Management Plan for

NABQ

MANAGED RESOURCE PROTECTED AREA

IUCN Category VI

NATIONAL PARKS OF EGYPT
SOUTH SINAI SECTOR

Draft

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Acronyms and Abbreviations

AGMRPA	Abu Galum Managed Resource Protected Area
AOP	Annual Operation Plan
CMA	South Red Sea Conservation Management Area
DEMA	Dahab Environmentally Managed Area
EEAA	Egyptian Environmental Affairs Agency
EEPP	Egyptian Environmental Policy Program
EGSMA	Egyptian Geological Survey and Mining Authority
EIA	Environnemental Impact Assessment
EIS	Environnemental Impact Statement
EU	European Union
GAFRD	General Authority for Fisheries Resources Development
GOE	Government of Egypt
GOPP	General Organization for Physical Planning
HSD	Health Services Directorate (governorate level)
IUCN	International Union for Conservation of Nature (World Conservation Union)
LE	Egyptian Pound (currency)
LF	Logical framework
MoA	Ministry of Agriculture
NCS	Nature Conservation Sector
NMRPA	Nabq Managed Resource Protected Area
NPA	Nabq Protected Area
PAMU	Protected Area Management Unit
PSU	Program Support Unit
RMNP	Ras Mohammed National Park
SCA	Supreme Council for Antiquities
SFD	Social Fund for Development
SNTC	South of NABQ Tourism Centre
TDA	Tourism Development Authority (Egyptian)
USAID	United States Agency for International Development
WFP	World Food Program
WHO	World Health Organization

Executive Summary

This draft management plan of NABQ is developed as part of the Nature Conservation Sector (NCS) plan to improve management of protected area and to ensure that national and international obligations are met which result in having effective management and evaluate the protected areas in Egypt in a professional way and according to the international requirements since 'If there is no general Management Plan, preservation, development and use activities in a park will occur in a haphazard basis, often in response to political pressures with little consideration as to the implications for the future. The result is likely to be lost opportunities and irreversible damage to park resources and values' (Young and Young 1993).

The management plan reviews the PA's most outstanding resources and indicates their relative significance beside it identify the PA objectives based on the national conservation goals particularly the National Biodiversity Strategy and Action Plan (Natural Conservation Sector [NCS] 1998), and in conformity with the international PA management standards established by IUCN. Management issues (problems, obligations, and opportunities) are identified, along with proposed policies and actions to be adopted by the NCS of the Egyptian Environmental Affairs Agency (EEAA). Management tools and resources are reviewed in detail and guidelines for implementation, finance, and evaluation are provided.

NABQ Protected Area NPA was established by Prime Ministerial Decree no.1511/1992, and in 1996 Dahab marine sector was add to the protected area as Dahab Environmentally Managed Area DEMA by Prime Ministerial Decree no.33/1996 to finally have NABQ Managed Resource Protected Area NMRPA.

The decelerations of Nabq as a protected area in both decrees were joined with the deceleration of another protected area in the north called Abu Galum and this was part of the plan of the Egyptian Environmental Affairs Agency EEAA to form a net work of protected areas in South Sinai Governorates, this ambitious plan was amid to face the rapid movement of development in South Sinai particularly on the Gulf of Aqaba coast which end up now with developing the whole coast except the protected area lies on it .

Management Framework and Apparatus

The Protected Area Management Unit PAMU of Nabq affiliated to the Sinai Protected Area net work which belongs to the department of the Protected Area of Egypt under the Nature Conservation Sector NCS one of the most important sectors of the EEAA created in 1992. The PAMU is characterized by its autonomous where the PA manager administers the PA. The PAMU is responsible of enforcing the environmental laws (law 102/1983 and law 4/1994) and report to the Sinai Regional PA Office in Sharm El Sheikh, which in turn reports to NCS/EEAA Cairo.

Resources of NMRPA

NMRPA characterized by the great diversity of habitats and ecosystems in a uniquely compact setting, representing a complete terrestrial/marine ecosystem characteristic of the Gulf of Aqaba coast. The region is of phenomenal natural beauty and outstanding biological diversity. The coral reefs are among the best and most diverse in the Egyptian Red Sea, and are home to a great diversity of fish and marine invertebrates. They have enormous economic value, providing the basis for international tourism activities and sustain locally important fisheries.

NMRPA includes a significant proportion of the mangrove resources of Egypt, a mangle of Avicennia marina extends for 4.5 kilometers (km) in a semi-continuous fringe beside it is consider the northern north mangrove in the Red Sea and Indian Ocean system and form important nurseries for economically important fish and nesting sites for many of the region's water birds. Substantial sea grass beds provide food for the threatened Green Turtle, Chelonia mydas, and Dugong, Dugong dugong.

The interior of the PA is a complex pristine mountain wilderness, inhabited by a diversity of wildlife including several endangered species, and representing an enormous resource for ecotourism activities. Wadi El Keed watershed is one of the largest drainage basins on the Gulf of Aqaba the Egyptian side . It is perhaps the best-vegetated wadi all over the Gulf having the biggest aggregation of the Arak Sand Dunes (Salvadora persica) representing a unique vegetation.

There are more than 20 globally threatened species known from NMRPA, the most significant of these (i.e. species for which NMRPA can make an important contribution towards their global conservation) are: marine turtles, Sharks, Dugong, Osprey (Pandion haliaetus), White-eyed Gull (Larus leucophthalmus), Dorcas Gazelle (Gazella dorcas), and Nubian ibex (Ammotragus lervia).

The area is inhabited by local peoples (Bedouin) belonging to El Mezina Tribe , who still practice a traditional lifestyle largely in harmony with their environment and mainly living on fishing, pasture and tourism. The area has an archaeological site at Wadi Saialet Dalal made by the in the old time by the Bedouin. Natural systems are still intact and no development in the area, expected for mining and quarrying for Alabite at Wadi El Samra and an old inactive Cupper mine.

Management Category and PA Objectives

NMRPA is designated as a Managed Resource Protected Ares (PA managed mainly for the sustainable use of natural ecosystems, IUCN PA management category VI). This defines the PA as an Area of land, with coast and seas as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, cultural and ecological value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.

NMRPA fits the Managed Resource Protected Area criteria: It is of substantial size, encompasses a unique example of a complete marine/terrestrial ecosystem not significantly altered by man and largely in pristine natural condition, has highly diverse ecosystems, has significant recreational value, and high culture value.

Accordingly the main proposed management objectives for NMRPA are:

- To maintain the natural resources and conditions of the PA.
- To protect cultural heritage resources of the PA.
- To enhance the sustainable utility of natural resources in the PA through the establishment of appropriate management systems.
- To promote NMRPA as a focal point for ecologically sensitive tourism, thus expanding and diversifying the economic activity base in the region.
- To enhance the environmental quality of the NMRPA.
- To optimize socio-economic benefits to the local population from the region's natural heritage.
- To promote public understanding and appreciation of Egypt's natural heritage.

Management Issues, Policies, and Actions

Twenty six management issues have been identified. Management issues include problems that currently or potentially could degrade the values of NMRPA, as well as opportunities such as development of ecotourism, and obligations for the Protected Area Management Unit (PAMU) such as visitor safety. For each management issue, approaches and specific actions are identified within a comprehensive framework reflecting and reinforcing the primary objectives of the PA.

Management Tools

Zoning is a primary management tool. Seven internal management zones are proposed, with management guidelines provided for each zone. In addition, patrolling, law enforcement, monitoring, licensing, moorings, site and species action plans, signposting, and public awareness are recognized as important management tools for NMRPA.

Permissible impact level	Management input	Name of zone
Zero impact	Low - moderate	1- Strict natural zone
Low impact	Moderate	2- Premium wilderness zone 3- No-take zone
Moderate impact	High	4- Recreational zone 5-Traditional use zone
High impact	High	6- Multiple use zone 7- Adjacent Area (Buffer Zone)

Table no.1 show the zoning of NMRPA

Management Resources

NMRPA needs about 19 staff members within the next 5 years to effectively manage the PA's resources and achieve stated objectives. The PAMU staff will include five ranks starting with the PA Manager, Senior Rangers, Rangers, Junior Rangers, and Community Guards. NMRPA is divided into two management sectors: NABQ PA and DAHAB Environmentally Managed Area DEMA. Each sector would have a base office and its assigned staff. Initially the PAMU would be based in Sharm El Sheikh headquarter. Important management facilities for PAMU staff are provided include patrolling vehicles and vessels, monitoring equipment and housing.

Plan Implementation and Management Priorities

The implementation of this plan will require that priorities must first be identified and addressed accordingly. Generally there are three priorities in implementing this plan, the first priority should be given to DEMA where the marine sector is protected and so the coast is under the supervision of the PAMU and there are a lot of developments going on, recreational activities and fishing activities too, Conflict between these activities need to be resolved and developments need supervision to minimize its impact on the marine environment, so to achieve this public awareness and environmental education should be raised and covering all the stockholders of Dahab community and then low enforcement should be done. Second priority is to solve the conflict on the southern boarder of Nabq with the TDA and to dominate this area and declare it as a buffer zone. The third priority is to control the current adverse activities, which will degrade the natural resource of NMRPA in the future based on a scientific research.
The integration and consultation of local inhabitants should be a constant priority for the PAMU as it was a successful management tool inside Nabq.

Plan Update and Review

This plan is meant to be flexible and should be regularly updated to keep up with new facts. It should be completely reviewed every 5 years. A yearly Operational Plan would be developed by the PAMU to translate this plan into clear and more practical and measurable actions and targets, associated with a detailed budget.

1. Introduction

Egypt has declared its commitment to enhancing environmental quality and the promotion of sustainable use of its natural resources as a strategic choice for the future of the country. The Government of Egypt has adopted a National Biodiversity Strategy and Action Plan (NCS 1998), which call for the establishment and maintenance of a representative PA network in the country.
Since the passage of the cornerstone legislation mandating the establishment of PAs (Law 102/1983), Egypt has succeeded in establishing a network of 27 PA's representing around 15 percent of the nation's territory. These most valuable segments of the country represent a legacy and a reservoir for future generations. The PA model has proven to be one of the most effective natural and cultural resource management tools in the Egyptian context, and in several cases have proven to be an essential asset to regional development (as is the case in South Sinai). Excellent partnerships have developed between PA's and various compatible users, the tourism industry in particular. This has shown that PA's are not merely closed areas that do not contribute to the national economy, but indeed are valuable assets, which can be highly productive if appropriately managed (Fouda 2002).

In order to have a net work of protected area in South Sinai Governorate NPA was established by Prime Ministerial Decree no.1511/1992, and in 1996 Dahab marine sector was add to the protected area as Dahab Environmentally Managed Area DEMA by Prime Ministerial Decree no.33/1996 to finally have NABQ Managed Resource Protected Area NMRPA. The decelerations of Nabq as a protected area in both decrees were joined with the deceleration of another protected area in the north called Abu Galum both are under Law 102/1983 concerning PAs.
The protected area with the status Managed Resource Protected Area (MRPA) IUCN Category VI for a protected area managed mainly for sustainable use of natural ecosystem. It is an area containing mostly unmodified natural systems, managed to ensure long-term protection and maintenance of biological diversity, while at the same time providing a sustainable flow of natural products and services to meet community needs.

NMRPA Located 35 km north Sharm El-Sheikh, and it consider the largest protectorate on the Gulf of Aqaba containing many unique systems of linked ecosystem. These include: Coral reefs, Sea grass beds, Mangroves, and dunes covered by unique vegetation. There are also a variety of desert ecosystems including mountains, wadis, and stone/gravel desert.

1.1 Purpose of the Plan

The purpose of NMRPA management plan is to facilitating the fulfillment of the PA's main objectives, through ensuring that existing and future pressures on the area's natural resources are managed within an ecologically sustainable framework, maintaining the traditional and characteristic culture of the local population and acting as a regional planning tool to diversify land use along the Gulf of Aqaba coast, thus enhancing the robustness of future economic output in the region.

Specifically the plan provides a review of the resources, opportunities, and problems in the PA, based upon which management policies and specific actions are identified within a comprehensive framework. Zoning is a primary management tool, with guidelines provided for specific zones. Site management plans are proposed for particular resource hotspots. Detailed instructions are provided to the PA manger and staff.

1.2 Framework of the Nabq protected area Management Plan

The Protected Area Management Unit PAMU of Nabq affiliated to the Sinai Protected Area net work with belongs to the department of the Protected Area of Egypt under the Nature Conservation Sector NCS one of the most important sectors of the EEAA.
The management of PA's in Egypt is subject to the provisions of Law 102/1983, which outlines and identifies the basic legal framework for managing a PA. PA's in Egypt have a standard management and administrative structure, sanctioned by the NCS/EEAA. In addition, the NCS has developed and adopted management planning approaches that are being applied to the National PA Network. The NMRPA management plan will be developed within this existing framework, taking into consideration local needs and limitations. Standardization and conformity with national level processes will facilitate both the smooth day-to-day on the ground management of the PA, as well as strengthen and streamline national PA management capacity.
This management plan is seen as a plan specifically designed to guide the management by the NCS/EEAA of the natural resources in NMRPA according to its legal mandate and obligations under Laws 102/1983 and 4/1994. Stakeholder consultation and participation in the NMRPA management planning process is an important component for its development.
Importantly, this plan should not be viewed in isolation but as an integral component of a suite of complementary management practices that should occur in the region adjacent to the PA. These include fisheries regulations, wildlife protection, pollution control and environmental impact assessment, as well as maritime transport and safety measures.

1.2,1 Ownership

The land of NMRPA is completely owned by the Egyptian Governorate, administered by (Egyptian environmental affairs agency), some area inside the protect area are under the ownership of the local communities (Bedouin) other sites are under the ownership of the army.

1.2.2 Legal Framework

Law 102/1983 Protected Areas Law—The main PA legislative instrument, Law 102/1983 sets out the principles for the declaration of PA's and stipulates development restrictions and prohibited activities within and adjacent to the PA.
Article 2 stipulated that EEAA is the authorized administrative body, to:

- Forbid actions leading to the destruction or deterioration of the natural environment and biota or which would detract from the aesthetic standards of the PA

Regulate scientific research

- Develop management plans for declared PA's
- Increase public awareness
- Regulate recreational activities in PA's to protect natural resources
- Establish control systems to enforce regulatory measures.

Article 3 of Law 102/1983 states, "It is forbidden to undertake activities or experiments in the areas surrounding designated protectorates [i.e. buffer or adjacent zone], which will have an effect on the PA's environment and nature, except with the permission of the concerned administrative body."
In addition, the Law established the "Protected Area Fund" specifically to finance the management of PA's this fund includes all revenue from donations, grants, sales, entrance fees, fines, and subsidies. According to
Article 6 state that all revenues and resources of the PA is transferred to a PA fund which should be used for , the Fund can be used for:

- Supplementing the budget of the EEAA
- Enhancement of protectorates
- Undertaking surveys and field research
- Rewarding persons who provide information on offences or who apprehend offenders.

Prime Ministerial Decree 1067/1983—Designates the EEAA is the executive entity to apply Law 102.

Prime Ministerial Decree 1511/1992—Establishing NMRPA.

Prime Ministerial Decree 33/1996— Establishing Dahab Marine PA as part of NMRPA and declaring the whole Gulf of Aqaba, the Egyptian marine side as a part of South Sinai PA net work.

Prime Ministerial Decree 264/1994—Sets out conditions, rules and procedures for definition and regulation of activities in natural reserve areas and provides the NCS/EEAA with executive administrative authority over natural protectorates. It has six articles and various conditions and rules and expressly forbids construction or development of any type without the permission of the EEAA.

Law 4/1994 for the Environment—Establishes principles and procedures to address environmental issues in Egypt. This comprehensive law includes measures to address terrestrial, air, and water pollution. Law 4 notes that the EEAA has the power to administer and supervise PAs. Importantly, the law specifies that all development is required to go through an appropriate EIA process.
Article 59 prohibits the construction of any establishment within 200 meters of the shoreline, except with the approval of the Egyptian General Authority for the Protection of Shores (GAPS), in co-ordination with EEAA, and after the approval of a satisfactory EIA. Furthermore, Article 60 prohibits all activities that cause any alteration or modification to the natural shoreline.

Law 4/1994 also prohibits the hunting, possession, transport, and sale of those species of wild fauna (alive or dead) determined by Executive Statutes of the same law.

Law 2/1973—Authorizes the Ministry of Tourism as the administrative body for the supervision and exploitation of tourism areas.

Law 117/1983—Provides for the protection of antiquities and historical sites.

Presidential Decree 374/1991—Establishes the General Authority for Tourism Development (TDA) to be responsible for allocation and sale of land in designated tourism areas. The local governorate approves development within recognized boundaries of urban areas.

Ministerial Decree 1611/1989 (Ministry of Justice)—Granted "police powers" to the manager of the EEAA governorate branch in which there is a PA and to the manager of the PA.

Ministerial Decree 1353/1996 (Ministry of Justice)—Vests certain employees of the EEAA, including Managers of Natural PAs with the capacity of "Judiciary Seizure Officers" relative to infringements of the Environmental Code enacted by Law 4/1994 and its Bylaws, relative to their competence.

Law 53/1966 Agriculture Law—Defines wild fauna protection regulations.

Decrees (Ministry of Agriculture) 28/1967, 5/1983, 66/1983, 1227/1998 and 90/1990—Lists the protected species in Egypt (12 mammals, 13 reptiles, and more than 100 birds).

Law 124/1983, Fisheries Law—This law deals with all living aquatic resources, fishing grounds, vessels, fishing methods, pollution, licensing, fees, penalties, and other matters.

Presidential Decrees 190/1983; 465/1983; 362/1984—The GAFRD was created by Presidential Decree No. 190 of 1983. Presidential Decree No. 465/83 gave the GAFRD the right and obligation to supervise, administer, and monitor the fisheries of Egypt. Presidential Decree No. 362 of 1984 declared that all license fees due for fishermen and fishing vessels are the property of the authority.

International Obligations—Egypt has ratified or signed a number of conservation-related international conventions including the Bonn Convention (CMS), Ramsar Convention, CITES, Biodiversity Convention, the African Convention on Conservation of Nature and Natural Resources and the Convention concerning the Protection of the World Cultural and Natural Heritage.

1.3 Areas Addressed by NMRPA Management Plan

This management plan addresses the area of land and sea defined in Prime Ministerial Decree 33/1996 declaring NMRPA (Appendix 1). The decree describes the boundary of

NMRPA (Map 1), splitting it into two areas the first is NABQ PA of an area of 586 km^2 (464.6 km^2 of land and 121.9km^2 of sea) and it is 35 km north of Sharm El Sheikh city including the Bedouin communities (Ghargana, Khariza, Shorafa and Abu Telihat), the second area is Dahab Environmentally managed Area DEMA which is 80 km^2 constitute the marine sector of Dahab city located north of NABQ PA and 100 km north of Sharm El Sheikh.
NMRPA is situated in the South Sinai Governorate laying on the Gulf of Aqaba coastal plain (about 65 km of coastline, including the Dahab costal areas) and mountains extending roughly between 28°04' N in the south and 28°26' N in the north; and between the Gulf of Aqaba shoreline in the east to about 34°18' E in the west (Sharm El Sheikh - Dahab road).

1.4 Planning Period

The operational period for this management plan is 5 years, from 2008–2013. However, it is essential that some sections of this document be regularly updated and that a comprehensive revision is undertaken every 5 years. The PAMU should initiate the review process and supervise intervening amendments.

1.5 Plan Structure

This plan follows to a large extent a structure developed by the NCS/EEAA and IUCN for use in Egypt's PA Network in May 2002. It starts with a description of the PA and its resources and an overview of its legal and socio-economic setting; then it reviews proposed management objectives. The next section provide an extensive appraisal of management issues along with proposed policies and actions to address them; then there is an overview of management tools and resources; then funding issues are discussed and a proposed budget provided; and finally there is a brief discussion of implementation and evaluation. Additional supportive information and maps are provided in appendices.

1.6 Main Roles of NABQ Managed Resource Protected Area

The main role of NABQ PA is to ensure sustainable use of the natural and cultural resources based on the following principles:

- The biological diversity and other natural values of NABQ should be protected and maintained on the long term.
- Management best practices should be applied to ensure ecologically sustainable use of the PA.
- Management of the PA should contribute to regional and national development to the extent that this is consistent with these principles.
- Protect the ecological integrity of one or more ecosystems for present and future generations
- Exclude exploitation or occupation inimical to the purposes of designation of the area

- Provide a foundation for spiritual, scientific, educational, recreational, and visitor opportunities, all of which must be environmentally and culturally compatible."

1.7 Vision Statement

NMRPA vision statement is to conserve, maintain and improve natural and cultural resources for the next generation.

2. Significance of Nabq protect area (Site description)

2.1 Physical Description

2.1.1 General Description

Nabq located at 35 north of Sharm el-Sheikh and it is a region of contrast. From the high mountains of the interior and north, through the rolling dune system of the south to the rich coral environmental where the desert meets the sea, Nabq provide varied and in some cases unique landscapes and habitats

NMRPA encompasses a wide variety of ecosystems and habitat-types. The majority of the Protected Area is occupied by mountain and wadi desert habitats. Wadi Kid is the largest wadi in the area draining into the Gulf of Aqaba, where it forms a wide delta of alluvial fan where the biggest aggregation of the Arak sand dunes *Salvadora presica*. Along the sea front of the delta there is an extensive stand of mangrove *Avicennia marina*, known as Al Shora. The mangroves are scattered along 4.5 km of shoreline, forming, in places, very dense and extensive groves that contain fairly large trees**.**

2.1.2 Climate

2.1.2.1 Regional climate:

Climate in the entire area is typical of arid regions with cool winters and hot summers. Throughout the year the weather is moderate with very little rainfall, but localized heavy rains can lead to floods. Air temperature varies from 15 °C in the short winter to more than 40 ºC in the summer. The summer temperature may reach 45 ºC in July and August with moderate humidity

2.1.2.2 Nabq protected area climate:

Average evaporation varies between 2400 mm^3 in the north and 4250^3 mm in the south (Assaf and Kessler, 1976). Winds blow predominantly from the north and northeast with speeds of up to 8 Beaufort. Winds from the south are subordinate with speeds of less than 6 Beaufort (Friedman, 1968).

- Temperature (Air temperature)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Des
Day	20	22	25	29	33	35	36	35	33	31	26	21
Night	8	9	11	14	17	20	22	22	20	18	14	10

(Figures in degrees Celsius)

The climate is arid, average rainfall is below 10 mm /y (Friedman, 1968), no data exist on annual seasonal runoff**.**

- Hours of daylight

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Des
7	8	9	10	11	12	12	12	11	10	8	7

2.1.3 Geology

NMRPA situated in a very active geotectonical region. The extension zone of the Red Sea rift at the north-eastern edge of the African plate is active since Tertiary times. The Sinai Triple Junction is dividing the Afro-Syrian rift system (Courtillot 1987; Hayward 1985; Said 1990). Unlike the shallow Gulf of Suez « 100 m which separates the African plate as an extension zone from the Sinai plate, the deep Gulf of Aqaba « 1850 m represents a transform fault with a dominating left-lateral strike-slip motion of a total left-lateral displacement of about 105 km and still continues separating the Arabian plate from the Sinai plate (Brown1970; Bartov et al. 1980; Ben Avraham et al. 1979; Ben Avraham 1985; Ben Menahem 1971; Cochran 1983; Cochran et al. 1985; Courtillot et al. 1987; Eyal et al. 1981;Freund 1970; Mart & Hall 1984; Shata 1957; Tamsett1984). It continues northward in the System of the Jordan rift (Friedman 1985, Jado et al. 1984, Said 1990). The Arabian peninsula is spinning anti clockwise with a pivot in the southern central Mediterranean (Fig. 8). Therefore extension rates are increasing from north to south in the Gulf of Aqaba (Cimiotti 1980; Said 1990).Ben Avraham (1983) divided the Gulf of Aqaba into a southern part with the character of an extension zone and a central and northern part with transform fault like kinetics.

Before graben tectonics began in the Tertiary (-Oligocene), the Arabo-Nubian Shield showed a generally even relief. after an epirogenetical uplift of land bordering the rift which reached 4-5 km in southern Sinai and diminishes northward, erosion erased former layers thus Precambrian basement dominates southern Sinai at present (Gvirtzman & Buchbinder 1978; HOtzl1984; Reiss & Hottinger 1984; Said 1990).
As a result of the uplift there are practically no continental shelves bordering the Gulf of Aqaba, coastal plains are absent or very narrow and slopes on the margins of the Gulf of Aqaba are dropping very steep into the deep sea (Ben Avraham, Almagor& GarfunkelLI979).
In the Tertiary and earlier Quaternary frequent changes of dry and humid environments led alternately to the processes of weathering, erosion, and sedimentation and therefore to

the denudation of upper strata (Ben Avraham et al. 1979~ Reiss &Hottinger 1984~ Said 1990).
Frequently the weakened rocks along such faults were greatly eroded, determining the course of linear valleys which were cut into the existing tectonical structures. Widely branched systems of valleys developed intersecting the Sinai basement horst and which "drowned" in sediments later on (Rothenberg 1979) .Towards the coasts alluvial fans developed which extend as submarine cones down to 150 m depths in some places. Submarine V-shaped incisions and canyons show past eroding activities by land runoff and turbidities creating gaps « 2000m wide, < 8 km long, < 130 m deep) in recent and pre existing fringing reefs which were known and used by Arabian sailors as harbours (Arab.Marsa, Sharm) (AI-Sayari et al. 1984~ Cimiotti 1980; Gvirtsman et al. 1977~ Reiss & Hottinger 1984).
Coral reefs were included in the general uplift so that many elevated relictic reefs can be found nowadays bordering the recent shores (Ben Avraham, Almagor& GarfunkeI1979).
Beach rock conglomerates have mainly developed during times of retreating sea levels (due to the Pleistocene period of glaciation and tectonical uplift) (Russel 1962) and are attached to the alluvial sediments along the shores (Ben Avraham, Almagor& Garfunkel 1979).

Igneous rocks of deeply weathered alkaline granite of the upper Gattarian series are dominating south of wadi Kid the biggest wadi on the Gulf of Aqaba (Eyal et al. 1980; Friedman 1983, KOMEX G. T.1998; Said 1990).These plutonic rocks show a lot of discordant volcanic intrusions, mainly of basalt dykes running in the same directions as faults .These faults were caused by kratogenic disturbances which were an echo of orogenic or epirogenic movements (Abu Al-izz 1971).

North of w: Kid metavolcanic, metapyroclastic, metasedimentary, and metamorphosed rocks predominantly build the bedrock within NMRPA boundaries see the geological map (Eyal et al. 1980; Friedman 1982).

