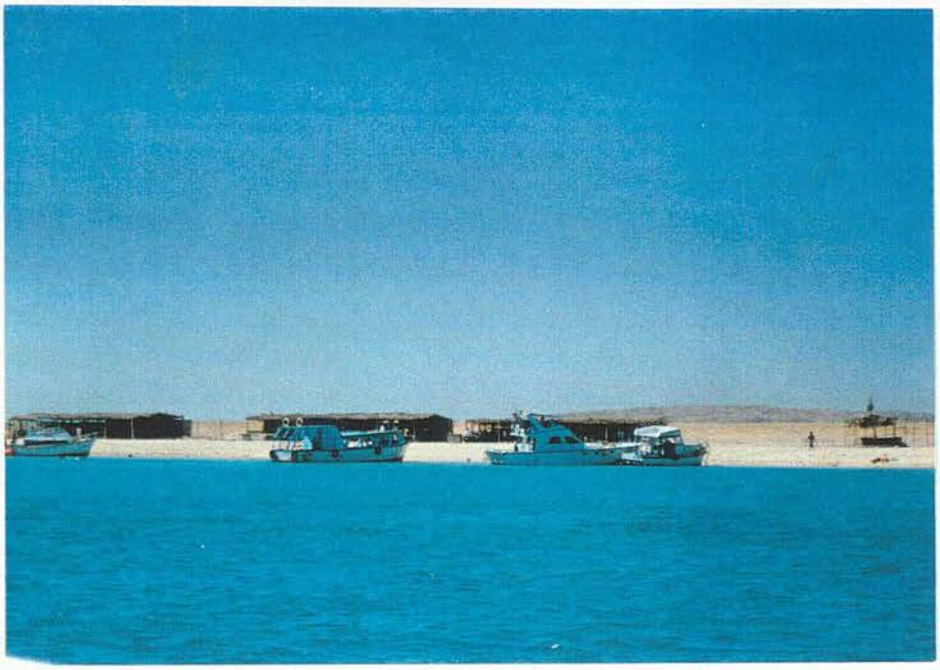

Figure 6.82: Bungalows are the only built structures allowed on the islands. (8/1993)

Figure 6.83: A derelict landing pier on one of Hurghada's off-shore islands, built to provide access to fishermen. (7/1992)

According to Dr. Nasry Abadair, Professor of marine science at Cairo University, and Dr. Ahmad Nawar, Chairman of the Institute of Marine Life in Hurghada, in an Article in Al-Ahram newspaper, 31/10/1993[28], more than 60 to 70 % of the marine life in Hurghada has been destroyed due to the various impacts of tourism.

In addition to its coral reefs, Hurghada's potential and uniqueness lies in its off-shore islands. These are protected and all development should be strictly forbidden. Improvement programmes such as; cleaning the northern shore lines of oil and debris, protecting critical habitats and ecosystems, installing a system of vessel moorings and prohibiting the use of anchors at popular diving sites, initiating a comprehensive study to assess levels of use and sources of impact with a view of management has to be carried out to protect the natural resources of the area (Figure 6.84).

Impact on Local People's Everyday Life

Tourism has been of great influence on the local culture. Most evident are western-style modernisation, urbanisation and industralisation. The main characteristic of this new form of culture is that it is economically determined. All things and all forms of life are now perceived as resources to be exploited, manipulated and consumed for mere profit-making. Moreover, an unjust socio-economic structure has been established on a global scale that allows only a wealthy and powerful minority to benefit from this tourism development.

During the visits to the city of Hurghada, a survey was carried out by the author in order to determine what might be the impact of tourism development on the local people. A short questionnaire was compiled and given a random sample of people either born and living in Hurghada, or working in Hurghada at least for the last ten years (appendix). The results of the survey gave unexpected information. Firstly, they drew attention to a large housing problem in Hurghada, which is unexpected in a desert city with no limits of land expansion. The government builds low income housing for Hurghada citizens, but instead of being owned by the local citizens, unfortunately, the tourist resorts owners through corruption in the local government, buy these dwellings and use these flats as self catering tourist accommodation during the peak season.

28 op cit., A. Abd Al-Lattif

Figure 6.84: The only mark for boats to avoid the coral line is a wooden cross. A better marking system is urgently needed. (8/1993)

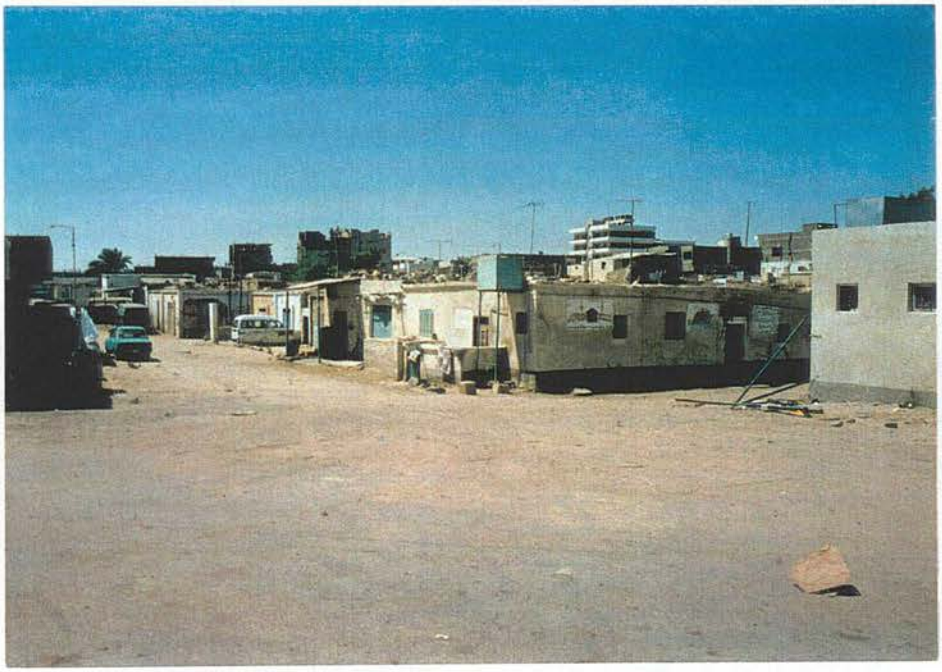

Figure 6.85: Most buildings in Hurghada are of low rise property, the new high rise developments can be seen at the back. The high rise buildings are all private properties. (8/1993)

Some of these dwellings built by the private sector, and designed as housing schemes are even transformed into hotels or given hotel related non residential uses. Along the main street in the city center there are some relatively high rise hotels. These so called hotels are of very modest standard. As an indicator for recent development the buildings in the main street are mostly of rural character. The rural appearance of the city may be seen in the quality of most buildings, in particular the old ones, some of which are of mud brick. On both sides of the main street in Hurghada are shops of a traditional nature, grocers, vegetable and fruit shops and also many coffee houses of traditional type. Most of the buildings in the city are low rise, but building height has recently begun to increase, especially in hotels and guest buildings (Figure 6.85).

In routine tourism in Hurghada, opportunities for tourists and hosts to meet as equals and really get to know each other are extremely limited. There is a strong tendency that a master-servant relationship develops between the relatively rich tourists and the relatively poor locals.[29] Local people are led to believe that tourists from rich countries always have plenty of time for leisure and plenty of money to spend. An example is the invasion of tourists into the Bedouin communities, located in the nearby mountains through what is called "desert safari". The Bedual used to offer Bedouin hospitality to all visitors, even tourists. Being members of a poor tribe, they experience hardships as a result of feeding extra mouths. It was expected that the visitors would leave a gift, no matter how small, for the hosts. Tourist abuse of Bedouin hospitality has changed this. Although hospitality is offered, Bedul want to be paid cash (in any currency). The impact of this is also seen in the city, as all the shop owners offer a percentage of what the tourist buys to any Egyptian accompanied by foreigners.[30]

Investments in Hurghada generally are directed towards the sea (Resorts areas) and not to land (City). Upgrading is directed towards the tourist areas, and the city is suffering from lack of infra structure. Problems with sewage disposal are everyday life issues. There is a growing feeling among the local people that they are second class

[29]During my field trip I met some tourists who were interested in going sightseeing around the city centre, I offered to assist them as this would be a part of my research in assessing the interaction between tourists and locals. I was very annoyed when I was offered some money for my time. They were shocked when I refused to accept it.

[30]I can attest to this personally, as I was accompanying some German friends of mine on a sightseeing tour of the city, and without exception, the shop owners whose shop's we visited, thinking I was a tourist guide, offered me a percentage on their purchases.

citizens (Figure 6.86).

The city also suffers an unemployment problem. As the attraction of the seaside to those unemployed is very high in the city, the competition for jobs is very high. All jobs offered are directed towards the tourism industry which needs qualified labor, and which is scarcely to be found locally. More than half of the fishermen have changed their jobs from fishing to diving instructors, or sailors on tourist boats or even tourist guides. The change in the nature of jobs is also affecting the urban pattern of the city. Before the tourist boost, most of the shops were of a technical nature dealing with car repairs and other every day services. Today these shops sell for example, jewelry and leather products.[31] The daily market has had to move to other places in the back streets of the city (Figure 6.87). It is obvious that the nature of products and goods being marketed is changing to provide services for the tourism market (Figure 6.88). It is often claimed that tourism with its related souvenir trade stimulates local arts and crafts activities and, therefore, contributes to the preservation of the culture. For local people such things are not decorative objects but to be used in daily life. They have a special value.

The cost of living in Hurghada now is very high, (what are called "tourist prices"), and this badly affects the local people, especially those who do not work in the tourism sector. The price of vegetables and fruit is even higher than in Cairo. Citizens have to buy their goods from the city of Suez, 200 km to the north, as prices there are normal. Even transportation prices within the city are high. There is no public transport, only private mini buses, which are relatively expensive in a city expanding like Hurghada, and the distances between places, together with the hot weather do not encourage walking (Figure 6.89).

[31] Leather shops and bazaars are very common in Hurghada today. Due to its cheap prices compared to the west, it has a huge market in Egypt in general.

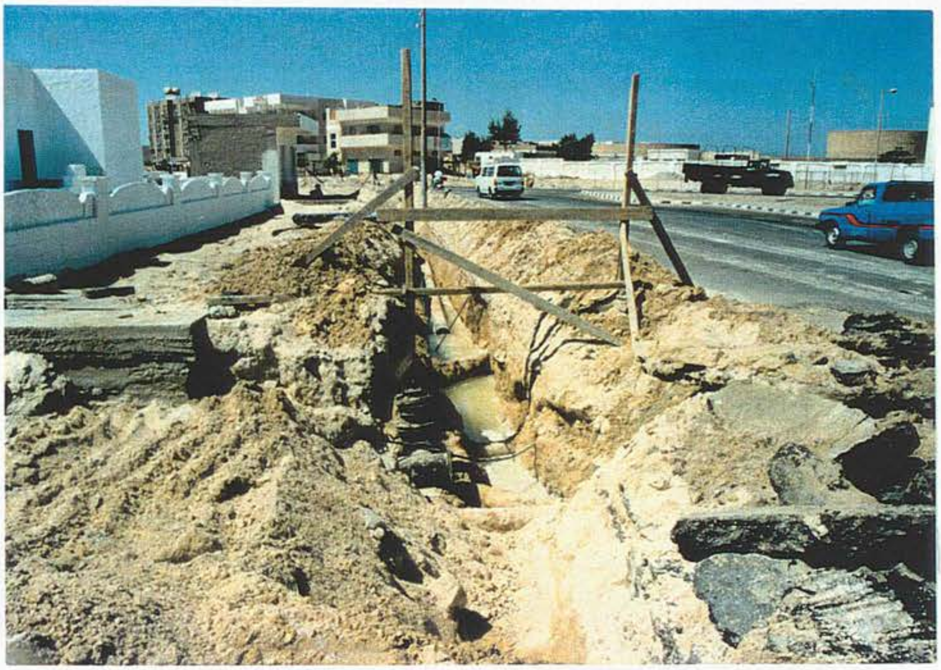

Figure 6.86: Work at Hurghada on the sewage system under construction in August 1993, still catching up with development.

Figure 6.87: The new tourist market which has replaced the old market. (8/1993)

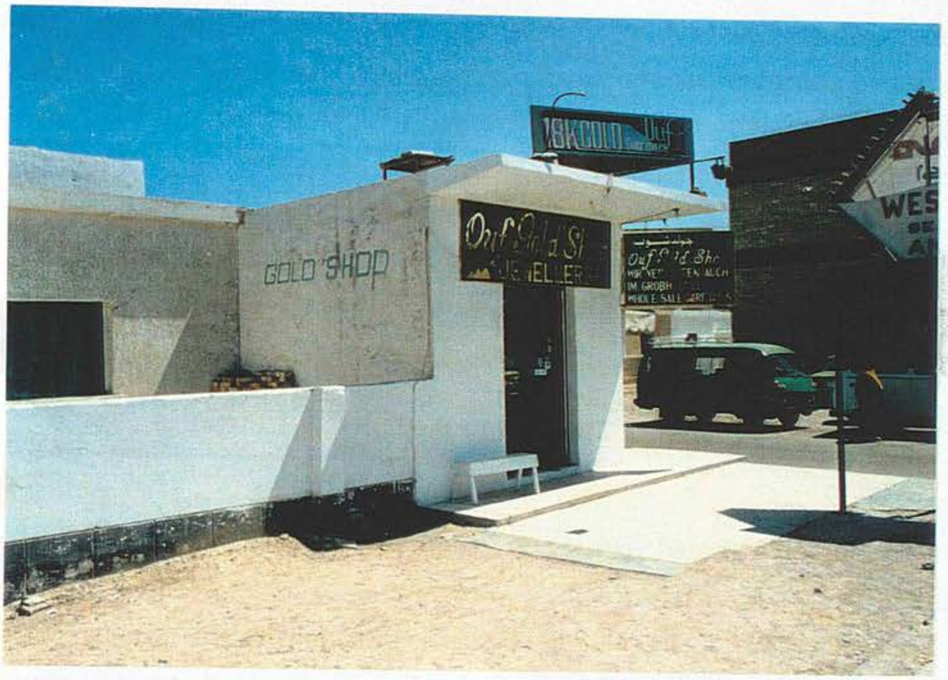

Figure 6.88: A Hurghada shop which used to be a car repairs now a jewelry shop. (8/1993)

Figure 6.89: Signs of the new life style in Hurghada. A mini-cab, a residential building which is now used for as a hotel (the high rise building), and a tourist led by a local tourist guide. (8/1993)

The matter of **privacy** is something very important in the Islamic religion, and it has a strong impact on Egyptians. Following the tourism invasion there is now no access to the beach except through paying a day-use fee and entering one of the tourist resorts. The governerate has left only two public beaches under its control for access to the beach by locals. One of them has all ready been sold to a private investor to be a resort (Figure 6.90). The city now has only one public beach, which is hardly used, as people say that the necessary privacy is no longer available. Those that can drive at weekends at least 40 km south to a virgin beach (Sahl Hasheesh) can enjoy the privilege of living by the waterside. Unfortunately if the plans for the tourist community of Sahl Hasheesh are carried out, there will not be a single beach outlet between Hurghada and Safaga accessible to the public.

The pretourist local community was largely based on fishing and it understood the importance of marine species to everyday life. Today, it is economically more advantageous to collect and sell corals and shells to shops in the city centre. Previously, most of these shops used to sell fish for food but in order to cater for tourists, have adapted their business, sometimes even selling sharks (Figures 6.91 & 92).

The city appearance

Any discussion of the relationship between architecture and tourism must recognise that it can only exist within a much wider context of relationship between man and his surroundings; but the advocates of the "community architecture movement", such as, HRH The Prince of Wales, and Rod Hackney, RIBA president, are correct in their assumptions that architecture must relate to the needs of people as both individuals and communities. The effects of tourist upon host, and host upon tourist, are not restricted to modes of behaviour. Architecture has long been part of the aspiration of society. If tourism is an agent of social change, then the styles of architecture and buildings of the new built form of the city should be worthwhile expressions of that process. They are at Hurghada, but they are not worthwhile. Hurghada and its developments have a shabby appearance that serves to magnify the lack of applying any rational framework of architectural style or city identity. The old city was formed of narrow streets and low rise buildings (Figure 6.93). The invasion of relatively high rise concrete buildings is intruding upon the old pattern, leading to haphazardness in style and loss of character (Figure 6.94 & 95).

Figure 6.90: Notice at the left states that what used to be a "Public Beach" is now sold to be a resort. (8/1993)

Figure 6.91: Shells and marine species used to be appreciated by the fishermen. Now commercial gain is more important. (8/1993)

Figure 6.92: Even 'Sharks' are now displayed for sale to tourists. (8/1993)

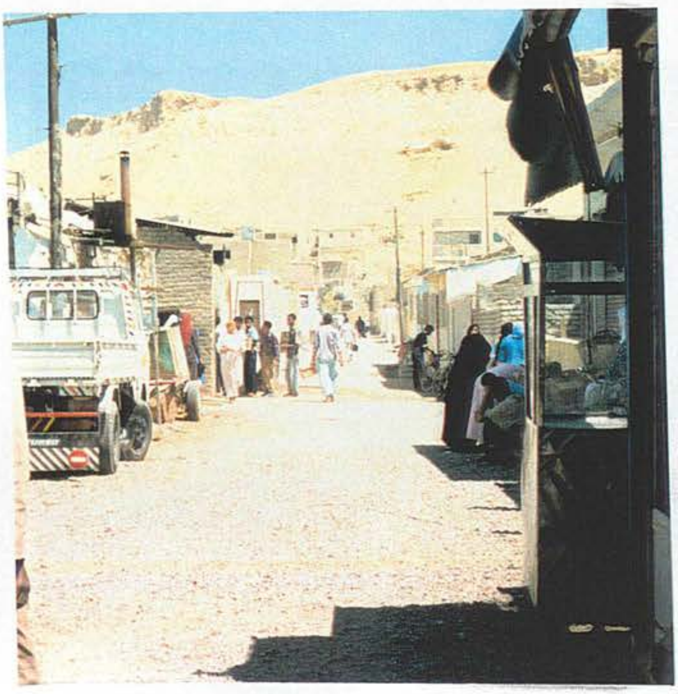

Figure 6.93: The narrow streets and low rise buildings still follows the old city pattern resisting the modern development. (8/1993)

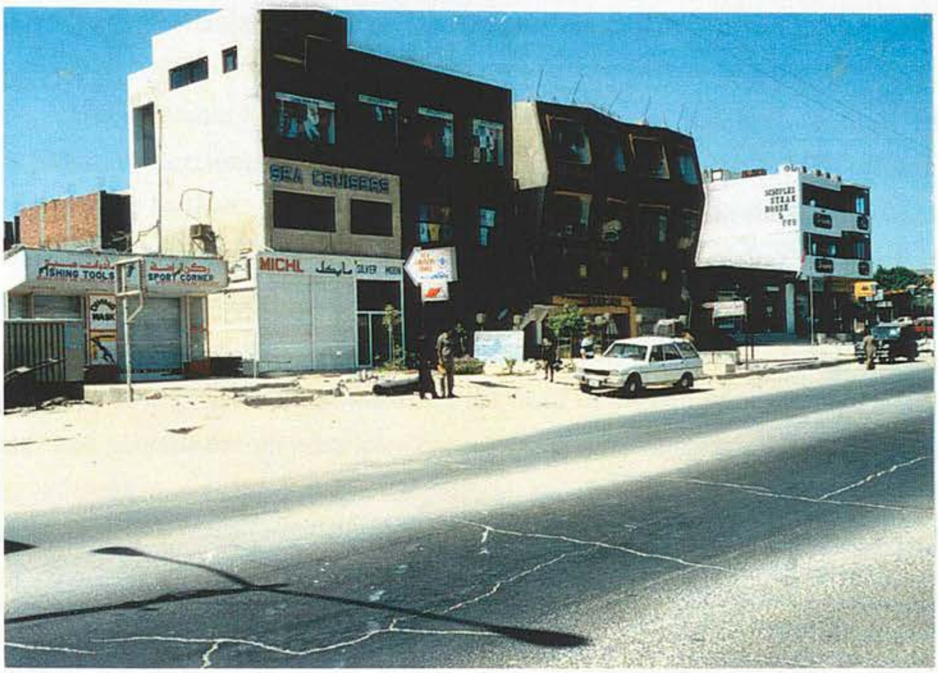

Figure 6.94: The main street in Hurghada city is a battleground of architectural haphazardness. (8/1993)

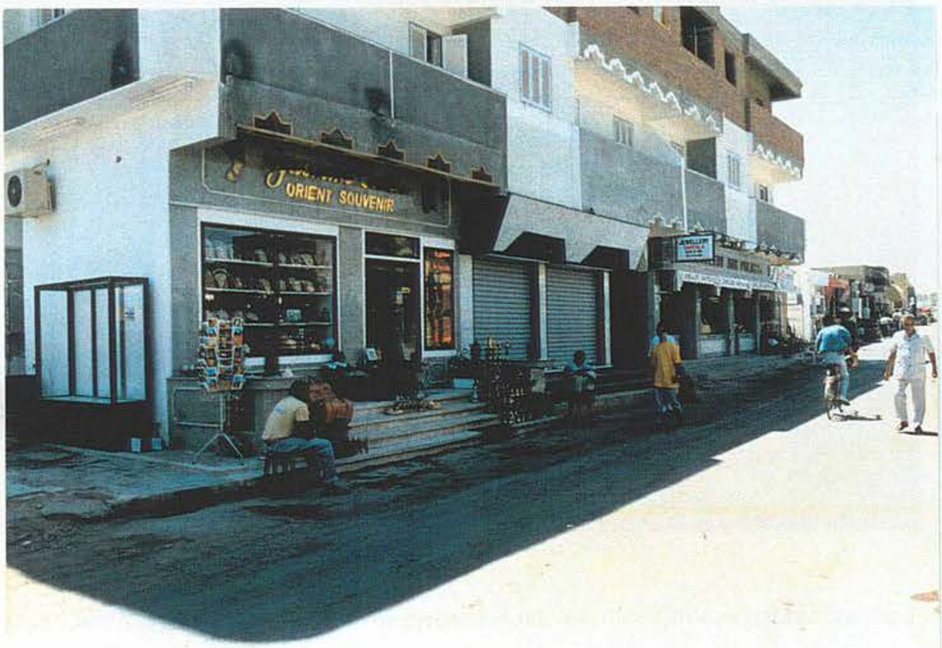

Figure 6.95: There are no rules governing or guiding the new development standards or styles. (8/1993)

Advertisement boards are very poor in design structure, and message which reflect the poor standard of environmental policies in Hurghada (Figure 6.96).

Unfortunately, the byproducts of tourism on the architectural lifestyle in Hurghada is destructive to both the character and identity of Hurghada's natural environment. Bylaws to improve the appearance of Hurghada should be considered and should include the following: Pedestrian walkways, Advertising standards, Structural maintenance and colour options, garbage disposal, setbacks to the coast and permissible heights of buildings, marina operations and standards, diving operations and code of practice, fencing materials eliminating the need of barbed wire, landfill sites in coastal areas, and general design principles encouraging sustainable traditional values in climate and building control and form. In general, we may identify Hurghada as being in a period of cultural distortion closely following Rayn's model described in Chapter Four.

Figure 6.96: A sign stating not to throw garbage in the sea, the colorless graphic standard is a reflection of the treatment of environmental issues in Hurghada.