Geologically, a complex of ancient crystalline rocks forms the Nabq Protected Area with some rocks dating back 1,100 million years. Grey granites are among the oldest rocks, while the more common rose granites are younger at about 600 million years old. Some of the rocks, particularly the grey, rose and red granites have value as ornamental stones and the wadi deposits are used as building aggregates. Albitite, a rare and highly alkaline igneous rock which is used in the ceramic industry is mined in the north western part of the PA. Gold, silver, copper and other minerals exist in Nabq and ancient copper mines dating back to the Bronze Age have been found there. Copper was mined until recently.

Nabq is a region of contrast. From the high mountains of the interior and north, through the rolling dune system of the south to the rich coral environmental where the desert meets the sea, Nabq provide varied and in some cases unique landscapes and habitats.

2.1.4 Geomorphology

Nabq comprises a lot of different geomorphological forms, either related to terrestrial or marine processes or both. These are the base for the rich and diverse biological inventory of the NMRPA as well as the base for the landscapes which are admired by tourist, scientists, and also by locals.
The landscape at the north of Nabq built out of (dominating) metasedimentary rocks appears more barren and rugged, while the landscape to the south of the MRPA shows more smooth shapes which are related to weathering and erosion patterns of granite rock Especially at the area of w.Siyalat Dalal "dinosaur-backs" with lateral tali of slope debris have been formed due to the difference in hardness between granite, which is much more liable to weathering and the more resistant volcanic intrusions .
Inselbergs, at Nabq often in the shape of castle coppies/boulder hills/tors, are characterizing the landscape where either rocks have been more resistant to weathering processes in relation to their surroundings (Bremer & Jennings 1978; Pritchard 1986) or where rock have had less crevices compared to their surrounding. This in return had provided less surfaces where weathering could have taken place (Ahnert 1996; Dalchow 1989; Gerrard1988;) and where sheet erosion occurred later on (Rohdenburg 1989).
At Nabq the near shore areas of the Sinai horst have been elevated up to heights of 1128 M/G. Aischierat or within the surveyed area up to heights of 923 m/ Gabal Ghurabi at present which had been even much higher in the late Tertiary (Gvirtzman & Buchbinder 1978), Corresponding distances to the shoreline (sea level), which the base for the erosion gradient, are comparatively short (G. Aischierat 4,4 km; G. Ghurabi 7,2 km). Therefore high potential energy gradients are accelerating erosion processes that are in addition influenced by the available amount of water, exposition, slope angle, relief, and obstacles. In the Pleistocene the sea level erosion base was -130 m lower (Gvirtzman et al. 1977) increasing the kinetic energy of erosion processes.
Parallel slope retreat due to the alternating processes which were induced by different palaeoclimates described led to the development of pediments at many places.
Nowadays pediments are often covered by the geomorphological issue of a glacis, fluvial reliefs deeply covered by sediments. Wadis have been filled up with sediments up to their present surface with weathering products of the surrounding mountain slopes nearly everywhere in the Sinai horst. Every wadi and tributary shows the sedimentation of its own catchments with grain sizes depending on the hydraulic force of erosional events under related past climatic conditions. Sediment massiveness reaches up to e.g. 160 m at the mouth of w: Kid (KOMEX G.T. 1998; water well drilling team, pers. comm. 1999).
Wadi beds developed under frequent changes of deep weathering of slopes, accumulation by fluvial transport, deep linear and lateral fluvial erosion within phases of geomorphological activity and stability under the related palaeoclimates. Winterly flash floods still have their effects on the geomorphological shapes of terrestrial surfaces and if they are transporting material through major wadis onto the shoreline even on reefs and submarine parts of alluvial fans (Reiss & Hottinger 1984).
Wadi terraces, remained mainly lateral in the wadi courses as relics, are documenting the stratification of former wadi beds. The correlation of their heights and position gives us

the possibility of a relative chronology of related geomorphological phases and past surfaces.
Numerous graves from ancient times, soil development, and the differentiation of desert varnish colors confirm the relative age and the period of geomorphological stagnation of the prevailing wadi terrace.
These features serve as witnesses for past climates and climate changes and therefore different phases of geomorphological activity and landscape evolution. The recent wadi beds at Nabq show a surface with a much lower relief, which witnesses more recent rainfalls and flash floods with smaller traces of erosion and sedimentation.
The huge alluvial fan of Wadi Kid and of some merging fans of neighboring less important wadis stretches about 20 km with a width up to 7 km and developed during times of erosion activity in the mountain areas.
In the northern part hamada like deflation flats are dominating. At places of longer geomorphological stability (> 3000 years) they are covered by a desert varnish. Depending on the darkness of the patina these surfaces have rested calm for several thousand years without having been moved (Abraham & Parsons 1994~ Krumbein 1971). At many places horizons of fossil "Terra Rossa" are situated below the residual debris surface from allochtonuous regolith which covers the deflation flats as desert pavement .
The deflation of silty/fine sand material is the main geomorphological process in these areas under present climate conditions thus leading to a relative accumulation of residual debris by the selection of small grain sizes by wind erosion. Deflation and therefore wind erosion is heavily triggered by damages to the surface from off track-driving . More recent rainfalls are documented by shallow flood runnels that cut through the flats of the alluvial fan and the presence of a vegetation, which is denser with a higher abundance of annual and biannual species.
Blown away material from the deflation flats and fine marine sediments being further transported by the prevailing winds are increasingly accumulated in the south and centre of the alluvial fan in NNE-SSW direction.
Shadow-dunes covered and initiated by vegetation are the most conspicuous geomorphological features of the alluvial fan. They show the prevailing wind direction (NNE-SSW) in their shape as well as in their arrangement.
The alluvial fan of wadi El Kid is manly covered by the Arak Sand Dunes (Salvadora persica) representing a unique vegetation and they reach heights of ~12 m (0 -5 m) and lengths of max. 80 m. The Arak is not completely fixed by their vegetation. The dynamic of ongoing accumulation and erosion is often documented by the shape of plant growths and the arrangement of straw layers.
Wide coast near areas are situated just around the high tide level and are therefore influenced by episodical floods and/or the subsurface inflow of saline water. Fully arid climate conditions with a low average precipitation between ~ 10 mm/a at the coast and ~ 50 mm/a at the mountains (AshbeI1951, Friedman/Krumbein et al. 1985) on the one hand and a potential evaporation rate of about 4000 mm/a (Griffith 1972~ Reiss & Hottinger 1984) on the other hand result in an accumulation of salts in and on soils (Chap. 7.4.2.1). On those salt-clay flats and saltpans (Arab. "Sabkha") only specialized salt- and draught resistant vegetation is able to survive. Even on these Sabkhas were formed by aeolian transport and deposition of sand.
Fossil coral reefs have been elevated by tectonic movements building terraces of marine origin and have been further influenced by carbonate weathering and fluvial erosion.

The distal margin of the w: Kid alluvial fan has been shaped by palaeofluvial processes, vertical profiles show interlocked strata that document an alternation of fluvial, aeolian, and marine sedimentation.
Coastal dynamics form beach barriers and bay bars cutting of lagoons and erode soft sediments at un-protected stretches of the coastline. Beach rock has been built at some coarse grained or sheltered beaches .Recent geomorphological relevant processes at the coast are biogenic sedimentation related to mangroves and sea grass beds on the fossil/relic reef flat and related to the living fringing coral reef
The granite rock at Nabq shows the typical features of granite stone weathering with exfoliation, desquamation, rock splits/kernel cracks, dissected tafonis, and sphaeriodal boulders which give the landscape of the southern part of the MRPA its typical shape.
Feldspar/orthoclase, quartz and mafic biotite are the three typical components of the plutonic granite, which is the dominating rock in the southern part of Nabq (Figs. 20; 25). Different absorbency of the electromagnetic (thermal) spectrum leads to different extension rates of the three crystals. In return cooling down brings contraction of the crystals.
Granite weathering at Nabq continues to form debris and further on to even smaller grain sizes. Very small heavy mineral platelets of mafic biotite-mica accumulate in the lee of sand ripples within the dunes and along the shore. Those glimmering and shining accumulations are called "dahab" (gold) from the unsuspecting observer, see the geomorphological map.

2.1.4.1 Mountains:

Table (2): List of the most important mountains and their heights inside Nabq protected area

Mountain's name	Height (m)
Gabel Qabila	778
Gabel el wuira	743
Gabel elsamra	365
Gabel tar	519
Gabel umm biraam	375
Gabel umm raaqa	497
Gabel umm beraqa	499
Gabel El hamra	599
Gabel el mauweerid	286

2.1.5 Hydrology and Drainage resources

2.1.5.1- Groundwater potential:

Two wells of fresh water where established in wadi el Keed drainage line and facing Kheriza Bedouin Community but both were blocked and not in use any more many attempts was done by the local community to clean them and operate them again but it was not successful.

There is still an ongoing project not finished yet to support the Bedouin community of NABQ with fresh water funded by the EEAA where another well was constructed and the water was brackish so a desalination unit was also established but the project was stopped.

2.1.5.2- The natural springs

There is only one natural spring at the high altitude mountain at Wadi Ghoraby in the northern part of Nabq and it performs the main water source for the Nubian Ibex .

2.2 Biodiversity Resources

Nabq is home to a variety of animal and marine species, including one of the largest populations of gazelles in southern Sinai. These are often seen at sunset in the vicinity of the dunes. Nubian ibex can be found in the mountain areas and hyraxes thrive in Wadi Khereiza. The largest mangrove stand in the Gulf of Aqaba and the northernmost mangroves in the Indian Ocean/Red Sea area front the shoreline of Nabq, and the coast's coral reefs are extremely rich with unusual profiles and structures that add to their beauty and diversity. Ras Tantour and Nakhlet El Tall provide easy access to excellent viewing of these and other underwater wonders.

2.2.1 Habitats

Coral reef ecosystems

Coral reef provides food and shelter for thousands of organisms, which co-exist in complex interconnected food chains. Coral reef ecosystem is in a constant state of change. Corals grow and provide the framework for extension of the reef. Simultaneously, the reef is being broken down by animals living in or feeding on the structure (sponges, bivalves, urchins, fish). If corals are damaged then the complex equilibrium of the reef will be permanently altered. The result would be loss of productivity and biodiversity, both of which would have serious economic consequences.

Coral reefs in Nabq are extremely rich. Reef profiles and therefore community structure are different from reefs in the Ras Mohammed National Park. Visibility is often poor as a result of fine sediments washing out of the mangrove area, but this does not detract from the beauty and diversity of the reef.

Mangroves ecosystem

Mangroves serve several important functions. They stabilize and extend shoreline through their sediment retention capacities, they create a habitat important to large numbers of bird, invertebrate and fish species and they provide organic material which is then recycled through other near shore (coral reef, sea grasses, back reef) communities in close proximity to the stand. Careful examination of the root systems will reveal a profusion of snails, crabs, algae, larval fish, shrimp, bivalves and other species. The coastline of Nabq is fringed by 4.8 km of mangrove forest. This mangrove, which is composed of just one species of tree, *Avicennia marina*, is very fragile. In addition, being the most northerly in the Red sea - Indian Ocean system, it worthy of protection. Mangrove forests play an important role in shoreline protection and are vital as fish breeding and nursery areas. They also support a large resident bird population, as well as providing a rest stop for migratory birds.

Sea grass ecosystem:

Sea grasses are one of the most important marine ecosystems found in Nabq. They belong to the order of Monocotyledons. Seven species have been recorded in Nabq on the ten present in the Red Sea. Sea grass is a very productive ecosystem reaching the level of cultivated tropical agricultural lands. Sea grasses are ecological important for the following reasons:
Amongst the seven species of sea grass present in Nabq protected area, *Halophila stipulacea* is the most common, covering wide areas. It can be found until 70 meters depth.

High altitude deserts and wades ecosystems:

The mountainous interior of the area is crossed by numerous wadis, river valleys, which are dry for most of the year but which nevertheless provide a relatively lush environment. The many plants and animals, including Gazelle and Ibex, which are found here are sustained by the periodic flooding of the valleys following heavy rains. The wadis also provide a supply of fresh water to local population and are an important grazing area for Bedouin sheep and goatherds. The wadis and the mountains, which surround them, with their wide variety of rock and mineral formations, provide an important geological record of the area. High altitude deserts and connecting wadi systems form catchments watersheds, providing fresh water to habitats at lower elevations. Te highlands provide for a multitude of microhabitats supporting flora and fauna that are well adapted to this environment. During infrequent winter rains, flash floods will wash through wadis

transporting seeds and organic matter to lowland areas. Gravels and sands are also transported. These will be deposited in downstream areas often establishing new areas for plant growth. Small, shaded indentations on hillsides will retain water for extended periods and serve as water reservoirs for local fauna (Gazelle, Nubian Ibex, Hyrax and small mammal populations. when water and forage is scarce these animals move to lowland areas.

Dunes ecosystem:

There are four types of dunes in Nabq they form high vegetation characterizing the area with each one having its own particular plant these are:
Salvadora persica
Limonium axilare
Netraria retusa
Avecinia marina
The most dominant one is the Arak Dunes *Salvadora persica*, being the most important community in the Middle East. These dunes also help to control the movement of sand in the region. Unfortunately these important systems are very sensitive to human disturbance and so these areas are closed to visitors.


S. persica Dune system


L. axilare Dune system


N. retusa Dune system

2.2.2 Species

2.2.2.1. Flora

- The most important flora of Nabq protected area:

- **The Mangroves (*Avicennia marina*)**

  Mangrove trees called "shoora" by the locals, are found in two distinct locations in Sinai one community in Ras Mohmmed and four large communities on the Nabq coastline, compromising the northernmost mangrove in the Indo-Pacific region.
  Avicennia marina (family Avicenniaceae) is an evergreen tree growing up to 6m in height, showing the typical dark brown respiratory roots that reach beyond the high tide mark. *Avicennia marina* has dark green leathery leaves, often crusted over with salt crystals. The flowers are orange and the fruits appear as green 'nuts' when ripe, they drop into the water and the tides carry them to new location.

- **The Arak (*Salvadora persica*)**

  The evergreen *Salvadora persica* Called by Bedouins Arak is found only rarely in Sinai apart from the extensive community at Nabq, which forms the largest stand in Middle East region.
  The Arak has a large woody trunk, the size of which depends on the age of the plant. Most trunks are twisted in a snake like manner and split in several sections that rejoin again.
  The Arak has opposite pale green leaves. Tiny white flower clusters appear in spring to be followed later by small, white fruit that redden upon ripening Leaves and fruit are edible, but quite pungent and bitter.

Traditionally this plant was used extensively in folk medicine:
A tonic prepared from the bark for treating poisonous bites; dried powdered leaves mixed with a little flour and honey as an anti-syphilitic; the fruit (very bitter) for stomach troubles; young twigs striped of any leaves as toothbrushes.


- **The Syale (*Acaci raddiana*)**

The umbrella shaped acacia tree (family Leguminosae) is easily spotted in many areas of Sinai, occurring mostly in sandy wadi beds. Acacia exists in two distinct forms :one as a hardwood tree with reddish bark, and one as a low growing shrub without trunk. Both forms, exhibit the same characteristics, which include: long, sharp, silvery-white thorns (strong enough to puncture a tire) and feathery double branching leaves. Yellow or cream colored flowers appear in high summer, followed by the characteristic 'beans' that contain the new seeds.

Traditionally Bedouins used Acacia gum dissolved in water to treat eye problems and to promote wound healing. Dried Acacia seeds powdered is a remedy for diarrhea.

Threatened Plants

Acacia: is keystone species in south Sinai of vital ecological and cultural importance. In recent years acacias have been subjected to overgrazing , cutting and other threats and recruitment to the population has been seriously compromised.

Medicinal Plants

Latin Name	Vernacular name	Medicinal use
Salvadora persica	ARAK	For treating poisonous bites & stomach troubles & toothbrushes
Acacia raddiana	SYALE	For remedy for diarrhea
Cappapris sinaica	LASF	For rheumatism and articulation pains
Cleome droserifolia	SAMWA	For diabetes and irritation
Iphiona scabra	ZAFRA	For stomach pain and envy
Nitraria retusa	GHARQAD	For irritation
Tamarix aphylla	TARFA	For stomach pain and spleen
Zygophyllum coccineum	GALUM	For irritation

2.2.2.2. Fauna

The most important fauna of Nabq protected area:

The Mammals

- **Dorcas Gazelle (***Gazella dorcas***)**

  The Dorcas Gazelle has a wide range stretching from Morocco across North Africa to Egypt including Sinai, and Jordan. Everywhere it has declined. Today it is generally found in pairs, rather than herds. Both sexes are about 60 cm at the shoulder, with slender limbs and a striking head pattern. The upper parts are a fairly uniform pale red-brown white below separated by a variably dark flank stripe. The tail is dark above but the underside and rump area is contrastingly white. The head is boldly marked in brown and white and the ears large and pale. At close range the sexes can be differentiated by the horns. In the male these are robust, lyre-shaped curving back and then upwards. In the female they are straighter and much more slender.
  Dorcas Gazelles are not mountain dwellers. They should be looked for around vegetated wadi floors and are closely associated with Acacias.

- **Nubian Ibex (***Capra ibex nubiana***)**
  The Ibex is a close relative of the Wild Goat and like Wild Goats, both sexes have a back-curved horns. In the female these are rather short and slender but in mature male they are huge, ridged and backswept it can reach over a meter long along the outside edge.Ibex are highly adapted to the mountain environment, able to traverse the steepest cliffs and seemingly defy gravity as they cross a mountainside. They live in small herds, reportedly in the past of up 40 animals now generally of less than ten, ranging over vast area. Sometimes young females may temporarily separate from the herd and old males may be solitary. When moving Ibexes generally travel in single file. The color of their coats makes them virtually invisible against a vast rock face.Access to water is Key to the Nubian Ibex distribution since they must drink at regular intervals. Hunters have taken advantage of this in the past, waiting up at known watering holes. Ibex feed on grass, shrubs, acacia and roots.

- **Red Fox (***Vulpes vulpes***)**

  Red Foxes present in Sinai are the same species as the animal found over most of Europe, northern Asia and north America. In Sinai they are pale beige, darker in winter with large ears colored black behind, a dark chest with a full, white tipped tail. It is tolerant, even reliant, on human activity, and can be seen in the open by day.The Red Fox seems to be a relative newcomer to the area not having been recorded in south Sinai until the mid eighties. The Red Fox has been recorded regularly down to Ras Mohmmed and is now common inside Nabq.

The Birds

- **Rock Dove (***Columbia livia***)**

  The Rock Dove is the ancestor of the domesticand feral pigeons.while flocks of domestic pigeons can be seen around human settlement sat Nabq, the Rock Dove seen in the high mountains, their original stronghold are the real thing. Rock Doves are a fairly uniform gray with a darker head, dark tipped tail and a distinct double black wing bar. The race resident in the protectorate is distinctive for lacking the usual white rump.

- **Osprey (***Pandion haliaetus***)**

  The Osprey or Fishing Eagle one of the most important resident birds in South Sinai. It's length range between 50 – 60 cm, and one of the biggest aggregations of Osprey present In the Red Sea shore. The Osprey is a rare species. Their nests were usually near the ground, which makes their eggs susceptible to be eaten by foxes. In order to assist to its survival, an artificial nest has been built near the mangrove.

- **Reef Heron (***Egretta garzetta***)**

  White Reef Heron live and breeding around mangrove stands. It's length ranged from 40 – 50 cm and it's feeding by fishing the insects and small fishes from shallow water.

The Reptiles

- **Egyptian Dabb Lizard (***Uromastyx aegyptius***)**
  This is the protectorate's largest lizard and looks as though it might have just stepped off the set of Jurassic Park. Up to 60cm long it is heavily built with a relatively small head, heavy skin folds around the neck, thick, well clawed limbs and a robust, armored tail that makes up just under half its length. From any distance the Egyptian Dabb is a fairly uniform gray, the tail tinged yellow and the under parts pale yellow.
  The Egyptian Dabb can be found on broad vegetated wadi beds where despite its fearsome appearance it feeds on leaves and shoots.

- **Sinai Agama (***Pseudotrapelus siniatus***)**

  The Sinai Agama is one of the characteristic reptiles of the protectorate though its name is misleading. Far from being restricted to Sinai it has a wide range from Libya east across Egypt to Arabia and south in Africa to Eritrea. Large lizards, some 25 cm long of which over half is tail, they have robust bodies and large head but are long limbed and agile.

- **Horned Viper (***Cerates cerates***)**

The Horned Viper lies completely buried in sand with only the eyes showing above the surface. The horns are elongated scales above the eye and it is thought that these keep sand clear of the eyes while buried. The Horned Vipers can be distinguished from all other snakes in the area by the broad head clearly distinct from the much narrower neck.

2.3 Cultural Heritage Resources

Cultural sites

There is only one site at wadi Ghoraby on the coast side used as a cultural sites, where a yearly celebration is done there in August by the Bedouin community and this tradition is kept on for many years.

Historical sites

Old mining activities can be found in different places, mainly for copper at wadi el-Samra, and some old storerooms built by rocks from the surrounding environment in wadi Syalet el-Dalal.

Traditional uses

The resident Bedouins are using the area traditionally inhabiting the area from hundreds of years and they where mainly depending on fishing and grazing and at this time the population were very small while now due to the tourism activities in the area the Bedouin established them self and they increased in population and most of them are involved in the tourism activities.

Threats to cultural features

The real threat to the Bedouin culture that the Bedouin traditional activities start to disappear so there no more high quality handy crafts or traditional dresses are done by the ladies, and instead of doing high quality handy crafts the young girls and ladies are bagging the tourists with a low quality of products.
Also the traditional celebrations every year start to be irregular and will disappear by time.

2.4 Local people (Bedouin)

2.4.1 Population

Bedouin population of Nabq protected area are from El Meziena tripe with a total population of 452 person according to the last survey by Nabq rangers in 2006 with an increase of 29% over the last 10 years since it was recorded as 350 person in 1996 . This population divided into three main settlements, two of them are inside the protected area and related to each other with a special seasonal migration pattern. These two main settlements are called Ghargana and Khriza villages and inhabited with 49 Bedouin families with a total population of 241 persons.

The Bedouin of those two villages used to move from the two settlements according to seasons so in summer time most of the population 43 families of 227 person settled in El Ghargana Village on the coast since it is cooler and better weather while in winter it became too windy and cold so 18 families from the 43 with a total population of 114 persons are moved back to Khriza village at wadi Khriza where there is electricity and school for the kids, the distance between the two villages is 9 km, see the satellite image blow.
The next table shows the distribution of the Bedouin families within the main two settlements over summer and winter since there are some families are settled and don't move over seasons, Ghargana 25 families 113 persons and Khriza 6 families 14 persons.

Bedouin population

	summer		winter	
settlement	**families**	**persons**	**families**	**persons**
Ghargana	**43**	**227**	**25**	**113**
Khriza	**6**	**14**	**24**	**128**
Total	**49**	**241**	**49**	**241**

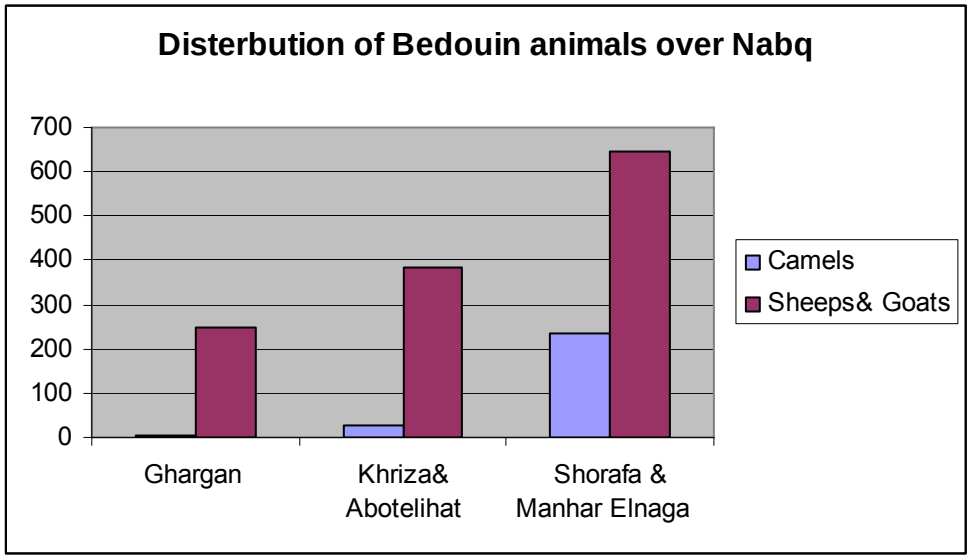
Table shows the distribution of the Bedouin over space and time.

The third Bedouin settlement is Called Shorafa El Maghary and Manhar El Naga at the western boarder of Nabq protected area located near by the asfaltic road Sharm – Dahab 30 km from Sharm El Sheikh City, this settlement is inhabited with around 35 families and 211 persons. Almost all of them are working in the tourism as they are providing Bedouin dinner and camel safaris in the western side of the asfaltic road Sharm – Dahab in St. Katherine protected area.

A survey on the gender of the Bedouin population show that **60%** of the population are **female**, also a survey on the age group where show that **54%** of the Bedouin are **children** (under 18 years old), **37%** are **adult** (18-50 years) and **9 %** are **old** over 50 years.

2.4.2 Bedouin domestic animals

The next graph and table show the distribution of the Bedouin animals over the three main settlements of Nabq and it show that the population settled in El Ghargana village because they are mainly fishermen are having less animals while as the settlement become more involved in the Bedouin dinner and camel safaris numbers of animals increased.



Bedouin animals

Settlement	Camels	Sheep& Goats
Ghargana	**5**	**250**
Khriza& Abotelihat	**25**	**384**
Shorafa & Manhar Elnaga	**234**	**648**
Total	**264**	**1228**

Fig1 show the distribution of Bedouin domestic animals

2.4.3 Socioeconomic of the Bedouin in Nabq

All the Bedouin settlements in Nabq are involved in the tourism activities in a way or an other, if we see the females which constitute 60% of the total population of Nabq we can found that from the beads production (necklace, medals, ect) they can make 5 $/day as an average income from selling this products to the tourists, where from 6 years old till old ladies are working in this business.

They are also fishing only Ghargana settlement as they are mainly catching Octopus and collecting mollusks but this is mainly for their consumptions as source of food.

The girls are also responsible about the herding activity which now became a good business since they sale the goat around 60 - 90 $ each and the sheep for 110 - 140 $ each for the Bedouin dinner.

On the other hand we find that the males are also involved in the tourism activities as they are fishermen at **El Ghargana** settlement where around 20 fishermen permanent and can be increased to 40 with a fish production from 2000 to 4000 Kg / year, with a price of 4-5 $ /kg this production sold to the cafeteria of El Ghargana mainly for the tourists. This is beside the cafeteria it self it provide a good job and business for employing more than 10 Bedouin and 3 Bedouin families are partners in it.

For the Bedouin they live in the wadies **Khriza** and **Shorafa & Manhar Elnaga** we found that they are mainly working in the Bedouin dinner and camel safaris since there are around 259 Camels working mainly in safaris with a rental fee of 5- 7 $/ trip for the tourist company, beside the business of Bedouin dinner which employ many of them and brings good money the meal for the tourist is around 7 – 9 $ / dinner. There are around 1500 visitor a month as an average for both side at Cafeteria El Ghargana and at the Bedouin dinner at **Shorafa & Manhar El Naga.**

2.5 Existing Land Uses

2.5.1 Mining and Quarrying

The only mining and quarrying in the area is the one running by the National Service Authority NSA and it is for the Albitite bite this is the raw material which used to form the ceramic and most of the national stock of this material is in NABQ at Gabal El Tarr.
The area of this activity is zoned and it is not allowed to have any other mining activity in the area.

2.5.2 Fishing

There is a fishermen village El Ghargana it's the only settlement of Bedouin on Nabq coast and most of the Bedouin there are fishermen. The village is the main landing of all fishermen which can be ranged from 20 permanent fishermen up to 40 fishermen mainly in summer time, with a fish production ranged from 2 to 4 tons of fish per year.
Mainly they are fishing using the net and few of them having small boats (4 boats, 5m) for line fishing
Also the Bedouin ladies and girls are collecting mollusks like Octopus, Giant Clam, lambs sp. Strombus sp.
The Bedouin communities within NABQ PA are respecting the PA regulation since in 1996 the PAMU with the consultation with the Bedouin society established the no take areas as a tool in managing this activity giving 70% of NABQ PA coast as closed for fishing while only 30% is just allowed.
In Dahab Marine PA fishing is not regulated and causing a conflict with other recreational activities like diving and snorkeling.

2.5.3 Tourism

NMRPA is characterized by having many ecosystems and habitats with high diversity giving it a unique place to be visit by tourists and the big costal plain of wadi Keed and the relatively high vegetation on the coast make it attractive to tourists especially to those don't dive they want just to enjoy the nature and the beautiful landscape, So NMRPA comparing to the rest of the protected area in South Sinai it is the most divers in habitats and so in species. In the last 10 years 180300 visitors visit NABQ PA with an average of 18000 visitors/year there is a fee entrance of 5$/ foreigner and 5LE for Egyptian, Still

NABQ PA not visited as much as it expected comparing to the famous Ras Mohammed National Park RMNP which have an average visitors in the last 10 years of 210000 visitors, so NABQ PA visitors is constitute 8.5% of RMNP visitors and this is mainly due to the lack of advertising and proper infrastructures, although there is a good market for attracting tourists since Sharm El Sheikh Airport receive 2.2 million tourists 2007 and number is expected to increased in the next few years to reach 5 million .

There are many recreational activities can tourists do in NABQ PA like diving, snorkeling, camping, hiking and camel safari as there are diving and snorkeling sites, camping sites, camping sites, natural trails and camel safaris. Also beside the recreational activities NABQ PA attract many foreign Universities for educational activities and this due to the high biodiversity it have.

NABQ PA has a good opportunities to catch since south of NABQ PA there is one of the biggest tourism project in South Sinai Governorate South of NABQ Development Center it is belong to the Tourism Development Authority TDA , the project is of a total area of 28 million square meter and with a coast of 7 km. the area of the project was divided in to 3 slots the costal one with 27 mainly 5 stars resorts 15 of them are operational now, the middle one with 86 hotel 3 and 4 stars and back area for services.

On the other side DAHAB Marine Protected Area DMPA north of NABQ PA it has a lot of touristic activities as it is known as one of the best places in the world in diving and wind surfing due to the high diversity of coral 155 species of hard coral (Christian 2005) at the dive sites 24 dive sits with easy access from the shore and the strong northern wind most of the year for the wind surfing and it is not expensive for tourists comparing with Sharm El Sheikh as it have only 24 hotels only one is 5 stars and 76 camps and motels .

2.5.4 Urban Centers and Settlements

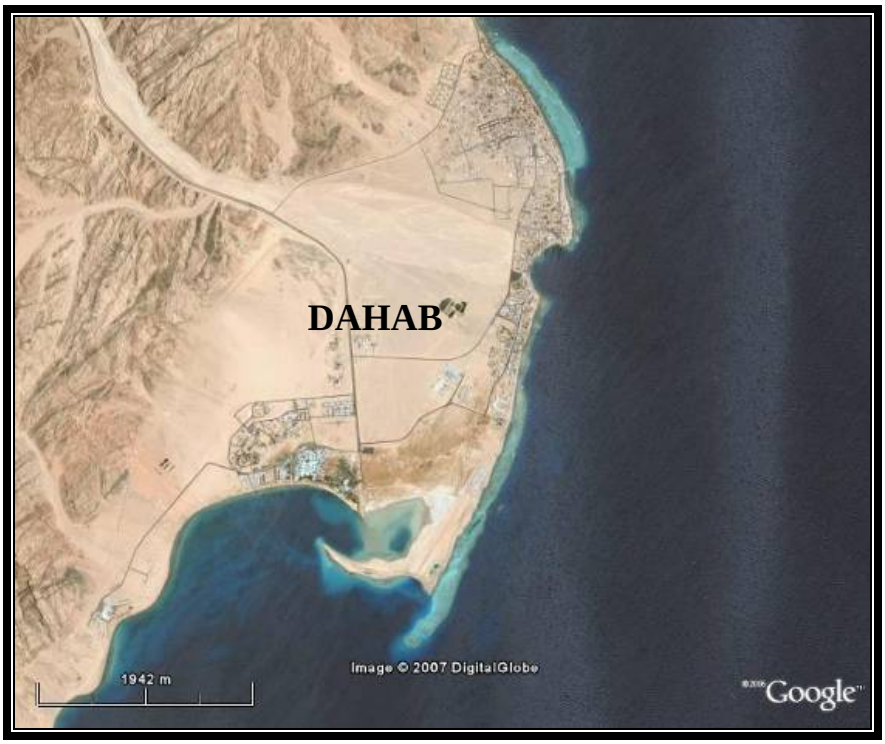
There is no Urban Center in NABQ PA only three main settlements for the Bedouin from El Meziena tribe with a total population of 452 people according to the last survey by Nabq rangers in 2006 with an increase of 29% over the last 10 years since it was recorded as 350 people in 1996.

Two of them are inside the protected area and related to each other with a special seasonal migration pattern. These two main settlements are called Ghargana and Khriza villages and inhabited with 49 Bedouin families with a total population of 241 persons.

The third Bedouin settlement is Called Shorafa El Maghary and Manhar El Naga at the western boarder of Nabq protected area located near by the asfaltic road Sharm – Dahab 30 km from Sharm El Sheikh City, this settlement is inhabited with around 35 families and 211 persons. Almost all of them are working in the tourism as they are providing Bedouin dinner and camel safaris in the western side of the asfaltic road Sharm – Dahab in St. Katherine protected area.

Satellite image for the southern part of Nabq show main Bedouin settlements and the mangrove stands.

At DAHAB EMPA there is Dahab City which inhabited with 11000 people according to the last survey of the Central Authority for Counting and Statistical CACS 2006, 7000 of this population are Bedouin the city is characterized by its Bedouin atmosphere and style, and so it has only one 5 stars.
Mainly Dahab are depending three main recreational activities diving, snorkeling and wind surf, so DAHAB has 60 diving centers and 6 wind surf schools. It has also 6 diving boat and a marina controlled by the marine police.



Satellite image for DAHAB city

2.5.5 Roads

NABQ PA is connected to Sharm El Sheikh City with 35 km of asfaltic road this road is passing by Sharm El Sheikh Air Port and through South Nabq Development Center, also at the western boarder of NABQ PA there is the asfaltic road Sharm – Dahab and consider the western boarder of NABQ PA .
Within NABQ PA there is no asfaltic roads but there is a net work of tracks with 70 km length giving access to tourists to diving, snorkeling, camping and natural trails sites and also serving the local community.
These tracks need regular maintenance in order to avoid off tracking from both tourists and Bedouin.

2.5.6 The Experimental Shrimp Farm

This experimental Shrimp Farm was established in 1992 with the declaration of the PA and it was taken in consideration all the guidelines and the regulation of the EEAA and the PA in order to put the standers for Shrimp Farm all over Egypt since it was the only Shrimp Farm running in Egypt , beside it aims to provide alternative jobs for the Bedouin fishermen .
Monitoring the coral reef and the water quality was regularly done to ensure that there is no impact on the coral reef ecosystem .

2.6 NMRPA Stakeholders

There are a large number of direct and indirect stakeholders and participants in the PA's activities. The main stakeholders and their involvement with the PA are briefly described.

2.6.1 Egyptian Environmental Affairs Agency

As explained in the PA frame work the Egyptian Environmental Affair Agency is the by the low the governmental authority which control and managing the protected areas of Egypt law 102, 1983 of protected area and this is through the Nature Conservation sector the biggest sector within the EEAA

2.6.2 South Sinai Governorate

NMRPA as a whole falls under the administrative authority of the South Sinai Governor, who is the highest authority in the Governorate. The Governorate is responsible for regional planning and development strategies such as housing, road and tourism projects. The main Governorate departments who have interests in the PA include:
The environmental Department which is responsible on all the environmental issues in the governorate and coordinate with the PA in those issues like EIA, solid waste managements, marine activities ect..).
Dahab city council responsible for municipal development planning, water and power supply, rubbish collection and liquid waste disposal for Dahab.
Sharm El Sheikh city council responsible for municipal development planning, water and power supply, rubbish collection and liquid waste disposal for Sharm.
The Quarry Department of the Governorate, which is responsible for issuing quarrying licenses.

2.6.3 Tourist Development Authority

TDA is responsible for the planning of tourism developments, allocation and sale of land for investors in designated tourism areas which in this case is South of Nabq Touristic Center SNTC .

2.6.4Ministry of Interior

The Ministry of Interior has under its authority the Environmental and Marine Police EMP which supporting the rangers in enforcing the environmental law and in confiscations and also the Central Security which guarding the coast of NMRPA.

2.6.5 The General Organization for Roads and Bridges

Is responsible for the maintenance of existing asphalted road Sharm - Dahab which is the western boarder of NABQ PA .

2.6.6 Investors

Investors and beneficiaries (hotel owners, tour operators, dive boats, guides, desert safari companies, etc.) of NMRPA ecosystem have a direct stake in the ecological state of the region, and should have an interest in maintaining a high quality environment in the region.
In the case of SNTC they form a company responsible on the infrastructures of the center (roads, electricity, fresh water, telephone, ect,…) called **Shaming Sharm Co.**

2.6.7 Local (Bedouin) Communities

The Bedouin communities are the traditional users of the natural resource base and as such are among the main stakeholders in the PA; their understanding and support of the PA's objectives and involvement in planning and implementing management interventions are critical. Local communities should be enabled to manage their own resources locally but as local communities may have to restrict their activities and so pay the opportunity costs for conservation, they should be entitled to share tangible benefits from the management of the PA to offset such costs and ensure their support.

2.6.8 Ministry of Agriculture

Dahab office for GAFRD which is the official governmental authority belong to the Ministry of agriculture and in charge of regulating and developing fisheries and fish resources in Dahab

2.7 Current Conservation Capacity at NMRPA and Vicinity

Other than NMRPA there three PAs. in the vicinities these three PAs. are surrounding NMRPA in a unique model . South of NMRPA there is RMNP the marine side and on the west there is St. Katharine PA separated from NABQ PA by the asfaltic road while on the northern boarder there is Abu Galum Managed Resource Protected Area AGMRPA.
The headquarter is in Sharm El Sheikh which is 35 km from NMRPA where central units are giving assistant to the PA like legal affairs unit, administration unit, marine unit, maintenance unit, ect...
At present the NCS / EEAA capacity in the NMRPA is limited, currently 2007 there are only two rangers assigned to NMRPA with 3 assistant rangers and community guard from the Bedouin equipped with a double cabin 4X4 car and a quarter motorbikes. Their primary mission is to patrol NMRPA coast and wades and inspect coastal activities recreational by tourists or traditional by Bedouin beside follow up developments in SNTC to ensure that no violations to the coastline occur.. the PA manager is based in the headquarter office in Sharm El Sheikh where he follow up the day to day management of the ranger in the PA and doing a regular visit to manage Dahab MPA .In Dahab there are two apartments for the PAMU and they are not in used cause they need maintenance and furniture, So actually NMRPA is running with a very limited resources .

3. Management Goals and Objectives

The management goals and objectives of NMRPA need to reflect both national policies and priorities, and local circumstances and needs. In the mean time the PA management should seek to adopt, as much as possible, the established international standards in this field (IUCN). These standards have evolved over many years and reflect an extensive global experience, presenting practical and tested solutions to common management problems.

3.1 IUCN Protected Area Management Category

NMRPA is designated primarily as a National Park (PA managed mainly for the sustainable use of natural ecosystems, IUCN PA management category VI). This defines the PA as an Area of land, with coast and seas as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, cultural and ecological value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.
The reserve should be managed mainly for the sustainable use of natural ecosystems based on the following principles:

- The biological diversity and other natural values of the reserve or zone should be protected and maintained in the long term.
- Management practices should be applied to ensure ecologically sustainable use of the reserve or zone.
- Management of the reserve or zone should contribute to regional and national development to the extent that this is consistent with these principles.

- Protect the ecological integrity of one or more ecosystems for present and future generations
- Exclude exploitation or occupation inimical to the purposes of designation of the area
- Provide a foundation for spiritual, scientific, educational, recreational, and visitor opportunities, all of which must be environmentally and culturally compatible."

NMRPA fits the Managed Resource Protected Area criteria: It is of substantial size, encompasses a unique example of a complete marine/terrestrial ecosystem not significantly altered by man and largely in pristine natural condition, has highly diverse ecosystems, has significant recreational value, and high culture value.

3.2 National Objectives for Protected Areas

The Protected Areas Network of Egypt aims at maintaining the diversity and viability of the various components of Egypt's natural heritage, and to ensure their sustainable utilization, through conserving adequate representative examples of the country's natural ecosystems and landscapes, for the benefit of present and future generations: the intergenerational equity.
The main objectives PAs Network of Egypt are (adapted from NCS/EEAA policy documents):

- To conserve representative examples of all the nation's main natural habitats & physiographic regions;
- To help maintain the nation's biological diversity;
- To help maintain the nation's ecological viability;
- To protect the nation's most outstanding landscape features;
- To optimize socio-economic return from the nation's natural systems in a fashion that ensures their long term sustainable maintenance;
- To support Egypt's economic development strategies, particularly with regard to sustaining the tourism sector;
- To protect natural assets as future options available for economic diversification;
- To promote public understanding and appreciation of Egypt's natural heritage.

3.3 NMRPA Management Objectives

- To conserve and maintain the natural resources of the PA;
- To protect cultural heritage resources of the PA;
- To enhance the sustainable utility of natural resources in the PA through the establishment of appropriate management systems;
- To promote NMRPA as a focal point for ecologically sensitive tourism, thus expanding and diversifying the economic activity base in the region;
- To enhance the environmental quality of the NMRPA;
- To optimize socio-economic benefits to the indigenous population from the region's natural heritage;
- To promote public understanding and appreciation of Egypt's natural heritage.

4. Management Issues, Policies, objectives and Actions

This section reviews the main management problems, obligations and opportunities for NMRPA, providing specific proposed management objectives, policies, actions and evaluation indicators for each.

4.1 Management of Existing Urban Centers

There are three main urban settlement for Bedouin in NMRPA from El Meziena tripe with a total population of 452 person according to the last survey by Nabq rangers in

2006 with an increase of 29% over the last 10 years since it was recorded as 350 person in 1996 . This population divided into three main settlements, two of them are inside the protected area and related to each other with a special seasonal migration pattern. These two main settlements are called Ghargana and Khriza villages and inhabited with 49 Bedouin families with a total population of 241 persons.

The Bedouin of those two villages used to move from the two settlements according to seasons so in summer time most of the population 43 families of 227 person settled in El Ghargana Village on the coast since it is cooler and better weather while in winter it became too windy and cold so 18 families from the 43 with a total population of 114 persons are moved back to Khriza village at wadi Khriza where there is electricity and school for the kids, the distance between the two villages is 9 km,

The third Bedouin settlement is Called Shorafa El Maghary and Manhar El Naga at the western boarder of Nabq protected area located near by the asfaltic road Sharm – Dahab 30 km from Sharm El Sheikh City, this settlement is inhabited with around 35 families and 211 persons. Almost all of them are working in the tourism as they are providing Bedouin dinner and camel safaris in the western side of the asfaltic road Sharm – Dahab in St. Katherine protected area.

The two settlement of Khariza and El Shorafa are more developed than the one of El Ghargana village since the housing are properly made and there is electricity provided by the governorate to them while at El Ghargana village there is no electricity and the housing are made of wood , ten and mainly on the shore.

There is a need to launch community development initiatives to upgrade and enhance these urban communities especially El Ghargana village as it show bad reputation for the PA. There was an attempts to have a housing improvement project for El Ghargana community where the set back area is respected, a proper housing is constructed with proper sewage system and running by solar energy but there was no enough fund for it but such a project would address poverty alleviation and essential for the Bedouin community.

Objective: Urban settlements within NMRPA operate in an environmentally and ecologically sound manner and become aesthetically compatible with the PA.

Policy: Urban settlements within NMRPA should become environmentally compatible with the PA, through better control of solid and liquid waste, and through limiting urban expansion to their currently recognized limits. No new urban centers will be allowed within NMRPA.

Actions:

- Establish contact and direct communication between the PAMU and the Town or Village Councils of concern.
- Develop urban planning schemes, which take into consideration the conservation character and objectives of NMRPA.
- Clearly demarcate the current legal limits of each urban center on the ground, in order to detect violations.
- Enforcement of suitable building codes, which provoke local characteristic architecture and energy conservation.

- Establish suitable sanitary landfills and waste collection systems at the concerned urban centers.
- Fund raising for the housing improvement project.

Indicators:

- Numbers of operational sanitary landfills near each urban center.
- Amount of solid waste in and around urban centers.
- Urban development plans established and sanctioned by stakeholders.
- Indigenous trees used for ornamentation.

4.2 Management of Coastal Developments

Costal development along the Gulf of Aqaba is growing rapidly in the last 20 years making the PAs along the Coast the lung for the whole Gulf since they are the only place over the Gulf with no development, and so most of the effort of the PAMU is directed to face this rapid movement of this costal development.
In the case of NMRPA there are two coastal developments in the vicinity of NMRPA and both of them consider as a case study due to the difference in the way they developed the first one located on the southern boarder SNTC owned by the TDA while the second is Dahab Coastal Development DCD .
SNTC area was started to be developed in 1995 in cooperation with the PAMU and that's why the center was following the guidelines of the EEAA and supervision from the PA staff was done.
There was a regional EIA for the whole center and it is reviewed and primmeted from the EEAA and the PAMU , beside each developer had to provide his project EIA to be also approved before start his project , although the EEAA was involved in the planning and in supervision of the center but there was still some violations and threats to the marine environment and so to the coral reef . Threats include: Direct damage to coral reefs, sediment plumes from construction operations degrades the reefs, destruction of coastal habitats, disturbance to plants and animals, altering flood water flow, which can be a hazard to the environment and tourists if facilities are built in a wadi bed. Negative impacts reach far into the adjacent desert habitats through haphazard building material extraction and solid waste disposal, but generally the center was a good example in respecting the regulation of the EEAA and the PA since there is no building inside the set back area from 50m to 100m , no sea filling or land filling in the set back area and no dredging in the reef flat or construction on the reef flat. There were only two violations from the 27 plots covering the 7km coast of the center and legal action was taken against them .
The main conflict now in this center with the PAMU is the southern boarder with Nabq PA since the TDA sold a piece of land on the coast which is belong to the PA and the land is now suspended until the solve of the conflict between the EEAA and TDA.
Dahab Coastal Development DCD show completely different case since Dahab is an old city development start there from 1985 for tourism but even before this there was a Bedouin community living and most of them was living directly on the shore without respecting to the set back area and at this time there was even no regulation or law for the area. This make from Dahab a city with many violations since there is no respect in the

old areas to the set back beside there was a lot of violation building in the set back and sea filling mainly in the inter tidal zone.

Objective: To minimize as much as possible any current or potential negative impacts from tourism developments on NMRPA.

Policy: All violations, such as reef flat disturbance, building within the setback zone, and building in wadi (flood) courses, and haphazard waste disposal must be halted.

Actions:

- Achieve consensus amongst stakeholders of the importance of maintaining a sound environment in the region.
- Establishing effective communication of the PAMU/EEAA with TDA and local authorities.
- Full EIAs will be obligatory for all development and installations, facilities and activities in the Buffer Zone before approvals are granted.
- The PAMU staff should participate in the assessment of EIAs for proposed developments in the Buffer Zone.
- All contractors will be obliged to restore the landscapes, as far as possible, before leaving any development site.
- Establish suitable sanitary landfills and waste collection systems for existing and future developments. See further instructions under: Solid and liquid waste.
- The PAMU to establish and maintain a register of all developments within the Buffer Zone, with a record of environmental conduct.
- The PAMU to continue to undertake periodic patrols of developments (operational and under construction) to ensure that regulations, such as setback are being followed.

Indicators:

- Number of violations.
- Operational sanitary landfills.
- Amount of solid waste in and around tourist developments.

4.3 Public Awareness

Raising local and national awareness of the importance of conservation management of NMRPA is essential for achieving the long-term management objectives of the PA. Public awareness in PAs aims to elicit the support and goodwill of stakeholders as a means of meeting conservation management goals. Public support flows from relationships based on trust, respect and a sense of ownership of the PA, public awareness is, therefore, about participation, effective two-way communication and education between the stakeholders and the PAMU/EEAA.

Objective: To ensure public support for long-term PA objectives, through the promotion of understanding and valuation of PA role and function.

Policy: Public awareness and education will be a priority management activity for the PAMU.

Actions:

- Equipped and operate the Visitor Center of NMRPA in a proper way to play its role in educating the visitors.
- Training the ranger on guiding and interpretation.
- Intensive direct communications between PAMU and local stakeholders.
- On the short-term, establish and continuously update public communication tools (signs, newsletter, brochures, posters etc.).
- Establish a detailed Public Awareness Strategy.
- Respond promptly to all inquiries from the public.

Indicators:

- Number of supportive stakeholders.
- Results of public interviews
- No of visitors.

4.4 Visitor Safety

With an anticipated increase in the number of visitors to NMRPA , both to the marine and terrestrial components, visitor safety and security should be considered. Although Law 102 for 1983 does not attach any particular legal responsibility to the EEAA for the safety of PA visitors, it is implicit and expected that the EEAA would seek to ensure some minimal safety levels to the visitors of any PA. This is particularly an issue when visitors are paying an entrance fee and expect services in return.
And the main risk for visitors in NMRPA at the southern gate where there is still mines field in the area and it is fenced by a wires 6 peoples killed in this area over the last 10 years 4 of them are tourists there was an operation to clean the area from mines but in 1996 but it was not completed, so this area which is 50 hr need to be cleaned.
Emergencies in NMRPA could include diving accidents, poisonous stings, dehydration, disorientation in the desert, car accidents, climbing accidents, etc.

Objective: Ensure an acceptable level of safety to visitors against the most likely life threatening incidents in NMRPA.

Policy: The PAMU should be capable to respond efficiently to medical emergencies. The PAMU will ensure that an adequate system is established and is fully operational at all times.

Actions:

- Cleaning the mines from the southern coastal area at the coastal gate.
- Establish an emergency response plan, which should identify the closest hospitals and doctors in the region and "best practices" for each of the most anticipated incidents in NMRPA.
- The PAMU staff should include one doctor, who should receive specialized training in emergency treatments.
- Other PAMU staff should get training in basic rescue and emergency medical response.
- An emergency phone number should be designated and distributed to visitors. Phone should be attended at all times.
- Conduct awareness campaigns among tour operators and ensure that visitors are aware of the emergency procedures.

Indicators

- Number of treated incidents.

4.5 Roads

NMRPA have a net work of tracks of 70 km length, those tracks play an important role in conserving the natural habitats inland and even on the shore, beside it is one of the major factors which affect the no. of visitors to the PA since the bad tracks mean low no. of visitors and it will reflect to the income, also it can affect critical flood patterns and affecting natural vegetation patterns. Roads fragment natural landscapes and disrupt the free movement of wildlife and lead to road kills by traffic. Roads have a direct effect on socio-economic activities in the areas they pass through and can lead to widespread changes in the cultural landscape of an entire region.
It is very important to have good tracks and have a regular maintenance for them so preventing tourists and Bedouin from going off roads and disturb the natural habitat and destroy the landscape.
Important regional and national highways pass through the eastern and western fringes of

Objective: Good tracks net work serving the tourism and the Bedouin in NMRPA.

Policy: No Asfaltic roads will be allowed within NMRPA. The currently existing surfaced tracks will be maintained.

Actions:

- A plan for regular maintenance of the tracks with the appropriate budget.
- Alternative fund raising for the tracks maintenance
- The PAMU will inform maintenance contractors of road construction standards.

- Establish informative signs and instructions to alert drivers and passengers that they are in a PA.
- Providing resting areas with an educational context, to capitalize on the presence of casual travelers in the PA.
- Enforcing the speed limit is 40 km on the tracks .

Indicators:

- Regularity of the maintenance process.
- Satisfactory of the visitors and local community.
- Number of violation exceeding the limit .

4.6 Off-road Vehicle Use

Off-road driving has increased dramatically in the last 8 years due to the bad condition of the main tracks of NABQ PA since the last full maintenance for the tracks was done in 1999 from this time parts of the tracks was maintained by the self effort from the PAMU. Off-road driving is environmentally damaging to fragile desert ecosystems, causing soil erosion, compaction, crushed plants and disturbance of wildlife. The growing development pressure, increase in human population, particularly tourists, and the increased availability of 4x4 cars mean that the volume of off-road traffic in NMRPA is causing growing widespread impact. Multiple braided tracks are especially noticeable in wider wadis and plains and control and remedial measures are now required.

Objective: No off-road driving within the PA.

Policy: All lands within the PA are considered as either limited or closed to vehicles. Driving off the main tracks is prohibited for both PA visitors (paying or permitted visitors), local inhabitants. All off-road vehicles will be restricted to the main existing track in NABQ PA, which are to be designated on management maps and marked on the ground. Routes are considered to be open unless indicated as closed on the ground by signs, barricades, or other physical considerations, which appropriately direct the user.

Actions:

- Regular maintenance of the tracks.
- Survey and categorize various tracks according to their sensitivity to wildlife, importance to traffic, connectedness to habitations and sites of interest.
- Identify areas that need to be sealed off completely or where traffic should be diverted to avoid critical areas and where severe disturbance is being caused by traffic etc.
- Improve single tracks in critical habitats or where vehicles are making multiple or braided tracks and making it less practical to drive off tracks. Tracks can be improved at particularly bad patches where drivers tend to try better alternatives.
- Obstacles (large rocks etc.) can be placed at critical points in an aesthetic fashion in order to force drivers to follow a particular route.