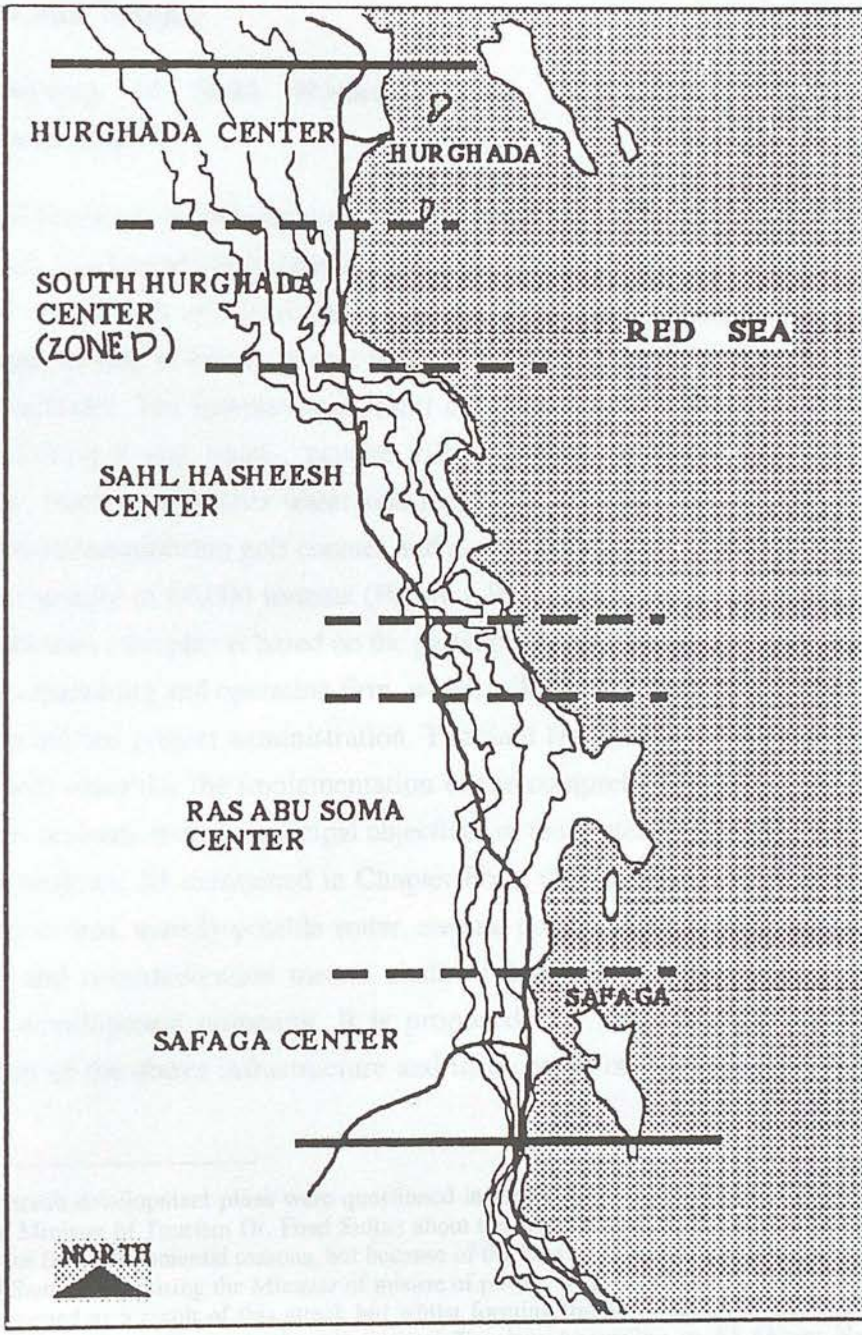

Figure 6.97: The location of Sahl Hasheesh tourist centre. (After TDA)

3. The Proposed Development Plans for the Rest of the Coast (between Hurghada and Safaga)

3.1 Summary of Sahl Hasheesh Sea Side Resort Community Development Plan[32]

Sahl Hasheesh resort community is based on a new approach to regional tourism development, fundamentally differing from existing patterns applied in the sector area. Typical developments are small sized, independent tourist units, offering limited facilities and catering to tourists whose stay is generally of short duration due to limited available facilities. The international resort community will be, a 32 million square meter, including 5 star hotels, private villas, chalets, exclusive tourist villages, apartments , marinas and other water side recreational centers. In addition, the resort will have two championship golf courses and a new town center. The resort will have a maximum capacity of 60,000 tourists (Figure 6.97). Due to the large size of the total development area , the plan is based on the participation of a wider number of investors, as well as a marketing and operation firm, which will be part of a wider framework that will form a unified project administration. The Sahl Hasheesh development company (SHBD), will supervise the implementation of the comprehensive development plan, ensuring the realisation of the principal objectives of the center and the integration of the individual projects. As mentioned in Chapter Four, the development assumes that all key infrastructures, namely potable water, electric power, main internal roads, sewage treatment, and communication means, shall be designed and furnished by the Sahl Hasheesh development company. It is proposed that this company supervise the construction of the above infrastructure and take charge of running, maintaining and

[32]Sahl Hasheesh development plans were questioned in the Peoples Assembly, July 1992. The MP's attacked the Minister of Tourism Dr. Foad Sultan about the issue of Sahl Hasheesh. Unfortunately, the attack was not for environmental reasons, but because of the land price, especially to a specific investor (Mr. Asaad Samaan), accusing the Minister of misuse of power, by giving some facilities to his friends. Nothing happened as a result of this attack but whilst forming the new cabinet in October 1993, Dr. Sultan refused to be re-chosen as the Minister of Tourism According to Al-Ahram News paper (14/10/1993)p.4, Mr. Sultan was very affected by the attack launched by the MP's about Sahl Hasheesh as he felt that all his work was worthless. The Egyptian media considers Dr. Sultan as the most successful Minister of Tourism in last decades, as he was dealing with tourism issues from a business background which is something unusual with Egyptian bureaucrats(he used to be the chairman of one of the private banks in Egypt) during his era tourism in general and coastal tourism in particular flourished. His efforts led to a very high increase in tourist receipts, which greatly affected the Egyptian economy.

managing the project once completed.[33]

3.1.1 General features of the site

Sahl Hasheesh falls between the Red Sea coast to the east and the road Suez - Hurghada - Mersa Alam to the west. The road runs adjacent to the western border of Sahl Hasheesh bay. The total area of the proposed project is nearly 32 million square meters of gently sloping terrain grading to 100 meters, above sea level. The area slopes from the hills towards the coast is and cut by ravines with sparse wadi vegetation. The wadis vary in size and aspect. The northern part of the site is characterised by a gradual rise in ground level. The length of the water front is approximately 10,000 meters, with a curved bay and an island facing it. The island has an altitude of some 5 meters above sea level, surrounded by coral reefs. The soil is composed of sand deposits covered in some areas with gypsum. There are several rock formations spread over the north eastern part of the site. The beds of most of the wadis cutting across the site, are covered with sandy and loose pebble deposits. The climatic conditions of the site are affected by the general features of the Red Sea region climate mentioned in Chapter Two, temperature varies between 30-36 degree C. at its highest in summer, and 22-25 C in winter, while the lowest is; 23-25 in summer and 10-12 in winter. The average relative humidity is a very low 20% in summer. Average rainfall never exceeds 10 mm., per year and winds are mostly northwesterly with a useful cooling effect specially in summer time.

3.1.2 The development master plan

The proposed plan which was approved by the Ministry of Tourism, is based on three nodal points (two hotels and a town center site) connected by a ribbon type beach development along the length of the site. In conjunction with the beach development, two secondary, self sufficient residential golf developments and apartments in park like settings, starting approximately 1 km., from the beach, representing a multi- directional development. According to the development report[34] the concept plan has developed from the natural limits of the site and its capacities, as well as from the strategy

[33] Anderson, Cooper, Georgelas, " The international seaside resort community at Sahl Hasheesh, Egypt", August 1991, p.3
[34] ibid., p. 18

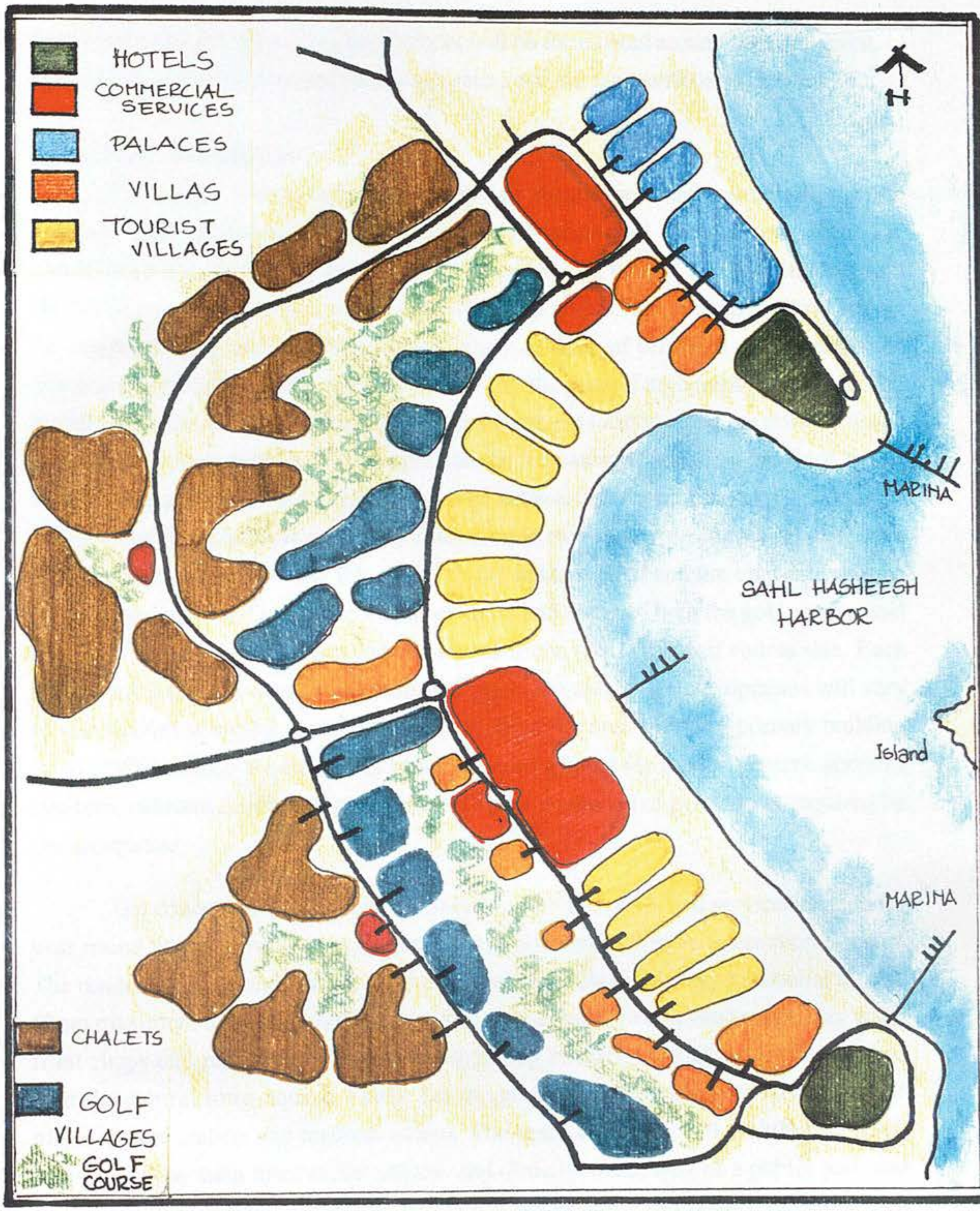

Figure 6.98: Sahl Hasheesh master plan. (After Anderson, Cooper, Georgelas)

formulated for the region. The development will be formulated around the focal point, which is the Red Sea coast and its topographical and climatic attributes (Figure 6.98).

3.1.3 Plan description

Two major development areas located on the northern and southern tips of the site have been singled out for development into international five star hotel sites. The first location (North end) is the strip of land penetrating the sea and forming the Sahl Hasheesh bay. It is characterised by hills and steep slopes. The second location lies on the southern tip of the site where the bay ends. A chain of principal tourist areas, the size and the surface area of which are dictated by the general topography of the site and by the wadis which cut perpendicularly across them, are located along the primary beach at the bay. Linkage between the villages and the recreation area will be provided by the wadis which cut across and form open spaces between the development units. The golf villages consist of groupings of golf villas around two championship world class golf courses. The golf villas have lots of 1/4 to 1/3 feddans each and are clustered around golf course fairways. Golf villas will have views and vistas of both the golf courses and the sea. The lots will have side and front walls to the rear at the golf course side. Each village will have its own private controlled gates. Sea side villa developments will vary in size to suit the buyers specifications. Each single lot may include a primary building up to 2,000 to 5,000 square meters as well as out building for guests quarters, servants quarters, cabanas, tennis and pool houses as well as extensive gardens, as required by the occupants.

The concept of a town center will provide all the goods and services needed for year round living as well as recreational amenities expected in an international resort. The residential component of the town center will include multi-story residential blocks, (from maximum hotel height of 8 stories stepping down to two stories) containing water front shops and restaurants. Traditional shopping bazaars, or souk, would be located near the central town square. Public buildings, will include religious facilities, post office, police station and medical clinics. The main landmark will an 800 bed hotel, fronting on the main town center square, and directly on the axis of a public park and fishing centre. The town center road network provides direct access to all the public and residential users. Special areas of the network include the bow shaped corniche.

The apartment buildings will be located in park settings with each three story apartment complex grouped around its own self contained recreational and commercial areas. The plan has made provision as well for the building of staff housing in the southern tip of the site which will be built in stages, in conjunction with buildings of each phase of development. The road system concept is formed of two points of access to the site that will be created on the regional road. These will open onto a circular road built around the development units with entrances into each unit.

The infra structure services, comprise the following:[35] Potable water; the entire requirements being met through the installation of appropriate sea water desalination facilities. Electric power; the generating requirements, being met by an independent power generating station of sufficient capacity to cater for the gross need of each phase. Sewage treatment; the requirements being met by the establishment of an on site independent treatment plant along with all associated lifting stations and collection network. Additional infrastructure facilities such as internal roads and communication means will be provided as part of the infra structure service.

3.1.4 The phasing plan for the Sahl Hasheesh tourism development

Tourism is by its nature easily affected by the balance of demand and supply. The adaptability of tourism development plans is therefore of great importance. The flexibility of phasing and its adaptability (which should not affect the efficiency and economic soundness of the development) should become one of the most important principles governing the planning of the new community. The phasing of work and the clear cut linkage of the various phases should be organised in such a way that each phase may separately constitute an attractive tourist image which fits into the general development framework for the completed community.

The planning of development will not only be determined by current forecasts of tourist demand, but by the self stimulation of what is provided.[36]

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[35]ibid., p. 13
[36]ibid., p. 15

The first phase of Sahl Hasheesh provides a range of facilities, services and utilities to attract both investors and tourists. The phases are also planned in such a way as to provide sufficient adaptability in implementation and operation according to available technical and financial resources. The first phase provides for a 5 star hotel, luxury villas, grand palaces, several tourist villages, an 18 hole championship golf course with villas surrounding the course, as well as three story apartments. There will also be several commercial areas to serve the first phase of development. A marina will be constructed in conjunction with the first hotel site. During the first phase to maximize the use of beach area, the southern half of the site will be temporarily occupied by extensive park lands and recreational facilities. This includes; a two lane construction of the Corniche road, the permanent development of the park at the town center site, beach front restaurant sites and a temporary 9 hole golf course with driving ranges and miniature golf. At the far east end of the site will be beach cabanas of varying architectural themes which will have daily food services supplied by the hotels and restaurants.[37] (total land budget is included in Appendix H)

The other development project is the Ras Abu Soma tourism centre, like Sahl Hasheesh it will be also developed through the private sector. The following is a brief summary of the project development process.

3.2 Ras Abou Soma Tourism Community Development Plan

The peninsula of Ras Abu Soma is situated within the heartland of Egypt southern resort coastline, adjacent to Sahl Hasheesh. It is situated 40 km., south of Hurghada airport and it is also accessible through high ways from Cairo 460 km., and 240 from Luxor.(Figure 6.99, 6.100)

In order to develop this peninsula into a major world class tourism complex, Egypt's Ministry of Tourism has assigned Abu Soma Development Company (ASD)[38]

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[37]ibid., p.19

[38]ASD, has been established under Egypt's Foreign Investment Law No. 230 of 1989 with an issued capital of L.E. 25 million and an authorised capital in excess of L.E 100 million. The company 's issued capital is expected to be increased in stages as work progress through the various phases of master plan development. Separate legal entities will be formed for each of the resort units to be established on Soma Bay. ASD will participate as a shareholder, together with other investors, in their establishment. ASD is majority-owned by Egyptian Finance Company, a leading financial institution in Egypt.

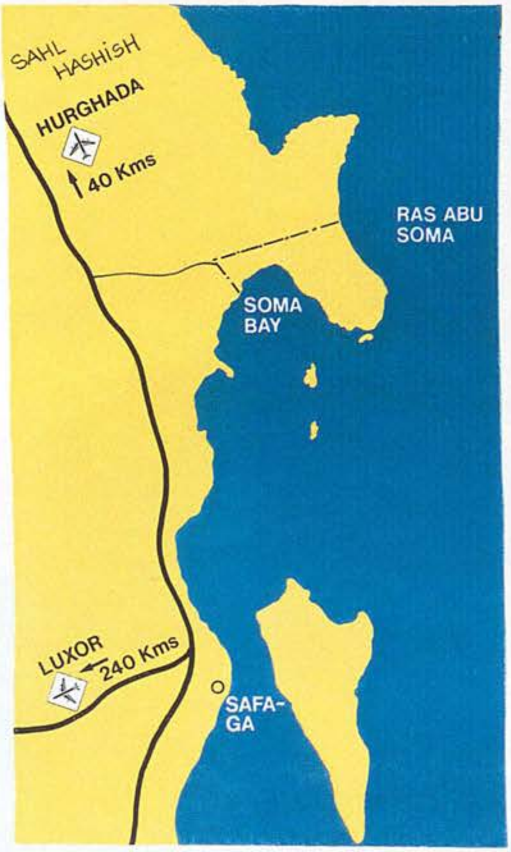

Figure 6.99: The location of Ras Abu Soma tourist centre. (After ASD)

Figure 6.100: The natural features of the site. (8/1993)

Figure 6.101: The master plan of Ras Abu Soma tourist centre. (After ASD)

Figure 6.102: The development plan of the peninsula, the first phase of development. (After ASD)

to establish and carry out a co-ordinated development plan for this property. A master plan has accordingly been prepared at ASD's instructions by the internationally known architecture/planning firm of Skidmore, Owings and Merrill, in association with the local engineering firm of Sabbour Associates, for the phased development of the Soma Bay site.

The first phase will be starting with a one million square meter development comprising four resort hotels, up to 50 resort villas, a marina with accompanying restaurants and commercial/retail facilities, and a central medical clinic. A utility center will support this first phase development with all necessary infrastructure (Figure 6.101).

The peninsula development is expected to expand in subsequent phases to cover the entire ten million square meter site to include (Figure 6.102): up to 15 resort villages and hotels to be built on individual beach front lots ranging in surface area from 90,000 to 120,000 square meters; three marinas with adjoining restaurants and commercial/retail outlets; 23 clusters of resort housing developments; a central sporting facility, including an 18 hole golf course and finally utility centers serving the overall development with all necessary infrastructure.

3.3 Analysis of the Landscape Planning Principles and Process of Sahl-Hasheesh and Ras Abu Soma.

In order to analyze the project of Sahl-Hasheesh the following questions first have to be answered:

1. Why develop here at all?

2. Are there any additional environmental considerations and limits for the design process other than those mentioned by the government, in order to be taken into consideration while developing?

3. As seen in the second part in this chapter the small number of resorts, compared to the number of resorts in Sahl-Hasheesh and Ras Abu Soma, have already affected the social life of the inhabitants of the city of Hurghada. Are the various impacts of tourism on the social structure in the region taken into consideration?

4. Would the decision making process be better under the auspices of a "Management Company" or, in other words would development under a semi-private sector management be the cure for a haphazard development process with its consequences on the environment?

5. From an economic point of view, what are the pros. and cons. of such a huge development?

6. Is the theory of concentrated development such as at Sahl-Hasheesh, compared to the scattered developments in the form of the Hurghada's resorts, the ideal alternative for coastal development in the Red Sea Region ?

In a personal interview with geologist Salah Hafez the Chairman of the EEAA, in his office in Cairo, on September 1993,[39] during the discussion he was asked, as the head of the only environmental body in Egypt, what would he think of the impacts of such development on the Red Sea coastal environment. He replied:

> **" if it is done correctly, it is correct. If it is not done correctly then it is not correct."**

This reply reflects the influence of politics on the decision-making process in Egypt. As the development of Sahl Hasheesh is a decision in principle taken by the cabinet represented by the Minister of Tourism, not even the sole defender of the environment within the government can challenge it.

During the search for the reports and research done on Sahl Hasheesh, the environmental impact assessment of Sahl Hasheesh was not available in the T.D.A (the body which has to approve such projects in order to be implemented). The study could not be found. There was only one single copy and that copy was missing from the files. Nobody was interested to seek for another one even just to put it in the project file. While in the other governmental authority EEAA which should be concerned with the impacts of such development on the Egyptian environment, the study was supposed to be there but not for public or research use.[40] Fortunately, a copy was found in the EQI

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[39] Salah Hafez was hired as the chairman of the EEAA in 1991, until October 1993 he was on top of the environmental decision making process in the Egyptian system. But in the new cabinet, for the first time in Egyptian history the task of environmental issues were given to a Minister (Dr. Attif Abyed), besides his tasks as the Minister for administration and local development. In order to have an appointment with Mr. Salah Hafez, I had to search for many connections, finally I succeeded in September 1993.

[40] During my search for the study, at the T.D.A Dr. M. Saleh was the only person furious about the loss of the study, as he is the environmental consultant to the T.D.A. While at the EEAA, during my meeting with Dr. Salah Hafez, I was told that a copy of the study is there but that I could not have

(the private consultant office which was in charge of supplying the study to the government).

In a meeting with Dr. M. Salah the environmental consultant of the T.D.A, from his expressed view the study was done in such a way to convince any body that there would be no harmful impacts of development project on the environment. But the study did not suggest any further environmental constraints other than those already used by the government.(a copy of the conclusion of the study is attached in Appendix I)

As for Ras Abu Soma, the situation does not differ much, as the environmental aspects are not mentioned at all in the development process in spite of a general description that, among the tasks of the ASD is that of ensuring environmental protection, (without mentioning the tools needed for such protection). The following quotation from the report prepared by S.O.M about Ras Abu Soma[41]

> **" Throughout this development process ASD will be responsible: to ensure the availability of all the necessary infrastructure required by each resort unit; to co-ordinate all developments in accordance with the guidelines set down by the master plan; and to ensure compliance of the entire development within acceptable standards."** Such standards were not defined, nor was it specified who would set them.

From all of this we may see that there are no frankly stated environmental constraints upon development. Without these, this new development is very unlikely to be an improvement on those proceeding.

access to it.

41 S.O.M, " Soma Bay" , report 1992

In an interview with the author Dr. M. Al-Safty[42], she ventured the following two observations in discussing the issue of the sociological impacts of such massive developments on the native environment of the Hurghada district:

Firstly, the proposed developments will apparently deflect some of the demographic pressure on the Nile Valley in general, and Cairo in particular. By creating centres of attraction outside the capital, population pressures may be slightly reduced. Tourism will attract people to the unpopulated Red Sea area and this is a national goal.

Secondly, existing problems such as inadequate infrastructure and housing shortage will increase as more people immigrate to the area. Planned housing projects are essential, not only to alleviate the shortage but to ensure that an uncontrolled random growth pattern, or mushrooming, does not occur. If the government concentrates on upgrading the existing infra structure to cope with future demand, this would be a positive asset of such future development for the local society.

Cultures change because the environment within which the culture exists changes both physically and socially. Many of the cultures studied exhibit processes of change independent of those thought to be associated with tourism, and tourism is one but one means by which acculturation (the borrowing of one culture by another) occurs. What then may be concluded is that whilst tourism may be a catalyst for change, the nature of change is not always predictable. Host societies should be aware of the potential that tourism has for such change. What might help is that in an early stage, societies should seek to make decisions upon the volume and type of tourism they want. In our situation, all the procedures are helping tourism to be a very effective catalyst in the acculturation process, but probably at the longer term expense of the cultural subdominant -that is Egypt.

The issue of privatization is a major debatable concern of the both the government and the public in Egypt. According to Dr. M. Kashwa[43]the idea of a semi private "Management Company" is worth trying. It will face major problems as the

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[42]Dr. M. Al-Safty, is currently the Professor of Sociology in the American University in Cairo, she was involved in several studies concerning the impacts of new planning developments on the social life of local people in various parts of Egypt.

[43]Dr. M. Kashwa, is the Professor of Planning Laws in both Al-Azhar and Cairo universities. He was as well involved with the T.D.A in the early stages of the planning process of Sahl Hasheesh.

interference of several administrative bodies is still there. For example in order to employ any environmental constraints (if there is an intention to) it has to have the approval of the EEAA, and so does not have the freedom described in the agreement. But as the government has some representatives on the board of trustees of the company they might help in speeding the application of decisions made by the company. It is too early to judge the success or failure of the experiment.

According to Dr. H. Al-Qranshawy[44], such huge projects have a significant economical impact on the national economy. It is an additional asset to the Egyptian tourist market. Such projects will also provide job opportunities in the region, direct employment also on the other hand which provides tourists with basic services such as catering, reservations, entertainment and shopping and indirect employment on the other hand which provides services that feed into the primary services previously mentioned, such as those associated with maintenance and upkeep, agriculture and transportation.

An important issue which must always be taken into consideration in planning is that tourism is likely to be seasonal and its workforce employment only at certain times of the year [45]. It may therefore be sensible in planning to propose alternative employment to reduce hardship to the community. Even given such fluctuations tourism is of vital importance to the Egyptian economy.

As for the **Scattered** or the **Concentrated** development approaches, each has its positive and negative sides. Scattered development will scatter the environmental impacts on various sites all over the coast, while concentration will limit the environmental impacts on specific limited sites. Any planning concept may be open to criticism. But the government description for example of Sahel Hasheesh and Ras Abu Soma being concentrated is only true within their own boundaries. In a general context they may be each regarded as scattered and arbitrary. From the map of the Hurghada -

[44]Dr. H. Al-Qaranshawy, is a Professor of Economics at the American University in Cairo, he was engaged in several economic assessments concerning tourism developments on the Red Sea.

[45]During the period of January-April 1993, which was expected to be the peak of the tourism season in Hurghada, due to the impact of terrorism actions in Cairo the area suffered badly from the lack of tourists. Prices were cut to almost half price in almost every thing, starting from the every day life merchandise to the prices of accommodation and package deals among the resorts. The area managed to survive such crises by using the charter flights packs, which came directly from all over the world to Hurghada without stopping in Cairo.

Safaga coast, looking at the location of such developments in general shows that the whole coast is going to be developed in the next ten years or so. There are some buffer zones recommended between such developments, but as explained previously, the debate among the various administrative bodies will reduce these zones to the same existing developing framework as in Hurghada city, by not allowing any physical gaps to exist between such projects, and turning the coast into a continuous ribbon of development and neglecting any rational planning theory, a monument only to cynical greed and incompetence.

Finally it has to be stated that due to the lack of care and weakness in enforcing regulations, all the activities accompanying tourism such as diving and fishing had its share in destroying the Red Sea coastal environment.

This chapter has focused on the tension between the tourism development process and the natural environment in the Hurghada district. The impact of tourism development on the Hurghada coast, represented by the resort type of tourism, **has demonstrated an alarming mismatch with the surrounding environment.**

The concluding Chapter of this thesis, on the basis of the evidence presented attempts to address general principles or guidelines which may help in the future bring about a better balance in the development process of tourism on Egypt's Red Sea coast.

CHAPTER SEVEN

CHAPTER SEVEN

THE HYPOTHESIS REVIEWED AND DISCUSSED; CONCLUSIONS

" He will manage the cure best who foresees what is to happen from the present condition of the patient."