- Sealing the terminal parts of critical wadis with no through passage to vehicular traffic, by placing natural boulder obstacles to prevent car access, but allow for the unobstructed passage of wildlife and floodwaters. This will undoubtedly improve habitat conditions for wildlife in these areas and access on foot and by camel would be allowed.
- Liaise with safari operators over permitted routes and an enforceable code of conduct
- Posting obvious and easy-to-read instructions with codes of off-road driving at the entrances to important and heavily used tracks, indicating clearly the penalties for misconduct.
- Patrolling to enforce the regulation of tracks driving .

Indicators:
- Number of car tracks outside main track.
- Number of track kilometers maintained.
- Number of off road driving violations.

4.7 Anchoring

Most tourist vessels operating in Dahab MPA in addition to many of the fishing boats, at some time, remain stationery near reefs or other features that tourists wish to view or fishermen target for fishing. Anchoring or mooring are two ways that vessel remain temporarily fixed at a given location. Unfortunately, anchors and anchor chains are potential sources of coral reef damage. Anchors can break, crush or push over coral colonies. Anchors and their chains can crush, severe and scour other sessile benthic organisms such as soft corals and sea grasses. There was only one diving boat at DAHAB MPA now 2007 there 6 diving boats, beside 20 small fishing boats 5m length making their potential damage even greater.
In 2000 the PAMU through the marine unit in Sharm El Sheikh established 7 mooring in to cover NABQ PA and DAHAB MPA since there where three mooring were installed in NABQ PA and 5 in DAHAB MPA.
In 2003 the PAMU through the marine unit maintain the 5 mooring sites in DAHAB MPA and in 2005 maintenance and installation for another 5 mooring was done.

Objective: To stop coral damage caused by anchors.

Policy: Direct anchoring is prohibited on coral reefs. Mooring buoys will be made available to PA users in regularly used permissible sites. All vessels in the PA must use mooring buoys when they are available. Eventually, no anchoring will be allowed where buoys are not present. Mooring maintenance will be an important component of the PAMU activities.
Action:
- The PAMU/EEAA implements the Mooring Buoy Strategy
- The PAMU/EEAA to install moorings at frequently used reefs within permissible zones.
- The PAMU undertake boat patrols, at random periods, to assess compliance of regulations pertaining to mooring use and no-anchoring

- The PAMU, in consultation with boat operators and the Coastguard, implement a strategy to regulate the number of vessels permitted to visit popular dive locations per day within the PA[5].
- The PAMU regularly inspects mooring buoys and arranges for their maintenance.

Indicators:
- Number of moorings.
- Number of infringements relating to mooring use.
- Number of anchoring violations

4.8 Boat Groundings

Over the last 15 years there were 3 vessels grounding the reef two in NABQ PA one touristc sailing boat in of 15 m length in 1997 and the other is a big cargo ship in 2003 , the third was a glass bottom boat in 1998 in DAHAB MPA. Boat groundings were frequently occurring south of NABQ PA where there is a big risk for the ships passing the Strait of Tiran but in 1998 this problem was solved by establishing the VTS unit in South of NABQ.
Objective: To minimize risk to human life and damage to corals by boat groundings.

Policy: Establish a marine environment where proper navigational and boat safety procedures are followed.

Action:

EEAA review navigational requirements and aids for all vessels operating in the PA.
Inform boat operators of the risks and costs coral reef damage represents.

Indicators:
- Number of boat groundings.

4.10 Local (Bedouin) People

The Bedouin Inhabiting NABQ PA are from the Meziena tribe having a costal settlement El Ghargana fishermen village where most of the families are fishing and contributed in the tourism activities while the other two settlement Khariza and Shorafa are inland and also the community there are contributed to the tourism activities as they organizing camel safari to tourist and Bedouin dinner.. At present there is a considerable local community involvement and benefit sharing from tourism. Few locals are employed in the hotels and related businesses. Some Bedouins are living off the garbage from the tourism resorts.
Local people are an integral component of NMRPA; they have an intrinsic right to continue their traditional lives in NMRPA and to benefit from its natural resources. The welfare and prosperity of these people must be of primary concern for the future management of NMRPA. Although local people can contribute to the deterioration of natural resources of NMRPA, they are in fact a primary stakeholder, who should participate in a significant way in enhancing and benefiting from these resources on

the long run. No management plan will be successful and sustainable on the long run without the full participation and support of the local people and the PAMU realized this from the start begging and so from the 15 total staff of NMRPA 7 are from the Bedouin working as assistant ranger, community guard, a cleaning team. .

Objective: Ensure maximal benefit to indigenous communities from NMRPA support of its management objectives.

Policy: There should be initiatives to involve the local communities in NMRPA and insure benefit-sharing from activities arising within it.

Actions:

- Regular consultations should be maintained with indigenous community representative, such as tribal leaders (sheikhs).
- The PAMU should seek to employ locals as community guards in the park, who can also provide services such as assist with waste management and trail maintenance.
- The PAMU should also stipulate that locals are employed in the businesses and facilities operating inside the PA. Among the potential jobs, locals can work as tour guides and operate excursions such as camel trekking. Locals can also provide fish and meat and other goods and services.
- Local community handicraft programs can be developed based on traditional crafts such as rug weaving. More innovated handicrafts and other natural products could be developed using local materials, such as jewelry from gemstones, sale of minerals and stones, carvings from granite, and healthcare products from talcum and medicinal plants.
- Through the Social Development Fund (SDF) grants can be provided to the local communities for the development of community businesses, such as Handy craft project.
- In cooperation with tour operators initiate a program to train suitable indigenous people as tour guides.
- Locals could also operate wildlife attractions such as feeding and drinking stations.
- The PAMU will seek to establish a basic health monitoring system for local people, providing basic medication (through a trained medical ranger), and transferring more serious cases to near by hospitals.

Indicators:

- Average annual income of local inhabitants.
- Health status of local people.
- Number of local people supporting NMRPA.

4.11 Deterioration of Traditional Culture

The culture of the Bedouin community considered a culture heritage which if developed properly can return back with benefit to the community, but the problem that this traditional culture start to disappear no and the new generation of Bedouin is not using

this tradition any more, and there many example on this from the tradition dresses through the traditional handy crafts to the traditional way of living which all consider a culture heritage need to be conserved.
There was an attempt to conserve the traditional handy crafts of the Bedouin in NMRPA through a project called the handy craft project in 2003 similar to that of St. Katherine project which was successfully done, In NMRPA a work shop was established and the PAMU start to collect the Bedouin ladies and girls and provide them with materials to start developed their talents and having a good quality products but the EU project which was supporting this project was terminated and there was no funding to continue the handy craft project.

Objective: Stop the deterioration and loss of traditional culture in NMRPA.

Policy: Aware the Bedouin community about the value of their traditional culture and how it can be a source of income and raise their living stander.

Actions:

- Coordinate with St. Katherine handy craft project Fan Sina Co. to provide assistances to NABQ PA handy craft project.
- Training the Bedouin girls and transfer the experience of the old ladies in Handy Crafts to them.
- Raising fund for the project through the private sectors Hotels, tourism Co., ect..
- A good marketing plan for the product with assistant with the private sector.

Indicators:

- Number of girls and ladies involved in the project.
- The quality of the Handy Crafts products.
- The income from the products.

4.12 Solid Waste

Solid waste is consider a problem along NMRPA coast since most of the solid waste (mainly plastic bags and bottles) come from the sea and by the southern current and waves it goes to the shore and then dray and flay again to get stalked in the shrubs along the coast.
That's why the coast of NABQ PA receive a lot of solid waste of course some of it are from tourists and the Bedouin community but it is mainly from the sea since there are three main harbors north of the Gulf of Aqaba and current send most of there solid waste to NABQ PA, so in NABQ PA there is a team of four Bedouin with a pickup working daily on the coast to collect the solid waste.
The problem of solid waste management in NABQ PA is that the solid waste is dumped in the PA in a dumping site and no separation or recycling is done.

Objective: Having NABQ PA clean and no dumping inside it.

Policy: Solid waste management inside NMRPA must be a high priority for the PAMU. The general policy will be to prohibit the dumping of all waste inside the PA and aware the community and the visitors about the danger of solid waste on the environment.

Actions:

- Establish close cooperation between the PAMU and city councils and tourism developments and operators and encourage them to reduce the waste stream through recycling, separating organic waste at source and promoting a reduction in packaging and use of plastic bags.
- Training the solid waste collection team on the separation and recycling.
- Having a unit for recycling and compaction of plastics as it is constitute 90 % of the total solid waste.
- No dumping inside the PA.
- Conduct cleaning campaigns with the assistance of local businesses and indigenous communities.
- Prohibit burning of waste.
- Enforce immediate prosecution of offenders.

Indicators:

- Number of clean beaches.
- Number of desert shrubs free of garbage in sample wadi areas.
- Number of waste items on sample beach lengths.
- Amount of Kg. of packed product from recycling.

4.13 Ship-originated Pollution

As there are three main harbors on the northern side to the Gulf of Aqaba which are Aqaba , Elate and Newiba so there are a lot of marine traffic and some time the ships passing the Gulf discharge the ballast water and it is draft to the shore of NABQ PA.
Other case is that some of the ships carrying sheep in the season of pilgrim mainly through the dead one in to the sea and it is also drafted to the shore as it happened in 2000 where 24 dead sheep was found deteriorated and drafted on the shore of NABQ PA.

Objective: Ensure that vessels passing the marine traffics in the Gulf do not degrade the environmental quality of the PA through intentional or unintentional introduction of pollutants or waste.

Policy: No discharge of liquid or solid waste will be allowed from vessels in or adjacent to the PA. All vessels must dispose of waste at port. Appropriate facilities to receive and treat boat waste.

Action:

- Coordinate with the VTS unit to aware the vessel passing the Strait of Tiran about doing any discharge of wastes in the Gulf.
- The PAMU will conduct regular marine patrols to ensure that vessels operating in the PA are not disposing of liquid or solid waste and those vessels are not producing oily discharge.

- The PAMU will inform stakeholders of PA regulations.
- The PAMU/EEAA will coordinate with stakeholders to ensure that existing and future harbors are supplied with liquid and solid waste disposal facilities.

Indicators:
- Number of violations.
- Number of ports with waste disposal facilities.
- Number of waste items on sample beach lengths.

4.17 Sewage

There are discharge of sewage in NABQ PA or even in DAHAB MPA since the development there are not allowed to discharge sewage to the sea or even trated water but to be connected to the city sewage net work or to have his own sewage treatment unit and use the treated water in irrigation. At El Masbat area on Dahab coast some times the sewage net work get blocked and sewage discharged in to the sea water causing the water to be contaminated with pathogenic bacteria and high nutrients DANIDA report 2003 on the water quality in the Gulf of Aqaba. In Dahab city they still working with the precipitation sewage pounds system but the governorate is now establishing a sewage treatment plan and a new sewage net work to serve the whole city and solve the problem of sewage in the city since high number of residents are depending on septic and holding tanks which can contaminate groundwater aquifers or the adjacent reef flat environment. Still all the Bedouin settlements in NABQ are depending on septic systems.

Objective: Sewage generated in the PA and its Buffer Zone will have minimal effect on the environmental quality of the PA and it biota.

Policy: No discharge of sewage into the sea or on land. All sewage will be treated. Within and sludge can be used as fertilizer, otherwise it will be disposed in designated landfills outside the PA. No new septic trenches should be allowed, and the effect of existing ones should be assessed.

Action:
- The PAMU undertake study to assess the impact of septic systems on adjacent coastal waters and on the ground water in NMRPA.
- The PAMU patrol new resorts to ensure the developers comply with their licenses governing the treatment and disposal of sewage.

Indicators:
- Levels of pollutants in areas where septic systems are anticipated to have an impact on adjacent coastal waters and ground water in NMRPA.
- Number of new resorts and other infrastructure with operational treatment plants in DAHAB city.

4.14 Major Oil Spill Risk

The risk of a major pollution event due to an accidental oil spill in the PA is high given the volume of commercial shipping that pass through the Gulf of AQABA In 1996 a big oil spill from Million Hope ship accident at south of Nabq pollute the shores of more than 20 km with oil since the oil reach Naama bay sandy beach. An oil spill in or adjacent to the PA would not only have detrimental effects on water quality but could also have significant ecological impacts on birds and intertidal assemblages in the PA. The EEAA is responsible for coordination of oil spills incident response and remediation (Borhan 1998). Whilst the management of shipping is outside the scope of this Plan, the preparation for an incident is not. Dr Mohamed Borhan, Director General of the Egyptian National Oil Spill Contingency Plan suggested that the risk of environmental damage associated with a spill is high given the incomplete knowledge on the spatial distribution of sensitive habitats in the PA and the current lack of spill control equipment (pers. comm. January 2003).

Objective: Reduce the risk of an oil spill causing significant impact on the PA.

Policy: Increase preparedness to deal effectively with any potential major oil spill in the PA.

Action:

- Red Sea PA GIS provide EEAA NSCP GIS Office with maps of mangroves and other sensitive habitats in NMRPA.
- EEAA develop a contingency plan to combat an oil spill in the PA
- Having a regular training to the ranger on combating oil spill
- Indicators:
- Number of oil spills reaching land
- Development of an oil spill contingency plan for the PA

4.15 Fuel Wood Collection

Wood is collected by the Bedouin as a source of fuel. Dead wood is only used as it is prohibited to cut green branches, few families who are still doing this now and mainly in winter for worming since most of the Bedouin now had cookers. In the past around 10 years ago most of the Bedouin were depending on the dray wood collection mainly from the Arak and mangrove and because the Arak sand dunes is closer to El Ghargana and easy to collect the dray branch than the entangled mangrove branches which can hurt the collector so they were mainly depend on the Arak and some time on the Netraria dray branches.
Now most of the Bedouin around 80% had cooker working with gas tank, so collection of wood as fuel is reduced a lot and its effect on the mangrove stands can be neglected.

Objective: To reduce the impact of fuel wood collection on wild flora of NMRPA and adjacent regions, and ensure its sustainability.
Policy: Only indigenous inhabitants will be allowed the collection of fuel wood. Visitors must obtain fuel from other sources, such as gas cylinders. The PAMU will seek to prohibit the collection of fuel wood for all visitor activities in NMRPA and to stimulate

demand for alternative fuel. Utilization of solar technology and other renewable energy sources should be encouraged.

Actions:

- Prohibit the use of fuel wood by non-indigenous users of NMRPA, through awareness and enforcement.
- Inform tour operators and other visitors that they should bring their own supply of imported fuel wood, butane gas cylinders or kerosene stoves.
- Produce awareness materials on the threat of fuel wood collection to biodiversity.
- Hold workshops for stakeholders engaged in tourism businesses to increase awareness of the regulation of fuel wood and alternatives.

- Monitor the impact of implementing the above measures on fuel wood consumption.
- Establish a pilot venture to import fuel wood from the Nile Valley for sale to visitors to NMRPA.
- Design, test and manufacture simple solar stoves for demonstration purposes, with the aim of generalizing its use by indigenous inhabitants of NMRPA (use experience gained in St Katherine PA).

Indicators:

- Number of visitors using native fuel wood.
- Condition of vegetation in monitoring plots established near local settlements.

4.16 Grazing

Herding or Grazing activity is mainly limited to unmarried mature girls, and is practiced in nearby sites where the girls take their flocks for grazing mainly on the *Netraria retosa* bushes in the area around El Ghargana, a herding day starts at about 9 o'clock and ends at sun set.

Localized overgrazing is one of the main problems in NMRPA. However, until alternatives such as affordable feed supplements are available, the problem will remain intractable, as grazing is a long-standing cultural tradition linked directly to one of the most important livelihood sources of the local communities.

Few Camels feed on mangroves in NMRPA most of the Camels are involved in the camels safari and it is on the western side of NABQ PA and it is a long distance for the camel and even the Bedouin who own them to come and bring mangrove branches for them, so most of the Bedouin prefer buying fodder.

The main effect from the herding or grazing is by goats and sheeps and can be easly identified around the Bedouin settlement especially at El Ghargana Village on the coast where there was a lot of vegetation *Zygophyllum sp.* and *Lemonium sp.*

Objective: To ensure that grazing pressure is maintained at sustainable levels.

Policy: The PAMU, with the co-operation and agreement of local communities, will seek to introduce an integrated program for sustainable grazing, particularly in critical habitats, such as mangroves and salt marshes.

Actions:

- Establish close communication with local community members to understand grazing patterns and issues.
- Conduct a study to assess the impact of grazing on the natural vegetation of the region, including mangroves.
- Grazing in mangroves should be restricted to Traditional Use Zones only.
- Grazing will be prohibited in Strict Natural Zones.
- Patrolling to enforce no grazing zones.

Indicators:

- Number of goats in selected monitoring sites.
- Number of camels in selected monitoring sites.

4.17 Fishing

Fishing is just allowed only for Bedouin inside NABQ PA using net or lines with standers. There is a fishermen village El Ghargana it's the only settlement of Bedouin on Nabq coast and most of the Bedouin there are fishermen. The village is the main landing of all fishermen which can be ranged from 20 permanent fishermen up to 40 fishermen mainly in summer time, with a fish production ranged from 2 to 4 tons of fish per year.
Mainly they are fishing using the net and few of them having small boats (4 boats, 5m) for line fishing
The Bedouin communities within NABQ PA are respecting the PA regulation since in 1996 the PAMU with the consultation with the Bedouin society established the no take areas as a tool in managing this activity giving 70% of NABQ PA coast as closed for fishing while only 30% is just allowed.
In Dahab Marine PA fishing is not regulated and causing a conflict with other recreational activities like diving and snorkeling.
Studies have indicated that Bedouin fishermen can have significant effect local fish stocks. Galal et al. (2002) reported that fishing by Bedouins in Nabq PA, had led to a significant decrease in the abundance and mean length of some serranids and lethrinids. The long-term effects of human induced change in the composition of reef fishes or modification of trophic structures remain unknown. Long-term studies suggest that the loss of herbivores can contribute to shifts in the composition of sessile benthic organisms.

Objective: To establish sustainable and ecologically sound fisheries in NMRPA.

Policy: Reduce current level of fishing activity in DAHAB MPA through limiting fishing rights to indigenous fishermen only, and reduce ecological damage through prohibition of illegal fishing methods and establishing no-take zones in DAHAB MPA.

Action:

- The PAMU/EEAA and the Fisheries Authority to establish and implement a fisheries management plan for DAHAB MPA.
- The PAMU to establish and implement PA zoning scheme, which will include no-take zones in DAHAB MPA.

- The PAMU to implement no fishing for non-indigenous fisherman in DAHAB MPA
- All fishermen active in NMRPA will need to be licensed from the PAMU and registered. Licensees will be given clear instructions on the regulations of fishing in the PA and details of no-take zones.
- The PAMU will carry out an information and educational campaign to alert fishermen, fisheries authorities and coast guard active in the NMRPA region to the PA regulations.
- The PAMU will patrol the PA waters and prosecute repeat violators of regulations.
- The PAMU will monitor fish landings in and around NMRPA.

Indicators:
- Fish landing statistics in and around NMRPA.
- Population structure of commercial species.
- Number of operational no-take zones.

4.18 By-catch and Boat Strikes

Dugong and turtles are vulnerable to being caught and drowned in large mesh (150 mm and greater) fishing nets, and being hit by fast moving boats. The frequency of such occurrences in NABQ PA was In the last 10 years the result of the by - catch with the fishermen nets was 2 turtles, one shark, one dolphin and from Boat Strikes it was a dugong.

Objective: Limit the impact of human activity on dugongs, marine turtles and cetaceans in the PA.

Policy: Ensure that fishermen and boat operators active in the region are aware of the risks posed to dugongs, marine turtles and cetaceans, and of the complete protection they enjoy inside the PA. Prohibit vessels from speeding in important habitats and locations. Ban the use of all sporting speedboats in the PA.

Action:
- The PAMU identify critical habitat for dugongs and marine turtles in the PA.
- The PAMU develop strategy to minimize disturbance and mortality of dugongs and marine turtles in the PA.
- The PAMU to inform fishermen and boat operators active in the region of the complete protection dugongs, marine turtles and cetaceans enjoy in the PA.
- The PAMU to implement zoning scheme.

Indicators:
- Number of turtle and dugong caught by fishermen in NMRPA.
- Number of turtle, dolphins and dugong injured by vessels in NMRPA.

4.19 Collection of Marine Invertebrates

In NABQ PA an invertebrates fishery, carried out by women, is well developed. Interviews to the local Bedouin women revealed that they harvest invertebrates daily on shallow reef flats using a traditional metal spear (Ashworth et al, 2004) and that commonly exploited mollusks are Octopus spp., Tridacna spp., Lambis lambis, Tectus dentatus and Strombus tricornis. The NTZs effects on fish stocks have been monitored since 1995, and after five years of protection the abundance of the main target fish families was found to be significantly greater (Galal, 1999; Galal et al, 2002). No overall statistically significant differences in benthic assemblage's multivariate composition were found between TZs and NTZs. However on reef flats, the presence of broken and dead coral colonies, not found in NTZs,

Objective: To maintain the natural population levels and ecological functions of marine invertebrates in NMRPA.

Policy: No collection of marine invertebrates will be allowed in NMRPA. As the long-term ecological damage from this activity is very high, with limited socioeconomic consequence and clearly contradicts the PA objectives; the ban on invertebrate collection should be immediately effective.

Action:

- The PAMU/EEAA and the Fisheries Authority will coordinate efforts to enforce the ban on invertebrate collection in NMRPA.
- The PAMU will carry out an information and educational campaign to alert fishermen, fisheries authorities and coast guard active in the NMRPA. region to the PA regulations.
- The PAMU will patrol the PA waters
- and prosecute repeat violators of regulations.

Indicators:

- Number and species of marine invertebrates found with violators.
- Number of violations.
- Numbers of indicator species in specified monitoring plots.

4.20 Collection of Medicinal Plants

The medicinal plants found in NMRPA. are a valuable resource for local people. Balanites and Salvadora are two of the most valuable medicinal plants in NMRPA. The collection of Balanites fruits, and Salvadora branches and roots is a source of cash for the local population. However, if unregulated, this activity could lead to the degradation of the plants and affects their regeneration. In the mean time the income received by the local people represents a fraction of the true value of their products.

Objective: To ensure that medicinal plant collection is sustainable and the income to indigenous communities is maximized.

Policy: Best practices for the collection of medicinal plants, which insure sustainability should be applied. Collectors will be encouraged to process, package and market their own medicinal plants. PAMU will assist in facilitating marketing avenues.

Actions:

- Build consensus for a community agreement on sustainable collection levels for medicinal plants from NMRPA.
- Develop best practices for medicinal plant collection. The collecting system should be based on traditional indigenous conservation traditions.
- Developing a marketing strategy for medicinal plants from NMRPA.
- Encourage the GEF/UNDP/EEAA Medicinal Plants Project (which aims to establish sustainable harvesting practices for wild medicinal plants several PAs in Egypt) to assist and participate in developing the above activities.
- Encourage collectors to process package and market their own medicinal plants to add value to their product.
- Introduce a system for licensing collectors.
- Establish a local branch of the Medicinal Plant Association.

Indicators:

- Number / cover of medicinal plants in monitoring plots.
- Income from medicinal plant units.

4.21 Hunting

Hunting is a serious threat to large mammals in the region. In NMRPA hunting the Nubian Ibex *Capra nubiana* at wadi El Ghoraby natural spring was the only haunting problem which the PAMU face and it is by local people.

Objective: To maintain the natural population levels and ecological functions of wildlife in NMRPA.

Policy: Stop all hunting and wildlife collection activities in the PA. The no-hunting regulations within the PA and it's Buffer Zone will be strictly enforced for all wild native species (this excludes catching commercial fish), and offenders will be vigorously prosecuted.

Actions:

- Frequent patrols of important wildlife locations and habitats. Special note should be given to securing water holes and wells, where wildlife might concentrate to drink or hunt.
- Mobilize Community Guards interventions and liaison activities in those areas and in seasons in which hunting (trapping and collecting) is reported.
- Vigorous interpretation program to local people explaining wildlife's ecological importance and the charismatic value of native wildlife for PA visitors, especially large mammals and particularly predators.
- Expanding eco-tourism destinations to remote areas to offer alternative income generation opportunities.

- At the local level, Community Guards should take note of animal collection or hunting activities, as local participants are usually involved.
- Install clear signs that indicate that wildlife hunting is strictly prohibited in the PA and its Buffer Zone.

Indicators:

- Number of selected indicator species at designated monitoring sites

4.22 Mining and Quarrying Activities

The only mining and quarrying in the area is the one running by the National Service Authority NSA and it is for the Albitite this is the raw material which used to form the ceramic and most of the national stock of this material is in NABQ at Gabal El Tarr.
The area of this activity is zoned and it is not allowed to have any other mining activity in the area.

Objective: To seek to minimize quarrying and mining activities in NMRPA and to ensure that existing activities do not destroy the long-term value of the PA's natural resources.

Policy: PAMU will seek to limit and reduce current mining and quarrying to the minimum. All quarrying and mining activities will be prohibited in important wildlife habitats, premium tourist areas, areas of natural beauty and archaeological, cultural and religious sites.

Actions:

- Evaluate the situation at the albait mining and quarrying areas in NMRPA, and the operational / contractual condition at each.
- The PAMU will ensure that regular monitoring of the albit min sites is implemented.
- The PAMU will ensure that operators are kept fully aware of quarry regulations.
- The EEAA will help initiate projects to introduce efficient modern methods of quarrying and mining, which reduce waste in the industry.

Indicators:

- Number of degraded mining and quarry sites.
- Maximal distance from quarry or mining site center where soil disturbance can be observed.

4.23 Threatened Species

NMRPA is home to a number of globally (as well as nationally) threatened species of fauna. The conservation of these threatened species is an international obligation, and one of the priorities of the National Biodiversity Strategy and Action Plan. The most outstanding threatened species in need of urgent management effort include desert antelopes, marine turtles, birds of prey, dugongs and nesting seabirds (see Table 7 for a complete listing of globally threatened species).

Objective: To ensure the long-term in-situ survival of the globally threatened species found in NMRPA. at their natural densities.

Policy: Globally threatened species found in NMRPA represent a critical resource in need of constant monitoring and special management effort.

Actions:

- The PAMU will seek to establish monitoring programs to establish the conservation status and population sizes of the most critically threatened species (Dugong, marine turtles, Dorcas Gazelle and Ibex)
- The PAMU will establish Species Action plans for the above-mentioned species.
- The PAMU will conduct regular patrolling of critical habitats and locations for the above-mentioned species.
- The PAMU will establish scientifically rigorous monitoring programs for the above-mentioned species.