Hippocrates, ca 460-377 b.c[1]

This thesis has attempted to plead the cause of the landscape within the context of Egyptian planning. By examining the planning process of coastal zones in Egypt, taking the Red Sea coast as an example, focus has been made on the need to introduce landscape considerations within the existing system. The sequence of the previous chapters, concluded by examining the tourism planning process in Hurghada. In this chapter an attempt will be made to answer some of the questions raised by the research and which will help to summarise the whole argument. The chapter is in three parts; the first deals with the general features of the coastal planning process; the second part will attempt to recommend improvements to the process; while the third ventures some guidelines for future development on the Red Sea coast.

1. General Characteristics of the Red Sea Coastal Planning Process

Unfortunately, the features which make the Red Sea so valuable ecologically and economically, are also leading to its degradation through the demands of oil exploration, the phosphate industry and tourism. The development of tourism in Egypt has been actively encouraged by the Egyptian Government over the last ten years. In the last three decades, international attention has been directed to the Red Sea and the value of its coral reef and under water life not only in scientific terms but also in its attraction for visitors. The other tourism advantages of the coast, its pleasant climate

[1] Paul R., Anne H. Ehrlich, Holdes, *Ecoscience, population, resources, environments.*, 1977, W. H. Freeman & Company, p. 13

and its proximity to the tourism markets of Europe, have also contributed greatly to the development the Red Sea for coastal tourism.

As has been stated, minimal land use planning and ignorance of coral reef and marine ecosystems have led to a haphazard and loosely controlled high density development around the town of Hurghada. The allocation of land in an almost continuous belt along the coast, the continuous extension of Hurghada township's informal boundaries to the south as more and more tourist resorts are being developed, the lack of public beaches and parks, the poor basic infrastructure falling years behind development, the rapid deterioration and destruction of coral reefs and the loss of natural tourist attractions in and around Hurghada are all major features of existing tourism development. At present there is a considerable programme of new resort development on the coast between Hurghada and Safaga at Sahl Hasheesh and Ras Abu-Soma, to be carried out by large scale developers. However, there is still a sad lack of knowledge of landscape planning, and a lack of fundamental understanding of marine environments and management experience of visitor pressure on coastal habitats in both the government and private sector development interests. Until these weaknesses are made good, coastal planning on the Red Sea will not improve.

The landscape planning process aims to conserve and improve the collective landscape. The job of a landscape planner is not only to predict every significant side effect that a project might generate, but also to identify those side effects that have a particular impact on the landscape or on man as a user of outdoor space. From a theoretical point of view the relationship between a new development and its surroundings is one of compatibility or incompatibility. As we have already shown in Chapter Six, Red Sea coastal tourism development is not integrating in any way with the sustainable natural environment and may thus be presently described as incompatible. Who then is responsible for such incompatibility and how may it be redressed?

The following, is an excerpt on tourism development in the Red Sea region from an interview about the problems of tourism in Egypt, with Mr. Fuad Sultan the Minister of Tourism, on 25/6/1993, in Al-Mussawar magazine:[2]

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[2]A. Al-Geddawy, *An interview with the Minister of Tourism*, Al-Mussour magazine, 25/6/1993, pp. 16-17 & 74, Arabic reference, my translation.

> *"Q: Who is responsible for the pollution and environmental crises in Hurghada? Is it true that the policy of privatisation which the Ministry is adopting is being accused as the main culprit?*
>
> *A: Not true, there is a lot of confusion and misunderstanding on this issue. The land owned by the Ministry of Tourism is located outside the city boundaries, therefore the local government is the one to be accused of what has happened to Hurghada as such developments were done under their supervision. Not long ago, the local government was very proud that they had sold the sea to the investors allowing them to land fill the shore against the objections of the Ministry of Tourism, which led to the pollution of Hurghada as well as the loss of the natural resources like coral reefs. Today environmental laws are being prepared to prevent any further destruction to the corals."*

By his reply, the Minister of Tourism clearly sought to throw responsibilities back on the local government. The Minister was also referring to several articles published between 1991 and January 1993 in several tourism magazines such as The international Arab Tourist and The Business Traveler Magazine (Al-Siyaha) as well as Tourism 2000 Magazine. All the articles referred only to how well organised the Local Government had been in making Hurghada into an important tourism attraction. Not a single word was mentioned about any environmental destruction except in Al-Akhbar newspaper in an article published under the title "The Whales are swallowing Hurghada's shore line".[3] In this article, the reporter raised a cry of help for the environmental damage of the shore line in Hurghada. He described the existing situation and started questioning people connected to the subject. A contractor told the reporter that he was very depressed that he had lost a chance for a land fill project as it was and is a very profitable process. When the reporter asked him

> *"Do you have a license for land filling, or are you land filling without a license ?*

[3]M. Abd Al-Maqsoud, *The Whales are Swallowing Hurghada's Shore Line,* Al-Akhbar newspaper 12/10/1992 (Arabic reference, my translation)

The Contractor replied" ***The resort owner gets an unwritten approval from the local government so that they do not interfere till he finishes land filling, then they add this area to his total land ownership as dry land and, as long as he pays the bribe, every thing will be all right. If he does not he will suffer, as the local government will stop his land filling schemes on the pretext of protecting the shore line."***

The reporter took such accusations and faced the Red Sea Governor, General Youssry Al-Shamy,[4] with them. His reply was that he was against land filling in any way because it affects the natural habitats as well as causing erosion problems and added that there was no future for tourism without protecting the environment. He also said that he enforced the law that starting from the first of October 1992 land filling will be against the law and there would be a committee held to survey the land filled sites and punish who ever has been responsible for them.

As mentioned in Chapter Six, the author's survey of the environmental impacts of tourism on the natural environment was carried out in two visits before and after the Governor's decision. There was no change to the land filling process following the Governor's decision in October 1992. It continued as usual. The Secretary of the Governerate reply -in the same interview- was different, General Gamal Karawya[5], replied:

" where do you want the tourist resorts to expand to away from the sea shore, especially when they have no choice when they have the road as an edge in the west, the only alternative is to land fill and given that the adjacent coral reefs close to the shore are already dead, what do you want us to do prevent tourism development for no real reason?

General Karawya's hopelessly compromised reply reflects one of the major features of the planning process in Egypt and which will be discussed later. Even if the

[4]General Youssry Al-Shamy was the Governor of the Red Sea only from 1991-1993. The Governor responsible for such crises was General Youssif Afiffy, who was the Red Sea Governor from 1980-1991. During his period of office the foundations of environmental hazards were established.
[5]General Gamal Karawya stayed as the Secretary of the Governerate, in which under the Egyptian ruling system, he remained the second most powerful man in the Governerate from the early eighties till 1992

corals were dead they may still form a usful natural habitat providing, for example, a breeding place for fish and in helping to prevent erosion of the shore line. Where then were the planners and environmentalists while land filling was going on?

The defence of the environmentalists came from Dr. M. Fawzy, in the same article. He is in charge of the coastal protection schemes in the Egyptian Environmental Affairs Agency. He stated that the EEAA does not have the legal power to prevent in filling. The EEAA had sent letters to the governerate as well as to these Ministries with coastal development projects explaining the environmental damage caused due to land filling as well as recommending that any future project should carry out an environmental impact assessment report before starting the development. He also added that the EEAA had succeeded in establishing a GEF (Global Environment Fund) for having a coastal management programme scheme.[6]

It appears that the environmental crises in Hurghada are not only products of a misguided decision-making process, but they are products of a very incomplete planning system which suffers severely from the following:

Firstly, resources are treated as common property. No single organisation or individual owns the resource, so that it is subject to use by more than one user. One use may have effects on others. Users are not motivated to use the resource wisely. In fact, they may have an incentive to overuse a resource because of fear that if they do not, some other agent will.

Secondly, most individuals, groups, and government organisations have a restricted sphere of interest in the coastal zone, normally related to their use or area of responsibility. Such a narrow perspective severely restricts awareness or consideration of problems that are inherent or that may be developing in the coastal zone. Much shore zone-related damage is incremental and may not be perceived until damage becomes gross; this adds greatly to the problem of raising people's awareness.

[6]These were the words used as a defence by Dr. Fawzy in the same article mentioned before in 1992. Up till early 1994, such a scheme of a coastal management programme is not implied. As for the environmental impact assessment projects, they already exist but as mentioned in Chapter Six, they have had no significant impact on the development process. Currently a new environmental law is being prepared by the EEAA to be approved by the People's Assembly giving more power to the EEAA.

Thirdly, the lack of political support behind the coastal management plan. Although certain individuals within the government perceived a need for integrated coastal management to mitigate coastal degradation and to help resolve resource use conflicts, their views were not widely shared. Senior politicians also did not hear from the public about coastal zone management, and therefore would not support this new policy initiative.

Fourthly, the essence of sound decision-making is the availability of adequate information of the right type. For the coastal zone, lacking good natural resources information, the tendency is to base resource allocation decisions almost entirely on economic and political considerations. Stimulated by a succession of developments over the last few years, there has been a great increase in "descriptive" information about the resources of the coast and their use. There has, however, been slow progress in developing "functional" knowledge (describing cause and effect relationships) of these resources and use systems. As a result, even with the best use of available knowledge, there is and will continue to be, great uncertainty about the consequences of management and planning actions.

Fifthly, one of the inherent problems with coastal management is the large number of sectoral divisions and corresponding number of government bureaucracies with decision-making powers that directly or indirectly affect coastal resources, uses, and users. Each agency has its own set of objectives which, to some extent, reflect the concerns of particular clients. The problems of administrative fragmentation and overlapping or unclear jurisdiction and responsibility, inevitably lead to conflicts. These inherent conflicts, combined with a lack of enthusiasm to resolve them, result in a lack of action toward the development of a strict coastal management policy.

Lastly, experience has shown that any management framework of natural resources should be based upon an ecosystems approach if it is to have a reasonable chance of success. The selection of ecological units for management, however runs head on into a complexity of political divisions along and across the coastal area. These decision-making units (political boundaries) do not usually coincide with ecological units; nor do they recognise the ecological unity of the zone; nor do they neatly divide the multiplicity of human uses to which the zone is put. Administrative boundaries are often arbitrary. For an ecologically based management system to work, political boundaries must be de-emphasised. It is not necessary to eliminate them, but to include all those who have jurisdiction in a co-operative regime working toward mutually agreed and beneficial goals.[7] Each political unit must still take responsibility for its own decisions. However, all agencies have to look beyond their own boundaries to see the linkages with the units around them and to understand how these fit within the ecological unit.

Corruption, is a world-wide phenomenon. When money and power stand together, corruption will be their shadow and that shadow is very evident in the case studies of the thesis. It will always exist as far as there is no strict supervision on the decision - making process at any level; especially, in local communities subject to the seductions of suddenly introduced outside wealth.

2. Improving the Planning Process

> ***"By far the greatest obstacle to the progress of science and to the undertaking of new tasks is found in this: that men think things impossible"***
>
> Sir Francis Bacon, The New Atlantis.

This study has led me to the conclusion that Egypt, like all other countries suffering from similar coastal problems, can only successfully implement a coordinated coastal development programme , if the following are achieved:[8]

Striking the right balance between political considerations and professional criteria. Decision- making procedures by the agencies entrusted with managing the coast assume that a number of decisions will be based on professional considerations backed by appropriate coastal data. It is assumed that data will be used as a rationale for resource management, instead of a sole reliance on political considerations and narrow interests. This assumption is contrary to present conditions in Egypt. On certain subjects there is presently very little well-researched data that can be used to defend a management policy in the highly political decision - making environment. The future professionalisation of decision - making, will therefore depend on the quality of available data and its use, and on the development of new and existing knowledge through investment in applied coastal research programmes.

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[7] op cit., Hildbrand, p. 30
[8] op cit., Shaul Amir, pp. 220-221

Successful implementation requires changes of values and supervision methods of existing agencies. The decision to implement any coastal management programme with existing agencies creates difficulties that will have to be overcome before success is assured. Successful implementation will depend on the ability of coastal programme sponsors at the political level to supervise closely the agencies involved and to re-educate their leadership in a way that makes them see the coastal ecosystems as a valuable resource.

The limits of physical land use planning in management of natural systems. Any implementation strategy is based mainly on land use planning control. The effectiveness of resource conservation efforts, however, will depend also on the management of resources and habitats not administrated solely through such controls. In order to manage the coast successfully, land use decisions and resource management decision making have to be co-ordinated before and during implementation. While the former stage decides on the most suitable uses and activities for the site, the latter is intended to ensure that resulting activities are not causing pollution, retardation, or over exploitation of resources.

The involvement of several ministries in coastal management will demand continual investment of effort in co-ordinating efforts on each decision-making level, and particularly when the issue is not in direct relation with the land use system. Many land use decisions with potentially adverse environmental impacts were made in the past by policy makers with the assumption of vigorous pollution control. But often such controls did not materialise, due to administrative difficulties, and a negative impact resulted. It is recommended therefore that the decision-making process is taken through the least possible number of agencies.

Interdependence of marine and terrestrial ecosystems must be recognised. It must be understood that any development scheme affects not only its immediate environment but also the ecosystems of its surroundings. A sound tourist economy, cannot be built on a damaged environment and it is generally not appreciated that environmental damage seldom takes the form of one huge catastrophic event, but rather occurs in small steps, the individual effects of which are often difficult to detect. Thus damage only becomes evident when it is irrevocable. An approach of management of ecosystems must therefore be adopted rather than one of uncoordinated use of individual components of ecosystems combined with short term conservation schemes.[9]

Landscape, architects, planners and developers must be equipped with the knowledge required for recognising the needs of their environment. New knowledge relevant to environmental protection must be sought. Environmentally oriented research must be pursued vigorously by environmental science departments and schools. Research done in the field must be published and readily circulated, as well as coordination between fields of research which are concerned with the issues vital to save both money and efforts. Such a process will, to a large extent, lead to the avoidance of practices causing environmental damage.

Public support is needed for full implementation. Much planning work is done with very little public understanding and participation. Local or state-wide interest groups that are not part of the bureaucracy are not partners in the process. While this is a typical phenomenon of the Egyptian planning process, its correction by the development of public participation in support of planning programmes is very important.

New Laws. The introduction of new laws for environmental protection, which will give the Egyptian Environmental Affairs Agency (EEAA) more power are needed; not only to monitor environmental destruction but also to bring severe punishment and penalties upon those responsible for such destruction. Penalties should greatly exceed the limits of present nominal fines which as we have seen in Chapter Six were quite ineffective in the case of Hurghada's land fillings.

The use of loans . Loans directed to the development process, such as the World Bank loans may be used as a tool to fulfill the aims of environmental conservation as well as development, but the World Bank itself must be fully involved and aware of the environmental issues and thoroughly satisfied that all the conditions imposed on development are fully observed. Loans are not to be directed unless certain criteria of environmental protection are applied and shown to be applied.

9P. Roelf Both a, *The African Coastal Frontier Landscape,* IFLA Congress, 1981, Department. of Plant Science, Univ. of British Columbia, p. 52

3. A "Blue Print" for the Red Sea Coastal Development

> ***"One sort of world is dying. Another is struggling to be born. We may not be able to predict the future. We can invent it."*** [10]

Promoting the care of a landscape should always involve the local community and should create the fullest understanding between local people, designers and developers. This may also result in a financial saving or expenditure for the land user. Proposals may therefore be classified as either cost - saving or cost incurring. Since cost incurring proposals are the most common, planners and designers frequently find themselves in the invidious position of making recommendations which the land user must pay for in order to benefit the community. It is thus very important that a planning proposal be supported by a set of rational well argued and justified guidelines in order to be acceptable and understood by the local community as well as by developers and designers. The following draft suggestions can put forward as a basis for a set of guidelines for coastal development on the Red Sea.

3.1 The Decision Making Process:

Recently, in November 1993, the new Egyptian Cabinet appointed a Minister for Environmental Affairs to be responsible for coordinating the recommendations of EEAA and those of the other Cabinet Ministries. A new law also is being prepared for environmental protection to be voted on by the People's Assembly (Appendix J, Egyptian Governing system). As was noted earlier, the problems facing the development process in the Red Sea are mainly due to the number of official bodies involved. Thus there is a need for unifying the decision-making process under one body.

It is suggested that the new law should include the designation of a Development Authority, to be constituted by the central government as a committee with nominated representatives from the following organisations, The Egyptian Environmental Affair Agency, The Local Government of the area involved, the Ministry of Tourism, the Ministry of Defence, the Ministry of Industry and Mining, the Private Sector in the form of the Investors and The Egyptian General Petroleum Corporation. The critical battle thus revolves around the issue of this body's autonomy.

[10] Roberto P. Guimaraes, *Ecopolitics of development in the Third World,* Lynne Rienner Publishers, Inc. 1991, p. 22

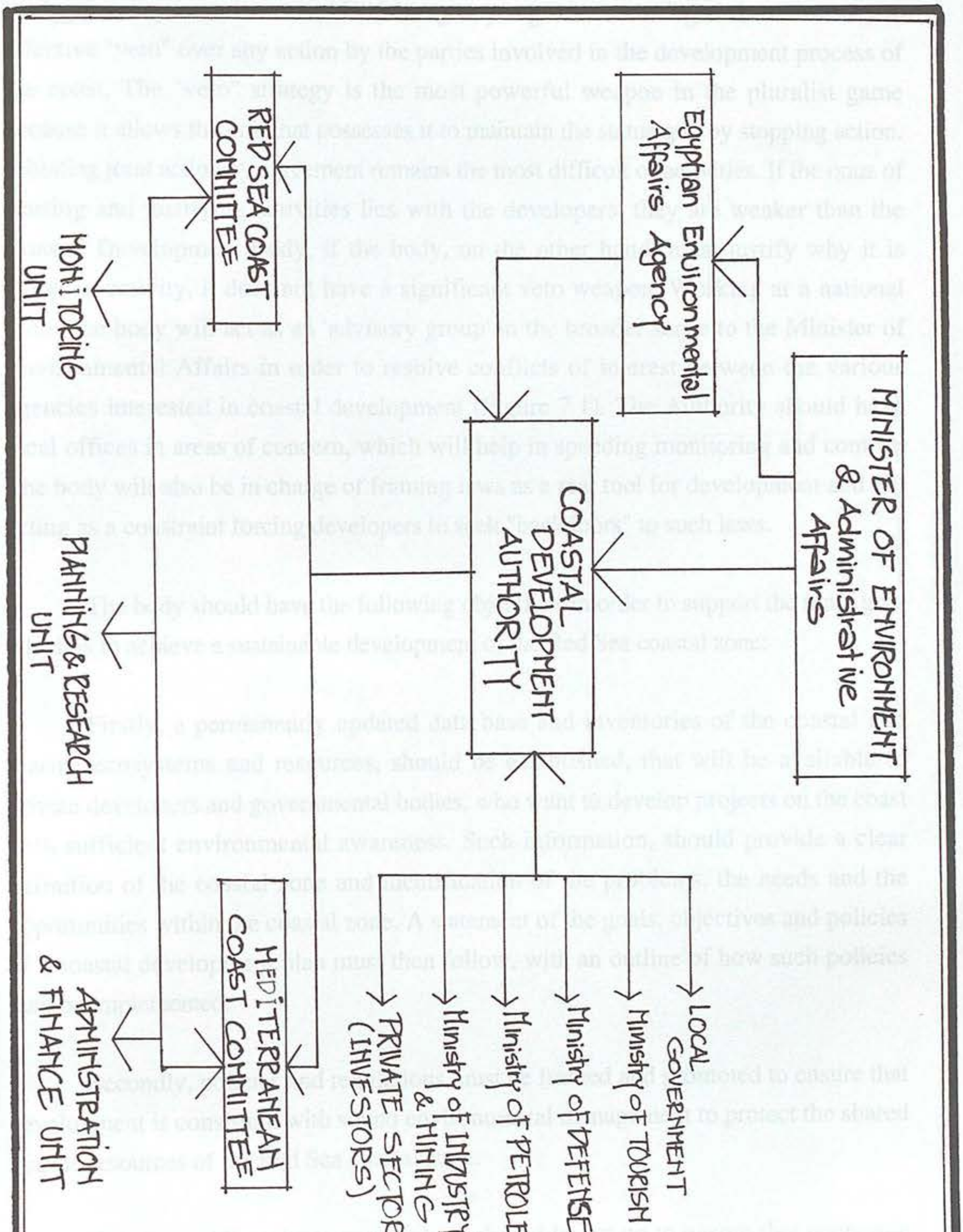

Figure 7.1: A proposed organisational structure of the Coastal Development Body, based on its objectives and areas of concern.

Such autonomy is most obtainable if the agency is given, via its legislative mandate, an effective "veto" over any action by the parties involved in the development process of the coast. The "veto" strategy is the most powerful weapon in the pluralist game because it allows the unit that possesses it to maintain the status quo by stopping action. Initiating joint action by agreement remains the most difficult of activities. If the onus of starting and justifying activities lies with the developers, they are weaker than the Coastal Development Body, if the body, on the other hand, must justify why it is stopping activity, it does not have a significant veto weapon. Working at a national scale, the body will act as an 'advisory group' in the broader sense to the Minister of Environmental Affairs in order to resolve conflicts of interest between the various agencies interested in coastal development (Figure 7.1). The Authority should have local offices in areas of concern, which will help in speeding monitoring and control. The body will also be in charge of framing laws as a real tool for development and not acting as a constraint forcing developers to seek "backdoors" to such laws.

The body should have the following objectives in order to support the main goal which is to achieve a sustainable development of the Red Sea coastal zone:

Firstly, a permanently updated data base and inventories of the coastal and marine ecosystems and resources, should be established, that will be available to private developers and governmental bodies, who want to develop projects on the coast with sufficient environmental awareness. Such information, should provide a clear definition of the coastal zone and identification of the problems, the needs and the opportunities within the coastal zone. A statement of the goals, objectives and policies of a coastal development plan must then follow, with an outline of how such policies may be implemented.

Secondly, policies and regulations must be framed and promoted to ensure that development is consistent with sound environmental management to protect the shared marine resources of the Red Sea coastal zone.

Thirdly, public-private partnerships should be set up to ensure that economic development is consistent with sustainable environmental management and common marine resources.

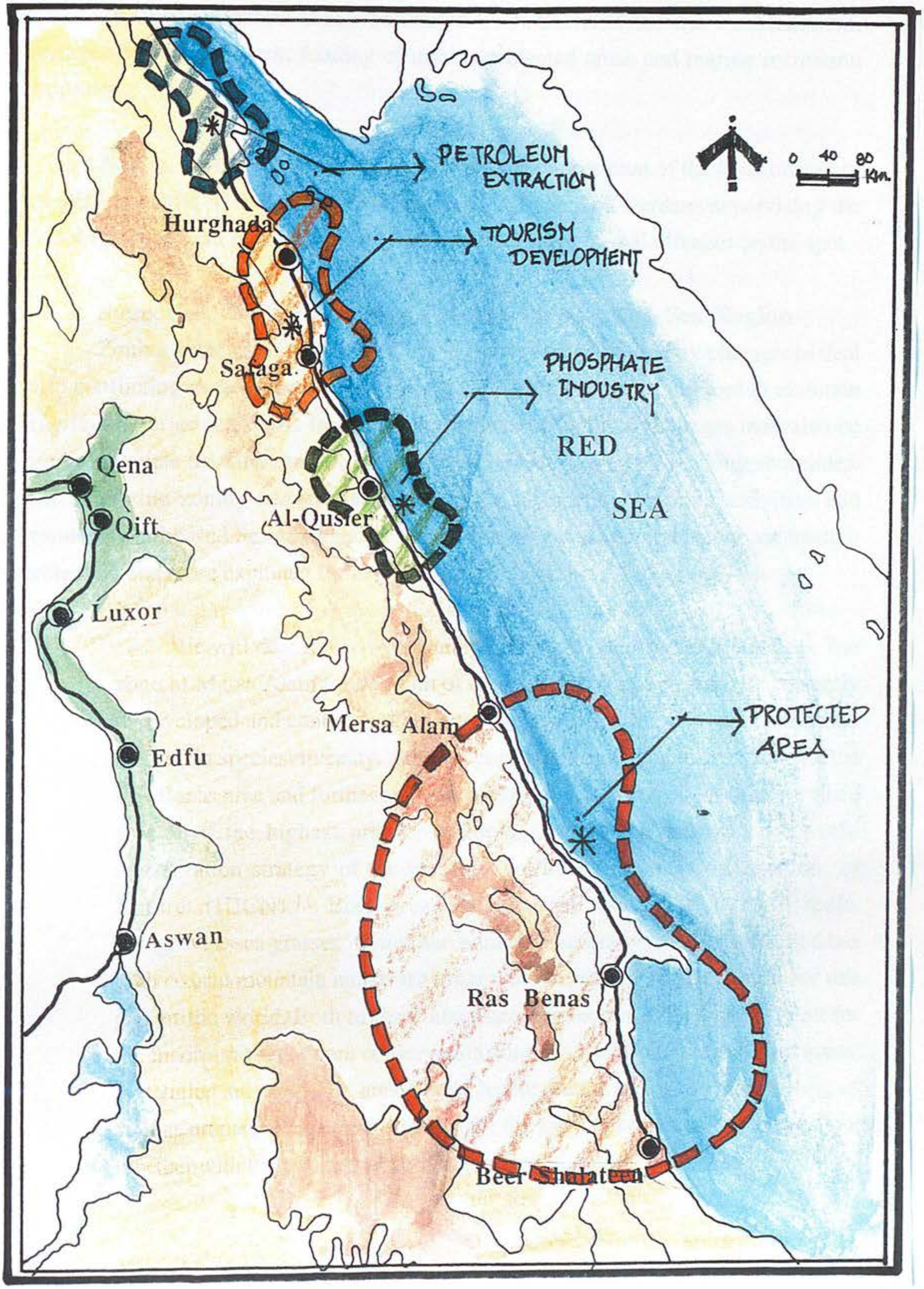

Figure 7.2: Proposed activity zoning along the Egyptian Red Sea Coast.