Indicators:

- Number of individuals of target species at designated monitoring sites.

4.24 Localized and Threatened Habitats / Locations

Some habitats are particularly vulnerable because they occupy very small areas and/or are naturally sensitive to disturbance, these include habitats or locations that are very small such as marine islands, mangrove stands, turtle nesting beaches and sensitive archaeological sites. A high degree of existing or anticipated human use (for recreation for example) at these sites, and the potential for conflict is an important factor in identifying sites of special concern.

Humans have the potential to disturb nesting marine turtles and seabirds. People walking or campfires may deter female turtles from nesting. Large pieces of solid waste, such as pallets or large lengths of timber, on nesting beaches may act as barriers to nesting turtles. Similarly, humans walking in or adjacent to an activity rookery may alter the behavior of adult birds to the detriment of the young. Introduced animals, such as rodents or cats, may prey on eggs, recently hatched birds or on adult birds.

Objective: To ensure that sensitive habitats / localities found in NMRPA retain their natural, ecological or cultural values and functions.

Policy: Sensitive habitats and localities need particular management attention to reduce or eliminate the risks they face, case by case (turtle nesting beaches will be closed to visitors during the breeding season, and no structures will be permitted in their vicinity).

Actions:

- The PAMU will seek to identify the most critical habitats and locations in need of special management input.
- The PAMU will establish Site Action plans for the listed habitats and localities, and others, which are identified at later stages
- The PAMU will conduct regular patrolling of critical habitats and locations.
- The PAMU will establish scientifically rigorous monitoring programs for indicator resources at each of the above-mentioned localities.

Indicators:

- Variable at each habitat / location. To be specifies in each Site Action Plan.
- Number of nesting turtles and seabirds at important nesting sites.

4.25 Introduced, Feral, and Invasive Species

Alien invasive species is one of the most outstanding issues facing biodiversity today on a global scale. Along the Gulf of Aqaba alien species of plants are widely introduced for ornamentation in tourist developments and can become invasive. Feral cats and dogs associated with human dwellings can be highly destructive to native wildlife. Feral cats are particularly damaging to reptile and bird populations, while dogs are known to hunt and disturb gazelles. Both cats and dogs can transmit diseases to wildlife. Feral donkeys are also a problem because of the impact they have on vegetation and water supplies (one donkey has the nutritional maintenance needs of three male ibex).
In temperate marine systems, invasive species are well-documented causes of marine community disruption. Recent studies indicate that tropical seas are also susceptible to invasions from introduced species.
There are three harbors in the Gulf of Aqaba that regularly receive vessels from international waters. Species introduced to these harbor could conceivably spread into adjacent waters. Alien species of marine fauna was recorded in Nabq PA (Ayman Mabrouk report 1998) as a result of the Mari-culture in Elate for the Mediterranean Bream Sparus Orata

Objective: To eliminate all introduced, feral and invasive species from NMRPA, and prevent the introduction of any further ones.

Policy: The PAMU will seek to eradicate, in a humane manner, all feral, alien and invasive species inside NMRPA. No poisons will be permitted for alien species control. Further introduction of alien, particularly invasive, species in NMRPA, will be prohibited.

Actions:

- The PAMU will prepare a list of feral and alien species found in NMRPA and record their distribution.
- PAMU to undertake biological survey over NMRPA to describe the occurrence of introduced marine species, and assess possible eradication.
- The PAMU will implement a humane eradication program for all alien species including feral cats and dogs, priority given to Strict Natural and Premium Wilderness Zones.
- Encourage the local inhabitants to round up feral donkeys from Strict Natural and Premium Wilderness Zones.
- Prohibit the use of exotic plants for landscaping in all developments inside NMRPA, and enforce the use of alternative indigenous species.
- Establish a nursery of local indigenous plant species to be used in landscaping in NMRPA.

Indicators:

- Number of introduced species.
- Number of individuals of feral / introduced species in designated monitoring plots.
- Number of non-indigenous plant species used in landscaping.

4.26 Scientific Research

Although the PAMU is primarily a management body and not a research institution, effective conservation management requires accurate and relevant information. Thus, targeted and management issues oriented research is an important component of the PAMU's scope of work. On the other hand, unplanned research lacking clear scientific objectives could be counterproductive. Indeed some research can be highly damaging to important natural resources, especially if research design calls for the collection of large numbers of specimens of fauna and flora or other samples.
NMRPA. is a valuable scientific resource that increasingly attract scientists and researchers not on the local level but on the international level as there are yearly visites and researches from Germen and Austrian Universities result in a lot of researches and these should be encouraged. Scientific research is one of the important activities, which PAs seek to promote and facilitate.

Objective: Ensure that all scientific research conducted within NMRPA. is not detrimental to critical natural resources, is scientifically and ethically justified and helps advance the PA management objectives.

Policy: Meaningful non-intrusive scientific field research is an important activity to be encouraged in NMRPA.. The PAMU will encourage and where possible support applied research both by outside researchers and by PAMU staff, according to planed priorities. Internal studies are the ones elaborated by the PAMU staff or financed by its administration to directly support the PAMU decision-making or management activities.
All external researchers must submit a detailed proposal to the PAMU/EEAA for approval. All data and research results are to be registered in the PAMU's IT/GIS unit as a matter of course.

Actions:

- The PAMU will prepare a schedule for priority research projects, which the PAMU staff should carry out, our can be contracted to external researchers.
- All researchers will have to submit a research proposal for PAMU/EEAA approval; outlining their intended research and methodology and indicate whether specimens of plants are to be collected, how and in what quantities, with justifications.
- Outside researchers will be encouraged and supported where practical to undertake applied research on condition that they submit; sign confidentiality and code of conduct statements and submit papers intended for publication for prior review.
- All researchers will be expected to acknowledge any support and submit a free copy of any paper, article or thesis arising from the research to the PAMU library.

- The PAMU technical staff will be encouraged to pursue relevant and applied research as part of their duties.

Indicators:

- Number of applied (i.e. management oriented) research projects.
- Percent of priority research topics addressed.
- Number of reports and reprints resulting from the research received by the PAMU.

5. Management Tools

5.1 Zoning

An important mechanism to achieve the objectives of NMRPA is a zoning scheme. The zoning scheme for NMRPA is a resource-based approach by means of which the area is zoned/classified according to its need for protection, level or intensity of management and capacity to sustain traditional, public or commercial use. The scheme provides guidelines for management actions and helps resolve conflicts, which frequently arise when attempts are made to conserve and utilize the same resource base. It also designates areas for specific activities such as scientific research, recreation, tourism or fishing.
Table ( ) Internal management zones for NMRPA.

Permissible impact level	Management input	Name of zone
Zero impact	Low - moderate	1- Strict natural zone
Low impact	Moderate	2- Premium wilderness zone 3- No-take zone
Moderate impact	High	4- Recreational zone 5-Traditional use zone
High impact	High	6- Multiple use zone 7- Adjacent Area (Buffer Zone)

The NMRPA zoning scheme includes seven management zones (Table), falling under four categories of varying protection levels, ranging from a strict natural zone, where no activities are permitted, to a multiple use zone, where many activities of limited ecological impact are allowed under strict management constraints. An external zone category will be applied to accommodate the PA adjacent area: Buffer Zone. Tables ( ) & ( ) categories the most common or anticipated activities in NMRPA according to their permissibility in each of the zones, both on land and in the sea.

5.1.1 Zone Descriptions

Strict Nature Zones

General Description: (The high altitude mountain north of NABQ PA) Pristine natural areas set aside for the free interaction of ecological factors and worthy of total protection with no roads or other forms of modern construction. These areas are variable in size; for desert wildlife conservation they are usually relatively large i.e. up to a hundred square kilometers and remote to serve their purpose; for marine and coastal wildlife they could be quite small (such as small islands). Where appropriate and possible, "Wildlife Corridors" that link critical habitats should be zoned in this category.
Protection Level: High with zero impact if possible.
Objectives: To ensure the representation and continued existence of all resident flora and fauna elements within the PA in a natural state, to allow for movement of wildlife between critical habitats and to serve as monitoring sites.
General management strategy: No active management other than patrolling, halting of damaging activities, removal of feral species, etc.; only non-manipulative scientific research is allowed. Any existing tracks will be closed to public access and used only for management purposes.
Development: None permitted and all scientific facilities to be removable.
Public Use: Generally none permitted.

Premium Wilderness Zones

General description: (The mangrove stands and the Arak stand) Very high value natural areas set aside primarily for the use of a limited number of visitors to have a rewarding experience in a remote wilderness area.
These areas are extensive in size, often made up of several landscape units, free of man-made constructions and to be used only in a way that does not necessitate access roads. Transit corridors for tourists will also be zoned under this category.
Protection level: High protection: Minimal impact.
Objectives: The preservation of wilderness environments in a condition as close as possible to their natural states to serve low density, high value/premium wilderness adventure tourism and bring associated benefits to local communities.
General management strategy: To limit the number of visitors (in terms of absolute numbers, group size and number of groups per area), to ensure the preservation of a premium wilderness environment for high value backcountry recreation with limited ecological management. Premium backcountry fees should be charged for entrance to premium wilderness zones.
Development: None.
Public use/Permitted activities: Strictly regulated to limit absolute numbers, group size and number of groups. Local communities to carry on traditional practices as long as these do not exceed sustainable off take of resources; non-traditional uses i.e. groups trekking on foot or by camel, will be limited by aesthetic and physical carrying capacity as determined on the site's absorptive capacity but in all cases will be severely limited.

No-take zones

General description: (The closed area for fishing) A no-take zone is an area where harvesting of marine resources is strictly prohibited, but passive non-extractive types of ecotourism activities, which are considered environmentally benign activities and scientific research may be permitted.
Protection level: High protection. Low impact.
Objectives: The no-take zones aim at protecting sensitive habitats from destructive fishing methods, providing refuge for intensively harvested species (target and by-catch species), enhancing production of target species outside the no-take zone, serving as a demonstration area to the extent of human impacts in coastal environments, and providing high quality localities for ecotourism.
General management strategy: Regular patrolling to ensure the halting of all fishing activities. Only a limited number of visitors should be allowed, to ensure the preservation of a premium high value resource with limited management input. Premium fees should be charged for reservation and use of no-take zones. Only non-manipulative scientific research is allowed.
Development: None permitted.
Public use: Restricted public use preferably limited to high quality diving and snorkeling tourists (ecotourists), who would have appreciation of the special conservation privilege these areas enjoy and the pristine condition they should be in.

Recreational zones
General description: (diving, snorkeling and camping sites) Largely natural areas where public access is freely allowed but organized to provide visitors with a natural and rewarding experience in the PA. Largely natural areas with high scenic and cultural value and of moderate importance for biodiversity conservation.

Protection level: Medium level, minimal impact.
Objectives: To provide opportunities for easily accessible backcountry tourism that provides visitors with a rewarding natural experience and generates income for local people.
General management strategy: Active management to maintain natural areas and minimize impacts by installation of facilities, monitoring guides, enforcing Trekker's Code etc. The aesthetic carrying capacity in these zones will be significantly higher than in Premium Wilderness Zones but specific limits will be set to maintain visitor expectations and standard entrance fees will be levied on users.
Development: Restricted to established Bedouin settlements, installation of camping sites, trails, markers and other facilities to limit visitor impact.
Public use: Organized access within prescribed carrying capacity.

Traditional Use Zone
General description: Relatively large and well-preserved areas where only traditional Bedouin activities (herding, artisanal fishing) for using biodiversity are permitted but controlled. Primarily devoted to the development of indigenous systems and practices for the conservation and sustainable use of biodiversity and internal buffer zones for areas of high conservation interest.
Protection level: Medium level. Moderate impact
Objectives: To sustain and enhance traditional Bedouin lifestyles and practices.

General management strategy: Active management with controls on development and where resource conservation measures such as grazing reserves, recharging groundwater supplies, veterinary surveillance and feral animal eradication can be practiced.
Development: Restricted. New tracks are permitted only to communicate with established settlements or areas related to traditional use. Upgrading and development of traditional agricultural activities, including wells and catchments dams, permitted with controls. Expansion of existing settlements allowed with vernacular architecture styles.
Public use: Limited with access to outside visitors reserved for Bedouin mediated experiences that benefit local communities.

Multiple Use Zone
General description: Areas of low conservation value which are individually relatively small and collectively constitute a small proportion of the PA; that are already developed or scheduled as urban areas, ecotourism development zones; have already been highly impacted or are likely to be in the near future. These areas are generally already developed (urban areas), utilized (quarrying), Shrimp Farm or set aside for services essential to the PA or for the provision of the facilities and deleterious activities required for visitors.
Protection level: Low protection. High impact
Objectives: Sacrificial areas used for multiple purposes to concentrate urban development, commercial activities such as quarrying or high impact tourism activities in areas of relatively low conservation value.
General management strategy: Passive with activities monitored to ensure compliance with regulations. The ecolodge development zones within NMRPA will be subject to strict development controls in accordance with the widely accepted ecolodge development codes.
Development: As required, according to PA regulations and EIAs.
Public use: Generally open access used for high impact commercial activities organized by operators for visitors such as quads, a reduced PA entrance fee will be levied on operators.

Adjacent Area (Buffer Zone)

General description: Strip of variable width surrounding the designated boundaries of NMRPA, as defined under Article 3 of Law 102 (Part II).
Protection level: Low to medium protection: Low, medium to high impact.
Objectives: To help minimize external threats to the PA from incompatible or unsustainable land-use practices occurring outside the legal boundary. Within the adjacent area there will be some form of management control over land use. In this regard the “adjacent area” will constitute a nominal “buffer zone.”
General management strategy: It is forbidden to undertake activities or experiments in the adjacent area that will have an effect on the protectorate’s environment and nature, except with the permission of the concerned administrative body. Within the adjacent

area there will be some form of management control over land use and commercial activities.
Development: Permitted according to location and PA regulations.
Public use: Open access according to type of activity and PA regulations.

Buffer zone	Multiple use zone	Traditional use zone	Recreational zone	Premium wilderness	Strict natural zone	Activity/ Zone
Yes	No	Yes	Yes	No	No	Recreational uses
Yes	Yes	Yes	Yes	Yes	No	Ecotourism (bird watching, wildlife photography, etc.)
Yes	Yes	No	Yes	No	No	Desert safari / camping
Yes	Yes	Yes	Yes	Yes	No	Cultural heritage
Yes	License	No	No	No	No	Commercial uses
License	License	No	No	No	No	Mining
License	License	No	No	No	No	Shrimp Farm
License	License	No	No	No	No	Prospecting for minerals
No	No	No	No	No	No	Charcoal making
Yes	Yes	Yes	No	No	No	Transport
Yes	No	Yes	No	Yes	No	Traditional uses
Yes	Yes	Yes	No	No	No	Collection of medicinal plants
Yes	No	Yes	Yes	No	No	Grazing
Yes	No.	Yes	No	Yes	No	Collection of firewood
NA	NA	NA	NA	NA	NA	Visitation to religious sites
						Other uses
Permit	Permit	Permit	Permit	Permit	Permit	Scientific research

Table (3) Uses permitted in each zone of the terrestrial component of NMRPA

Multiple use zone	Recreational zone	No-take zone	Strict natural zone	Activity/ Zone
Yes	Yes	No	No	Subsistence fishing
				Recreational fishing
Yes	No	No	No	Hand lining / drop lines from shore
Yes	No	No	No	Hand lining / drop lines from boat
Yes	No	No	No	Net fishing from shore
Yes	No	No	No	Net fishing from boat
No	No	No	No	Trap fishing
No	No	No	No	Collecting invertebrates
No	No	No	No	Spear fishing
				Commercial fishing
License	No	No	No	Hand lining / drop lines
License	No	No	No	Net fishing from shore
License	No	No	No	Net fishing from boat
No	No	No	No	Trap fishing
No	No	No	No	Trawling
No	No	No	No	Spear fishing
				Other commercial
Permit	No	No	No	Aquaculture
No	No	No	No	Mineral exploration / development
Permit	Permit	No	No	Charter vessels – fishing
License	License	License	No	Charter vessels – other
License	License	License	No	Eco-tourism activities
				Other recreational
Yes	Yes	Yes	No	Boating
Yes	Yes	No	No	Surface water sports
Yes	Yes	Yes	No	SCUBA diving
Yes	Yes	Yes	No	Snorkeling
Yes	Yes	Yes	No	Reef walking
Yes	Yes	NA	No	Beach activities
				Other activities
Permit	Permit	Permit	No	Groyne, jetties, moorings etc
Permit	Permit	Permit	Permit	Scientific research

Table 4 Uses permitted in each zone of the marine component of NMRPA

5.2 Patrolling

Patrolling is the main and most basic management tool to be used by the PAMU. ALL PAMU staff regardless of specialization (with the exception of technicians) will be obliged to participate in patrolling activities. It is expected that all PAMU staff (with exception of the PA Manager) will spend between 25-50% of their working time on field patrols, spending the balance of the time on their particular area of specialty.

Within NCS/EEAA patrolling is often considered to be synonymous with "monitoring". It is important to distinguish between the two activities (see further details under monitoring below). Patrolling consists of regular or irregular inspection of the PA and its resources, either on land or in the sea. The main objectives of patrolling are to enforce PA regulations, discover and stop violations to PA regulations by PA users and to detect any notable, broad changes in the PA's natural conditions, which might require further detailed investigation and monitoring.

Thus, patrolling intensity and frequency should be higher in PA zones where increased human activities are allowed (as in the Multiple Use, Traditional Use Zone and Buffer Zones).

Patrolling will be conducted by teams of PAMU staff (rangers and community guards). Patrolling teams must be in full uniform, to affirm their authority and identity. Patrolling teams will have multidisciplinary tasks. While the main objective is regulation enforcement, rangers on patrol could also collect data for use in monitoring programs; communicate with local inhabitants and community guards; maintain PA facilities (such as signs, buoys, tracks, etc.).

Specific patrolling schedules and routs need to be developed when PAMU staff is more familiar with visitor use patterns and issues. The patrolling schedule will identify specific routes, localities, times and teams to carry out the patrolling missions.

Safety considerations must be paramount for patrolling teams to avoid endangering PAMU staff. Long desert patrols should be composed of two vehicles, equipped with basic tools, spare tires, extra water and first aid kits. Similarly boat patrols must be equipped with life vests and first aid kits. All patrolling units should be linked amongst themselves and with the main PAMU headquarters via direct wireless communication.

5.3 Law Enforcement

Enforcement of the provisions of Law 102 for 1983 and Law 4 for 1994 is an important obligation for the PAMU. PAMU have police power enabling them to take action against violators of the law. Close contact and coordination with local coast guard and police is important to have effective law enforcement.

Law enforcement is one of the primary tasks of all rangers (regardless of specialization). ALL rangers should get basic training in enforcement procedures and expected professional behavior expected dealing with violators. Law enforcement is an important component of the patrolling activity, and patrolling teams should be prepared at all times to carry out their obligation in enforcing the law.

The legal officer (ranger) will be responsible for follow up of prosecution procedures and will keep track of record of details and relevant paper work.

5.4 Environmental Impact Assessment (EIA) in details

EIAs are one of the primary management tools for the PAMU. EIAs should be undertaken prior to the construction of any tourism facility inside the PA and even outside it due to the law 4/1994. The EIAs should follow the Environmental Impact Assessment Guidelines (EEAA 1996), the Environmental Guidelines for the Development of Coastal Areas (EEAA 1996) and any relevant TDA guidelines. The final EIA should be reviewed, verified by and approved by the PAMU to insure that information presented is accurate and that the project complies with the PA's regulations and management objectives.
This concerned mainly the development on Dahab coast where all the touristic development lies on it should go through this process before construction.

5.5 Licensing / Permits

Licenses are used to regulate certain long term and stable activities, where regulations do not need to be adjusted such as quarries. Permits are given for shorter periods where seasonal adjustments might need to be made on a short term basis, such as for fishing, research, entering closed zones, etc.
A comprehensive, consistent and stable licensing and permit system needs to be developed identifying activities which need to be licensed, prerequisites for licensing, and arrangements with other stakeholders who should participate in the licensing process.
Permits and licenses are also to be used as a method to inform users of the PA regulations and to educate them about its values. Thus, all licensees should receive a standard information / education package along with their permits or licenses.
The possibility of collecting fees for concession licenses should be investigated within the framework of revenue generation in Gulf of Aqaba PAs at large.

5.6 Site Action Plans

Site action plans are designed to provide specific and detailed management guidance to PAMU staff for small, discrete sites of particular concern due to significant conservation importance and sensitivity, and which could be subject to exceptionally high human pressures. An example would be a mangrove stand or sea turtle nesting beach. Site action plans must conform to the PA zoning plan and its management objectives.

5.7 Species Action Plans

Endangered species and species of particular concern due to their charismatic appeal to visitors, such as Dugong, marine turtles and dolphins need special attention to address their particular management needs. The globally threatened species listed in Table 7 are the fist candidates for species action plans. Key priority species will include Dugong, marine turtles and gazelles. PSU is currently preparing pilot species action plans.

5.8 Moorings

Establishing moorings has been the primary tool for the NCS/EEAA to control damage caused by small fishing boats active in the Gulf of Aqaba anchoring directly on to fragile coral reefs. This is one of the main threats the marine tourism activities pause to the marine resources of the region.
Moorings are prescribed in the NMRPA for three main reasons:
They protect corals and other organisms by eliminating the need to anchor directly on the reefs.
They provide extra security and convenience for vessels visiting the PA.
To indicate where visitation is permissible in the marine part of the PA (i.e. moorings are to be placed only where diving activities are allowed, no anchoring will be allowed where buoys are not present).

5.9 Monitoring

Monitoring is the primary source to direct and adjust management, and is thus an essential part of the management process. Monitoring generally involves the collection of data over time with the objective of detecting change in a particular situation. It is an activity carried out with an objective in mind, usually to detect departures from a set standard. For example, to detect if certain activities in the PA are having negative impacts on particular resources, and to provide timely warning of the deterioration in the conservation status of certain species, thus allowing remedial action to be taken. Monitoring is not an academic exercise, but a practical one that must produce data to be interpreted and feed back into management mechanisms.
Monitoring should be a carefully designed and focused activity with specific objectives that aid in important management decisions. The monitoring process can be divided to two components, an initial one that involves assessing existing status of resources and establishing the methodology used to do that. The other is more or less the replication of this assessment or parts of it over time, using the same methodology. The initial phase is crucial because it sets the tone for a long-term effort, which if not well designed and thought out, and if not practical, would not produce the desired results and be sustainable.
In biodiversity monitoring it is impractical to design several parallel systems to address various taxonomic groups independently. It is more efficient and logical to adopt a general methodology applicable to all faunal groups and flora as much as possible.
In the initial stage the aim should be establishing methodologies to collect field data and collate baseline information on the resources of the PA. This would help develop an understanding of the natural trends and processes of the local ecosystem. In order to gain such understanding and to be able to distinguish between what is natural and not natural, results of monitoring over a period of time are needed.
Several important issues should be considered carefully at the outset of a monitoring scheme:
What to monitor? Data collected should show meaningful trends and be useful for future management applications, as well as be practical to collect in a sustainable fashion. In the case of biodiversity monitoring (for example) we should aim at monitoring species range, abundance and their habitat condition.
How to monitor? Monitoring should be systematic, regular (not necessarily frequent) and sustained. The methodology should be simple, requires minimal resources and can be integrated with more regular ranger activities.

How frequently to monitor? This should be relevant to the phenomena being studied. Although supplementary data should also be collected on an ad-hoc basis during regular patrolling by park rangers.

5.9.1 Grid Cell System

It is proposed to use a 0.10° grid system as the basis for recording all fauna and flora observations during regular patrolling missions in the PA. The grid cell system will greatly facilitate spatial analysis of data acquired and help to indicate gaps in geographical coverage. This will contribute to building up the knowledge base of the PA's resources and help identify gaps in knowledge; focus survey work to target poorly covered locations. Data collected in the field should be integrated with the existing database at the IT/GIS unit at Sharm El Sheikh. The 0.10° grid system has been proposed and adopted in St Katherine and Siwa PAs as a basis for data collection and treatment. The uniformity in data treatment amongst PAs in Egypt will also facilitate the possibilities for comparative and system wide analysis.

5.9.2 Active Searching (Prospecting)

This is a non-quantitative simple and practical technique, the main objective of which is to document the presence and distribution of species within and among grid cells. Casual or opportunistic observations made by PAMU staff during routine tasks would fall within the scope of this data collection technique. All observations are to be recorded on standard forms.

5.9.3 Monitoring Specific Sites

Monitoring of specific sites can be adopted for two purposes, one to assess impacts on particularly sensitive sites or habitats, or at localities subjected to particular pressures; the other is establishing long term monitoring stations for the PA. The later requires establishing permanent transects at localities with good representation of the habitats and morphological features of the PA for long-term monitoring.
The PAMU could establish permanent monitoring routes linking series' of transects that sample the Protectorate's various habitats. These would be visited regularly in order to produce a reasonable time series that can be used in assessing changes in populations, impacts of human activities and responses to management practices etc.

5.9.4 Indicators

An effective way to monitor ecological and environmental change is to establish a group of indicators that would be the prime targets for future monitoring activities in the PA. In the section titled "Management issues, policies and actions" a group of indicators are proposed for each management objective. This need to be further refined and organized in logical clusters, which would form the backbone of the PA's monitoring program.
A popular ecological indicator is an "indicator species", which is a species of narrow ecological amplitude with respect to one or more environmental factors and which, when

present, therefore indicative of a particular condition or a set of conditions. Thus, indicator species are often used to sum up the ecological condition of a particular environment. Ideally, indicator species should be prominent, easy to detect,
easy to identify and sensitive to environmental change. Examples of good indicator species in WGHPA include Dorcas Gazelles Gazella dorcas, Ocellated Dab Lizard Uromastyx ocellata and marine turtles.

5.10 Reporting

Reporting is an important activity for the PAMU. It serves to inform the central offices of NCS of progress made, problems and needs, and also lets the PAMU to take stock on a regular basis of its achievements and ability to meeting the PA management objectives.
All PAMU staff will submit a monthly report to the PAMU Manager by the 28th of every month. Community Guard reports will be collected by visiting Rangers on a monthly basis. The PAMU manager will be expected to submit the PAMU report (according to NCS specified format) to the Regional South Sinai PAs office in Sharm El Sheikh and NCS head office in Cairo by the 1st of each month. A monthly financial statement is to be returned to the South Sinai PA financial controller in Sharm El Sheikh by the 10th of the following month.
NCS also requests annual reports for each PA. The format for this report should be obtained from NCS offices in Cairo.

5.11 IT and GIS

IT and GIS are important, efficient modern management decision-making support tools. Already the GIS unit at the PA regional office in Sharm El Sheikh has accumulated an extensive database of satellite images of the CMA and NMRPA and the distribution of the major coastal and marine resources and human resources in the region. However the efficiency and usefulness of GIS depends greatly on the overall design of its role in the management of the resources at hand.
A GIS unit will be established as part of the PAMU, and will function as a local node of Sharm GIS unit and will interact with it directly and fluidly. The local unit will serve PAMU management needs and benefit from the already existing capacities at Sharm In the Mean time it will digest locally generated data and information to be used at the regional unit and at central NCS databases.
At the PAMU level the IT / GIS unit will collect data from monitoring programs, patrolling, the spatial distribution of human development, welfare and economic activity in the PA, and the distribution of sites and natural resources of conservation interest. The unit will ensure that data is processed in an orderly fashion and retained for future use and analysis by the PAMU. The IT / GIS unit should be involved from early stages in the design and formulation of monitoring programs to insure adaptability of collected data.
Monitoring and management of this database will be critical and demanding tasks. It must be possible to integrate information from a wide, but controlled and defined, range of categories, adopt new data categories when they arise, and be able to demonstrate the comprehensiveness and limits of the database.

A review process needs to be periodically undertaken to ensure that the south Sinai / NMRPA GIS information base is developing usefully. The priority is to identify a checklist of data categories of spatial information representing the human and natural processes in the PA, which need to be complete and up to date.

5.12 Restoration and Rehabilitation

Rehabilitation and restoration of landscapes and habitats is a management tool that is applied to regain the natural features and ecological functions, which were lost due to human impacts. Restoration and rehabilitation should only be applied only after the causes of degradation have been halted or are under control.
This was the case were restoration of Mangrove Project were done in NMRPA where some area of the mangrove stands was eliminated from old time suspected to be at the 67 war and elimination of the mangrove trees cause an erosion on the shore.
The idea was to rehabilitate the mangrove in those eroded areas, the project give good results especially with the germinating seeds.

5.13 Public Education and Information

Public education is one of the most important management tools in the PA, which seeks to increase public awareness and stakeholder support. Public information is important to notify users of the PA regulations and restrictions. The target audiences are indigenous communities, tour operators, tourists, local, regional and national authorities, hotels, investors and schoolchildren.
Particulars of public education and information activities should be worked out in a detailed Public Awareness Strategy to be established by the PAMU.
Short-term activities should include direct communication between PAMU and the primary stakeholders in NMRPA, publishing a broacher and establishing signage in the PA.

5.14 Signs and Signposting

Signposting of a PA is one of the principal elements needed to guide visitors and residents through the area, making them aware of the PA's existence and particular places and facilities. Signs would need to be posted throughout NMRPA as a means to inform and educate visitors. Three types of signs will be used: to inform visitors and other users of NMRPA of the boundaries of the PA, signs with instructions and prohibitions, and signs which inform visitors about facts of educational value or points of interest.
A comprehensive signposting plan is needed to ensure the entire system would be integrated and stylistically harmonious. All PA signposting within NMRPA will be consistent in style, should show NCS/MSEA/ NMRPA logos, and whenever possible use natural materials.

5.15 Visitor Facilities and Infrastructure

The park will need to develop a wide variety of infrastructure and facilities to cater to visitors. There would have to be detailed studies of visitor's infrastructure and facilities prior to construction. The design, construction and maintenance of such facilities should take into consideration environmental impacts and utilize ecologically sound designs, traditional materials and appropriate technologies. It is suggested that these facilities be constructed from local materials such as stone, in particular the scrap granite in the mines around the park. It is also recommended that adaptive reuse be employed whenever appropriate. There are a number of abandoned buildings inside the park, which belong to the local communities and mines that could be converted for use as visitor facilities.

5.15.1 Visitor Centers

The visitor center is under maintenance and need to be equipped with Audio visual instruments to operate the show room beside the museum need to done in a proper way.
It is recommended to separate the staff accommodation from the Visitor Centre and this center be developed as a tourist attraction with exhibits, educational facilities, a cafeteria and gift shop.

5.15.2 Outdoor Displays

Outdoor displays can be set up at various sites for educational purposes. Such displays are recommended for sites of high visitor value, such as El Ghargana Mangrove and El Rewissia Mangrove.

5.15.3 Tracks

Tracks would have to be marked and some upgraded. Some tracks would have to be closed for visitation for conservation reasons, such as the track through the down stream part of Wadi El Keed (from the coast road up to the mountains).

5.15.4 Hiking Trails

Suitable areas for hiking trails need to be identified. Trails are needed in the Wadi El Samra where the Copper mine, as well as at Wadi Saialet Dalal.

5.15.5Observation Towers and Hides

Observation tower(s) and hides could be constructed at appropriate locations to facilitate viewing and minimize disturbance to the wildlife. It is recommended that an observation tower be constructed at the three Mangroves stands and hides erected near wildlife feeding and drinking sites.

5.15.6Viewpoints

At Ras Tntour and wadi Samra are recommended that lay-bys be established where vehicles could park to observe nature and photograph the scenery. Viewpoints are needed because at these sites the ranger can cover the coast of NABQ PA

5.15.8 Picnic Areas

Picnic areas can be developed at appropriate locations where the PAs Shelters are located which are mainly at the dive and camping sites.

5.15.9 Shelters

Maintenance of the existing shelters needed and new one to providing shade from the sun could be built in suitable areas where there is high tourism use. Recommended sites for shelters are at swimming areas, picnic areas, campsites and next to visitor centers.

5.15.10 Campsites

Campsites are identified and approved in coordination with the central security in suitable areas throughout the park.

5.15.11 Waste Receptacles

At certain high use areas locations such as picnic sites inside the PA, appropriate (non-offensive) waste receptacles should be set-up and regularly cleaned out.

5.15.12 Toilets

There are three dray toilets at El Ghargana Cafeteria, El Rewisiia and El Monqteaa, still there are sites need toilets like Nakhlet El Tall and Ras Tantour which they are also important as a diving, snorkeling and camping sites.

6. Management Resources

In order to facilitate the effective management of the PA essential resources have to be made available. The single most important management resource is a motivated and committed staff with a good understanding of conservation management principles. The management of PA staff and clear well defined responsibilities, as well as, communication lines are important to establish a coherent and self sufficient management unit. Communications within the PAMU and with South Sinai protectorates net work, as well as, with NCS is important, and it is exist through radio telemetry.
Basic infrastructure and equipment are also needed to make the management duties of the PAMU possible. Sufficient financial sources will have to be made available to develop the PAMU resources over the next five years. Ideally self-sufficient systems should be developed, whereby financial support to the PAMU is linked to revenue generation mechanisms within the PA, or the national PA system.

6.1 The Protected Area Management Unit (PAMU)

The PAMU is the management unit responsible of management and administration of NMRPA. It is directed by the PA manager and it should normally report to Sinai Regional Manager in Sharm El Sheikh, but direct reporting to NCS Cairo is expected on matters of urgent nature.

6.1.1 PAMU Staff

The PAMU staff is going to carry the responsibility for maintaining the resources of the PA and insuring that its objectives are met. Careful selection of future staff, clear job descriptions, training and well-defined career development lines are all important elements in developing a successful and effective team.
The PAMU administration will recruit sufficient suitable staff for the management of NMRPA. The global mean of PA staff per 1,000 km² is 27, while in NMRPA where many management issues need to be achieved a number of 23 are the target over the next 5 years.

Staff Career Development
It is important to establish a career track for PA staff to promote the spirit of achievement, encourage personnel development, allow the advancement of outstanding staff and provide NCS management a way of promoting qualified staff members. The following seven career ranks (Table 13) for PA staff within the NCS/EEAA has been adapted from the St. Katherine PA Management Plan with some adjustments. It is proposed to adopt this system throughout the PA network and to further formalize it within the NCS structure.

Table 5 Proposed career ranks for WGHPA staff within the NCS/EEAA

Basic qualification	Rank
Post graduate degree, over 10 years work in PAs	Senior NCS management positions
Post graduate degree, 10 years work in PAs	Regional Manager
University degree, over 5 years work in PAs	PA Manager
University degree, 5 years work in PAs	Senior Ranger
University degree, 3 years work in PAs	Ranger
Recent university graduate	Junior Ranger / technician
Basic schooling, nomination from local community leadership	Community Guard

6.1.2 PAMU Staff Duties

The main roles and functions of field staff defined below are based on the legislation concerning PAs (Law 102/1983 and Prime Ministerial Decree 264/1994) and on the Law of the environment (Law 4/1994). Rangers have general responsibilities for:
The management of the PA
The awareness and education of the public
The application of regulations and enforcement of the law

Duties of PAMU Manager (PA Manager)
The PAMU manager is both the PAMU office administrator and field staff manager for the PA and should integrate, co-ordinate and stimulate the staff under his command so as to achieve the stated objectives of the PA for which he is responsible. The PAMU manager should be familiar with the PAs' legislative instruments and apply these as appropriate.
The PAMU manager will assist with the development of operational management plans for the PA under his control and have the responsibility for implementing such plans.
The PAMU manager is responsible for the efficient day-to-day operation and performance of their duties by the Rangers under his control. He is expected to implement NCS/EEAA PA policy and directives effectively and efficiently in liaison with other agencies and to lead the Ranger force by example. The manager's specific responsibilities include:
Deploying Rangers and Community Guards and allocating monthly and daily tasks, including patrol schedules, in order to achieve the objectives of the PA under his control.
Ensuring that Rangers and Community Guards know what is expected of them and how to do it. This will involve some training, especially of new staff prior to deployment.
Co-ordination of Ranger and Community Guard activities, both in the PA and in South Sinai PAs as a whole (with Sharm office), to avoid duplication of effort and to ensure efficiency and the best possible use of resources. This will call for careful planning and intimate knowledge of where Rangers are deployed and for what purpose
Receiving information and reports from field staff and transmitting relevant information to the appropriate authorities.
Ensuring that Rangers are in uniform, smart and disciplined when on duty and conduct themselves in a manner befitting an EEAA staff member. The Manager will be expected to take minor disciplinary action where appropriate.
The Manager will be accountable for ensuring that all PAMU property is properly cared for, maintained and serviced where appropriate.
The Manager will be responsible for the proper disbursement and accounting of all PAMU finances.
The Manager should ensure that all PAMU infrastructure sites are kept clean and refuse is disposed of in a proper manner.
The Manager will ensure that required monthly and annual reports are prepared and sent to the PA Regional Office in Sharm and to NCS offices in Cairo.

Duties of a Senior Ranger
As the PAMU manager cannot personally organize the individual activities of all the field staff some of the Manager's responsibilities will be delegated to a competent and

experienced Ranger. The Senior Ranger will carry out any duty directed by the PAMU manager and which may be delegated to another field staff member only with the approval of the PAMU Manger. The Senior Ranger will be well acquainted with the PA conservation objectives and assist with the development of interventions to achieve these objectives. In addition to the general duties of a Ranger (see below) the Senior Ranger will be charged with the following:

The Senior Ranger will be responsible to the PAMU manager for the care and cleanliness of all PAMU property. He should advise the manager of any items that need attention, particularly vehicles for which he is expected to maintain a strict service schedule (according to manufacturers' specifications) and ensure that logbooks are properly maintained.

The Senior Ranger should ensure that an adequate patrol program and schedule is drawn up and followed; the Senior Ranger is responsible for collating all information from patrols and ensuring that the PAMU manager is kept informed of all developments on a daily basis.

The Senior Ranger will be a fully participating member of the patrol program.

Duties of a Ranger / Junior Ranger

The Ranger is the foundation of the PAMU staff establishment without whom little of the EEAA's mandate for PAs would be possible. The Ranger is a member of a team who should be loyal and committed to the ideals of the NCS/EEAA and its mandate. Rangers are qualified professionals in their own right and will need to apply their specific skills to their work; at the same time they are expected to be versatile and use their initiative as circumstances dictate. The Ranger is the public face of the NCS/EEAA and on duty must be disciplined at all times and helpful and polite to all members of the public. In addition to their specific allocated duties Rangers will be expected to:

Carry out instruction from the PAMU manager to the best of their ability. Duties assigned may include foot and vehicle patrolling (day and night), resource monitoring and data collection, public awareness, search and rescue, visitor management, refuse collection, equipment and infrastructure maintenance or cleaning, development planning and inspection etc. The Ranger will be expected to work as many hours as circumstances dictate.

Carry out patrols as directed by their Manager and pass on information to their superiors and keep a log of all incidents.

Uphold the laws for which they are responsible and initiate actions against transgressions of these laws without fear or favor.

Wear a full uniform at all times while on duty and communicate and interact with the general public in a mature and controlled manner, to set a good example to fellow citizens and so portray the EEAA in a positive light. This includes vehicle handling and road safety measures.

Be accountable for all PAMU property under their responsibility and to report any item that needs attention. Rangers will be responsible for maintaining vehicle logbooks for the vehicle of which they are given charge.

Maintain specific and general reporting schedules.

Encourage and assist the local community to undertake local conservation initiatives and community development projects through self-help projects.

Duties of Community Guards

The Community Guards will be a non-uniformed cadre to supplement the Ranger force; they will have no formal power and their primary functions will be to extend PAMU monitoring and regulatory activities to the more remote parts of the PA. They will report to PAMU Rangers. The community guards will carry PAMU identification cards and wear a National Park badge. The community guards will assist the Ranger force in the execution of their duties by:

- Reporting any hunting, killing, disturbance or collection of wild species (including plants) in or around the PA and monitoring and reporting on wildlife populations particularly of large mammals species.

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Reporting any developments such as building or quarrying in their area and monitoring development activities.

Guiding and assisting Rangers, orienting visitors within their area of responsibility and assisting with mountain rescue and other emergency responses.

Reporting on the condition of trails and paths and undertaking or arranging necessary maintenance.

Looking after any established monitoring sites and equipment and manning established outposts or other PA property.

Promoting PA regulations regarding resource conservation, e.g. grazing exclusion areas etc. within the local communities.

Monitoring tourism activities within the area (i.e. recording visitor numbers, tour companies, dates etc.) and checking on and regulating visitor behavior to prevent visitors from cutting vegetation, discarding rubbish, writing graffiti etc.

Cleaning visitor campsites of refuse and removing graffiti.

Promoting local community conservation and development initiatives, e.g. establishing local conservation areas, waste management, social programs etc.

Distribution of PAMU staff

NMRPA covers a large area, including both terrestrial and marine components. It is impractical to manage the PA efficiently on a daily basis as a single unit and from one base. NMRPA is already by the prime ministerial decree 33/1996 its divided in to two sectors: NABQ PA in the south and DAHAB MPA in the north .

NABQ PA Management Sector

This sector is identified by the above decree and it is covering NABQ PA land and marine water where the base is the Visitor Center where the staff accommodation and also the radios fro communications. While there is a substantial premises at the PAs headquarters in Sharm, where the PA manager based.

Dahab MPA Management Sector

This sector is also identified by the same decree covering the marine water in front of DAHAB city. The administration focal point of this sector will be at the two apartments which need urgent maintenance.

6.2 PAMU Infrastructure

6.2.1 Office Space

The PAMU administration is based at the administration building of the PAs in Sharm supervising the two offices of the two sectors the one of NABQ PA and the other of DAHAB EMA

6.2.2 Outposts

Outpost stations should be established at two sites south of Dahab where there is an entrance to NABQ PA and the other north of DAHAB to control the blue hole dive and snorkeling sites. These outposts should be simple structures, where some basic gear would be left (such as first aid, stores of water, sleeping bags, etc.) to facilitate temporary accommodation of patrolling teams. Rangers would not permanently man the outposts, but community guards from the respective areas would be assigned to maintain them.

6.2.4 Accommodation

Until more permanent infrastructure is established for the PAMU within the PA, staff will accommodated at the Visitor Centre and the prefabricated units in NABQ while in Dahab there are two flats need to be increased to be six to accommodate the staff will be there this beside there are two accommodations one for the ranger and the other for the tickets collectors at Sharm Housing.

6.2.5 Maintenance Workshop and Storage

A maintenance workshop will be needed for PA equipment, vehicles and boats; and appropriate storage for spare parts and equipment. This will need to be located within the NABQ PA to facilitate rapid on site fixing of equipment.

6.3 PAMU Equipment

The PAMU will need some essential equipment to support its activities in both the marine and terrestrial environments. See Appendix ( ) for an indicative list of essential equipment for PAMU staff, targeted within the current planning period.

6.4 Maintenance of Facilities

Regular maintenance of equipment and facilities is an important component of the PAMU's duties to ensure the upkeep of the PAMU capital. A maintenance schedule will be established showing timetable of maintenance and defining the responsible staff for performing the tasks at hand.

7. Finance

Without sustainable and stable sources of funding the long term management objectives of the PA can be jeopardized. The NCS has long been seeking the financial self-sufficiency of the PA Network in Egypt. From the practical point of view this goal is very realistic and well within reach, however many administrative obstacles remain to be resolved. In fact many PAs in Egypt (particularly NABQ PA) bring in substantial income, which can be further developed.

7.1 Sources of Funding

All PA's in Egypt receive core funding from annual GOE budget. This is a variable source of funding, which is largely directed towards paying staff salaries and benefits, and the establishment of infrastructure. Although the GOE has shown a great extent of commitment to PA development and financing, direct reinvestment in the conservation effort is essential for long-term sustainability.

The PSU is currently involved in developing a revenue generation strategy for the Red Sea (Colby 2003), which will hopefully soon establish an agreed framework for sustainable revenue generation and reinvestment in the regions PAs and conservation infrastructure. In view of current developments and efforts by the PSU / NCS in this respect, only brief reference will be made here to revenue generation possibilities.

There are three potential and realistic sources of revenue generation in NABQ PA, one is user (entry) fees, concession fees or leases, and through the sale of PA products.

Presently, all revenues from other PAs are transferred to the Environmental Fund. This needs to be adjusted so that at least a certain percentage of the PA income is reinvested in its management. A proportion of the funds can also be allocated to the South Sinai Governorate to support environmental activities (e.g. waste management).

7.2 Entrance Fees

The entrance fee for NABQ PA is like Ras Mohammed NP i.e. $5 for foreign visitors and LE 5 for Egyptians, other entrance fee can collected as the northern side of NABQ PA is opened to DAHAB and there is no body to collect the fee for both land and sea and the same can be done for the blue hole dive and snorkel site as a tool in site management plan.

7.3 Indicative Budget

An indicative budget will be developed after the review of this first draft of the management plan and based on the feed back of the reviewers and stake holders.

8. Implementation and Evaluation

8.1 Management Priorities

The implementation of this plan will require that priorities must first be identified and addressed accordingly. Generally the first priority should be given to the establishment of the management unit in DAHAB MPA to be able to cope with the rapid development going there and to solve the conflict between different activities, second priority is to solve the conflict with the TDA at the southern boarder of Nabq and to clean the entrance and NABQ PA from mines. Third priority is to halt or control the primary current adverse activities, which are degrading the natural resource base of NABQ PA, and which will continue to do so unless management interventions are not made by PAMU. Fourth priority can be given to public awareness and education. The enhancement of natural resources and promotion of the sustainable utility of resources (such as ecotourism) are proactive measures, which seek to improve future utility of the natural resources of NABQ PA.
The integration and consultation of indigenous inhabitants should be a constant priority for the PAMU from day one.

8.2 Evaluation of Plan Implementation

The implementation of this plan will be considered effective when it can be verifiably shown that it is achieving its main objectives:
The maintenance of the natural resources and conditions of the PA: Verifiable through results of monitoring programs.
The protection of cultural heritage resources of the PA: Verified through patrolling reports indicating halting of adverse practices.
The sustainable utility of natural resources in the PA: Verified through results of monitoring programs and the endorsement and adoption of the management plan by stakeholders.
The establishment of NMRPA as a focal point for ecologically sensitive tourism: Verifiable through assessments of performance of tourism operators and their impact on the natural environment.
The maintenance of environmental quality of NMRPA: Verifiable through results of pollution monitoring programs.
Optimizing socio-economic benefits to the indigenous population from the region's natural heritage: Verifiable through monitoring data indicating improvements to health and income generation to local people.
To promote public understanding and appreciation of Egypt's natural heritage: Verifiable through results of user surveys, including indigenous people's perceptions.

8.3 Revisions

This plan is intended to be a dynamic instrument. Continuous updates are expected and necessary to keep it accurate and up to date. It is envisaged that the plan should be completely reviewed and reassessed after five years, in light of achievements and shortcomings on the ground.

8.4 Annual Operational Plan

In order to facilitate that every day operation of the PAMU staff comply with the policy framework of this management plan and to ensure that short term actions actually contribute towards achieving the PA larger objectives, an Annual Operational Plan (AOP) will be prepared. The AOP will be drawn up in accordance with the policies and objectives set out in the management plan and will be prepared to justify the PA's annual budget request.
It will be the responsibility of the PA Manager to prepare the AOP, submit it to the Red Sea PA Regional Office and to NCS and get approval for it. This AOP will then be the PA's official annual work plan. The format of the operating plan will generally follow the format of this management plan.
The first draft of the AOP must be drawn up before the preparation of the annual budget for the PA, as the budget should be based on the AOP. The budget and justifying draft AOP will be presented to the South Sinai PA Regional Office and to NCS and when the approved budget is received, a final AOP will be prepared and distributed.

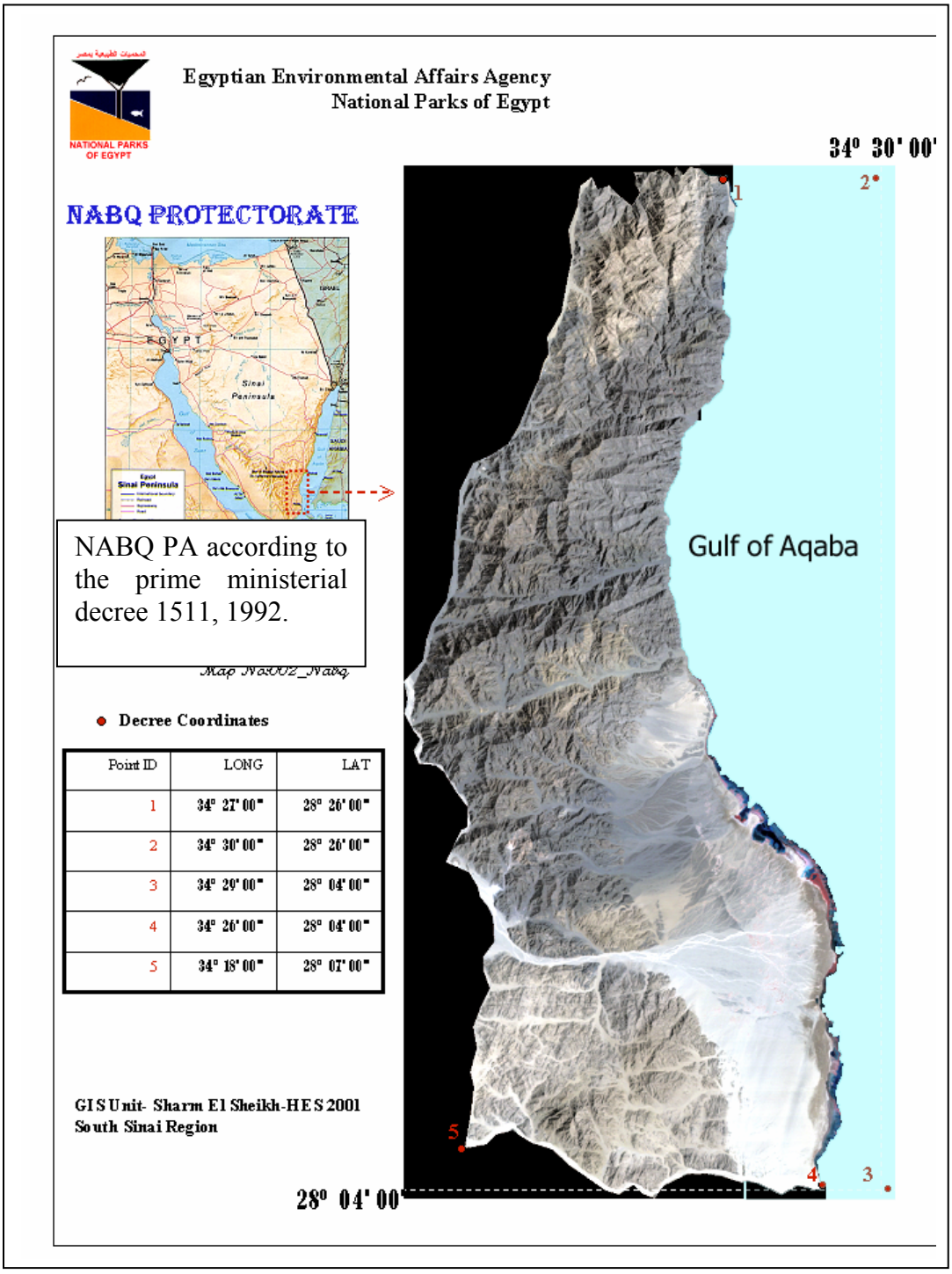
8.4.1 Procedures for Preparing an AOP

Identify priority actions as given in the management plan, plus any outstanding tasks and newly arisen needs. Establish priorities by classifying activities according to urgency: indicate tasks that are vital and must be completed, tasks that are necessary but not urgent and tasks that are desirable if resources are available.
Set a timetable for completion of activities.
Identify those activities that are dependent on prior completion of other activities and indicate which activities they must follow, as this will help the PA Manager to assign realistic priorities.

Plan out the tasks on a chart, with the most important activities fitted in first, to illustrate the correct time sequence for activities and to spread the workload evenly throughout the year.
Once activities are arranged on the chart the manager should prepare work schedules for each task together with the resources needed to complete each of the activities.
Once detailed task schedules and resource requirements are known, it should be possible to calculate annual budget needs.
Reschedule the AOP once the annual budget is approved to bring the tasks and priorities in line with funding constraints.