Tourism Petroleum and Phosphate Industry Protected Area

Fourthly, practical solutions should be formulated for the establishment, management and recurrent funding of marine protected areas and marine recreation resources.

Finally, the Development Authority, with the cooperation of the local offices of the EEAA should have permanent enforcement officers and wardens supervising the shores full-time who have the right to fine specific environmental offences on the spot.

3.2 A Suggested Coastal Planning Concept for the Red Sea Region

Zoning is the most widely used regulatory mechanism used by planners to deal with conflicting uses. Conservation or conservancy zoning is a useful tool to maintain fragile and/ or critical areas free from development. Zoning ordinances may also be used to regulate the kinds and density of developments taking place along shorelines. The following zoning concept is suggested for integration between activities and resources on the Red Sea coast and in particular between its natural resources needing protection and those exploited for mineral extraction and tourism (Figure 7.2):

> We will deal firstly with zoning needed to give special protection. The zone of Marsa Alam to the south of the Egyptian Red Sea coast, is currently undeveloped and contains a high diversity of coastal and marine habitats that are rich in species diversity. Areas of particular ecological interest include the Ras Banas area and further south the Gabl Elba area, which has been defined as one of the highest priority biologiographical provinces in the world conservation strategy of the International Union for the Conservation of Nature (IUCN).[11] Both areas have nearby islands, rich coral reefs, mangroves, sea grasses, turtles and numerous migratory birds. Gabl Elba has high coastal mountain ranges with unusually dense and diverse forests for this part of the world. Both of these areas need protection. The area is suited for the incorporating of core conservation zones as well as adjacent buffer areas. A detailed survey of the area should be conducted to specify such zones, as well as preparing management plans for the areas to be given legal protection, together with the training of a core staff in management techniques.

[11] Personal interview with Miss Merryweather Wilson, World Bank environmental consultant who worked in the preparation of the Global Environment Fund to the conservation of the Red Sea habitats, a project supposedly to be carried out in 1994. Edinburgh 1992.

Ras Mohammad National park in the North and the recommended protected area in the South of the Red Sea, would be good assets for special tourism, as they might form two poles of attraction for a restricted and carefully managed visitor access. Although this might seem to contradict the IUCN definition of National Parks as wilderness areas, there is a strong argument for allowing such access as a mean of explaining to tourists, both local and non local, what Egypt stands to lose here and has already lost elsewhere by thoughtless short term development of the kind this thesis has described. Within such a zone everything depends on the strictest control of the means of access and on the rate and distribution of visitor pressure in relation to the natural ecosystem.

Having given the Zone of Mersa Alam southward special protection by zoning (Figure 7.2), it would be essential to apply a zoning ordinance to identify, define and limit the activities of mineral extraction. As mentioned in Chapter Three, petroleum and phosphate excavations are causing much adverse impact on the coastal ecosystems. The locations recommended for such activities would be restricted to their present sites; petroleum extration in the north of Hurghada and the Gulf of Suez, and the phosphate industry in the city of Al-Quseir, Al-Hamraween zone. The reason for choosing such zones bore in mind that both petroleum and phosphate are non renewable resources and that any planning scheme should need to consider the sustainability of a resource besides the impacts of its extraction processes on the ecosystems.

The phosphate industry does not at present intend further expansion along the coast. If it did take place such expansion would be in the existing sites.[12]Existing zoning would therefore be maintained under any new zoning ordinance. However, there are still some recommendations which should be taken into consideration to minimise the existing impacts of the phosphate industry on the coast, such as, solid wastes disposal. This must be kept well away from both the wadis and the coastline. In addition, pollution from windblown phosphate dust both during extraction and transportation must also be far more strictly controlled. Future expansion schemes if any should be located where waste discharges present the least ecological threat, and it

[12]During the field work in 1993, the chairman of the Phosphate Company revealed that the company has no intention to explore the rest of the coasts. Any further expansion would be in the existing site.

would probably be unwise to admit any such locations within the zoning concept.

Unlike the phosphate extraction companies, those prospecting for oil can and will expect to be allowed to keep as many options open as possible, and always to argue an over riding national interest; and by this to challenge, if necessary, coastal conservation, tourism and all other considerations. There is however no predominating reason for such prospecting to be land based, and providing it employs closely agreed off-shore techniques in using the coastal waters, and within a strictly supervised regime following a clearly understood code of practice and one which is very visibly policed by an adequate and well qualified staff- then a zoning ordinance may be imposed which should allow an adequate, but far from ideal, protection to be given to the other resources of the coastline. Much would depend for its success on the power of goodwill accompanied by a desire to avoid unfavorable publicity. The oil rigs themselves and their owners need to deliberately and honestly promote having the equivalent in their rigs of clean man-made off-shore reefs, and to raise the level of their technology accordingly.[13]

Tourism development at present along the Red Sea coast is more destructive than in harmony with the surrounding environment. Therefore, it should be stated that actions must be considered to prevent such development from causing any more environmental hazards. It is suggested that tourism development should be restricted to the zone between Hurghada and Safaga cities and not to be allowed to develop in any another site such as Wadi Al-Gemal[14], which is located to the north of Mersa Alam (Proposed development is in Appendix K).

The decision to restrict tourism development to this zone stems from the following considerations: Firstly south of this zone (as mentioned in Chapter Five), the poorer and poorer becomes the infra structure, the transportation and the communications needed to support tourism. All are already very poor compared to the international standards achieved even in the cities of

[13]op cit., Clark, J. pp. 437-448

[14]The Ministry of Tourism has announced in *Al -Ahram* newspaper, 1/2/1994 that the site was approved by the Ministry of Petroleum and Defense to be left for tourism development and development plans are being made.

Hurghada and Safaga; Secondly as tourism exists already in both cities then they are priorities for development which will coincide with the National Planning Scheme of forming new alternatives for people to move from the Nile Valley to the desert cities; Thirdly, from Chapter Six, it was observed that both cities have physical carrying capacities which have yet to be exhausted. If the proper infra structure is given to these cities or even if the existing networks are upgraded, together with the provision of job opportunities as incentives for people to migrate from the Valley, then the cities could form a growth pole for the region, and one which will still be seen to fulfill the National Plan's goal; Fourthly from a planning perspective, (as we mentioned earlier in Chapter Six), the process of development going on for the coast is under the title of scattered development but, as we discussed it is only scattered within its limits. In a regional perspective it will end up forming a "concrete wall" of concentrated development all over the coast. By limiting tourism to an area between Hurghada and Safaga it can be guaranteed that even if the "concrete wall" approach is still encouraged, it will only be concentrated to approximately 75 km - the distance between the two cities - out of some 1,386 km., which is the total length of the Egyptian Red Sea shoreline.

3.3. Applied Case Study: A Conceptual Landscape Plan for Tourism Development (PROPOSAL)

In Chapter Six, the analyses of the development schemes for Sahl Hasheesh and Ras Abu Soma showed there were defects which might lead to the same haphazard development that had occurred in Hurghada. The following case study model is suggested as a guideline to overcome such defects:

The site chosen for applying planning and design recommendations for tourism is Zone 'D' (South Hurghada zone) in Chapter Six[15]. This forms the southern extension of tourism development within the Hurghada city boundaries and the new development of Sahl Hasheesh (Figures 7.3, 7.4).

Site description

The site is situated 24 Km south east of Hurghada airport, and has a 9 km coastal frontage (Figure 7.5). The site is bounded from the west by the

[15]See Figure 6.8 in Chapter Six

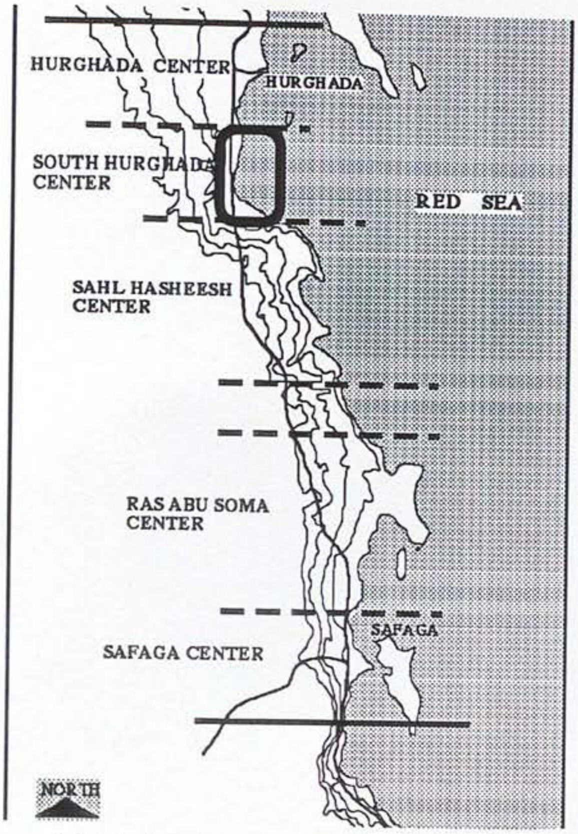

Figure 7.3: The location of the study area.


Figure 7.4: Aerial photo of the site, taken in 1991 before the service road was constructed.

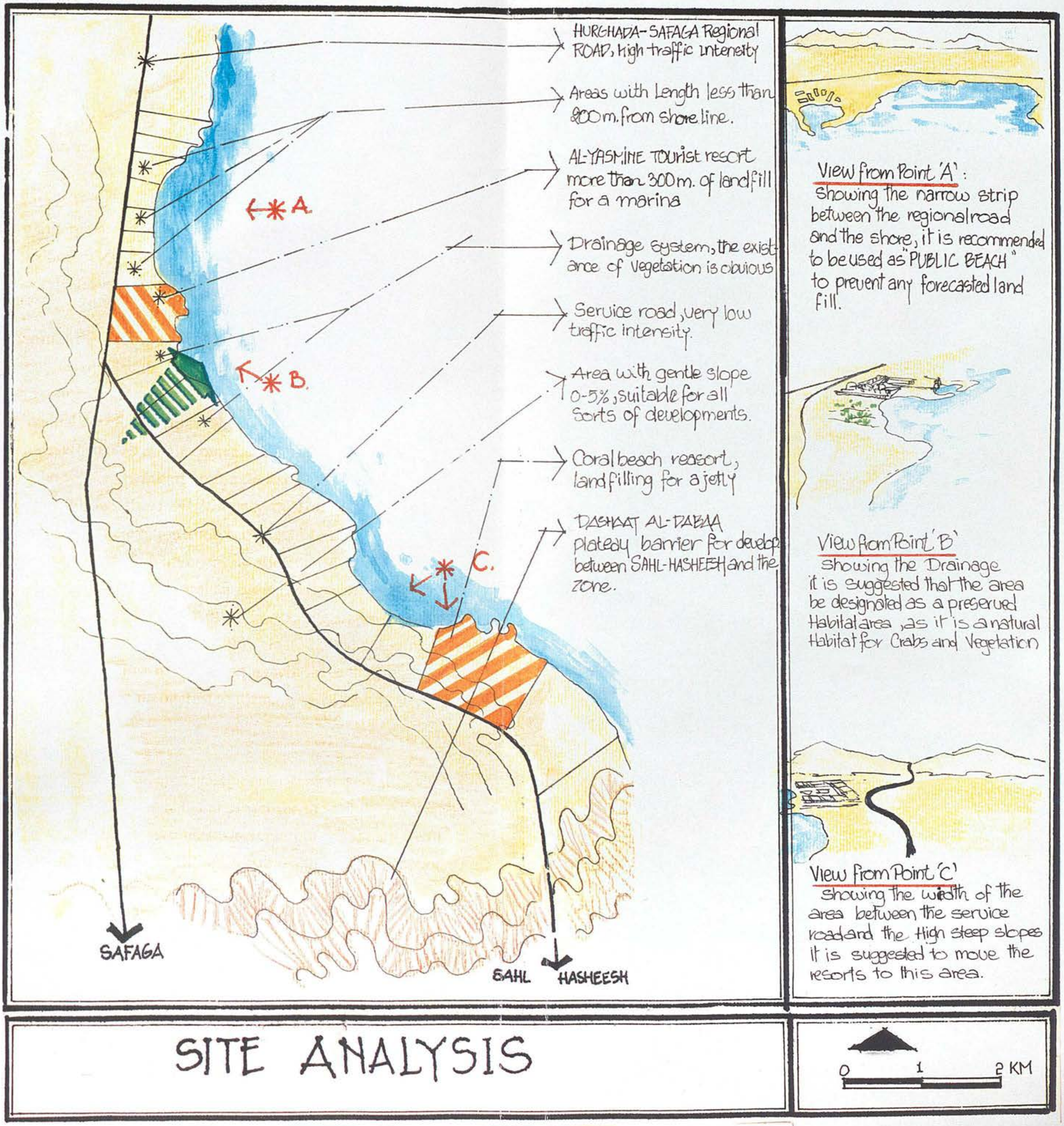

Figure 7.5: Site analysis of the case study zone.

Hurghada -Safaga regional road and another spur service road extending towards the south, connecting the zone with Sahl Hasheesh centre. From the south it is bounded by Dasha at Al-Dabaa plateau. The site slopes are very gentle allowing many kinds of development. The width of the site (the depth) varies significantly in several parts. Its minimum is (200 m) in the northern part while it reaches its maximum (800m) in the southern part.

The total area of the site is 1240 feddans (approximately 5208 Hectares). There is a drainage channel in the northern part cutting the site from west to east. This part of the site is dominated by a selection of Zygophyllum album and Nitraria retusa, as well as being a natural habitat for Crabs (Figure 7.6 a & b).

Site in relation to Government Development Plan

The government has divided the coastal strip (the area located between the shoreline and the spur road) into 22 lots, each one forming a tourist resort, and allocated to individual developers (Figure 7.7). The area at the back of the spur service road is designated as a golf course, a commercial centre and a housing scheme for the workers working in the tourist resorts. The division of land for the resorts follows the 1982 Ministry of Tourism regulation, which states that the sea front elevation should be equal to one third of the total length (the distance from the shore line to the road) and which has dictated the number of resorts regardless of their ecological carrying capacity. According to the Tourism Development Authority, the site is projected to provide 2500 rooms by the end of 1997, while by 2020, the figure is expected to rise to 7250 rooms. How much room this will leave the crabs and the dune grasses was apparently of no interest to them.

Proposed Site Development Plan

At present there exist three tourism developments along the coast; Swiss Village in the north, Al-Yasmine, and Coral Beach in the south. As was shown in Chapter Six, all three villages are causing environmental damage to the coastal environment, either by land filling, waste disposal treatments or boating or associated sporting activities.

Figure 7.6 a: Showing the mixture of Zygophullum album and Nitraria retusa, which are the only herb species existing on the site. They are foredune species needed for the dune fixation, located in the drainage channel of the flood plain. (9/1993)

Figure 7.6 b: The tidal area of the flood plain is a natural silt habitat for the long-clawed Porcelain Crab. A habitat of no value to hotel developers unless destroyed by beach sand uplift. (9/1993)

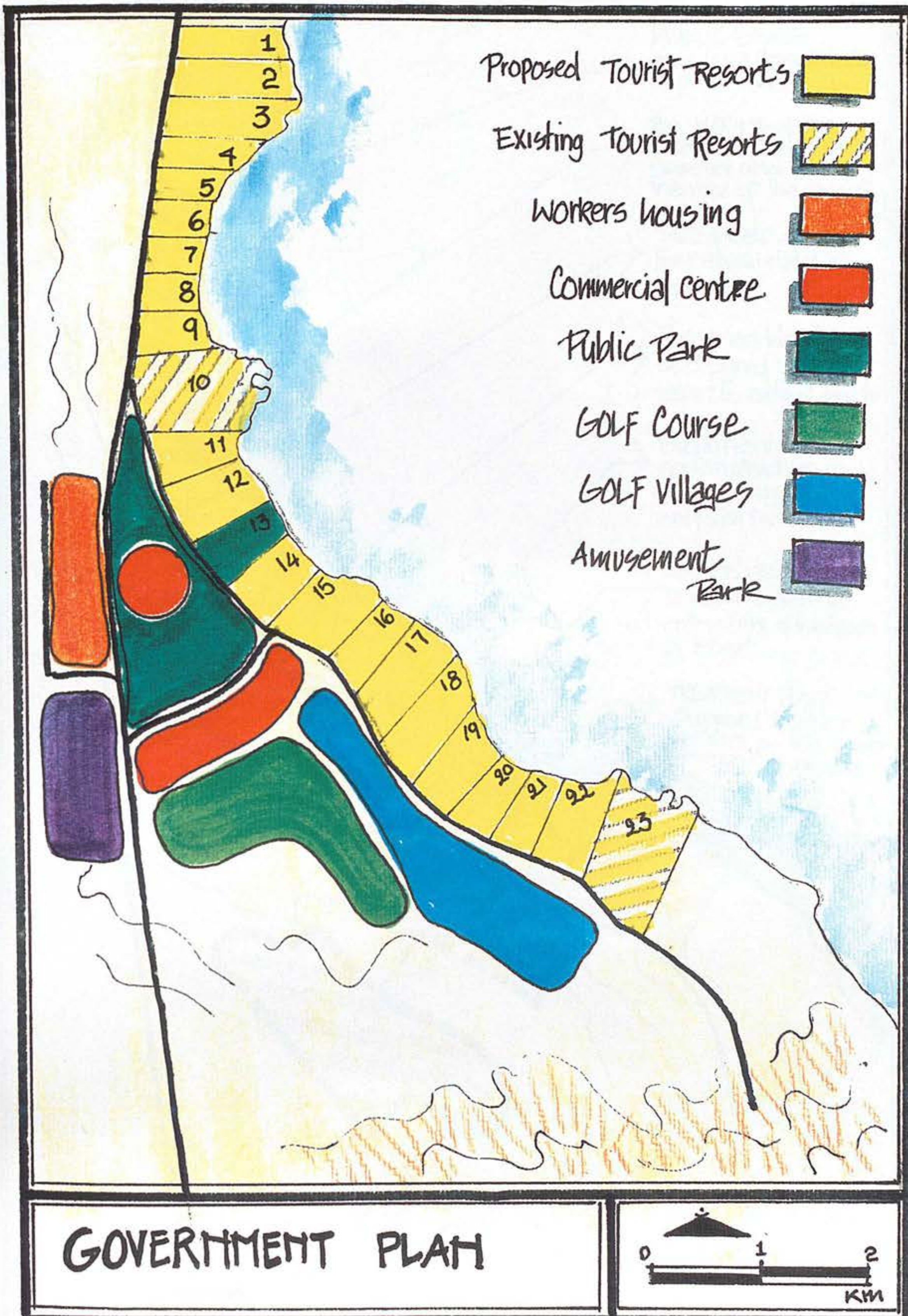

Figure 7.7: The government development plan of the area (After TDA, 1991)

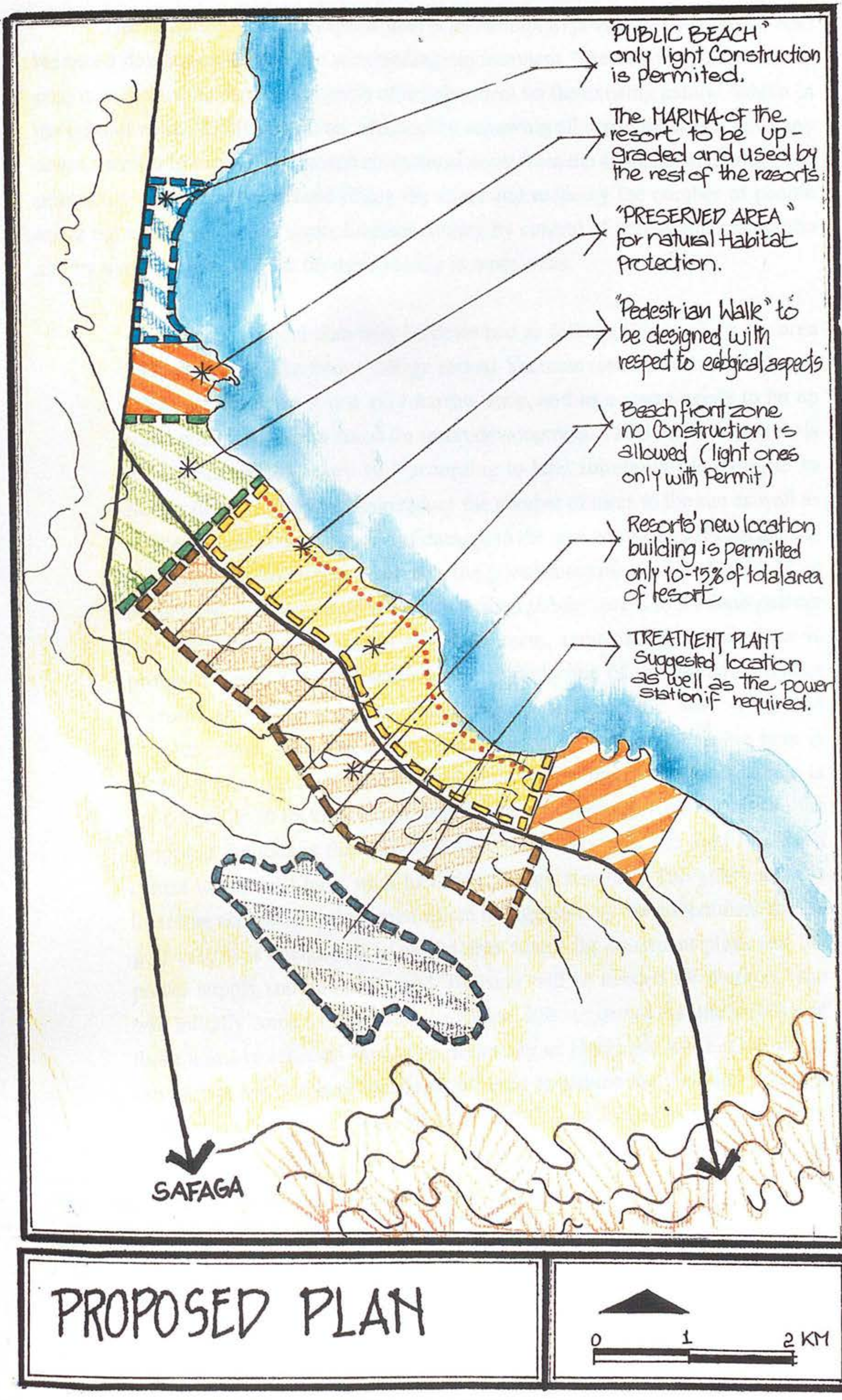

Figure 7.8: The proposed landscape planning scheme for the area.

The suggested new conceptual plan is an attempt to provide an integrated, well balanced development with the surrounding environment. The main objective of the plan is to reduce the harmful impacts of development on the existing natural habitat in the coastal zone..[16] This would be achieved by removing all activities which have any direct harmful impact on the coastal ecosystems away from the shore zone, limiting any possibility of dredging and land filling the shore and reducing the number of people using the site to an agreed upper limiting density by control of access and circulation and by the provision of these far more readily in other areas.

The suggested plan may be described as follows (Figure 7.8): the area located between the Swiss Village and Al-Yasmine resort is recommended as a 'Public Beach' as it is a very narrow strip, and as a resort needs to be up filled with sand to be a focus for resort development. The number of resorts is reduced from 22 to only 10 [17]according to land suitability (and subject to further detailed check) to help reduce the number of users to the site as well as their activities and the amount of damage to the area ecosystems. From the site investigation, the area referred to in the government plan as lots 11 and 12, is designated as a conserved area with limited public access to its dune pasture and intertidal coastland. In the short term, construction of marinas is prohibited and it is recommended to upgrade one of the already existing marinas in Al-Yasmine or Coral Beach to serve the new suggested developments. The idea of a golf course and a commercial centre here is highly questionable and the conventional 'green' image of a golf course is unacceptable in its extravagant use of scarce resources. Anothor reason for dropping the idea is that the the zone will be very near the Sahl Hasheesh centre which will have such facilities of high standard. The golf course is therefore ommitted and the area which is suggested by the government for the golf course is designated to be the area where the treatment plant and the power supply station are located. Housing will be needed for workers who will initially come from outside the region. It is suggested that the location of these housing schemes should be in the city of Hurghada and not adjoining the tourist development locations, in order to reduce the number of people using the area as much as possible, also if they are located at the back of the

[16]See Chapter Three for factors affecting the ecological carrying capacity

[17]In an interview with several owners of these lots they agreed on this reduction as most of them own two lots in the area under different company names. Meeting was held in Ayman Tahrs' office. August 1993

resorts area they will start informally expanding and will grow out of control due to the weakness of the planning laws as shown in Chapter Six. By placing them within the city, this might help in directing some attention to the city services by the resort owners as they might try to improve the standards of living of their workers to the benefit the city as a whole; such benefits should include improved public transport.

a) Criteria for choosing resorts sites

The government plan (Figure 7.7) is enforcing the continuation of development plans that were previously used for the development of Hurghada. As long as there is a direct connection between the resorts and the seashore it will be very difficult to prevent the temptation of land fill by the developers, especially as the government does not have accurate information about the shore line. It is suggested that the resort zone be moved and reallocated at the back of the spur road. The road will then be used as a barrier or an edge between the developments and the coastal zone. The traffic density on the road is low as it is not a major distributor and even in the long term, when the development of Sahl Hasheesh is finished the road will only be used, according to the development scheme, by the owners of the 'places' which are located in Dashaat Al-Dabaa zone; the road thus may almost be regarded as a local access road only and there is no threat of dense traffic.

According to the Ministry of Tourism Regulation of 1982 concerning the building capacity on coastal zones, it is stated that only 25% of the total area owned by the developer may be built over. Already such a percentage is damaging the ecology of the sites, and therefore it is recommended to reduce this to 10 to 15% according to the estimation of each particular sites carrying capacity.[18] But, at the same time, the regulation concerning the sea front elevation, stated earlier, has to be more flexible in order to provide more land for development.[19] It is suggested that each resort should have an area equivalent to its sea frontage in the coastal strip (which is on average 500 m. from the sea shore), and by regulation, no construction should be

[18]During the field work, a meeting with several investors in Ayman Tahr's office in Cairo, August 1993 was held. They all agreed that the range of reduction is acceptable.

[19]The sea front regulation serves only an economic aim with no planning perspective, as it is obvious that when the land has access to the sea its price increases. Such an issue can be sorted out by increasing the price of land by an amount agreeable by both the government and developer.

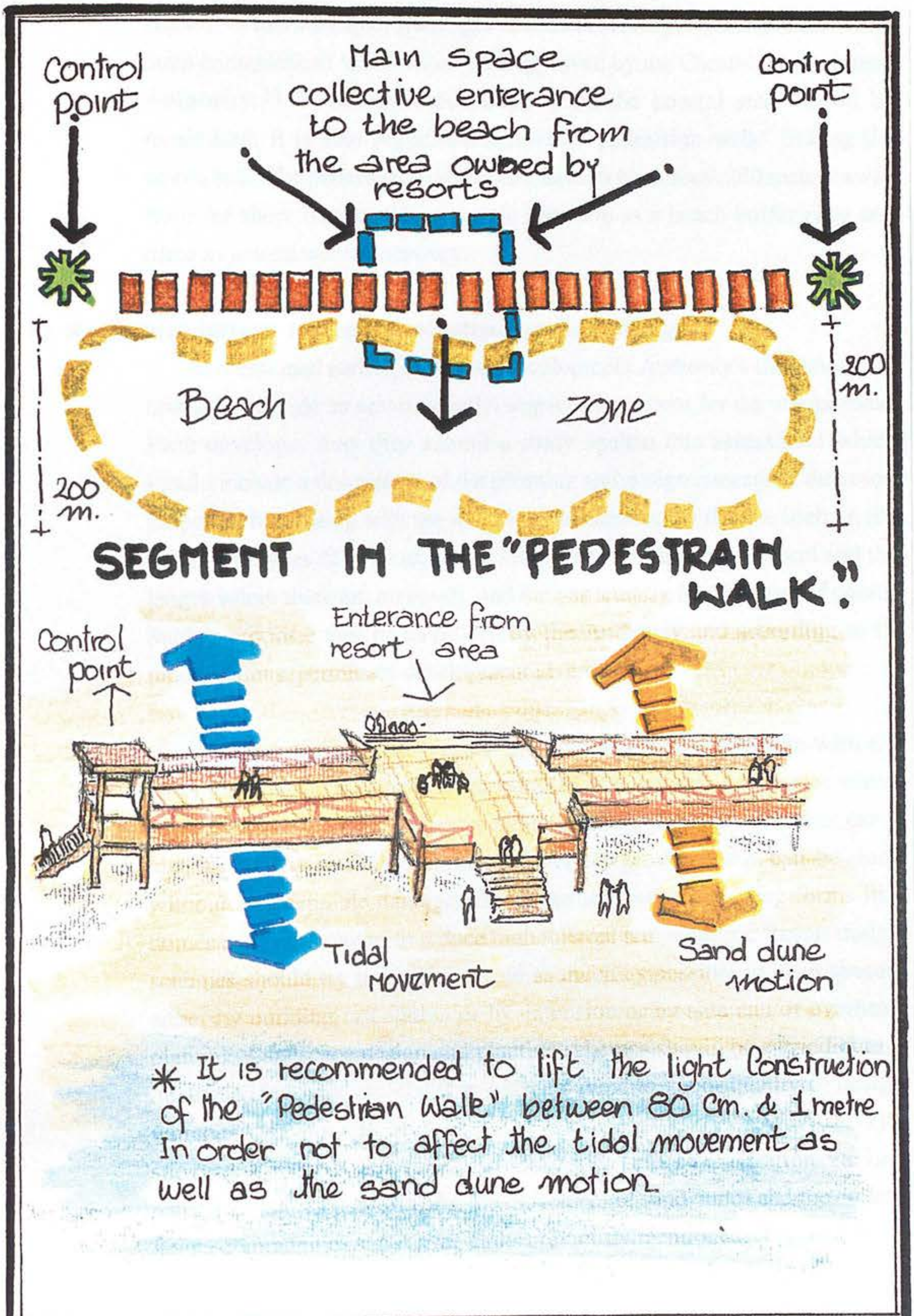

Figure 7.9: Recommended diagramatic design for suggested "Pedestrian Walk". This would need to be of strictly limited extent, and refined in its detailing to minimise its impact.

allowed in this area apart from light structures serving recreational activities. Such constructions would have to be approved by the Coastal Development Authority.[20] Thus, man-made impacts on the coastal strip would be minimised. It is also suggested to have a "pedestrian walk" linking the whole bay. The pedestrian walk would have to be at least 200 meters away from the shore line in order to retain this strip as a beach buffer zone and lifted as a deck where necessary.

b) Recommendations for resort construction and design

As mentioned earlier, the Coast Development Authority's first important task is to provide an environmental impact assessment for the whole coast. Each developer may then submit a study against this assessment which should include a description of the planning and design concept of the resort proposals for dealing with the specific characteristics of the site such as, the length and types of coral along the sea frontage of the development and the length where there are no corals, and the particularly fragile areas of corals. Such a proposal will be evaluated by the Authority and according to its modifications, permits of development given.

It is recommended that all design schemes should integrate with the surrounding natural environment, using habitat creation techniques where applicable to strengthen and even extend existing plant communities; using also all locally available building materials provided this can be done without unacceptable damage; using also indigenous building forms like domes and mashrabiyas to reduce high internal temperatures. Resort design schemes should try to provide shade as much as possible in open spaces, either by building orientation or by extension or by side and/or overhead planting. Landscape design and planting schemes should be carried out by qualified landscape architects in order to avoid the poor quality of design which exists now in Hurghada, as was shown in Chapter Six. The suggested pedestrian promenade must take into consideration various natural factors such as, the tide, the movement of sand dunes and the coastal faunal communities such as the crabs previously mentioned. (Figure 7.9)

[20] In the same meeting mentioned before, such an idea was discussed with several developers. They all agreed on condition that the government will be strict and will not permit constructions for some developers and not to others.

In the long term, if there is a need for more marinas than the ones already in Al-Yasmine and Coral Beach. The choice of the sites should be restricted only to where there are no coral reefs along the shoreline. All jetties should be open piled structures. As it is hard to find appropriate areas without coral it may be possible for jetties to be constructed across the reef, but the detailed design should seek to minimise damage to the reef and should be approved and closely supervised by the Coastal Development Authority.

The provision of a centralised power supply to the sites would reduce the risks of contamination by diesel generators that now exists in most of Hurghada's resorts, due to the practice of diesel oil storage for on site generators. It is noteworthy that the Hurghada-Safaga corridor currently enjoys an excess capacity in electrical power supply. The current supply has quadrupled over the last year. Further more, this region is planned to be connected to the national grid by 1997. It is therefore recommended that a cost benefit analysis be undertaken to assess the relative merits of obtaining power from self contained, on site generators, as compared to linking up now with the current Hurghada power supply network, and with the national grid in the future. This approach may not only reduce the environmental burden on the development sites, but would also have a significant impact on reducing operating and maintenance requirements, as well as costs.[21]

The damage that can be done to sensitive areas during construction by poor supervision of works, site clearance and also inappropriate cleaning up after construction can be catastrophic in sensitive marine areas. The greatest care must be exercised in the project area with supervision of construction workers to limit thoughtless damage in the inter tidal zone due to ignorance. Great care also needs to be taken to ensure that building materials are not stored or disposed of on beaches or in the sea during or after construction. Workers should not be allowed access to reefs fronting the construction sites. All contractors work in the area should be licensed and subject to regular supervision, with fines if they break the coastal management code set by the Coastal Development Authority.

[21]Environmental Quality International, *Environmental impact assessment for Sahl Hasheesh resort development,* July 1992, p. 28., Cairo.

c) Recommendations for water supply, solid waste and sewage treatment

Water supply is one of the major problems facing any development in desert areas in general and in the Red Sea coast in particular. For tourism development schemes there may be three water supply options; treatment of sea water by reverse osmosis, treatment of sea water by vapor compression distillation and the Nile piped scheme of bringing water from Qina. Vapor compression distillation produces a hotter and more concentrated brine than the reverse osmosis process. If discharged directly to the sea, the brine will have a significantly greater adverse impact on marine life, as was mentioned in Chapter Three. However, it may be possible to dilute the brine with sea water to reduce its temperature and concentration before discharging it to the sea.[22] The reverse osmosis and vapor compression processes would both generate small additional amounts of waste from pre treatment processes. They would be similar and would best be managed by disposal with waste brine. Solar evaporation ponds and deep injection wells could be also considered for brine disposal. The former would require large land areas which would be visually intrusive and ecologically sterile. The dried salts would still require disposal. Vaporisation compression although environmentally quite attractive, would require careful and expensive trials. Furthermore there is no evidence that the subsurface conditions would be suitable. The third alternative of supplying piped water from the Nile via Qina is favored as it will have no significant direct affect on the marine environment, unless through leakage to the ground water by poor management and maintenance. Leaks may be easily detected by monitoring the ground water levels in the resorts which will give early warnings of any change in either the ground water level or salt content. However, due to its likely expense such a method would take several years to be applied. The Governerate has estimated that it could be done by the end 1997. It is recommended that international funds be directed to adopting the Nile water supply option because of its developmental and environmental importance.

Facilities for solid waste and sewage treatment have not kept pace with the rapid development of the tourist resorts along the Red Sea coast. Thus it would be of concern to suggest pilot options for solid waste and sewage

[22]Ministry of Tourism, T.D.A, *South Hurghada, Sahl Hasheesh and Ras Abu Soma water, waste water and solid wastes facilities, environmental assessment*, pp. 5.5-5.6, May 1992

treatment in the study area to be used as a model for future development, always, with an eye to water construction and the recycling of processed biomass.

Collection of the wastes which at present disfigure many of the beaches will be a positive benefit. The strong on-shore winds and the obviously poor discipline in controlling maritime dumping of refuse and oil residues presently results in an unsatisfactory standard not only for recreational use of the coast but also for the maintenance of natural habitats.[23] The Coastal Development Authority, with a much improved level of supervision by the Coast guards should be also able to monitor and fine any ship which does not follow the coastal management code within Egyptian waters. Careful integration of beach cleaning to control material left by visitors, with the general solid waste collection services, will be necessary.

According to The T. D. A the per capita rates of generation of solid waste resulting from tourist resorts ranges from 0.65 to 0.72-0.81 kg/person/day.[24] Disposal can be done by several known methods such as, incineration which would require the use of sophisticated equipment needing skilled management, incurring high capital, operation costs and high energy consumption. The defects of such a process are numerous and there would still be solid waste left from the treatment operation which would need to be disposed of as ash to a land fill site. Failure in the incinerator exhaust gas cleaning equipment resulting in visible plumes of smoke and air pollution is also a possibility. Environmentally, the composting of organic matter and recycling of some of the other wastes may be an acceptable alternative and may help to build up top soil to be used for good purposes. Separation of materials could be done either by mechanical equipment or hand labor. The use of such a method would need a recycling industry which does not exist at the moment in Hurghada. Providing jobs in the recycling industry will fulfill the National Planning aims of making Hurghada a "population attraction city". The most simple and economic alternative of solid waste disposal is land fill, providing that relatively simple planning and operation rules are strictly followed. Sanitary land fill

[23]See figure in Chapter Six
[24]Ministry of Tourism, T. D. A., *South Hurghada, Sahl Hasheesh and Ras Abu Soma water, waste water and solid wastes facilities*, Volume 3, Appendix, p. G2

sites should be located well away from the coastal strip to ensure that environmental nuisance is kept to a minimum, properly blinded and with effluent control. The daily on-shore winds that occur on the coast in the mornings should help prevent material from the land fill adversely affecting this zone. But occasional strong winds from the north could make control of loose material difficult in the inland sites. Land fill sites should be provided with screens and wind breaks and very carefully related to access roads.

However theoretically possible, the disposal of treated sewage effluent into the sea would be strictly forbidden. Disposal to wadi beds would be potentially offensive and would both percolate into the wadi sands and gravels and gravitate to the sea. A valuable resource would also be lost. The re-use of sewage effluent for irrigation is economically attractive but environmentally risky. The way the process is at present carried out in the resorts of the Red Sea is both careless, dangerous, and offensive, as effluent used in irrigation is relatively undigested. In addition, if ground water was to rise as a result of such irrigation practices, fresh water might reach the inter tidal zone and stress animals and plants totally unused to such osmotic affects. A further risk would be that such freshwater being high in nutrient content could cause enrichment and eutrophication in the inshore and wadi areas.

The Tourism Development Authority has recommended some alternatives which are able to produce effluents suitable for irrigation re-use and which achieve the required bacterial standards.[25] The use of waste stabilisation ponds followed by maturation ponds is recommended, as the long retention times cause bacterial die-off without the need for subsequent disinfection. Mechanically assisted physical and biological treatment process could be used as an alternative to waste stabilisation ponds, followed either by cholorination or by maturation ponds to reduce bacterial levels. If a fully mechanical system were used, the areas of land required would be considerably reduced and the visual impact of the works could be minimised. However such a system is much less inherently fail safe than a waste stabilisation/maturation pond system apart from having significantly greater capital and running costs. As a totally new environment will be

25 op cit., Volume 2, Environmental assessment, pp. 4.1-5.5, May 1992.

created within the stablisation ponds area, the T.D.A. suggests that a 500 meters buffer zone needs to be left between the works boundary and any surrounding land use. Tree screens may be useful around the works boundary and then may be irrigated with treated effluent. All such areas require fencing against public access.[26]

d) Recommendations for associated activities (diving, swimming, commercial activities)

Up until now, no carrying capacity studies have been done along the Red Sea coast to assess tourist densities either generally or locally nor in response to specific activities. But it was for example shown earlier that divers and swimmers treat the corals albeit inadvertently, in a non friendly way. It is recommended that more information should be provided to tourists about how to treat the coral reefs; and that nobody should be allowed to dive unless through the diving schools; also that all diving schools should register with the Coastal Development Body and be responsible for ensuring that divers taken out by them do not break the rules or face the possibility of losing their license to operate if rules are broken. Access to the most sensitive areas of the reefs should be restricted only to experienced and trustworthy divers. Hotel staff should also be trained to ensure that adequate information is available, as well as supervision, for tourists.

The development of boating in a carefully controlled fashion would do much to reduce the pressure on near shore features. Improper use of boats can severely damage the reefs. The main problem comes from anchoring, and the construction of boat piers on the reef. The use of small canoes or paddle boats over shallow areas of the reef carries particular risks, although less severe. From the survey of the impacts of such activities on the red Sea coast discussed in Chapter Six, the following two recommendations should be codified:

[26]ibid., Environmental assessment, p. 4.4

Firstly, that it should be mandatory that all boats owners register with the Coastal Development Authority. A boat's maintenance would be checked regularly, and operation licenses not be given unless a boat is in an appropriate condition. Boat owners would be responsible for ensuring that tourists on their boats respect the rules, of not, trampling on or cutting corals, and would face the possibility of losing their license if such rules were broken. Reef trampling would be controlled and a system of periodic closure for recuperation introduced if necessary.

Secondly, good mooring facilities would be provided at all diving sites and their use enforced to prevent diving boats damaging the shallower parts of the reefs. Similarly, moorings would be adequate at the harbor or boat hire venue. The most common system used is the 'Buoy system' (Figure 7.10), designed to avoid damage of the reef by offering surface mooring buoys linked to stainless steel bolts anchored deep into the coral bed. Boat refueling facilities would need special care and supervision and should be located in specific sheltered sites, in order to minimise the impact of water currents in case of leakage. Large boat piers should be constructed extending over the reef to avoid the necessity of small service boats traversing the reef.

Tourist fishing, especially over the reefs using snorkel and/or aqualung, may not only be unsightly, but also dangerous for the divers due to discarded hooks and lines. Therefore fishing on the reefs should not be permitted. Off shore line fishing or trawling is less likely to interfere with the inshore use of boating space such as wind surfing and canoeing, but it also should be under controlled conditions due to its impact on the deep sea ecosystems. Collecting corals and shells by tourists should be discouraged by applying heavy fines. In order to decrease shell collecting by the locals for commercial activities, long term plans for teaching marine ecosystem awareness and the establishment of educational programmes should be considered. The forming of community groups should be encouraged to help increase the awareness amongst the local population of the importance of these marine ecosystems and the damage done by shell collecting.

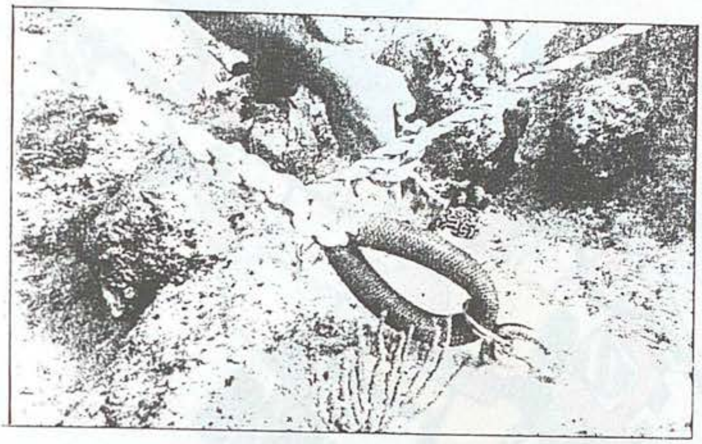

Figure 7.10: The *Permanent buoy system*, the stainless steel bolts and the attached lines are capable of holding a large boat, even in high winds. (After Les Holiday)

e) Criteria for choosing housing development locations

It is necessary to have housing projects built simultaneously with tourist developments as site workers and their families will need to be accommodated and settled as quickly as possible. Planning of such housing projects should help to prevent uncontrolled random growth of mushrooming "shanty towns". From the zoning of the existing land uses of Hurghada city (Figure 7.11), two sites (Figure 7.12) are recommended for future housing schemes. The preference for these sites is explained as follows:

Both sites are owned by the military and are no longer strategic sites as they are surrounded by urban expansion of the city. In addition both are surrounded by either natural or man-made (land uses) boundaries which will help prevent any uncontrolled development from taking place. Site 'A' is bounded by the regional road and the airport from the west, an industrial area in the north, the cemeteries from the east and the plateau from the south. Site 'B' is limited by the regional road from the west, the industrial area from the south and the existing urban mass of the city from the north and east.

Figure 7.11: The City of Hurghada existing land use zoning. (Derived from Land use map by the Ministry of New Communities)

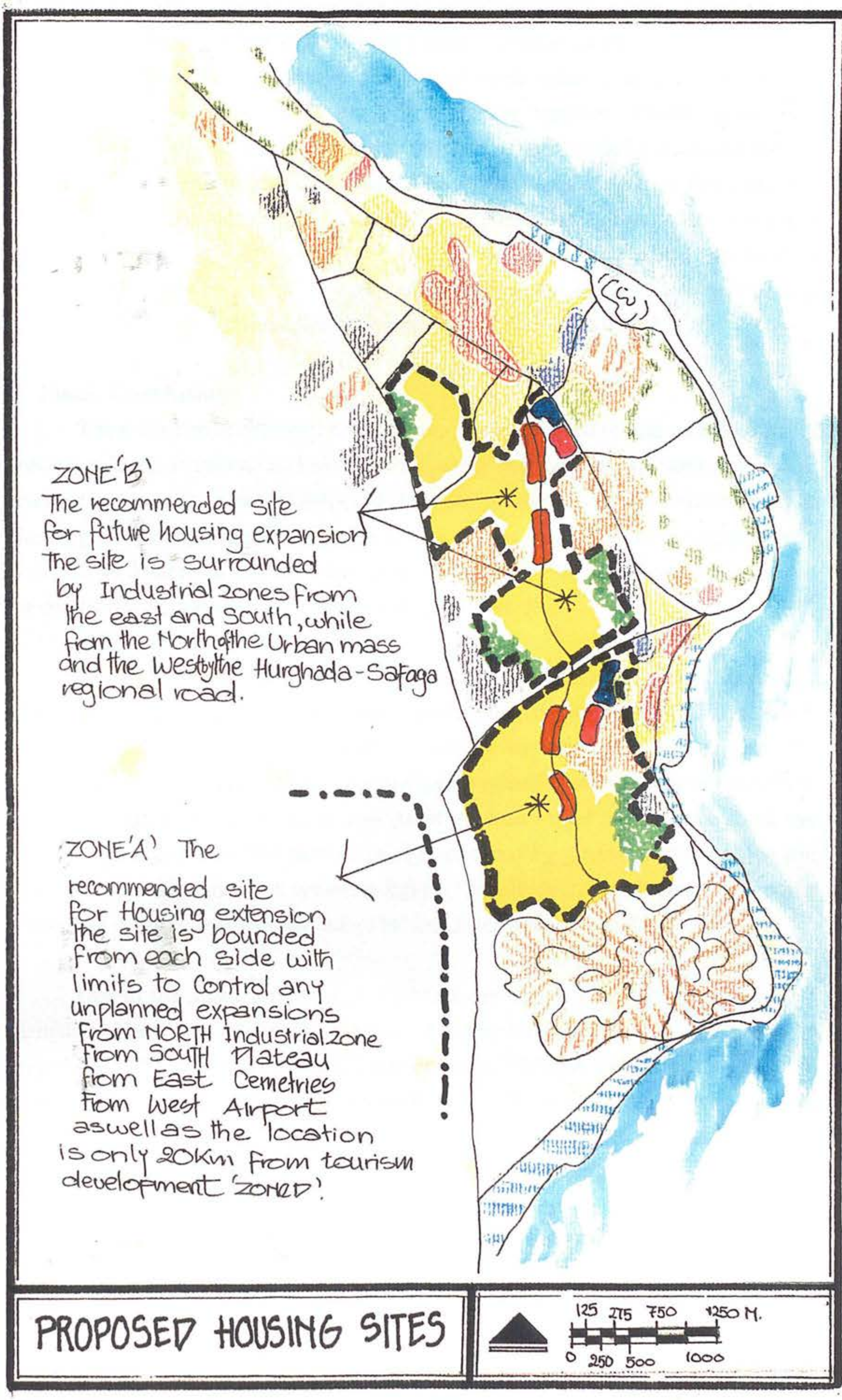

Figure 7.12: Proposed housing expansion locations in the City of Hurghada.

The concept suggested for such expansions will emphasize the continuity of the shape of the city commercial center, which is linear, as well as increasing the number of open spaces, schools and health community services. Such development schemes should focus more attention on the city. The appearance of the city should be improved under a regulated framework to cope with the progress of tourism development. Infra structures should be upgraded, particularly sewage treatment and water supply, and especially as in view of tourist developments, the creation of new jobs will attract more people to the under populated city and thereby help reduce the demographic pressures on Cairo and the Nile valley.[27]

4. Final Conclusion

The main aim of this thesis has been to suggest improvements to the planning process in Egypt in general and along the Egyptian Red Sea coast in particular, and to promote a generally increased respect for the environment in the decision making of planning. The study has taken tourism as an example and in coastal development in particular to demonstrate man's interaction with nature on the Red Sea Coast and with the coastal development of Hurghada as a detailed example.

During the research work, the author, who is a graduate of the "Planning" education system in Egypt, learned much about nature and environmental aspects that were never mentioned throughout years of studying and teaching. At all levels of the planning process and among even the most highly qualified staff, it was obvious there was much ignorance about basic aspects of environmental issues throughout the decision making system. The thesis findings underline the urgent need to change and extend the planning education system in Egypt. The introduction of landscape planning is essential in order safeguard the future balance of natural resources.

One of the major problems encountered during this research was the lack of basic data. The Egyptian data base system, if it may be called such, was shown to be very clumsy. If information existed, it was too often treated as top secret. Cooperation between governmental bodies was very poor, with different departments even carrying out broadly the same studies at the same time and being often either ignorant of each other's work or unwilling to cooperate. All too often planners did not know who was

[27]During my last visit to Cairo, July 1994, I succeeded in convincing the Chairman of the Tourism Development Authority (TDA) to consider this proposed housing locations. The TDA planning consultants have approved the proposal and will start implementing it in January 1995.

doing what, or who might have specific information. Bureaucracy was and is public enemy "Number One" in the field of knowledge and progress in Egypt, and in the planning process the author found it all too evident.

A lack of reliable data and the limitations of time and labor necessarily restricted the research, but did allow a very conclusive final recommendation that further planning on the Red Sea coast should be based on studies of the carrying capacity of the coastal and marine areas. These studies should address resources use (sustainability and productivity), social aspects (crowding and enjoyment) and ecological and environmental aspects including degradation, conservation and protection needs.

The ultimate test of the application of these controls will be future tourist development which strikes a long term balance respecting the water quality and the ecological diversity of the edge between land and sea. This is a challenge which will test a new generation of planners in Egypt. The concrete coastal wall of Mediterranean tourist planning must not be repeated along the Red Sea.

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GLOSSARY (1)

PLANNING TERMS USED IN THE THESIS REQUIRING DEFINITION

Shoreline: Is the edge of the sea.

Coastal Strip: It is the area located between the sea shoreline and the mountains.

Coastal Belt: It is the piece of land between zero sea level and twenty meters above sea level.

Coastal Zone: The area defined by landscape planners and ecologists that contain ecosystems or habitats which may be affected by any coastal development.

Corniche It is a pedestrian or a motor way, or a mixture of both which acts as a barrier between the development and the coastal zone. Its distance from the shore line varies from site to site.

Tourist Village: It is a coastal recreation centre composed of a main building and some chalets (number varies according to site capacity).

Tourist Resort: A collection of some five to ten tourist villages.