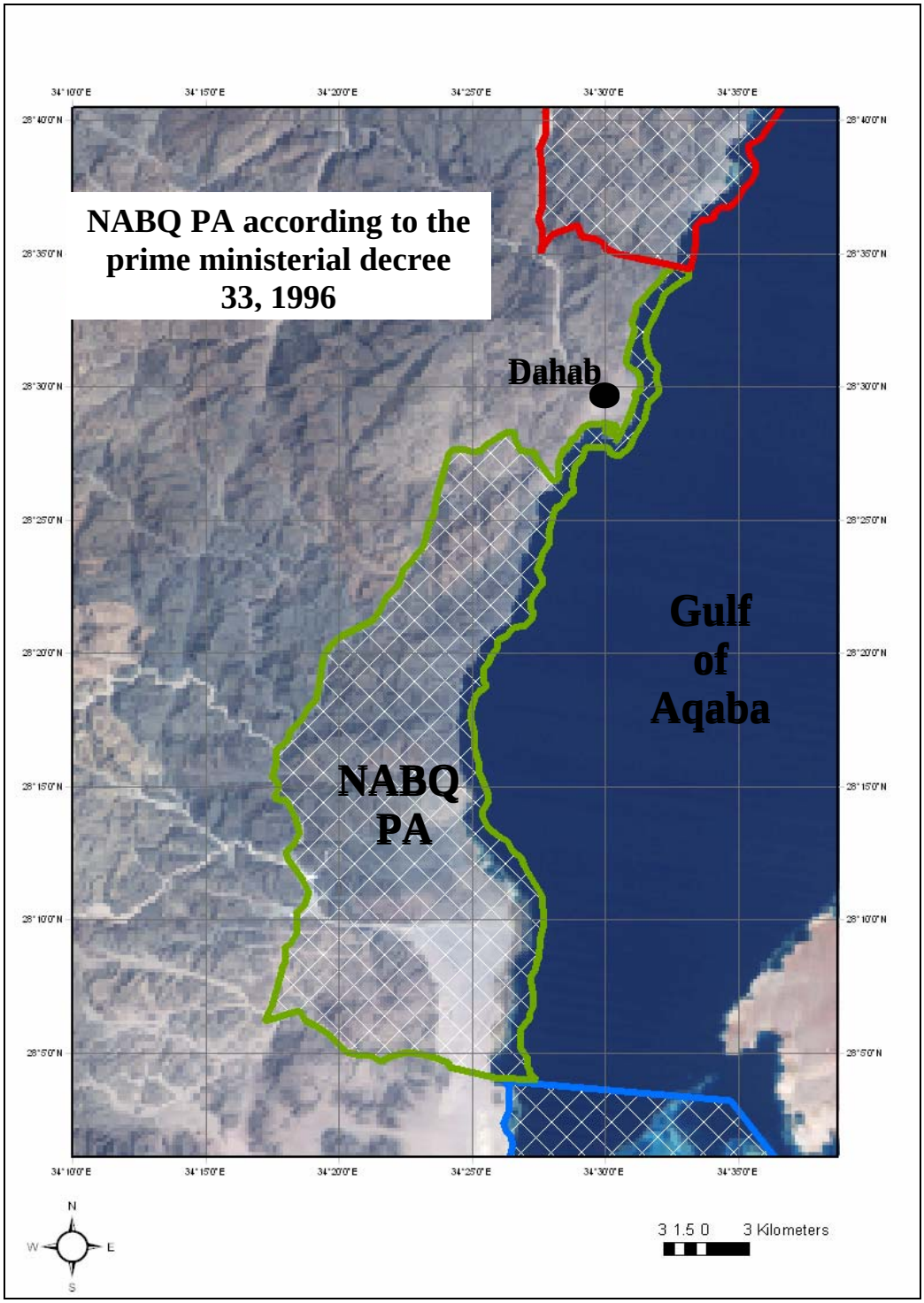
9. References

Appendix1: Map for NPA according to the decree 1511/1992



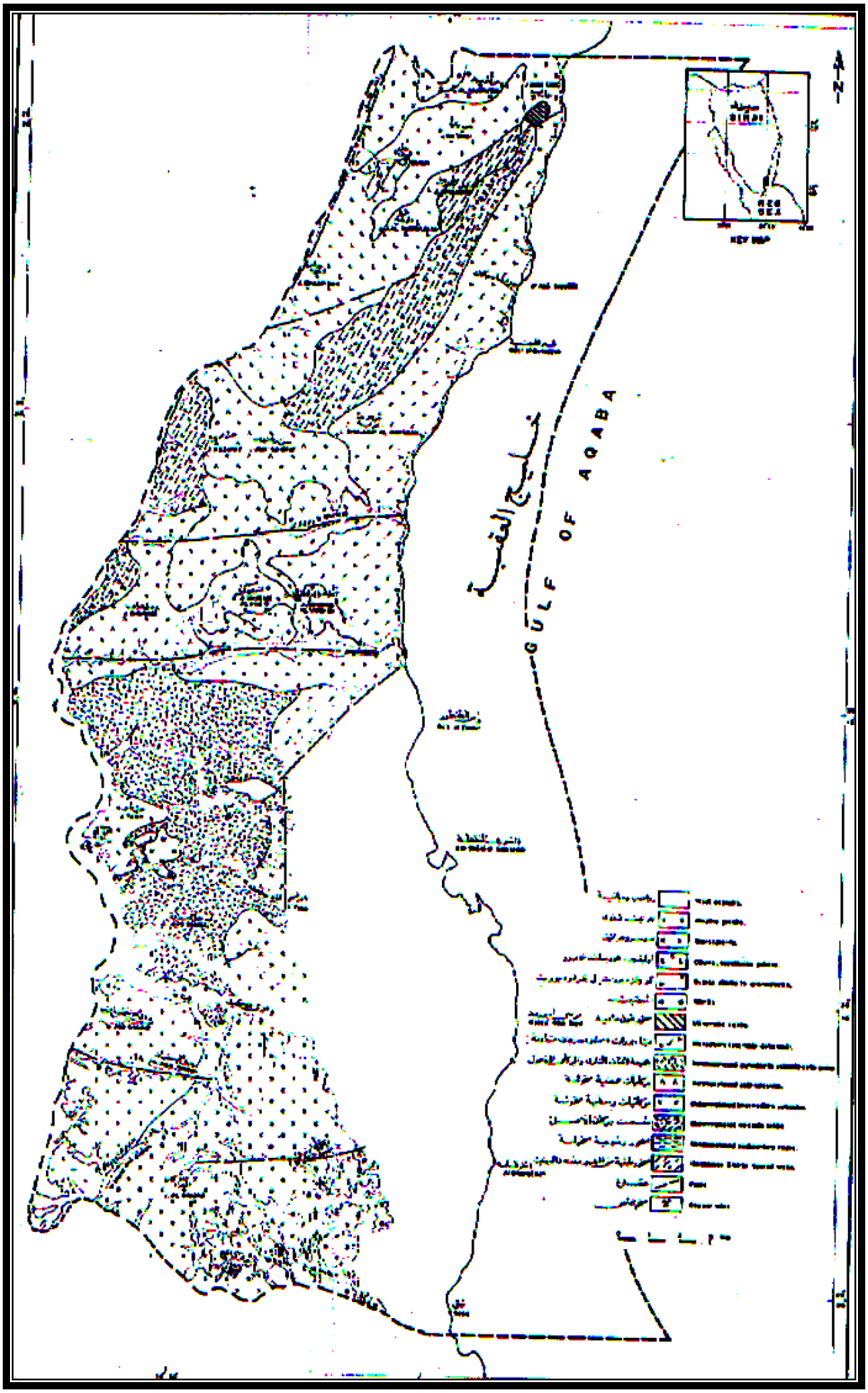
Point ID	LONG	LAT
1	34° 27' 00"	28° 26' 00"
2	34° 30' 00"	28° 26' 00"
3	34° 29' 00"	28° 04' 00"
4	34° 26' 00"	28° 04' 00"
5	34° 18' 00"	28° 07' 00"

Appendix 2: Map for NMRPA according to the decree 33/1996

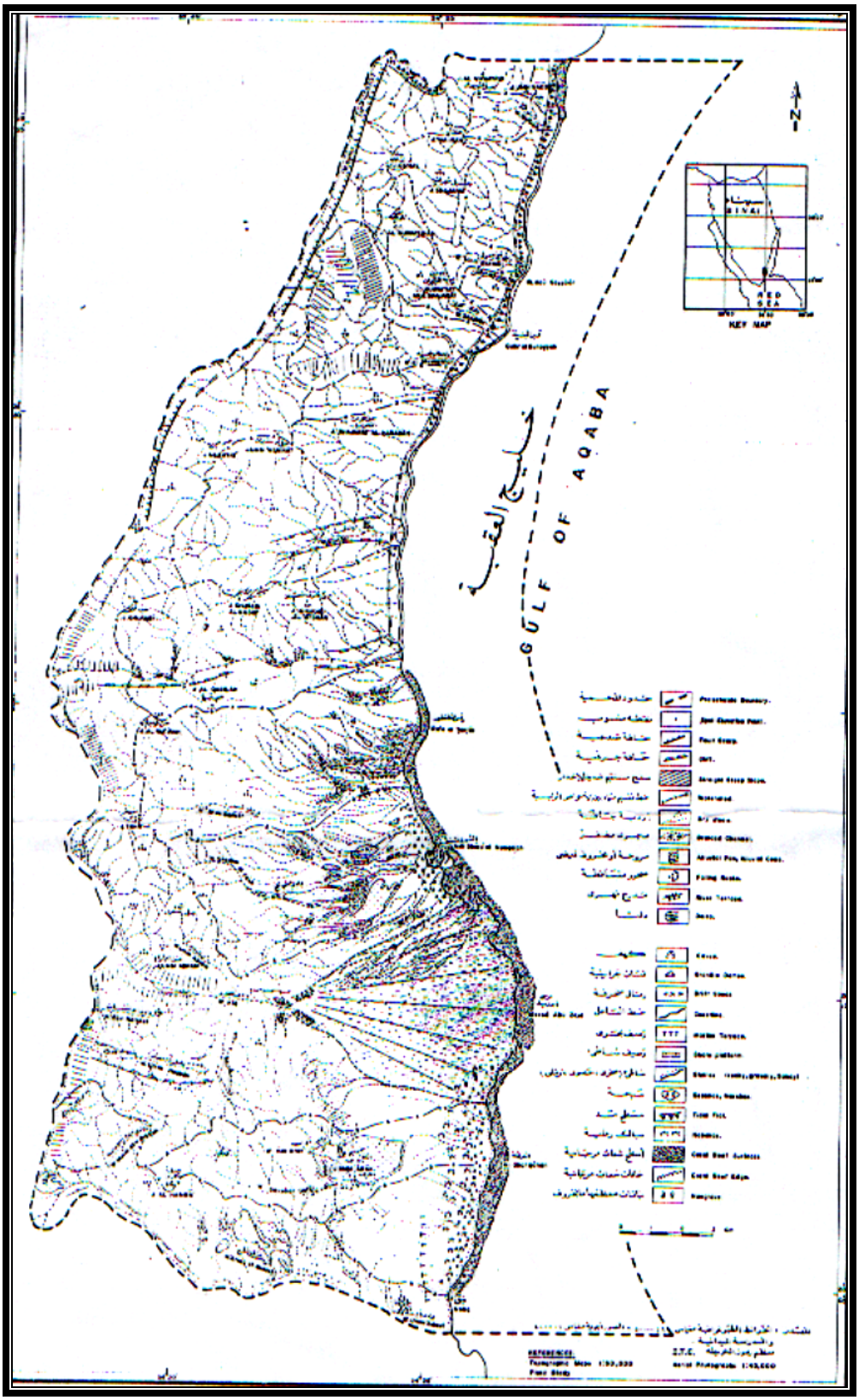


Appendix 3: Map for Zonation of NPA

Appendix 4: Geological Map of NABQ PA



Appendix 4: Geological Map of NABQ PA



Appendix 5: NABQ Flora List
N = 43

No	Species (Latin Name)	Species (English Name)
1	*Acacia raddiana*	(SAYAL)
2	*Aerva javanica*	(ARA'A)
3	*Artemisia judaica*	(BOAITHERAN)
4	*Avicennia marina*	(SHOWRA)
5	*Blepharis ciliaris*	(SHOK EL-DAB)
6	*Calotropis procera*	(OSHAR)
7	*Capparis sinaica*	(LASSAF)
8	*Capparis spinosa*	(LAISOOF)
9	*Chrozophora oblongifolia*	(GHABIRA)
10	*Citrullus colocynthis*	(HANDAL)
11	*Cleome droserifolia*	(SAMWA)
12	*Cornulaca monacantha*	
13	*Cucumis prophetarum*	(HONAIZELAN)
14	*Fagonia scabra*	(EWRAQA)
15	*Forsskaolea tenacissima*	(LOSSAAGA)
16	*Heliotropium arbainense*	(ERHABA)
17	*Hyoscyamus muticus*	(SAKARAAN)
18	*Indigofera arabica*	(GADAB)
19	*Iphiona scabra*	(ZAFRA)
20	*Leptadenia pyrotechnica*	
21	*Limonium axillare*	(SOWEID)
22	*Lotononis platycarpa*	(ADRAS)
23	*Lycium shawii*	(AWSAG)
24	*Nitraria retusa*	(GHARQAD)
25	*Ochradenus baccatus*	(GORDI)
26	*Panicum turgidum*	(NATASH)
27	*Pennisetum divisum*	(THEMMAAM)
28	*Pergularia tomentosa*	(GHALQA)
29	*Phoenix dactylifera*	(NAKHIL)
30	*Pulicaria crispa*	(RABL)
31	*Reseda alba*	(KHEZAMA)
32	*Rumex cyprius*	(HOMMEID)
33	*Salvadora persica*	(ARAK)
34	*Schouwia thebaica*	(NEMNAM)
35	*Solenostemma arghel*	(HARGAL BAHARI)
36	*Tamarix aphylla*	(TARFA)
37	*Teucrium polium*	(GA'ADA)
38	*Trichodesma africanum*	(HEMIMA)
39	*Zilla spinosa*	(SELLA)
40	*Ziziphus spina-christi*	(NABQ-SEDR)
41	*Zygophyllum album*	(GALUM ABIAD)
42	*Zygophyllum coccineum*	(GALUM)
43	*Zygophyllum simplex*	(GARMAL)

Appendix 5: NABQ Fish List
n=438

No.	Order	Family	Species	FB name
1	Perciformes	Pomacentridae	Abudefduf saxatilis	Sergeant major
2	Perciformes	Pomacentridae	Abudefduf sexfasciatus	Scissortail sergeant
3	Perciformes	Pomacentridae	Abudefduf sordidus	Blackspot sergeant
4	Perciformes	Sparidae	Acanthopagrus bifasciatus	Twobar seabream
5	Perciformes	Acanthuridae	Acanthurus nigrofuscus	Brown surgeonfish
6	Perciformes	Acanthuridae	Acanthurus sohal	Sohal surgeonfish
7	Perciformes	Acanthuridae	Acanthurus xanthopterus	Yellowfin surgeonfish
8	Perciformes	Serranidae	Aethaloperca rogaa	Redmouth grouper
9	Perciformes	Carangidae	Alectis ciliaris	African pompano
10	Perciformes	Carangidae	Alectis indicus	Indian threadfish
11	Perciformes	Carangidae	Alepes djedaba	Shrimp scad
12	Lamniformes	Alopiidae	Alopias pelagicus	Pelagic thresher
13	Perciformes	Gobiidae	Amblyeleotris sungami	Magnus' prawn-goby
14	Clupeiformes	Clupeidae	Amblygaster sirm	Spotted sardinella
15	Perciformes	Pomacentridae	Amblyglyphidodon flavilatus	Yellowfin damsel
16	Perciformes	Pomacentridae	Amblyglyphidodon leucogaster	Yellowbelly damselfish
17	Perciformes	Pomacentridae	Amphiprion bicinctus	Twoband anemonefish
18	Perciformes	Labridae	Anampses caeruleopunctatus	Bluespotted wrasse
19	Perciformes	Labridae	Anampses meleagrides	Spotted wrasse
20	Perciformes	Labridae	Anampses twistii	Yellowbreasted wrasse

21	Lophiiformes	Antennariidae	Antennarius coccineus	Scarlet frogfish
22	Lophiiformes	Antennariidae	Antennarius nummifer	Spotfin frogfish
23	Lophiiformes	Antennariidae	Antennarius pictus	Painted frogfish
24	Lophiiformes	Antennariidae	Antennarius striatus	Striated frogfish
25	Perciformes	Serranidae	Anthias anthias	Swallowtail seaperch
26	Perciformes	Serranidae	Anyperodon leucogrammicus	Slender grouper
27	Perciformes	Lutjanidae	Aphareus furca	Small toothed jobfish
28	Perciformes	Apogonidae	Apogon angustatus	Broadstriped cardinalfish
29	Perciformes	Apogonidae	Apogon annularis	Ringtail cardinalfish
30	Perciformes	Apogonidae	Apogon coccineus	Ruby cardinalfish
31	Perciformes	Apogonidae	Apogon cookii	Cook's cardinalfish
32	Perciformes	Apogonidae	Apogon exostigma	Narrowstripe cardinalfish
33	Perciformes	Apogonidae	Apogon fleurieu	Cardinalfish
34	Perciformes	Apogonidae	Apogon fraenatus	Bridled cardinalfish
35	Perciformes	Apogonidae	Apogon guamensis	Guam cardinalfish
36	Perciformes	Apogonidae	Apogon imberbis	Cardinal fish
37	Perciformes	Apogonidae	Apogon kallopterus	Iridescent cardinalfish
38	Perciformes	Apogonidae	Apogon nigripinnis	Bullseye
39	Perciformes	Apogonidae	Apogon nigrofasciatus	Blackstripe cardinalfish
40	Perciformes	Apogonidae	Apogon pselion	
41	Perciformes	Apogonidae	Apogon savayensis	Samoan cardinalfish

42	Perciformes	Apogonidae	Apogon taeniatus	Twobelt cardinal
43	Perciformes	Apogonidae	Apogon taeniophorus	Reef-flat cardinalfish
44	Perciformes	Apogonidae	Apogon zebrinus	
45	Perciformes	Apogonidae	Apogonichthys perdix	Perdix cardinalfish
46	Perciformes	Pomacanthidae	Apolemichthys xanthotis	Yellow-ear angelfish
47	Perciformes	Lutjanidae	Aprion virescens	Green jobfish
48	Perciformes	Apogonidae	Archamia fucata	Orangelined cardinalfish
49	Perciformes	Apogonidae	Archamia lineolata	Shimmering cardinal
50	Perciformes	Sparidae	Argyrops filamentosus	Soldierbream
51	Anguilliformes	Congridae	Ariosoma balearicum	Bandtooth conger
52	Tetraodontiformes	Tetraodontidae	Arothron immaculatus	Immaculate puffer
53	Perciformes	Blenniidae	Aspidontus dussumieri	Lance blenny
54	Atheriniformes	Atherinidae	Atherinomorus lacunosus	Hardyhead silverside
55	Perciformes	Carangidae	Atule mate	Yellowtail scad
56	Tetraodontiformes	Balistidae	Balistapus undulatus	Orange-lined triggerfish
57	Tetraodontiformes	Balistidae	Balistoides viridescens	Titan triggerfish
58	Perciformes	Blenniidae	Blenniella periophthalmus	Blue-dashed rockskipper
59	Perciformes	Labridae	Bodianus anthioides	Lyretail hogfish
60	Perciformes	Labridae	Bodianus axillaris	Axilspot hogfish
61	Perciformes	Labridae	Bodianus diana	Diana's hogfish

62	Perciformes	Scaridae	Bolbometopon muricatum	Green humphead parrotfish
63	Pleuronectiformes	Bothidae	Bothus pantherinus	Leopard flounder
64	Ophidiiformes	Ophidiidae	Brotula multibarbata	Goatsbeard brotula
65	Perciformes	Caesionidae	Caesio caerulaurea	Blue and gold fusilier
66	Perciformes	Caesionidae	Caesio lunaris	Lunar fusilier
67	Perciformes	Caesionidae	Caesio striata	Striated fusilier
68	Perciformes	Caesionidae	Caesio suevica	Suez fusilier
69	Perciformes	Caesionidae	Caesio varilineata	Variable-lined fusilier
70	Perciformes	Scaridae	Calotomus viridescens	Viridescent parrotfish
71	Tetraodontiformes	Tetraodontidae	Canthigaster margaritata	
72	Perciformes	Carangidae	Carangoides armatus	Longfin trevally
73	Perciformes	Carangidae	Carangoides bajad	Orangespotted trevally
74	Perciformes	Carangidae	Carangoides coeruleopinnatus	Coastal trevally
75	Perciformes	Carangidae	Carangoides ferdau	Blue trevally
76	Perciformes	Carangidae	Carangoides fulvoguttatus	Yellowspotted trevally
77	Perciformes	Carangidae	Carangoides gymnostethus	Bludger
78	Perciformes	Carangidae	Carangoides plagiotaenia	Barcheek trevally
79	Perciformes	Carangidae	Caranx crysos	Blue runner
80	Perciformes	Carangidae	Caranx ignobilis	Giant trevally

81	Perciformes	Carangidae	Caranx melampygus	Bluefin trevally
82	Perciformes	Carangidae	Caranx sexfasciatus	Bigeye trevally
83	Carcharhiniformes	Carcharhinidae	Carcharhinus albimarginatus	Silvertip shark
84	Carcharhiniformes	Carcharhinidae	Carcharhinus altimus	Bignose shark
85	Carcharhiniformes	Carcharhinidae	Carcharhinus amblyrhynchos	Grey reef shark
86	Carcharhiniformes	Carcharhinidae	Carcharhinus brevipinna	Spinner shark
87	Carcharhiniformes	Carcharhinidae	Carcharhinus falciformis	Silky shark
88	Carcharhiniformes	Carcharhinidae	Carcharhinus limbatus	Blacktip shark
89	Carcharhiniformes	Carcharhinidae	Carcharhinus longimanus	Oceanic whitetip shark
90	Carcharhiniformes	Carcharhinidae	Carcharhinus melanopterus	Blacktip reef shark
91	Carcharhiniformes	Carcharhinidae	Carcharhinus plumbeus	Sandbar shark
92	Carcharhiniformes	Carcharhinidae	Carcharhinus sorrah	Spottail shark
93	Lamniformes	Odontaspididae	Carcharias taurus	Sand tiger shark
94	Lamniformes	Lamnidae	Carcharodon carcharias	Great white shark
95	Perciformes	Serranidae	Cephalopholis argus	Peacock hind
96	Perciformes	Serranidae	Cephalopholis hemistiktos	Yellowfin hind
97	Perciformes	Serranidae	Cephalopholis miniata	Coral hind

98	Perciformes	Serranidae	Cephalopholis oligosticta	Vermilion hind
99	Perciformes	Serranidae	Cephalopholis sexmaculata	Sixblotch hind
100	Perciformes	Scaridae	Cetoscarus bicolor	Bicolour parrotfish
101	Perciformes	Chaetodontidae	Chaetodon auriga	Threadfin butterflyfish
102	Perciformes	Chaetodontidae	Chaetodon austriacus	Blacktail butterflyfish
103	Perciformes	Chaetodontidae	Chaetodon fasciatus	Diagonal butterflyfish
104	Perciformes	Chaetodontidae	Chaetodon larvatus	Hooded butterflyfish
105	Perciformes	Chaetodontidae	Chaetodon paucifasciatus	Eritrean butterflyfish
106	Perciformes	Chaetodontidae	Chaetodon semilarvatus	Bluecheek butterflyfish
107	Perciformes	Labridae	Cheilinus fasciatus	Redbreast wrasse
108	Perciformes	Labridae	Cheilinus lunulatus	Broomtail wrasse
109	Perciformes	Labridae	Cheilinus undulatus	Humphead wrasse
110	Perciformes	Labridae	Cheilio inermis	Cigar wrasse
111	Perciformes	Apogonidae	Cheilodipterus lachneri	
112	Perciformes	Apogonidae	Cheilodipterus macrodon	Large toothed cardinalfish
113	Perciformes	Apogonidae	Cheilodipterus quinquelineatus	Five-lined cardinalfish
114	Perciformes	Sparidae	Cheimerius nufar	Santer seabream
115	Clupeiformes	Chirocentridae	Chirocentrus dorab	Dorab wolf-herring
116	Perciformes	Scaridae	Chlorurus genazonatus	Sinai parrotfish
117	Perciformes	Scaridae	Chlorurus gibbus	Heavybeak parrotfish

118	Perciformes	Scaridae	Chlorurus sordidus	Daisy parrotfish
119	Syngnathiformes	Syngnathidae	Choeroichthys brachysoma	Short-bodied pipefish
120	Perciformes	Pomacentridae	Chromis chromis	Damselfish
121	Perciformes	Pomacentridae	Chromis flavaxilla	Arabian chromis
122	Perciformes	Pomacentridae	Chromis pelloura	Duskytail chromis
123	Perciformes	Pomacentridae	Chromis viridis	Blue green damselfish
124	Perciformes	Pomacentridae	Chromis weberi	Weber's chromis
125	Perciformes	Pomacentridae	Chrysiptera unimaculata	Onespot demoiselle
126	Perciformes	Labridae	Cirrhilabrus rubriventralis	Social wrasse
127	Perciformes	Cirrhitidae	Cirrhitichthys oxycephalus	Coral hawkfish
128	Perciformes	Cirrhitidae	Cirrhitus pinnulatus	Stocky hawkfish
129	Perciformes	Blenniidae	Cirripectes castaneus	Chestnut eyelash-blenny
130	Perciformes	Labridae	Coris aygula	Clown coris
131	Perciformes	Labridae	Coris caudimacula	Spottail coris
132	Perciformes	Labridae	Coris cuvieri	African coris
133	Perciformes	Labridae	Coris julis	Mediterranean rainbow wrasse
134	Perciformes	Labridae	Coris variegata	Dapple coris
135	Syngnathiformes	Syngnathidae	Corythoichthys flavofasciatus	Network pipefish
136	Syngnathiformes	Syngnathidae	Corythoichthys nigripectus	Black-breasted pipefish
137	Syngnathiformes	Syngnathidae	Corythoichthys schultzi	Schultz's pipefish

138	Syngnathiformes	Syngnathidae	Cosmocampus banneri	Roughridge pipefish
139	Syngnathiformes	Syngnathidae	Cosmocampus maxweberi	Maxweber's pipefish
140	Perciformes	Mugilidae	Crenimugil crenilabis	Fringelip mullet
141	Perciformes	Gobiidae	Cryptocentrus caeruleopunctatus	Harlequin prawn-goby
142	Perciformes	Labridae	Ctenolabrus rupestris	Goldsinny-wrasse
143	Perciformes	Pomacentridae	Dascyllus aruanus	Whitetail dascyllus
144	Perciformes	Pomacentridae	Dascyllus trimaculatus	Threespot dascyllus
145	Perciformes	Carangidae	Decapterus macrosoma	Shortfin scad
146	Scorpaeniformes	Scorpaenidae	Dendrochirus brachypterus	Shortfin turkeyfish
147	Perciformes	Haemulidae	Diagramma pictum	Painted sweetlips
148	Perciformes	Sparidae	Diplodus cervinus cervinus	Zebra seabream
149	Perciformes	Sparidae	Diplodus noct	Red Sea seabream
150	Syngnathiformes	Syngnathidae	Doryrhamphus dactyliophorus	Ringed pipefish
151	Perciformes	Echeneidae	Echeneis naucrates	Live sharksucker
152	Anguilliformes	Muraenidae	Echidna polyzona	Barred moray
153	Perciformes	Blenniidae	Ecsenius aroni	Aron's blenny
154	Perciformes	Blenniidae	Ecsenius frontalis	Smooth-fin blenny
155	Perciformes	Blenniidae	Ecsenius gravieri	Red Sea mimic blenny
156	Perciformes	Blenniidae	Ecsenius midas	Persian blenny