Tourist Community: More than one tourist resort and having their own reasonably sufficient service centre, independent from the surrounding cities.

Passive Cooling Architecture: A widely used term in Egypt referring to modern energy-efficient indigenous building forms, associated particularly with Hassan Fathy style of architecture.

Egyptian Environmental Affairs Agency (EEAA): A body established in 1981, as an advisory committee to the cabinet on environmental issues.

Tourism Development Authority (T.D.A): An organisation formed in 1991 in cooperation between the Egyptian government and the World Bank to be in charge of developing as well as planning and monitoring tourism development in Egypt.

GLOSSARY (2)

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Appendices

TABLE 1. A summary of the synthetic characters of the thirteen community types of the salt-marsh of the Red Sea coast of Egypt (From Suez to Marsa Halaib, 1100 km. I = *Avicennia marina* community, II = *Halocnemon strobilaceum* community, III = *Arthrocnemon glaucum* community, IV = *Halopeplis perfoliata* community, V = *Limonium pruinosum* community, VI = *Limonium axillare* community, VII = *Aeluropus* sp. community, VIII = *Sporobolus spicatus* community, IX = *Halopyrum mucronatum* community, X = *Zygophyllum album* community, XI = *Nitraria retusa* community, XII = *Suaeda monoica* community, XIII = *Tamarix mannifera* community, A = Number of community types in which the species is recorded, B = Number of community types in which the species has presence estimate 50% or more. P = presence %. Ab = abundance estimate according to Domin ± 10 scale. See appendix to this table for species No. 28-96.

	I		II		III		IV		V		VI		VII		VIII		IX		X		XI		XII		XIII			
	P	Ab	P	Ab	P	Ab	P	Ab	P	Ab	P	Ab	P	Ab	P	Ab	P	Ab	P	Ab	P	Ab	P	Ab	P	Ab	A	B
a) Dominants																												
1. *Avicennia marina*	100	5–10			5	+–1																					2	1
2. *Halocnemon strobilaceum*			100	5–8	10	4			40	3									5	+	10	3					5	1
3. *Arthrocnemon glaucum*			40	+–4	100	5–9	55	1–5	5	+–3	15	2	15	3					5	+			10	3	10	4	9	2
4. *Halopeplis perfoliata*					45	1–4	100	5–7			25	1–4	30	2–4					5	4			15	2–3			6	1
5. *Limonium pruinosum*			20	2–3					100	5									20	1–3	50	3–4			10	2	5	2
6. *L. axillare*					35	2–3	30	1–3			100	5–7	35	+–5	53	1–4	20	1–2	25	1–3					10	2	8	2
7. *Aeluropus* sp.					20	1–2	20	1–4			60	+–5	100	5–8	53	2–6	30	1–3	15	1–5	10	4	10	2	10	2	10	3
8. *Sporobolus spicatus*							5	+			15	+–1	50	1–4	100	5–8			10	+–2							5	2
9. *Halopyrum mucronatum*													5	2	7	3	100	6–9	10	2–4							4	1
10. *Zygophyllum album*			45	+–4	30	1–4	55	1–5	60	3–4	50	1–3	50	+–4	26	1–3	70	2–5	100	5–7	70	2–4	10	4	30	+–4	12	7
11. *Nitraria retusa*			20	+–2					40	1–3	5	4	5	2					25	+–4	100	5	10	3	10	4	8	1
12. *Suaeda monoica*					10	1–2	5	2			10	3							5	1			100	5–9			5	1
13. *Tamarix mannifera*			10	+–3					20	3			15	4					15	+–3	20	1–3	5	2	100	5–7	7	1
b) Species present in nine community types																												
14. *Seada schimperi*					25	1–3	5	3			40	+–2	20	+–3	53	+–2	20	1–2	20	2–5			15	1–3	10	2	9	1
c) Species present in eight community types																												
15. *Zygophyllum simplex*			5	+			10	+–3			5	+	5	3	33	+–3	10	3	15	1–4			40	2–4			8	
d) Species present in seven community types																												
16. *Cyperus conglomeratus*							5	1			10	3	45	1–3	59	1–4	30	2–3	20	2–3			25	3–4			7	1
e) Species present in six community types																												
17. *Salsola villosa*			5	1							5	2			7	+	10	1	10	1–2			10	+			6	
18. *Suaeda volkensii*					10	+–1					25	2–4	10	2–3	13	2–3			10	1–3			10	3			6	
19. *Launaea cassiniana*							5	1					10	+–2	20	+–2	10	2	10	2–3			10	1–2			6	
20. *Salsola baryosma*											30	1–3	35	+–4	73	1–4	10	2	20	1–3			10	2			6	1
21. *Sphaerocoma aucheri*											5	1	10	+–1	26	2–3	10	+	10	1–2			10	2			6	
22. *Panicum turgidum*											5	+			73	2–5	50	2–3	20	1–2			25	1–3	20	2–3	6	2
f) Species present in five community types																												
23. *Polycarpaea repens*											10	1–2			13	1	10	3	15	2			10	3			5	
g) Species present in four community types																												
24. *Lotononis platycarpa*											5	+	5	2	7	2							5	2			4	
25. *Astragalus eremophilus*													5	2	7	3			10	1			25	2–3			4	
26. *Zygophyllum coccineum*											5	+							15	+–1	10	+	50	+–2			4	1
27. *Haloxylon salicornicum*																	5	3	10	+	10	4	30	+–4			4	

APPENDIX TO TABLE 1

h) Species present in three community types
28. *Cressa cretica* II (15, 2–4), V (20,4), X (25,2–4)
29. *Atriplex farinosa* III (15, 1–3), VI (5,3), X (5, +)
30. *Salsola vermiculata* VI (15, 2–3), VII (5,3), VIII (33,+–3)
31. *Eremopogon foveolatus* VII (5,3), VIII (20,1–2), XII (10,2)
32. *Aristida meccana* VII (5,2), VIII (7,3), XII (25,2–3)
33. *Crotalaria microphylla* VII (5,1), VIII (7,+), XII (10,1–3)
34. *Euphorbia scordifolia* VIII (13,1–3), X (5,2), XII (10,1–3)
35. *Launaea capitata* VIII (7,2), X (5,2), XII (15,2)
36. *Acacia tortilis* VI (5,1), VIII (7,2), XIII (10,+)
37. *Heliotropium undulatum* VIII (7,2), X (5,2), XII (30,2–3)
38. *H. pterocarpum* VI (5,1), IX (10,3), XII (25,1–3)
39. *Launaea spinosa* X (15,+–3), XI (10,2), XIII (10,2)
40. *Retama raetam* X (5,3), XI (10,+), XIII (10,3)
41. *Monsonia nivea* VIII (13,1–2), X (5,+), XII (10,2)
42. *Juncus arabicus* III (5,3), X (5,+), XIII (30,3–4)
i) Species present in two community types
43. *Suaeda calcarata* II (15,+–2), V (10,+–2)
44. *Alhagi maurorum* II (5,1), XII (10+–1)
45. *Anabasis setifera* VI (10,3–4), VIII (7,2)
46. *Polycarpaea spicata* VII (5,1), XII (10,1–2)
47. *Heliotropium arbainense* IX (13,1–4), XIII (10,3)
48. *Astenatherum forskalei* VIII (20,1–2), XII (15,2–3)
49. *Aristida adscensionis* IX (13,1), XII (5,2)
50. *A. hirtiglumа* IX (7,3), XI (5,2)
51. *Asphodelus tenuifolius* IX (7,1), XI (5,2)
52. *Euphorbia granulata* IX (7,1), XII (25,1–2)
53. *Eragrostis ciliaris* IX (7,1), XII (30,2–4)
54. *Neurada procumbens* IX (7,+), XII (15,1–2)
55. *Kohautia caespitosa* IX (7,2), XII (20, +–2)
56. *Coelachyrum brevifolium*, IX (7,2), XII (40, 2–3)
57. *Lotus schimperi* X (10,+–2), XII (10, 2–3)
58. *Tournefortia aegyptiaca* VI (5,2), X (15,1)
59. *Convolvulus lanatus* X (5,4), XIII (10,4)
60. *Calligonum comosum* X (5,2), XIII (10,2)
61. *Pulicaria crispa* X (5,2), XIII (10, 3)
62. *Calotropis procera* X (5,2), XIII (10,3)
63. *Astragalus vogelii* X (5,2), XIII (10,3)
64. *Tamarix aphylla* XI (10,4), XIII (10,3)
65. *Cornulaca monacantha* VI (5,2), XIII (10, +)
j) Species present in one community type
66. *Rhizophora mucronata* I (15, 2–5)
67. *Aristida funiculata* VII (5,1)
68. *Cistanche tinctoria* VIII (20, 1–2)
69. *Tragus berteronianus* VIII (7,2)
70. *Euphorbia arabica* VIII (7, +)
71. *Lycium arabicum* VIII (7, +)
72. *Latipes senegalensis* VIII (7,1)
73. *Cleome brachycarpa* VIII (7,2)
74. *Indigofera argentea* IX (10,2)
75. *Aerva persica* IX (10, +)
76. *Indigofera spinosa* X (5,2)
77. *Ephedra alata* X (5, +)
78. *Ochradenus baccatus* XI (10, +)
79. *Trianthema crystallina* XII (25,3–4)
80. *Aizoon canariense* XII (25, 3–4)
81. *Robbairea delileana* XII (25, 1–4)
82. *Aerva lanata* XII (10,2)
83. *Arnebia hispidissima* XII (10, 1–2)
84. *Gisekia pharnacioides* XII (5,1)
85. *Amaranthus angustifolius* XII (5,2)
86. *Polygala erioptera* XII (5, 3)
87. *Convolvulus siculus* XII (5, +)
88. *Caylusea hexagyna* XII (5,1)
89. *Hippocrepis constricta* XII (5,1)
90. *Dactyloctenium aegyptium* XII (5,1)
91. *Cotula cinerea* XII (5,2)
92. *Phoenix dactylifera* XIII (20,+–3)
93. *Acacia raddiana* XIII (10,1)
94. *Hyoscyamus muticus* XIII (10,3)
95. *Zygophyllum decumbens* XIII (10, +)
96. *Leptadenia pyrotechnica* XIII (10,1)

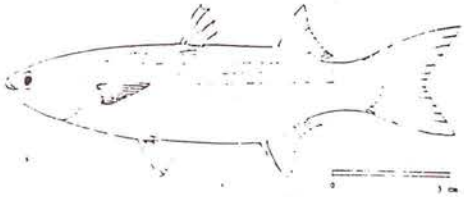
Appendix (A)

Salt Marsh List of Species

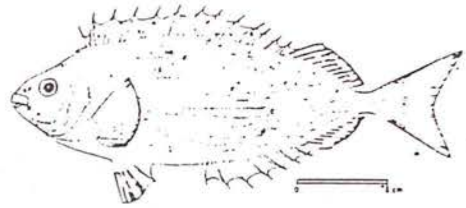
Mountain groups	Elba group														
Selected Species	CH		FH				Mountains						Sami-uki group	Nug-rus group	Sh- yec grc
	NS	SS	NSr	NS	SSr	SS	NS_1	NS_2	NS_3	NS_4	SSr	SS			
A. *Trees, Shrubs and Undershrubs*															
1. Lower water requirements															
Acacia tortilis (Forssk.) Decne	4–5	+–1	1–3	2–4	2–4	+	3–5	1–3	+–2	—	2–4	—	4–5	2–3	—
A. raddiana Savi	—	—	—	—	—	—	—	+	+	+	+	—	+	+	+
A. nubica Benth.	+–6	—	+–2	—	—	—	+–2	+–2	—	—	—	—	—	—	—
A. ehrenbergiana Hayne	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—
Leptadenia pyrotechnica (Forssk.) Decne	—	—	—	—	—	—	+	—	—	—	—	—	—	+–1	+–1
Ochradenus baccatus Del.	+–1	—	+–2	—	+–1	—	—	+–2	+–1	+	+	—	+.	+	—
Ziziphus spina-christi (L). Willd.	—	—	—	—	—	—	—	—	+	+	—	—	—	—	—
Commiphora opobalsamum (L). Engl.	+–3	—	+–2	+	+–3	—	+–3	+	+	—	3–5	+	—	—	—
Salvàdora persica I.	—	—	—	—	—	—	—	—	+	—	—	—	—	—	+
Lycium arabicum Schweinf.	+–2	+–1	+–3	+–2	+	—	—	—	—	—	+–2	—	+	+	+
Ephedra alata Decne	+–1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Grewia tenax (Forssk.) Fiori	+–2	—	+–3	+	—	—	—	+–2	+–3	+–2	—	—	—	—	—
Indigofera oblongifolia Forssk.	—	—	—	+–2	+–1	—	+	+	+	+	—	—	—	—	—
Balanites aegyptiaca (L). Del.	—	—	—	—	—	—	—	—	+	+	—	—	+	+	—
Maerua crassifolia Forssk.	—	—	+–1	+–1	—	—	—	—	—	—	—	—	—	+	—
Cadaba farinosa Forssk.	—	—	—	+	—	—	—	—	+–2	+–2	—	—	—	—	—
C. rotundifolia Forssk.	—	—	+	—	—	—	—	—	+	+	+–1	—	—	—	—
Capparis decidua (Forssk.) Edgew.	+	—	—	—	—	—	—	+	—	—	—	—	+	+	—
2. Higher water requirements															
Moringa peregrina (Forssk.) Fiori	—	—	—	—	—	—	—	—	+–5	+	—	—	+–5	+–5	+·5
Ficus pseudosycomorus Decne	—	—	—	—	—	—	—	—	—	+	—	—	+–4	+–4	+–5
Dracaena ombet Ky. and Peyr.	—	—	—	—	—	—	—	—	—	+–5	—	—	—	—	—
Euphorbia cuneata Vahl	5	+–1	5–6	5	2–4	—	5–6	2–4	+–3	—	+–1	—	—	—	—
E. nubica N.E. Br.	—	—	+	—	—	—	+–2	+–6	+–2	+	—	—	—	—	—
Acacia etbaica Schweinf.	—	—	—	—	—	—	—	—	5	2–4	—	—	—	—	—
A. mellifera (Vahl) Benth.	—	—	—	—	—	—	+–4	+–3	+–3	+–3	—	—	+	—	—
A. laeta R.Br. ex Benth.	—	—	+	—	—	—	—	—	—	2–4	—	—	—	—	—
Delonix elata (Torner) Gamble	—	—	+–5	—	—	—	—	+–5	+	—	—	—	—	—	—
Euclea schimperi (A.DC.) Dandy	—	—	—	—	—	—	—	—	—	3–5	—	—	—	—	—
Dodonaea viscosa Jacq.	—	—	—	—	+	—	—	—	1–4	3–5	—	—	—	—	—
Jasminum floribundum R.Br.	—	—	—	—	—	—	—	—	—	3–5	—	—	—	—	—
'uminense Vell. v. *blandum* (S. Moore) urrill	—	—	—	—	—	—	—	—	—	3–5	—	—	—	—	—
Olea chrysophylla Lam.	—	—	—	—	—	—	—	—	—	+–3	—	—	—	—	—
Ephedra foliata Boiss. and Ky.	+	—	—	—	—	—	—	—	+–2	+–3	—	—	+	—	—
Rhus abyssinica Hochst. ex Oliv.	—	—	—	—	—	—	—	—	—	3–5	—	—	—	—	—
R. abyssinica v. *etbaica* Engl.	—	—	—	—	—	—	—	—	—	3–5	—	—	—	—	—
R. oxyacantha Schousb. ex Cav.	—	—	—	—	+	—	—	—	—	3–5	—	—	+–3	—	—
Ficus salicifolia Vahl	—	—	—	—	—	—	—	—	—	+–2	—	—	+	—	—
Pistacia khinjuk Stocks v. *glaberrima* Boiss.	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—
Withania obtusifolia Täckh.	—	—	—	—	—	—	—	—	—	+–2	—	—	—	—	—
Maytenus senegalensis (Lam.) Exell	—	—	—	—	—	—	—	—	—	+–2	—	—	—	—	—
Lantana viburnoides (Forssk.) Vahl	—	—	—	—	—	—	—	—	—	+–3	—	—	—	—	—
B. *Woo 'erbs and Herbaceous Herbs*															
1. Lower water requirements															
Aerva persica (Burm. f.) Merrill	+–3	5	2–3	+–3	2–3	5	+–4	+–2	+	—	2–4	+	2–3	2–3	2–3
Launaea spinosa (Forssk.) Sch.-Bip.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2–3
Cleome droserifolia (Forssk.) Del.	—	—	—	—	—	—	—	—	—	—	—	—	2–3	3–4	+–2
Fagonia bruguieri DC.	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—
F. tristis Sick. v. *boveana* Hadidi	—	—	+	—	—	—	—	—	—	—	—	—	+	+	—
Pulicaria crispa (Forssk.) Benth. and Hook. f.	—					—	+	—	—	—	+	—	+	‡	=
Zilla spinosa (Turina) Prantl	—	+—		—	—	—	—	—	—	—	—	—	2–5	2–5	2–5
Echinops galalensis Schweinf.	—	—	—	—	—	—	—	—	—	—	—	—	+–2	+–2	‡–2
Solenostemma argel (Del). Hayne	—	—	—	—	—	—	—	—	—	—	—	—	+–2	+	=–2
Salsola vermiculata L.	+–2	+–2	+	+	+	—	2–3	2–3	+	—	+	—	—	—	—
Solanum dubium Fres.	1–3	—	3–2	+–2	—	—	+	+	—	—	—	—	—	—	—
Seddera latifolia Hochst. and St.	1–2	+	1–2	—	—	—	+–3	+	—	—	—	—	—	—	—
Convolvulus hystrix Vahl	1–2	1–2	1–2	+	1–2	+	—	+	—	—	—	—	—	—	—
Farsetia longisiliqua Decne	—	—	—	+–1	—	—	—	—	+	+	+	—	‡	+	—
2. Higher water requirements							—	—	—	+–2	—	—	—	—	+
Lindenbergia abyssinica Hochsr.	—	—	—	—	—	—	—	—	—	+–2	—	—	+–1	+–1	+–1
L. sinaica Benth.	—	—	—	—	—	—	—	—	—	+–1	—	—	+–1	+–1	—
Parietaria alsinifolia Del.	—	—	—	—	—	—	—	—	—	+–1	—	—	—	—	+
Solanum nigrum L.	—	—	—	—	—	—	—	+	+	+–2	—	—	—	—	—
Leucas neufliseana Courb.	—	—	—	+–1	—	—	—	—	—	+–1	—	—	—	—	+
Veronica beccabunga L.	—	—	—	+	+	—	+	+	+	+	—	—	—	—	—
Ruellia patula Jacq.	—	—	—	+–1	—	—	+	+	+	+–2	—	—	—	—	—
Micromeria biflora Benth.	—	—	+	+–1	—	—	—	—	—	+–1	—	—	—	—	—
Galium setaceum Lam.	—	—	—	+	—	—	—	—	—	+–1	+	—	—	—	—
G. tricorne Stokes ex With	—	—	—	—	—	—	—	—	—	+–1	—	—	—	—	—
G. spurium L. v. *tenerum* Gr. and Godr.	—	—	—	—	—	—	—	—	—	+–2	—	—	—	—	—
Scrophularia arguta Ait.	—	—	—	+–1	—	—	—	—	—	+–1	—	—	—	—	—
Pancratium tortuosum Herb.	—	—	—	+–1	—	—	—	—	—	+–2	—	—	—	—	—
Echinops hussoni Boiss.	—	—	—	—	—	—	—	—	—	1–2	—	—	—	—	—

Appendix (B)

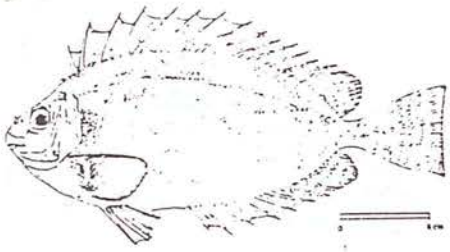
Red Sea Mountains Species



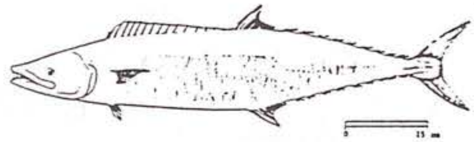
Liza tade



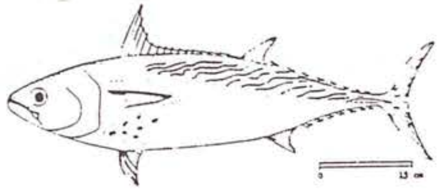
Siganus rivulatus



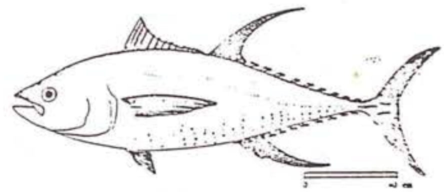
Siganus luridus



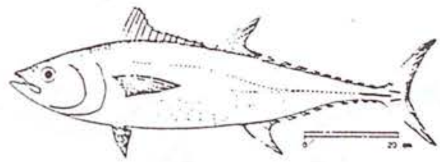
Scomberomorus commerson



Euthynnus affinis



Thunnus albacares

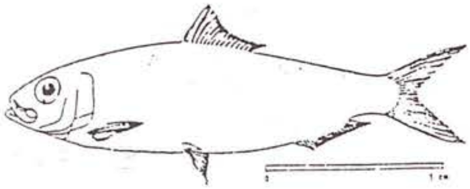


Thunnus tonggol

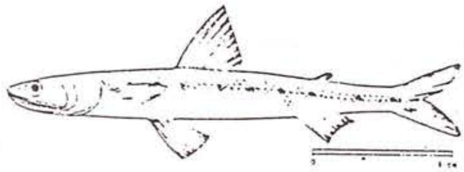
: Some important fishes of the Red Sea. (Source : FAO)

Appendix (C)

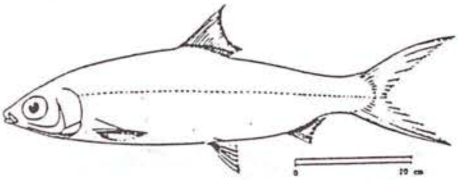
Some Importanat Fishes of the Red Sea



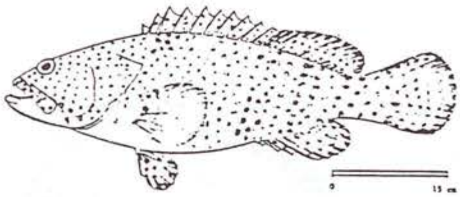
Sardinella sp.



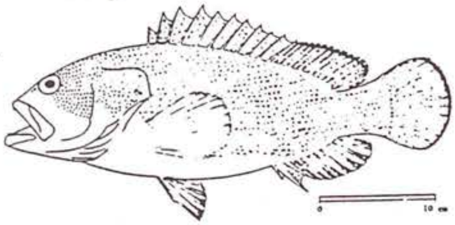
Saurida undosquamis



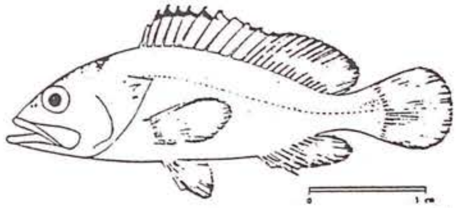
Chanos chanos



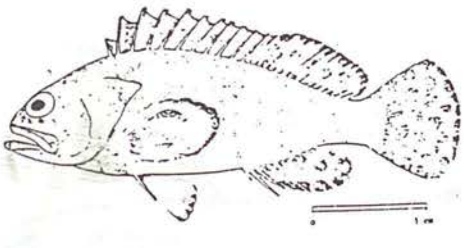
Epinephelus tauvina



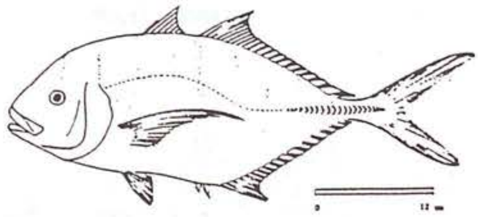
Epinephelus summana



Epinephelus fasciatus



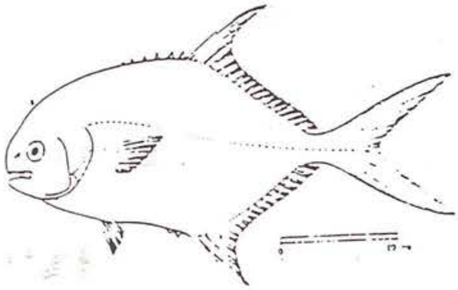
Epinephelus megachir



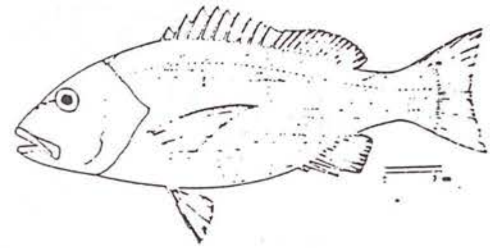
Caranx speciosus

Appendix (C)

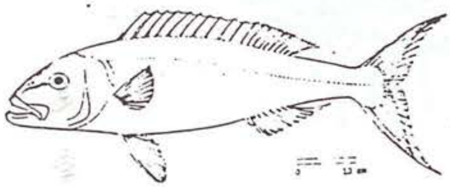
Some Importanat Fishes of the Red Sea



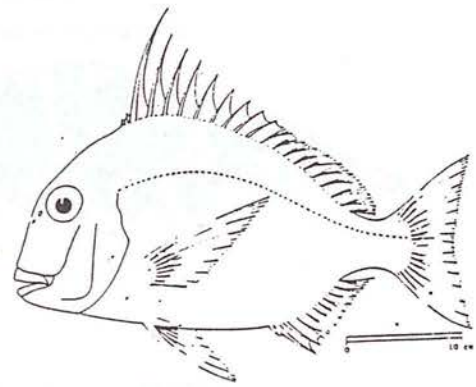
Trachinotus sp.



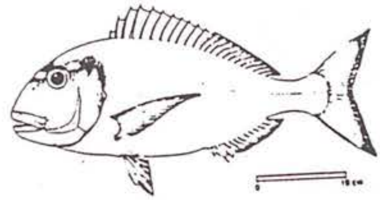
Lutjanus bohar



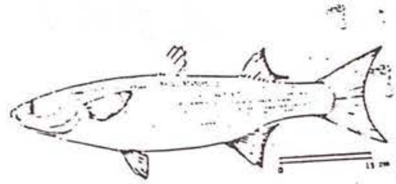
Aprion virescens



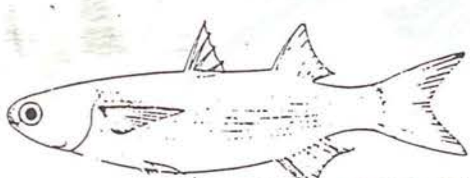
Argyrops spinifer



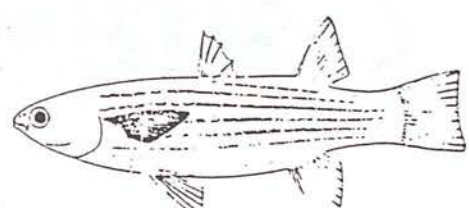
Sparus auratus



Mugil cephalus



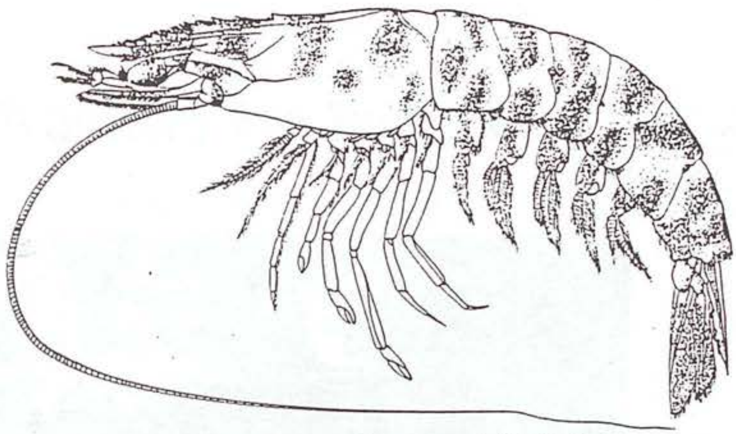
Valamugil seheli



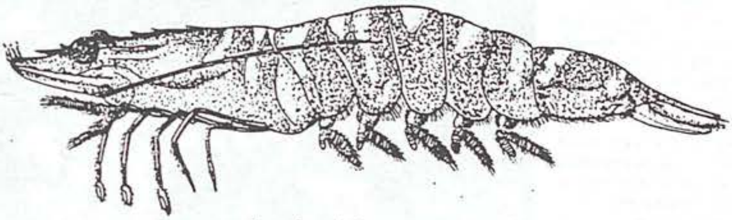
Mugil vaigiensis

Appendix (C)

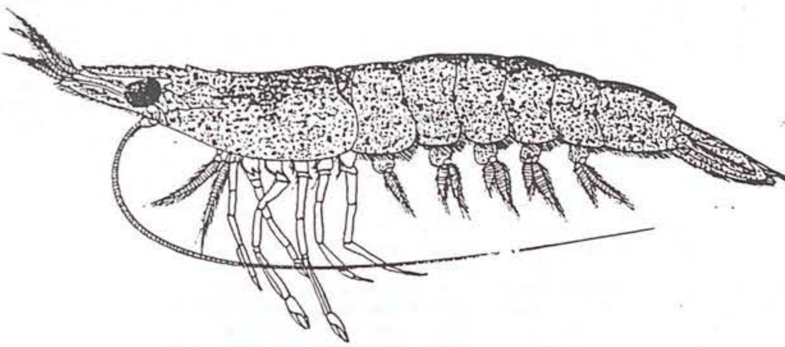
Some Importanat Fishes of the Red Sea



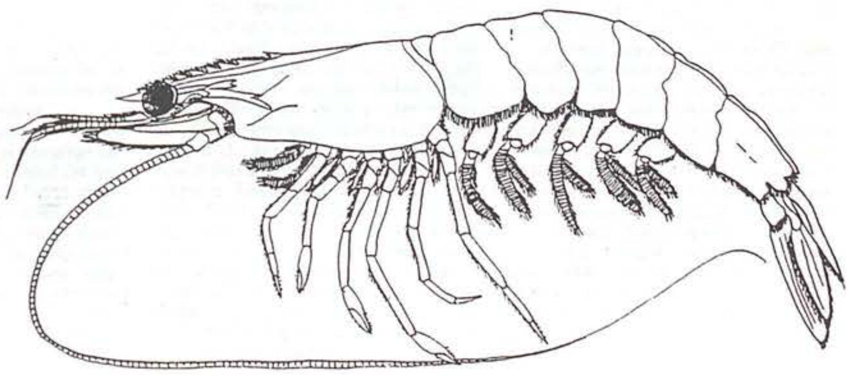
Penaeus kerathurus or trisulcatus



Penaeus semi sulcatus



Metapenaeus monoceros



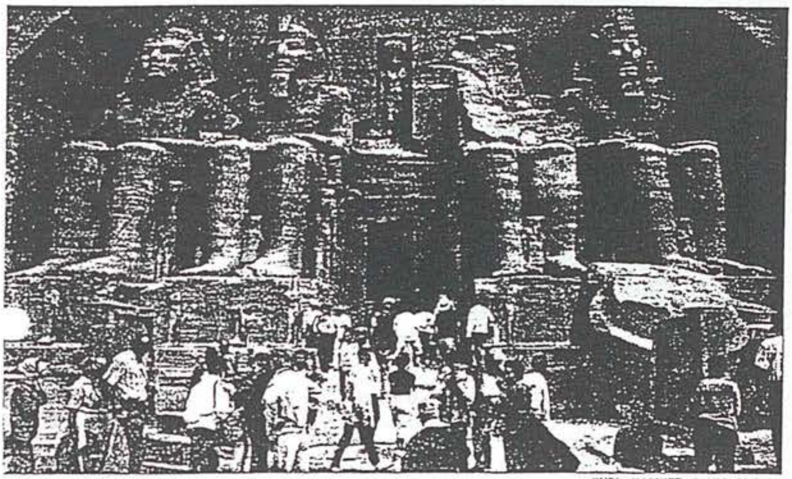
Penaeus japonicus

Appendix (C)

Some Importanat Fishes of the Red Sea

When Travelers Are Targets

Can Islam and tourism coexist on the Nile?



KURGAN-LISNET—GAMMA-LIAISON

A radical campaign to cripple the economy: *Sightseers at Abu Simbel*

The repeated warnings, unheeded for months, came from radical Islamic fundamentalists: stay away from the Pyramids and other ancient Egyptian monuments that attract tourists. Now those warnings have begun to bear bitter fruit. The first attack of its kind came in July, when militants threw a Molotov cocktail at a tour bus in Luxor, injuring no one. Last month gunmen hidden on the banks of the Nile opened fire on a cruise ship carrying German tourists. Three crewmen were injured. Three weeks later, extremists from Gamaa al Islamiya (The Islamic Group)—an organization outlawed by the government—ambushed a tour bus on a remote highway in central Egypt. A British nurse named Sharon Hill died in the gunfire. Why such violence? "Tourists come from the West and the West is trying to eliminate Islam," said a spokesman for Gamaa al Islamiya. "Visitors cannot be considered as innocent bystanders."

Last week Britain, Australia and the United States issued travel warnings cautioning passport holders to avoid the most troubled areas of Egypt. The Egyptian government did its best to play down the danger. President Hosni Mubarak—clearly concerned about damage to Egypt's tourist industry, the country's largest single source of foreign exchange—insisted that visitors had nothing to fear. "Tourism is going well," he said. "We are taking all measures to make tourists very safe in our country." On Mubarak's orders, Egyptian government helicopters began flying protective cover over more than 200 cruise ships that ply the Upper Nile. Meanwhile, reinforcements beefed up police and security units in all major tourist areas, particularly in Upper Egypt—the fundamentalist heartland to the south of Cairo.

The attacks on foreign tourists signaled a major escalation in the guerrilla war that Muslim extremists have been waging against Mubarak's moderate, pro-Western government. The fundamentalists, or at least a hard-core group some 10,000 strong, want to establish a strict Islamic state along the Nile. One particularly radical group, the underground Gamaa al Islamiya, has specifically targeted Egypt's tourist industry because it is vulnerable to hit-run attack—and vital to the cash-strapped government in Cairo. Last year some 3 million tourists visited Egypt, spending $3 billion there in hard currencies. The government hopes to attract double that number of visitors to Egypt by the turn of the century. But if terrorist attacks continue, Egyptian tourism—and Mubarak's efforts to strengthen the economy—could suffer severely. Hence the danger: unless the economy improves, unrest among Egypt's impoverished masses is bound to rise, playing directly into the hands of the fundamentalists.

The Mubarak government has tried—so far with scant success—to neutralize the militants. Police have arrested and detained hundreds of suspects, some of whom went on trial last week under tough new anti-terrorism laws. But the government has failed to gain the upper hand in the Nile Valley villages of central Egypt, where at least 70 people have died this year in shoot-outs between security forces, fundamentalists and Coptic Christians. Indeed, Islamic radicals in that troubled area are often openly contemptuous of authority. In Asyut, an Islamic stronghold 200 miles south of Cairo, militant clerics denounce "police brutality" over loudspeakers mounted on the minarets of mosques. Houses are adorned with provocative slogans, such as MUSLIMS BEWARE, THE JEWS ARE COMING.

Porous border: Radical gunmen have found a convenient haven in Sudan, a militant Islamic state just to the south. Militants easily slip in and out of northern Sudan, past apparently sympathetic border officials, smuggling rifles and ammunition. Government sources say some of the militants are Egyptians who fought with the mujahedin in Afghanistan and returned home this year. They have now formed a "military wing" to support Islamic groups banned by Mubarak's government.

Though they are concentrated mainly in the southern Nile Valley, the fundamentalists have begun to make inroads in Cairo, too. Last week, in a brazen challenge to the government, militants staged an "education seminar" in a working-class suburb of the capital. On television sets placed in crowded streets, the radicals played grainy videos of the 1981 assassination of Anwar Sadat. Posters showed photographs of Islamic "martyrs" hanged for their part in the assassination. Banners in Arabic proclaimed a threatening message: FIRST WAS SADAT . . . NEXT WILL BE EVERYONE WHO DOES NOT FOLLOW THE WAY OF ISLAM.

Last week Egyptian Tourism Minister Fuad Sultan described the recent spate of attacks on tourists as "isolated" incidents. In almost the same breath, however, he conceded that nearly 40 charter flights had canceled trips to Egypt in the past two weeks. Regularly scheduled airlines have reported additional cancellations. Meanwhile, radicals threatened to continue their attacks. "The government is pushing us to this violence," said one militant spokesman. Unfortunately, security officials concede there is simply no way they can protect every visitor coming to Egypt.

RAY WILKINSON *in Cairo and*
CAROL BERGER *in Upper Egypt*

Appendix (D)

Effects of Terrorism on Egyptian Tourism

The tourists are staying away

Egypt

When taming is inflaming

FEW secular Arab regimes have been as subtle as Egypt in their treatment of Islamic fundamentalism. After Anwar Sadat was murdered by Islamic extremists in 1981, his successor, President Husni Mubarak, opted for a policy of gentle containment. The Muslim Brotherhood, which calls for an Islamic state but eschews violence, is tolerated. The security forces meanwhile show no mercy to the small bands of extremists who hope to impose their views by force.

Confronted with this policy, the tactic of the armed bands has been to provoke a reaction that might unite all Islamists against the regime. Over the past six months, by [illegible] a series of gun attacks against [illegible] tourists, they have achieved a partial success. Although only one visitor (a British nurse) has been killed so far, Mr Mubarak says that tourist receipts have dropped by 35% in recent months.

On December 8th the government hit back by sending more than 10,000 security police into the Cairo suburb of Imbaba, the reputed stronghold of the Jamaat Islamiya, one of the deadlier underground groups. By the end of the week it had arrested some 600 people, impounded weapons and seized "subversive" literature and cassettes. A parallel operation was mounted against Islamist leaders in Upper Egypt. "We are in a deep-rooted operation to clear out these elements from their nests and dens," the interior minister, Mohammed Abdelhalim Mousa, told parliament.

The large number of arrests, and the evident popularity of the Islamic groups in Imbaba, sit uneasily with the official line that Islamic extremism is an external phenomenon, visited upon Egypt by malefactors in Iran and Sudan. "Iran shamelessly declares that it is helping and funding extremism and terrorism, and we have information to corroborate this tendency," Mr Mousa insists. Other government ministers, and the officially inspired newspapers, go further: they have accused the two countries of plotting to destroy the Aswan Dam. Egypt has reinforced a disputed area of its Sudanese border "to stop infiltration".

But if Egypt has convincing evidence of a foreign conspiracy, it has yet to make it public. One Cairo newspaper, *Akhbar al-Yom*, seemed closer to the point when it appeared to pin the blame on social conditions in slums like Imbaba, where aimless and jobless young men flock to unregistered mosques and *zawiyas* (prayer-rooms), to be told by fiery preachers that Egypt is being led astray by its secular leaders.

In July the government armed itself with sweeping new powers of arrest, and made membership of terrorist organisations a capital crime. It is now said to be drafting a law that will make it harder for Islamic organisations to take part in professional associations. Perhaps a country that depends on tourism for 8% of its foreign earnings had to be seen to be doing something. "We have crushed them," bragged Mr Mubarak on December 16th. The danger is that mass arrests, and new limits on what the Islamists are allowed to do legally, will simply polish the lustre of the underground.

ECONOMIST, DECEMBER 19TH 1992

Appendix (E)

Effects of Terrorism on Egyptian Tourism

RAS MOHAMMAD NATIONAL PARK

REGULATIONS

1. Do not collect, remove or damage any material, living or dead, from the Park (corals, shells, fish, plants, fossils, etc.).
2. It is prohibited to drive off marked tracks and to drive any motor vehicles on any beach.
3. Camping is prohibited unless in designated areas (by notice).
4. Do not litter. Place garbage in proper disposal containers or take it with you.
5. It is prohibited to access any closed area.
6. It is prohibited to walk or anchor on any reef area. Please use marked access points.
7. Fish feeding upsets the biological balance on the reef and is therefore prohibited.
8. Fishing and spearfishing are not allowed in the National Park.
9. All visitors must leave the Park by sunset unless using a designated camping area.
10. Access to diving areas is recommended at designated access points only to reduce damage to reef areas.
11. Please take note of any instructions posted in the Park.
12. Offenders are subject to prosecution according to the terms of Law 102 of 1983.

TAKE NOTHING WITH YOU - LEAVE NOTHING BEHIND

Appendix (F)

TABLE (1)
RESULTS OF WASTEWATER ANALYSIS FROM CORAL BEACH

Values in Mg/L

PARAMETER	SAMPLE (1) 24/11/1991	SAMPLE (2) 10/12/1991
Temperature*	28-31	22.5-23
PH	7.0	7.4
Total Solids	1328	994
Fixed Solids	138	492
Volatile Solids	1190	502
Suspended Solids	604	488
Volatile S. Solids	485	346
Fixed S. Solids	118	142
Settleable Solids	7.0 ml/l	4.5ml/l
Detergents	0.93	0.95
Ammonia	21	15.5
Organic Nitrogen	6.5	46.1
Sulphides	7.1	13.7
Sulphates	74	83.8
Phosphates	4.9	5.8
BOD	675	450
COD	964	700

* Temperature in degrees centigrade

TABLE (2)
RESULTS OF WASTEWATER ANALYSIS FROM JASMINE VILLAGE

Parameter	Sample (1) 24/11/1991	Sample (2) 10/12/1991
Temperature*	27	22.5-23.5
PH	7.4	7.1
Total Solids	1228	890
Fixed Solids	890	422
Volatile Solids	338	468
Suspended Solids	484	364
Volatile S. Solids	316	228
Fixed S. Solids	168	136
Settleable Solids	3.7ml/l	1.5ml/l
Detergents	1.25	1.1
Ammonia	29	9.8
Organic Nitrogen	7.9	21.5
Sulphides	9.8	7.7
Sulphates	75	75
Phosphates	10.4	7.5
BOD	600	433
COD	1015	576

* Temperature in degrees centigrade

Appendix (G)

Results of Waste Water Analysis

TABLE (3)
RESULTS OF WASTEWATER ANALYSIS FROM MAGAWISH VILLAGE

Values in Mg/L

Parameter	Sample (1) 24/11/1991	Sample (2) 10/12/1991
Temperature*	26-26.5	22.5-23
PH	8.0	7.1
Total Solids	644	452
Fixed Solids	64	266
Volatile Solids	580	186
Suspended Solids	306	172
Volatile S. Solids	290	64
Fixed S. Solids	16	108
Settleable Solids	1.8ml/l	0.7ml/l
Detergents	1.32	1.1
Ammonia	1.2	1.3
Organic Nitrogen	1.6	0.9
Sulphides	4.7	4.0
Sulphates	58	27.5
Phosphates	0.7	0.8
BOD	400	225
COD	660	275

* Temperature in degrees centigrade

TABLE (4)
RESULTS OF WASTEWATER ANALYSIS FROM AL-MASHRABIA VILLAGE

Values in Mg/L

Parameter	Sample (1) 24/11/1991	Sample (2) 10/12/1991
Temperature*	25-26	21-21.5
PH	7.1	5.7
Total Solids	1412	1250
Fixed Solids	878	576
Volatile Solids	534	674
Suspended Solids	796	476
Volatile S. Solids	392	332
Fixed S. Solids	404	144
Settleable Solids	5.8ml/l	9.0ml/l
Detergents	1.55	1.18
Ammonia	29.4	6.6
Organic Nitrogen	11.9	9.9
Sulphides	11.37	7.7
Sulphates	78	36.3
Phosphates	4.4	1.5
BOD	617	500
COD	1480	750

* Temperature in degrees centigrade

Appendix (G)

Results of Waste Water Analysis

TABLE (5)
RESULTS OF WASTEWATER ANALYSIS FROM HURGHADA SHERATON HOTEL

Values in Mg/L

Parameter	Sample (1) 24/11/1991	Sample (2) 10/12/1991
Temperature*	33	30.5-31
PH	6.8	7.1
Total Solids	1318	1422
Fixed Solids	558	564
Volatile Solids	760	858
Suspended Solids	828	824
Volatile S. Solids	506	580
Fixed S. Solids	322	244
Settleable Solids	2.9ml/l	9.2ml/l
Detergents	1.5	1.12
Ammonia	23.6	12.9
Organic Nitrogen	10.1	19.3
Sulphides	12.54	11.7
Sulphates	125	105
Phosphates	6.2	5.8
BOD	750	600
COD	1218	700

* Temperature in degrees centigrade

Appendix (G)

Results of Waste Water Analysis

Appendix (H)

Sahl Hasheesh Land Budget

SAHL HASHEESH
PROGRAM
5. SUMMARY OF LAND DEVELOPMENT CRITERIA
PROTOTYPES AND DEFINATIONS

Type	Density	Bldg. Cov.	Road and Park. Cov.	F.A.R.	Unit Land (SM)	Max Floors	SM/FL	Rooms BR	Kit	Pkg
TOWN CENTER				0.35		10				
Hotel	1rm/140 SM	70%	20%	1.5	120,000	10		800R	x	1/4R 100/ Casino
Resid. Zone 2		50%	30%			5	120	2	√	1.5/DU
Resid. Zone 1		40%	20%			3	120	2	√	1.5/DU
Commercial		25%	40%	0.25		2				3/100 SM
Public		50%	30%							1/100 SM
HOTEL	1rm/350 SM	15%	10%		200,000	8		400R	x	1/3 rms 1/1 Chalets
PALACES	1/40,000 SM	8%	4%		400,000	3		10	√	8
VILLAS	1/6,000 SM 4,000 SM min.	15%	6%		250,000	2	250	5	√	2
CHALETS	1/2,000 SM 1,500 SM min.	15%	8%		150,000	2	200	4	√	2
GOLF VILLAS	1/1,000 SM 950 SM min.	25%	10%		50,000	2	150	4	√	2
GOLF CHALETS	1/2,000 SM	15%	80%		250,000	2	200	4	√	2
TOURIST VILLAGE	1rm/1,000 SM	15%	10%		220,000	5		120	xrm √bg	1/rm 1/DU
MARINA					80,000			200 slips		1/3 Slips

SAHL HASHEESH
PROGRAM
1.LAND USE TOTALS

Type		Units/SM	Land Total SM
Town Center *			**900,000**
Residential			
	Saleable	2,380 DU	
	Hotel	800 R	
Comm[illegible]l			
	Retail	87,200 SM	
	Casino	20,000 SM	
Public Buildings		10,000 SM	

* Using 120 SM for each hotel room, total built space in Town Center is 462,000 SM or a 0.356 Floor Area Ratio (FAR).

Non Town Center Areas			**14,627,400**
Residential			
	Saleable	19,437 DU	11,252,000
	Hotel	3,237 R	2,983,000
Commercial (.25 FAR)			
	Convenience	234 SM	306,000
	Marina	4,000 SM	84,000
Golf			
	Course 1		1,200
	Course 2		1,000
	3 Hole		200
Parkland			N/A *
Utility Related			N/A
Beach			N/A
Major Road R.O.W.			N/A
Agriculture			N/A
Employee Housing			N/A

* When exact property boundaries are determined, complete land use and density calculations can be made.

Appendix (H)

SAHL HASHEESH
PROGRAM
2. TOTAL RESIDENTIAL CAPACITY

Per Land Use Plan of August, 1991

- Does not include land north of the top line on the Land Use Plan, August 1, 1991
- Does not include employee housing.

Location	Area (000) SM	Density	Units/ Rooms	Bedrooms
Town Center	1,300	Hotel N/A	800 R	*800*
		15 DU/4000 SM	1,305 DU	*2,610*
		35 DU/4000 SM	1,075 DU	*2,150*
				5,560
Hotel North	402	(>1 Room/500 SM)	780 R	*780*
			12 Chalets	*24*
			15 C. Houses	*30*
				834
Hotel South	390	(>1 Room/500 SM)	720 R	*720*
			30 Chalets	*60*
				780
Palaces	2,017	1 DU/40,000 SM	50	500
Villas	771	1 DU/6,000 SM	128	640
Chalets	522	1 DU/2,000 SM	261	1,044
Golf Villas	2,621	1 DU/1,000 SM	2620	10,480
Golf Chalets	1,093	1 DU/2,000 SM	546	2,184
Tourist Villages	2,191	(>1 Room/1,000 SM)	1600 R	*1,600*
			300 Bg.	*600*
				2,200
Flats	4,228	15 DU/4,000 SM	15855	31.710
Totals	15,534 *		21,840 DU 4,257 Keys	55,932

* This area total is only the land that would be sold or joint ventured to/with a third party. It does not include main roadways, beaches, parks, golf courses, infrastructure sites, marina or convenience retail. It does include roads & non-residential land uses in the Town Center.

Appendix (H)

Egyptians have the right to permanent or provisional emigration and no Egyptian may be deported or prevented from returning to the country.

Citizens have the right to private meetings in peace provided they bear no arms. Egyptians also have the right to form societies which have no secret activities. Public meetings are also allowed within the limits of the law.

SOVEREIGNTY OF THE LAW

All acts of crime should be specified together with the penalties for the acts.

Recourse to justice, it says, is a right of all citizens, and those who are financially unable, will be assured of means to defend their rights.

Except in cases of *flagrante delicto*, no person may be arrested or their freedom restricted unless an order authorizing arrest has been given by the competent judge or the public prosecution in accordance with the provisions of law.

SYSTEM OF GOVERNMENT

The President, who must be of Egyptian parentage and at least 40 years old, is nominated by at least one-third of the members of the People's Assembly, approved by at least two-thirds, and elected by popular referendum. His term is for six years and he 'may be re-elected for another subsequent term'. He may take emergency measures in the interests of the State but these measures must be approved by referendum within 60 days.

The People's Assembly, elected for five years, is the legislative body and approves general policy, the budget and the development plan. It shall have 'not less than 350' elected members, at least half of whom shall be workers or farmers, and the President may appoint up to 10 additional members. In exceptional circumstances the Assembly, by a two-thirds vote, may authorize the President to rule by decree for a specified period but these decrees must be approved by the Assembly at its next meeting. The law governing the composition of the People's Assembly was amended in May 1979 (see People's Assembly, below).

The Assembly may pass a vote of no confidence in a Deputy Prime Minister, a Minister or a Deputy Minister, provided three days' notice of the vote is given, and the Minister must then resign. In the case of the Prime Minister, the Assembly may 'prescribe' his responsibility and submit a report to the President: if the President disagrees with the report but the Assembly persists, then the matter is put to a referendum: if the people support the President the Assembly is dissolved; if they support the Assembly the President must accept the resignation of the Government. The President may dissolve the Assembly prematurely, but his action must be approved by a referendum and elections must be held within 60 days.

Executive Authority is vested in the President, who may appoint one or more Vice-Presidents and appoints all Ministers. He may also dismiss the Vice-Presidents and Ministers. The President has 'the right to refer to the people in connection with important matters related to the country's higher interests.' The Government is described as 'the supreme executive and administrative organ of the state'. Its members, whether full Ministers or Deputy Ministers, must be at least 35 years old. Further sections define the roles of Local Government, Specialized National Councils, the Judiciary, the Higher Constitutional Court, the Socialist Prosecutor General, the Armed Forces and National Defence Council and the Police.

POLITICAL PARTIES

In June 1977 the People's Assembly adopted a new law on political parties, which, subject to certain conditions, permitted the formation of political parties for the first time since 1953. The law was passed in accordance with Article Five of the Constitution which describes the political system as 'a multi-party one' with four main parties: 'the ruling National Democratic Party, the Socialist Workers (the official opposition), the Liberal Socialists and the Unionist Progressive'. (The legality of the re-formed New Wafd Party was established by the courts in January 1984.)

1980 AMENDMENTS

On 30 April 1980 the People's Assembly passed a number of amendments, which were subsequently massively approved at a referendum the following month. A summary of the amendments follows:

(i) the regime in Egypt is socialist-democratic, based on the alliance of working people's forces.

(ii) the political system depends on multiple political parties; the Arab Socialist Union is therefore abolished.

(iii) the President is elected for a six-year term and can be elected for 'other terms'.

(iv) the President shall appoint a Consultative Council to preserve the principles of the revolutions of 23 July 1952 and 15 May 1971.

(v) a Supreme Press Council shall safeguard the freedom of the press, check government censorship and look after the interests of journalists.

(vi) Egypt's adherence to Islamic jurisprudence is affirmed. Christians and Jews are subject to their own jurisdiction in personal status affairs.

(vii) there will be no distinction of race or religion.

The Government

THE PRESIDENCY

President: MUHAMMAD HOSNI MUBARAK (confirmed as President by referendum, 13 October 1981, after assassination of President Sadat; re-elected and confirmed by referendum 5 October 1987; and 4 October 1993).

COUNCIL OF MINISTERS
(October 1993)

Prime Minister and Minister of International Co-operation: Dr ATIF SIDQI.

Deputy Prime Minister and Minister of Planning: Dr KAMAL AHMAD AL-GANZOURI.

Deputy Prime Minister and Minister of Agriculture, Livestock, Fisheries and Land Reclamation: Dr YOUSUF AMIN WALI.

Minister of Transport, Communications and Civil Aviation: Eng. SULAYMAN MUTAWALLI SULAYMAN.

Minister of Defence and Military Production: Field Marshal MUHAMMAD HUSSAIN TANTAWI.

Minister of Electricity and Energy: Eng MUHAMMAD MAHIR ABAZAH

Minister of Information: MUHAMMAD SAFWAT MUHAMMAD YOUSUF ASH-SHARIF.

Minister of Foreign Affairs: AMR MUHAMMAD MOUSSA.

Minister of Supply and Internal Trade: Dr MUHAMMAD JALAL AD-DIN ABU ADH-DHAHAB.

Minister of Finance: Dr MUHAMMAD AHMAD AR-RAZZAZ.

Minister of Awqaf (Islamic Endowments): Dr MUHAMMAD ALI MAHGOUB.

Minister of Justice: FAROUK SAYF AN-NASR.

Minister of Culture: FAROUK HOSNI.

Minister of Cabinet Affairs: AHMAD RADWAN GOMAA.

Minister of Local Administration: MAHMOUD SAYED AHMED SHARIF.

Minister of Education: HUSSAIN KAMAL BAHAEDDIN.

Minister of Petroleum: Dr Eng. HAMDY AL-BANBI.

Minister of the Interior: HUSSAIN MUHAMMAD AL-ALFI.

Minister of Housing and Public Utilities: Eng. MUHAMMAD SALAH ED-DIN HASSAB-ALLAH.

Minister of Tourism: Dr MAMDOUH EL-BELTAGI.

Minister of Economy and Foreign Trade: MUHAMMAD MAHMOUD BAIOUMI.

Minister of Public Works and Water Resources: Eng. ISAM RADI ABD AL-HAMID RADI.

Minister of Health: Dr ALI EL-MAKHZANGI.

Minister of Industry and Mineral Resources: Dr Eng. IBRAHIM FAWZI ABD AL-WAHED.

Minister of Labour: AHMED AHMED EL-AMAWI.

Minister of Insurance and Social Affairs: Dr AMAL ABD AR-RAHIM OSMAN.

Minister of the Public Sector and Minister of State for Administrative Development and for the Environment: Dr ATIF MUHAMMAD OBEID.

Minister of State for International Co-operation: Dr YOUSSEF BOUTROS GHALI.

Minister of State for Population and Family Affairs: Dr MAHER AHMED MAHRAN.

Minister of State for People's Assembly and Shura (Advisory) Council Affairs: Dr MUHAMMAD ZAKI ABOU-AMER.

Minister of State for New Communities: Dr Eng. MUHAMMAD IBRAHIM SULAYMAN.

Minister of State for Scientific Research: Dr VINIECE KAMEL GOUDA.

Appendix (J)

The Egyptian System of Government

Minister of State for Military Production: Dr Eng. MUHAMMAD EL-GHAMRAWI DAWOUD.

MINISTRIES

Ministry of Agriculture: Sharia Wizaret az-Ziraa, Dokki, Giza; tel. (02) 702677; telex 93006.

Ministry of Awqaf (Islamic Endowments): Sharia Sabri Abu Alam, Ean el-Luk, Cairo; tel. (02) 746305.

Ministry of Civil Aviation: Sharia Matar, Cairo (Heliopolis); tel. (02) 969555.

Ministry of Communications: 26 Sharia Ramses, Cairo; tel. (02) 909090.

Ministry of Culture: 110 Sharia al-Galaa, Cairo; tel. (02) 971995.

Ministry of Development, New Communities, Housing and Public Utilities: 1 Ismail Abaza, Qasr el-Eini, Cairo; tel.: Development (02) 3540419; New Communities (02) 3540590; Public Utilities (02) 3540110; telex: Development and New Communities 20807; Public Utilities 92188.

Ministry of Economic Co-operation: 9 Sharia Adly, Cairo; telex 348.

Ministry of Economy: 8 Sharia Adly, Cairo; tel. (02) 907344.

Ministry of Scientific Research: 4 Sharia Ibrahim Nagiv, Cairo (Garden City).

Ministry of Electricity and Energy: Cairo (Nasr City); tel. (02) 829565.

Ministry of Finance: Sharia Maglis esh-Sha'ab, Lazoughli Sq., Cairo; tel. (02) 24857; telex 22386.

Ministry of Foreign Affairs: Tahrir Sq., Cairo; telex 92220.

Ministry of Foreign Trade: Lazoghli Sq., Cairo; tel. (02) 25424.

Ministry of Health: Sharia Magles esh-Sha'ab, Cairo; tel. (02) 903939; telex 94107.

Ministry of Industry: 2 Sharia Latin America, Cairo (Garden City); tel. (02) 3550641; telex 93112.

Ministry of Information: Radio and TV Bldg, Corniche en-Nil, Cairo (Maspiro); tel. (02) 974216.

Ministry of International Co-operation: 8 Sharia Adly, Cairo; tel. (02) 3909707; fax (02) 3915167.

Ministry of Irrigation: Sharia Qasr el-Eini, Cairo; tel. (02) 3552120.

Ministry of Justice: Justice Bldg, Cairo (Lazoughli); tel. (02) 31176.

Ministry of Land Reclamation: Land Reclamation Bldg, Dokki, Giza; tel. 703011.

Ministry of Manpower and Vocational Training: Sharia Yousuf Abbas, Nasr City, Abbasia, Cairo.

Ministry of Military Production: 5 Sharia Ismail Abaza, Kasr el-Eini, Cairo; tel. (02) 3553063; telex 92167.

Ministry of National Education: Sharia el-Falaky, Cairo; tel. (02) 8544805.

Ministry of Naval Transport: 4 Sharia el-Bataisa, Alexandria; tel. 35763; telex 54147.

Ministry of Petroleum and Mineral Resources: el-Mokhayem el-Dayem St, Cairo (Nasr City); tel. (02) 2622237; telex 92197; fax (02) 2636060.

Ministry of Planning: Sharia Salah Salem, Cairo (Nasr City); tel. (02) 604489.

Ministry of Social Affairs: Sharia Sheikh Rihan, Cairo; telex 94105.

Ministry of Social Insurance: 3 Sharia el-Alfi, Cairo; tel. (02) 922717.

Ministry of Supply and Internal Trade: 99 Sharia Qasr el-Eini, Cairo; tel. (02) 3552600; telex 93497.

Ministry of Tourism: Misr Travel Tower, Abbassia Sq., Cairo; tel. (02) 2828430; telex 94040; fax (02) 2829771.

Ministry of Transport: Sharia Qasr el-Eini, Cairo; tel. (02) 3555566; telex 92802; fax (02) 3555564.

Legislature

MAJLIS ASH-SHA'AB
(People's Assembly)

The law governing election to, and the composition of, the People's Assembly was amended in October 1990. In May 1990 the Supreme Constitutional Court had ruled that the previous elections to the People's Assembly, held in 1987, had been unconstitutional because amendments to the 1972 electoral law discriminated against independent candidates. There are now 222 constituencies, which each elect two deputies to the Assembly. Ten deputies are appointed by the President, giving a total of 454 seats. Parties are no longer required to gain a minimum of 8% of the total vote in order to be represented in the Assembly.

On 12 October 1990, following a popular referendum, the People's Assembly was dissolved. A new Assembly was elected, in accordance with the provisions of the new electoral law, on 29 November.

Speaker: Dr AHMAD FATHI SURUR.

Deputy Speakers: Dr ABD AL-AHAD GAMAL AD-DIN, AHMAD ABU ZEID.

Elections, 29 November and 6 December 1990

Party	% of votes received	Seats
National Democratic Party	79.6	348
National Progressive Unionist Party	1.4	6
Independents*	19.0	83
Total	100.0	437†

* The elections were boycotted by the principal opposition parties (the Socialist Labour Party, the Muslim Brotherhood and the New Wafd Party), which refused to offer candidates unless legislation providing for the declaration of states of emergency was repealed, and the elections were supervised by magistrates.

† Voting was suspended in three constituencies, and for one of the seats of a fourth. There are, in addition, 10 deputies appointed by the President.

MAJLIS ASH-SHURA
(Advisory Council)

In September 1980 elections were held for a 210-member **Shura (Advisory) Council**, which replaced the former Central Committee of the Arab Socialist Union. Of the total number of members, 140 are elected and the remaining 70 are appointed by the President. The National Democratic Party holds all the elected seats. The opposition parties boycotted elections to the Council in October 1983, and again in October 1986, in protest against the 8% electoral threshold. In June 1989 elections to 153 of the Council's 210 seats were contested by opposition parties (the 'Islamic Alliance', consisting of the Muslim Brotherhood, the LSP and the SLP). However, all of the seats in which voting produced a result (143) were won by the National Democratic Party. A supplementary poll was to be held at a later date to elect a further 10 members.

Speaker: Dr ALI LUTFI.

Deputy Speakers: THARWAT ABAZAH, AHMAD AL-IMADI.

Political Organizations

Democratic Unionist Party: f. 1990; Pres. MUHAMMAD ABD AL-MONEIM TURK.

Green Party: f. 1990; Chair. HASSAN RAGEB.

Ikhwan (Brotherhood): f. 1928; officially illegal, the (Muslim) Brotherhood advocates the adoption of the *Shari'a*, or Islamic law, as the sole basis of the Egyptian legal system; Sec.-Gen. MAAMOUN AL-HODAIBY.

Liberal Socialist Party: Cairo; f. 1976; advocates expansion of 'open door' economic policy and greater freedom for private enterprise; Leader MUSTAFA KAMEL MURAD.

Nasserist Party: Cairo; f. 1991.

National Democratic Party: Cairo; f. July 1978; government party established by Anwar Sadat; has absorbed Arab Socialist Party; Leader MUHAMMAD HOSNI MUBARAK; Sec.-Gen. Dr YOUSUF AMIN WALI; Political Bureau: Chair. MUHAMMAD HOSNI MUBARAK; mems: KAMAL HASSAN ALI, Dr MUSTAFA KHALIL, Dr RIFA'AT EL-MAHGOUB, Dr SUBHI ABD AL-HAKIM, Dr MUSTAFA KAMAL HILMI, FIKRI MAKRAM OBEID, Dr ISMAT ABD AL-MEGUID, Dr AMAL OSMAN, SAFWAT ASH-SHARIF, Dr YOUSUF AMIN WALI, HASSAN ABU BASHA, KAMAL HENRY BADIR, Dr AHMAD HEIKAL.

National Progressive Unionist Party (Tagammu): 1 Sharia Karim ed-Dawlah, Cairo; f. 1976; left wing; Leader KHALED MOHI ED-DIN; Sec. Dr RIFA'AT ES-SAID; 160,000 mems.

New Wafd Party: Cairo; original Wafd Party f. 1919; banned 1952; re-formed as New Wafd Party February 1978; disbanded June 1978; re-formed August 1983; Leader FOUAD SERAG ED-DIN; Sec.-Gen. IBRAHIM FARAG.

Socialist Labour Party: 12 Sharia Awali el-Ahd, Cairo; f. September 1978; official opposition party; Leader IBRAHIM SHUKRI.

Umma (National) Party: Islamic religious party, based in Khartoum, Sudan; Leader SADIQ AL-MAHDI (fmr Prime Minister of Sudan).

Young Egypt Party: f. 1990; Chair. ALI ALDIN SALIH.

Appendix (J)

The Egyptian System of Government

PHYSICAL AND CHEMICAL STRESS INFLICTED ON THE BIOTA

As indicated earlier, the important ecosystems in the Red Sea environment study entail coral reefs, seagrass beds, and benthic algae life. The plankton community has not been studied, and no mangrove stands have yet been observed on the coast under consideration. The three main environments mentioned above possess the following characteristics:

- They are primary producers. i.e. they build up the organic matter upon which other chains of life in the sea thrive.
- They are spawning grounds for several marine animals, and serve as shelter from predators as well.
- They possess scientific, educational, aesthetic. and recreational values.

Hence, it is necessary to conserve these natural habitats upon which the tourist industry largely depends. These areas are subjected to environmental stress and degradation in the following ways:

- Degeneration of communities during the construction phases due to filling inhabited areas with sediments, or due to the destruction of substrata by mechanical means or explosives.
- Regression of communities at distances away from the work sites, due to turbulence caused by raised sediments. This turbulence will result in attenuation of light energy necessary for photosynthesis, and will cause damage to filter feeders such as barnacles, corals, etc. The damage may be temporary, followed by recovery, or it may permanently affect the growth rate and reproduction of these species.
- Pollution of seawater by oil, sewage, and heavy metals, as well as by excessive heat and brine form desalination plants. Certain species are tolerant, but only for a limited period of time; others are irreparably damages.
- Exploitation of resources such as collection of plant and animal life by tourists, particularly of corals and mollusks; fishing by nets or by rod and line. as the hook and line often become entangled with the coral and cause dislocation; using anchors on coral reefs, as this also may dislocate corals; and littering the beach with empty cans,. plastic bags, food remains, etc.
- Beach erosion, as a result the destruction of the back reef and its fucoid belt which acts as a wave buffer, will expose the back shore to destruction. Boulders an stones are not as effective buffers as is the natural community; they also degrade the aesthetic value of the shore.

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Sahel Hasheesh Environmental Impact Assessment Conclusion

CONSERVATION STRATEGIES

In order to preserve a quality of environment and prevent its degradation a conservation strategy has to be made so as to achieve appropriate environmental management. The main parameters involved in the strategy are:

- Set and observe environmental standards.
- Carry out baseline studies.
- Protect rare or endangered species.
- Control pollution.
- Educate and train personnel.
- Supervise construction and monitor changes in environmental parameters.
- Follow-up programs should be designed and carefully observed.
- Development plans should be consonant with environmental preservation.

Key recommendations that must be fulfilled in order to preserve the marine environment and avoid its degradation include:

- The site for the marina on the northern side of the bay should be relocated. The best position for the marina is in the middle or lower end of the bay.
- The area of the old oil pier is ideal for a wharf, casino, and commercial market.
- The coral knolls in the lagoon should be fenced in and protected. No fishing in this area should be allowed.
- There are many places suitable for swimming on the site. Suitable areas have been indicated earlier. Construction in these areas should be limited to light structures.

At present the site has impressive sea frontage. The view along the coast towards Dishtet El-Dabaa ranks as one of the most spectacular in the area. It is recommended that effort be taken to ensure that architectural plans are in harmony with the landscape. As for infrastructure, the following recommendations should be taken into consideration.

Construction of intake and outfall pipes may cause significant damage to the coral reefs. The outfall pipe will have to cross approximately 200 meters of reef flat to reach the open sea. The intake pipe will probably need to cross the width of the reef to obtain water of suitable quality. Construction of such pipes will in all likelihood directly affect animal and plant communities close to the pipeline. Use of concrete may require the presence of boats or vehicles on the reef, and will result in severe damage or complete destruction of the living organisms in this area. The pipeline itself, if improperly constructed, could interfere with current reef flat patterns, which will result in modification of the reef flat fauna and flora in the vicinity.

The plant will discharge hot brine effluent into the sea as a by-product of desalination. This can be expected to cause severe damage to reef life in the intermediate vicinity of the outfall, including killing the reef altogether. The severity of the effects will depend on the amount of effluent discharged, and the rate of dilution in normal sea water. A rapid dilution rate will reduce the damage done to the reef. As it stands now, effluent discharge onto the reef flat itself could result in widespread death of corals and other organisms. The effects are generally chronic, and will last as long as the discharge into the sea takes place.

It is therefore recommended that the end of the outfall pipe be located at least 3 meters beyond the edge of the reef to ensure rapid dilution with sea water. The outfall pipe should not discharge waste on to the reef flat. It should be raised about 0.5 meters above the level of the reef flat on a series of concrete supports to ensure that water flow is not impeded. Attempts should be made during construction to contain the direct damage to the reef flat communities to as narrow a region as possible. With care, this can be kept to a band 5 meters wide on either side of the pipe. These areas should recover over a period of five years or so following construction.

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In order to overcome the above-mentioned problems in the medium to long term, due consideration should be given to reducing the dependence of the complex on its own desalination plant by linking it up with alternative sources of fresh water supply, whenever possible. This could conceivably be coordinated with regional plans for the provision of fresh water to the Red Sea governorate.

There are no plans to discharge treated or untreated semisolid or liquid wastes into the sea. If such waste were discharged into the sea it would result in severe nutrient enrichment. The damage to the reef ecology would be considerable because of the large quantities and concentrations of effluent involved. Furthermore, discharge of sewage waste results in high levels of coliform bacteria and intro viruses in the vicinity of the outfall. These can cause illness to swimmers. The proposed scheme indicates that all sewage and wastewater will be processed on site, with provisions up to tertiary treatment . The treated liquid waste and some of the solid waste will be used for irrigation and cultivation of plants and green areas.

While the adoption of tertiary treatment will undoubtably decrease the damage potential of the treated effluent, it is recommended that a thorough cost/benefit analysis be conducted on the relative merits of tertiary treatment, particularly in arid and temperate areas on the Red Sea's coast. Furthermore, the wastewater treatment process will generate some odor. The odor can be reduced by a variety of measures, including design, siting, as well as operation and maintenance of the plant.

The power plant will be noisy, and will produce exhaust gases containing smoke and soot. Once provisions are made for treatment of exhaust gasses, they should be dispersed by the winds over the site, and should not cause a significant adverse impact. The noise of the diesel generator will, however, be heard by resort guests, particularly downwind. It is therefore recommended that the power plant should be relocated in an insulated building downwind, to reduce noise and to allow for efficient dispersion of exhaust gasses. It is noteworthy that the Hurghada-Safaga corridor currently enjoys an excess capacity with respect to electrical power supply. The current supply has quadrupled over the last year. Furthermore, this region is planned to be connected to the national electric power grid by 1977.

It is therefore recommended that a cost/benefit analysis be undertaken to assess the relative merits of obtaining power from a self-contained on- site generators as compared to linking up now with the current Hurghada power supply network, and with the national grid in the future. This approach may not only reduce the environmental burden on the Sahl Hasheesh development, but would also have a significant impact on reducing operating and maintenance requirements, as well as costs.

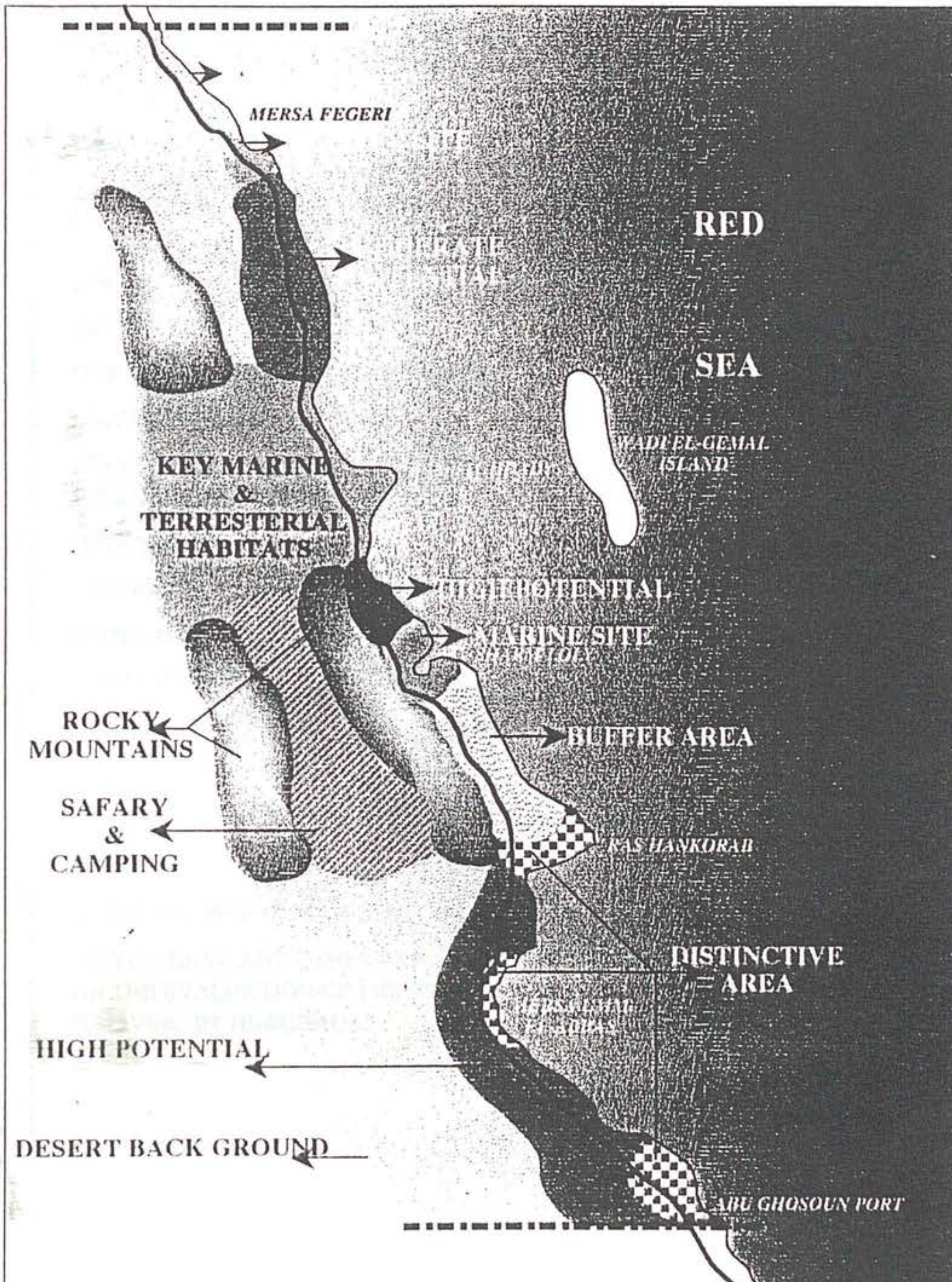
No provisions have been made for the collection, treatment, and disposal of solid waste. A solid waste management system for the resort needs to be developed. This system should, as much as possible, maximize the resource recovery potential of the waste and provide for the controlled disposal of rejects and non-recyclable materials.

Finally, we would like to confirm that the Sahl Hasheesh Development Company and its consultants, Sabbour Associates, have been most cooperative during the conduct of this study. The recommendations made in this report will not result in any additional costs or significant alteration in the development plans. On the contrary, the proposed recommendations will, over the medium to long-term, reduce costs, safeguard the environment, and enhance the marketability of the resort.

Appendix (I)

Sahel Hasheesh Environmental Impact Assessment Conclusion

WADI EL-GEMAL
POTENTIAL AREAS FOR TOURISM (8/1993)



(AFTER T.D.A) Appendix (K)

بسم الله الرحمن الرحيم

DATE	تاريخ
QUESTIONAIRE	استمارة استبيان
NAME	الاسم
AGE	السن
OCCUPATION	المهنة
DURATION OF LIVING IN HURGHADA	عدد سنوات الاقامة فى الغردقة
ORIGIN OF STAY	محل الاقامة الاصلى
WHAT IS YOUR EVALUATION TO THE FOLLOWING SERVICES IN HURGHADA	ماهو تقييمك لكل من هذه الخدمات فى مدينة الغردقة
(1) HOUSING	(١)الإسكان
GOOD FAIR POOR	جيد متوسط ضعيف
IF THE ANSWER IS POOR STATE WHY?	اذا كانت الاجابة بضعيف فلماذا ؟
(2) EVERYDAY SERICES (FOOD... WATER..ETC)	(٢) الخدمات اليومية (الاكل – المياه .. الخ)
GOOD FAIR POOR	جيد متوسط ضعيف
IF THE ANSWER IS POOR STATE WHY?	اذا كانت الاجابة بضعيف فلماذا؟
(3) TRANSPORTATION	(٣)المواصلات
GOOD FAIR POOR	جيد متوسط ضعيف
IF THE ANSWER IS POOR STATE WHY?	اذا كانت الاجابة بضعيف فلماذا ؟
DO YOU HAVE ANY OTHER REMARKS ON THE EVALUATION OF THE STATUS OF LIVING IN HURGHADA?	هل لديك اى ملاحظات اخرى على تقييم الحالة المعيشية فى الغردقة؟