157	Perciformes	Carangidae	Elagatis bipinnulata	Rainbow runner
158	Perciformes	Blenniidae	Enchelyurus kraussii	Krauss' blenny
159	Clupeiformes	Engraulidae	Encrasicholina heteroloba	Shorthead anchovy
160	Clupeiformes	Engraulidae	Encrasicholina punctifer	Buccaneer anchovy
161	Perciformes	Tripterygiidae	Enneapterygius abeli	Yellow triplefin
162	Perciformes	Labridae	Epibulus insidiator	Slingjaw wrasse
163	Perciformes	Serranidae	Epinephelus areolatus	Areolate grouper
164	Perciformes	Serranidae	Epinephelus chlorostigma	Brownspotted grouper
165	Perciformes	Serranidae	Epinephelus coioides	Orange-spotted grouper
166	Perciformes	Serranidae	Epinephelus fasciatus	Blacktip grouper
167	Perciformes	Serranidae	Epinephelus fuscoguttatus	Brown-marbled grouper
168	Perciformes	Serranidae	Epinephelus malabaricus	Malabar grouper
169	Perciformes	Serranidae	Epinephelus marginatus	Dusky grouper
170	Perciformes	Serranidae	Epinephelus morrhua	Comet grouper
171	Perciformes	Serranidae	Epinephelus polyphekadion	Camouflage grouper
172	Perciformes	Serranidae	Epinephelus stoliczkae	Epaulet grouper
173	Perciformes	Serranidae	Epinephelus summana	Summan grouper

174	Perciformes	Serranidae	Epinephelus tauvina	Greasy grouper
175	Perciformes	Serranidae	Epinephelus tukula	Potato grouper
176	Gasterosteiformes	Pegasidae	Eurypegasus draconis	Short dragonfish
177	Perciformes	Scombridae	Euthynnus alletteratus	Little tunny
178	Perciformes	Blenniidae	Exallias brevis	Leopard blenny
179	Perciformes	Chaetodontidae	Forcipiger flavissimus	Longnose butterfly fish
180	Perciformes	Chaetodontidae	Forcipiger longirostris	Longnose butterflyfish
181	Perciformes	Apogonidae	Fowleria marmorata	Marbled cardinalfish
182	Perciformes	Apogonidae	Fowleria variegata	Variegated cardinalfish
183	Carcharhiniformes	Carcharhinidae	Galeocerdo cuvier	Tiger shark
184	Perciformes	Pomacanthidae	Genicanthus caudovittatus	Zebra angelfish
185	Perciformes	Gerreidae	Gerres argyreus	Common mojarra
186	Perciformes	Gerreidae	Gerres longirostris	Longtail silverbiddy
187	Perciformes	Gerreidae	Gerres oblongus	Slender silverbiddy
188	Perciformes	Gerreidae	Gerres oyena	Common silver-biddy
189	Perciformes	Gobiidae	Gnatholepis anjerensis	
190	Perciformes	Labridae	Gomphosus caeruleus	Green birdmouth wrasse
191	Perciformes	Scombridae	Grammatorcynus bilineatus	Double-lined mackerel
192	Perciformes	Microdesmidae	Gunnellichthys monostigma	Onespot wormfish

193	Perciformes	Caesionidae	Gymnocaesio gymnoptera	Slender fusilier
194	Perciformes	Lethrinidae	Gymnocranius grandoculis	Blue-lined large-eye bream
195	Perciformes	Scombridae	Gymnosarda unicolor	Dogtooth tuna
196	Anguilliformes	Muraenidae	Gymnothorax buroensis	Vagrant moray
197	Anguilliformes	Muraenidae	Gymnothorax flavimarginatus	Yellow-edged moray
198	Anguilliformes	Muraenidae	Gymnothorax hepaticus	Liver-colored moray eel
199	Anguilliformes	Muraenidae	Gymnothorax pindae	Pinda moray
200	Anguilliformes	Muraenidae	Gymnothorax undulatus	Undulated moray
201	Syngnathiformes	Syngnathidae	Halicampus dunckeri	Duncker's pipefish
202	Syngnathiformes	Syngnathidae	Halicampus macrorhynchus	Ornate pipefish
203	Syngnathiformes	Syngnathidae	Halicampus mataafae	Samoan pipefish
204	Perciformes	Labridae	Halichoeres hortulanus	Checkerboard wrasse
205	Perciformes	Labridae	Halichoeres marginatus	Dusky wrasse
206	Perciformes	Labridae	Halichoeres nebulosus	Nebulous wrasse
207	Perciformes	Labridae	Halichoeres scapularis	Zigzag wrasse
208	Perciformes	Pseudochromidae	Haliophis guttatus	African eel blenny
209	Perciformes	Labridae	Hemigymnus fasciatus	Barred thicklip

210	Perciformes	Labridae	Hemigymnus melapterus	Blackeye thicklip
211	Beloniformes	Hemiramphidae	Hemiramphus far	Blackbarred halfbeak
212	Perciformes	Chaetodontidae	Heniochus acuminatus	Pennant coralfish
213	Perciformes	Chaetodontidae	Heniochus intermedius	Red Sea bannerfish
214	Clupeiformes	Clupeidae	Herklotsichthys quadrimaculatus	Bluestripe herring
215	Hexanchiformes	Hexanchidae	Hexanchus griseus	Bluntnose sixgill shark
216	Rajiformes	Dasyatidae	Himantura uarnak	Honeycomb stingray
217	Syngnathiformes	Syngnathidae	Hippocampus histrix	Thorny seahorse
218	Syngnathiformes	Syngnathidae	Hippocampus kuda	Spotted seahorse
219	Perciformes	Scaridae	Hipposcarus harid	Candelamoa parrotfish
220	Perciformes	Labridae	Hologymnosus annulatus	Ring wrasse
221	Perciformes	Labridae	Iniistius pavo	Peacock wrasse
222	Scorpaeniformes	Synanceiidae	Inimicus filamentosus	Two-stick stingfish
223	Perciformes	Blenniidae	Istiblennius edentulus	Rippled rockskipper
224	Perciformes	Blenniidae	Istiblennius rivulatus	
225	Perciformes	Gobiidae	Istigobius decoratus	Decorated goby
226	Perciformes	Gobiidae	Istigobius ornatus	Ornate goby
227	Lamniformes	Lamnidae	Isurus oxyrinchus	Shortfin mako
228	Perciformes	Kuhliidae	Kuhlia mugil	Barred flagtail
229	Perciformes	Kyphosidae	Kyphosus bigibbus	Grey sea chub

230	Perciformes	Kyphosidae	Kyphosus cinerascens	Blue seachub
231	Perciformes	Kyphosidae	Kyphosus vaigiensis	Brassy chub
232	Perciformes	Labridae	Labrus merula	Brown wrasse
233	Perciformes	Labridae	Labrus mixtus	Cuckoo wrasse
234	Perciformes	Scaridae	Leptoscarus vaigiensis	Marbled parrotfish
235	Perciformes	Lethrinidae	Lethrinus borbonicus	Snubnose emperor
236	Perciformes	Lethrinidae	Lethrinus harak	Thumbprint emperor
237	Perciformes	Lethrinidae	Lethrinus lentjan	Pink ear emperor
238	Perciformes	Lethrinidae	Lethrinus mahsena	Sky emperor
239	Perciformes	Lethrinidae	Lethrinus microdon	Smalltooth emperor
240	Perciformes	Lethrinidae	Lethrinus nebulosus	Spangled emperor
241	Perciformes	Lethrinidae	Lethrinus obsoletus	Orange-striped emperor
242	Perciformes	Lethrinidae	Lethrinus olivaceus	Longface emperor
243	Perciformes	Lethrinidae	Lethrinus variegatus	Slender emperor
244	Perciformes	Lethrinidae	Lethrinus xanthochilus	Yellowlip emperor
245	Perciformes	Serranidae	Liopropoma mitratum	Pinstriped basslet
246	Perciformes	Serranidae	Liopropoma susumi	Meteor perch
247	Perciformes	Lutjanidae	Lutjanus argentimaculatus	Mangrove red snapper
248	Perciformes	Lutjanidae	Lutjanus bengalensis	Bengal snapper
249	Perciformes	Lutjanidae	Lutjanus bohar	Two-spot red snapper
250	Perciformes	Lutjanidae	Lutjanus ehrenbergii	Blackspot snapper

251	Perciformes	Lutjanidae	Lutjanus fulviflamma	Dory snapper
252	Perciformes	Lutjanidae	Lutjanus fulvus	Blacktail snapper
253	Perciformes	Lutjanidae	Lutjanus gibbus	Humpback red snapper
254	Perciformes	Lutjanidae	Lutjanus kasmira	Common bluestripe snapper
255	Perciformes	Lutjanidae	Lutjanus lutjanus	Bigeye snapper
256	Perciformes	Lutjanidae	Lutjanus monostigma	Onespot snapper
257	Perciformes	Lutjanidae	Lutjanus rivulatus	Blubberlip snapper
258	Perciformes	Lutjanidae	Lutjanus russellii	Russell's snapper
259	Perciformes	Lutjanidae	Lutjanus sanguineus	Humphead snapper
260	Perciformes	Lutjanidae	Macolor niger	Black and white snapper
261	Perciformes	Malacanthidae	Malacanthus brevirostris	Quakerfish
262	Perciformes	Malacanthidae	Malacanthus latovittatus	Blue blanquillo
263	Perciformes	Carangidae	Megalaspis cordyla	Torpedo scad
264	Ophidiiformes	Bythitidae	Microbrotula bentleyi	
265	Syngnathiformes	Syngnathidae	Micrognathus andersonii	Shortnose pipefish
266	Perciformes	Lethrinidae	Monotaxis grandoculis	Humpnose big-eye bream
267	Perciformes	Mullidae	Mulloidichthys flavolineatus	Yellowstripe goatfish
268	Perciformes	Mullidae	Mulloidichthys vanicolensis	Yellowfin goatfish
269	Anguilliformes	Muraenidae	Muraena helena	Mediterranean moray

270	Anguilliformes	Ophichthidae	Myrichthys maculosus	Tiger snake eel
271	Beryciformes	Holocentridae	Myripristis berndti	Blotcheye soldierfish
272	Beryciformes	Holocentridae	Myripristis hexagona	Doubletooth soldierfish
273	Beryciformes	Holocentridae	Myripristis murdjan	Pinecone soldierfish
274	Perciformes	Acanthuridae	Naso brevirostris	Spotted unicornfish
275	Perciformes	Acanthuridae	Naso elegans	Elegant unicornfish
276	Perciformes	Acanthuridae	Naso hexacanthus	Sleek unicornfish
277	Perciformes	Acanthuridae	Naso unicornis	Bluespine unicornfish
278	Perciformes	Carangidae	Naucrates ductor	Pilotfish
279	Orectolobiformes	Ginglymostomatidae	Nebrius ferrugineus	Tawny nurse shark
280	Carcharhiniformes	Carcharhinidae	Negaprion acutidens	Sicklefin lemon shark
281	Perciformes	Pomacentridae	Neoglyphidodon melas	Bowtie damselfish
282	Perciformes	Labridae	Novaculichthys macrolepidotus	Seagrass wrasse
283	Perciformes	Labridae	Novaculichthys taeniourus	Rockmover wrasse
284	Tetraodontiformes	Balistidae	Odonus niger	Redtoothed triggerfish
285	Perciformes	Mugilidae	Oedalechilus labiosus	Hornlip mullet
286	Tetraodontiformes	Ostraciidae	Ostracion cyanurus	Bluetail trunkfish
287	Perciformes	Labridae	Oxycheilinus arenatus	Speckled maori wrasse
288	Perciformes	Labridae	Oxycheilinus digramma	Cheeklined wrasse
289	Perciformes	Labridae	Oxycheilinus mentalis	Mental wrasse
290	Perciformes	Cirrhitidae	Oxycirrhites typus	Longnose hawkfish

291	Scorpaeniformes	Platycephalidae	Papilloculiceps longiceps	Tentacled flathead
292	Perciformes	Labridae	Paracheilinus octotaenia	Red Sea eightline flasher
293	Perciformes	Cirrhitidae	Paracirrhites forsteri	Blackside hawkfish
294	Perciformes	Pinguipedidae	Parapercis hexophtalma	Speckled sandperch
295	Pleuronectiformes	Soleidae	Pardachirus marmoratus	Finless sole
296	Perciformes	Mullidae	Parupeneus cyclostomus	Goldsaddle goatfish
297	Perciformes	Mullidae	Parupeneus forsskali	Red Sea goatfish
298	Perciformes	Mullidae	Parupeneus heptacanthus	Cinnabar goatfish
299	Perciformes	Mullidae	Parupeneus macronemus	Longbarbel goatfish
300	Perciformes	Pseudochromidae	Pectinochromis lubbocki	
301	Perciformes	Terapontidae	Pelates quadrilineatus	Fourlined terapon
302	Perciformes	Pempheridae	Pempheris oualensis	Silver sweeper
303	Tetraodontiformes	Monacanthidae	Pervagor randalli	
304	Perciformes	Blenniidae	Petroscirtes mitratus	Floral blenny
305	Beryciformes	Anomalopidae	Photoblepharon steinitzi	Flashlight fish
306	Syngnathiformes	Syngnathidae	Phoxocampus belcheri	Rock pipefish
307	Perciformes	Lutjanidae	Pinjalo pinjalo	Pinjalo
308	Perciformes	Blenniidae	Plagiotremus rhinorhynchos	Bluestriped fangblenny

309	Perciformes	Blenniidae	Plagiotremus tapeinosoma	Piano fangblenny
310	Perciformes	Ephippidae	Platax orbicularis	Orbicular batfish
311	Perciformes	Ephippidae	Platax pinnatus	Dusky batfish
312	Perciformes	Ephippidae	Platax teira	Tiera batfish
313	Scorpaeniformes	Platycephalidae	Platycephalus indicus	Bartail flathead
314	Perciformes	Haemulidae	Plectorhinchus albovittatus	Two-striped sweetlips
315	Perciformes	Haemulidae	Plectorhinchus gaterinus	Blackspotted rubberlip
316	Perciformes	Haemulidae	Plectorhinchus gibbosus	Harry hotlips
317	Perciformes	Haemulidae	Plectorhinchus obscurus	Giant sweetlips
318	Perciformes	Haemulidae	Plectorhinchus umbrinus	
319	Perciformes	Pomacentridae	Plectroglyphidodon lacrymatus	Whitespotted devil
320	Perciformes	Serranidae	Plectropomus areolatus	Squaretail coralgrouper
321	Perciformes	Serranidae	Plectropomus pessuliferus	Roving coralgrouper
322	Perciformes	Plesiopidae	Plesiops coeruleolineatus	Crimsontip longfin
323	Perciformes	Sparidae	Polysteganus coeruleopunctatus	Blueskin seabream
324	Perciformes	Pomacanthidae	Pomacanthus asfur	Arabian angelfish
325	Perciformes	Pomacanthidae	Pomacanthus semicirculatus	Semicircle angelfish
326	Perciformes	Haemulidae	Pomadasys kaakan	Javelin grunter

327	Perciformes	Haemulidae	Pomadasys stridens	Striped piggy
328	Perciformes	Priacanthidae	Priacanthus hamrur	Moontail bullseye
329	Perciformes	Serranidae	Pseudanthias taeniatus	
330	Tetraodontiformes	Balistidae	Pseudobalistes flavimarginatus	Yellowmargin triggerfish
331	Tetraodontiformes	Balistidae	Pseudobalistes fuscus	Yellow-spotted triggerfish
332	Perciformes	Carangidae	Pseudocaranx dentex	White trevally
333	Perciformes	Labridae	Pseudocheilinus evanidus	Striated wrasse
334	Perciformes	Labridae	Pseudocheilinus hexataenia	Sixline wrasse
335	Perciformes	Pseudochromidae	Pseudochromis flavivertex	Sunrise dottyback
336	Perciformes	Pseudochromidae	Pseudochromis fridmani	Orchid dottyback
337	Perciformes	Pseudochromidae	Pseudochromis pesi	Pale dottyback
338	Perciformes	Labridae	Pseudodax moluccanus	Chiseltooth wrasse
339	Perciformes	Serranidae	Pseudogramma megamycterum	
340	Perciformes	Labridae	Pteragogus cryptus	Cryptic wrasse
341	Perciformes	Caesionidae	Pterocaesio chrysozona	Goldband fusilier
342	Scorpaeniformes	Scorpaenidae	Pterois miles	Devil firefish
343	Perciformes	Pomacanthidae	Pygoplites diacanthus	Royal angelfish
344	Perciformes	Sparidae	Rhabdosargus haffara	Haffara seabream

345	Perciformes	Sparidae	Rhabdosargus sarba	Goldlined seabream
346	Tetraodontiformes	Balistidae	Rhinecanthus rectangulus	Wedge-tail triggerfish
347	Rajiformes	Rhinobatidae	Rhynchobatus djiddensis	Giant guitarfish
348	Perciformes	Blenniidae	Salarias fasciatus	Jewelled blenny
349	Clupeiformes	Clupeidae	Sardinella albella	White sardinella
350	Clupeiformes	Clupeidae	Sardinella aurita	Round sardinella
351	Beryciformes	Holocentridae	Sargocentron caudimaculatum	Silverspot squirrelfish
352	Beryciformes	Holocentridae	Sargocentron diadema	Crown squirrelfish
353	Beryciformes	Holocentridae	Sargocentron macrosquamis	Bigscale squirrelfish
354	Beryciformes	Holocentridae	Sargocentron praslin	Dark-striped squirrelfish
355	Beryciformes	Holocentridae	Sargocentron punctatissimum	Speckled squirrelfish
356	Beryciformes	Holocentridae	Sargocentron rubrum	Redcoat
357	Beryciformes	Holocentridae	Sargocentron spiniferum	Sabre squirrelfish
358	Aulopiformes	Synodontidae	Saurida gracilis	Gracile lizardfish
359	Aulopiformes	Synodontidae	Saurida tumbil	Greater lizardfish
360	Aulopiformes	Synodontidae	Saurida undosquamis	Brushtooth lizardfish
361	Perciformes	Scaridae	Scarus collana	Red Sea parrotfish
362	Perciformes	Scaridae	Scarus ferrugineus	Rusty parrotfish
363	Perciformes	Scaridae	Scarus frenatus	Bridled parrotfish
364	Perciformes	Scaridae	Scarus fuscopurpureus	Purple-brown parrotfish

365	Perciformes	Scaridae	Scarus niger	Dusky parrotfish
366	Perciformes	Scaridae	Scarus psittacus	Common parrotfish
367	Perciformes	Nemipteridae	Scolopsis bimaculatus	Thumbprint monocle bream
368	Perciformes	Nemipteridae	Scolopsis ghanam	Arabian monocle bream
369	Perciformes	Nemipteridae	Scolopsis taeniatus	Black-streaked monocle bream
370	Perciformes	Nemipteridae	Scolopsis vosmeri	Whitecheek monocle bream
371	Perciformes	Carangidae	Scomberoides lysan	Doublespotted queenfish
372	Scorpaeniformes	Scorpaenidae	Scorpaenodes guamensis	Guam scorpionfish
373	Scorpaeniformes	Scorpaenidae	Scorpaenodes hirsutus	Hairy scorpionfish
374	Scorpaeniformes	Scorpaenidae	Scorpaenodes parvipinnis	Lowfin scorpionfish
375	Scorpaeniformes	Scorpaenidae	Scorpaenopsis barbata	Bearded scorpionfish
376	Scorpaeniformes	Scorpaenidae	Scorpaenopsis diabolus	False stonefish
377	Scorpaeniformes	Scorpaenidae	Scorpaenopsis gibbosa	Humpback scorpionfish
378	Scorpaeniformes	Scorpaenidae	Scorpaenopsis oxycephala	Tassled scorpionfish
379	Carcharhiniformes	Scyliorhinidae	Scyliorhinus stellaris	Nursehound
380	Scorpaeniformes	Scorpaenidae	Sebastapistes cyanostigma	Yellowspotted scorpionfish
381	Scorpaeniformes	Scorpaenidae	Sebastapistes strongia	Barchin scorpionfish
382	Perciformes	Carangidae	Selar crumenophthalmus	Bigeye scad
383	Perciformes	Carangidae	Seriola dumerili	Greater amberjack

384	Perciformes	Carangidae	Seriolina nigrofasciata	Blackbanded trevally
385	Perciformes	Siganidae	Siganus luridus	Dusky spinefoot
386	Perciformes	Siganidae	Siganus rivulatus	Marbled spinefoot
387	Perciformes	Siganidae	Siganus stellatus	Brownspotted spinefoot
388	Perciformes	Sillaginidae	Sillago sihama	Silver sillago
389	Perciformes	Sphyraenidae	Sphyraena barracuda	Great barracuda
390	Perciformes	Sphyraenidae	Sphyraena jello	Pickhandle barracuda
391	Perciformes	Sphyraenidae	Sphyraena obtusata	Obtuse barracuda
392	Perciformes	Sphyraenidae	Sphyraena qenie	Blackfin barracuda
393	Carcharhiniformes	Sphyrnidae	Sphyrna mokarran	Great hammerhead
394	Carcharhiniformes	Sphyrnidae	Sphyrna zygaena	Smooth hammerhead
395	Clupeiformes	Clupeidae	Spratelloides delicatulus	Delicate round herring
396	Perciformes	Pomacentridae	Stegastes lividus	Blunt snout gregory
397	Perciformes	Pomacentridae	Stegastes nigricans	Dusky farmerfish
398	Orectolobiformes	Stegostomatidae	Stegostoma fasciatum	Zebra shark
399	Perciformes	Labridae	Stethojulis interrupta	Cutribbon wrasse
400	Perciformes	Labridae	Symphodus melanocercus	
401	Perciformes	Labridae	Symphodus ocellatus	
402	Perciformes	Labridae	Symphodus roissali	Five-spotted wrasse
403	Perciformes	Labridae	Symphodus rostratus	
404	Perciformes	Labridae	Symphodus tinca	East Atlantic peacock wrasse

405	Scorpaeniformes	Synanceiidae	Synanceia verrucosa	Stonefish
406	Syngnathiformes	Syngnathidae	Syngnathoides biaculeatus	Alligator pipefish
407	Aulopiformes	Synodontidae	Synodus variegatus	Variegated lizardfish
408	Rajiformes	Dasyatidae	Taeniura lymma	Bluespotted ribbontail ray
409	Perciformes	Labridae	Thalassoma lunare	Moon wrasse
410	Perciformes	Labridae	Thalassoma purpureum	Surge wrasse
411	Perciformes	Labridae	Thalassoma rueppellii	Klunzinger's wrasse
412	Clupeiformes	Engraulidae	Thryssa baelama	Baelama anchovy
413	Torpediniformes	Torpedinidae	Torpedo marmorata	Spotted torpedo
414	Perciformes	Carangidae	Trachinotus baillonii	Smallspotted dart
415	Perciformes	Carangidae	Trachinotus blochii	Snubnose pompano
416	Perciformes	Carangidae	Trachurus indicus	Arabian scad
417	Syngnathiformes	Syngnathidae	Trachyrhamphus bicoarctatus	Double-ended pipefish
418	Carcharhiniformes	Carcharhinidae	Triaenodon obesus	Whitetip reef shark
419	Perciformes	Gobiidae	Trimma avidori	
420	Perciformes	Gobiidae	Trimma barralli	
421	Perciformes	Gobiidae	Trimma fishelsoni	
422	Perciformes	Gobiidae	Trimma flavicaudatus	
423	Perciformes	Gobiidae	Trimma mendelssohni	
424	Perciformes	Gobiidae	Trimma sheppardi	
425	Beloniformes	Belonidae	Tylosurus acus acus	Agujon needlefish

426	Perciformes	Carangidae	Ulua mentalis	Longrakered trevally
427	Perciformes	Mullidae	Upeneus moluccensis	Goldband goatfish
428	Perciformes	Mullidae	Upeneus tragula	Freckled goatfish
429	Perciformes	Mullidae	Upeneus vittatus	Yellowstriped goatfish
430	Perciformes	Carangidae	Uraspis helvola	Whitemouth jack
431	Perciformes	Carangidae	Uraspis uraspis	Whitetongue jack
432	Perciformes	Mugilidae	Valamugil seheli	Bluespot mullet
433	Perciformes	Serranidae	Variola louti	Yellow-edged lyretail
434	Perciformes	Labridae	Wetmorella nigropinnata	Sharpnose wrasse
435	Perciformes	Labridae	Xyrichtys pentadactylus	Fivefinger wrasse
436	Perciformes	Acanthuridae	Zebrasoma desjardinii	
437	Perciformes	Acanthuridae	Zebrasoma xanthurum	Yellowtail tang
438	Perciformes	Apogonidae	Zoramia leptacantha	Threadfin cardinalfish

Appendix 7: NABQ Hard Coral Species List
N = 208

Number	Species	Family
1	*Acanthastrea echinata*	Mussidae
2	*Acanthastrea hemprichii*	Mussidae
3	*Acanthastrea hillae*	Mussidae
4	*Acanthastrea ishigakiensis*	Mussidae
5	*Acanthastrea maxima*	Mussidae
6	*Acropora austera*	Acroporidae
7	*Acropora anthocercis*	Acroporidae
8	*Acropora capillaries*	Acroporidae
9	*Acropora cytherea*	Acroporidae
10	*Acropora clathrata*	Acroporidae
11	*Acropora danai*	Acroporidae
12	*Acropora digitifera*	Acroporidae
13	*Acropora divaricata*	Acroporidae
14	*Acropora eurystoma*	Acroporidae
15	*Acropora florida*	Acroporidae
16	*Acropora fomosa*	Acroporidae
17	*Acropora granulosa*	Acroporidae
18	*Acropora hemprichii*	Acroporidae
19	*Acropora horrida*	Acroporidae
20	*Acropora humilis*	Acroporidae
21	*Acropora hyacinthus*	Acroporidae
22	*Acropora loripes*	Acroporidae
23	*Acropora microphthalma*	Acroporidae
24	*Acropora nasuta*	Acroporidae
25	*Acropora nobilis*	Acroporidae
26	*Acropora pharaonis*	Acroporidae
27	*Acropora polystoma*	Acroporidae
28	*Acropora robusta*	Acroporidae
29	*Acropora squrrosa*	Acroporidae
30	*Acropora subulata*	Acroporidae
31	*Acropora valida*	Acroporidae
32	*Acropora valenciennesi*	Acroporidae
33	*Acropora verweyi*	Acroporidae
34	*Alveopora allingi*	Poritidae
35	*Alveopora ocellata*	Poritidae

36	*Alveopora spongiosa*	Poritidae
37	*Alveopora tizardi*	Poritidae
38	*Alveopora verilliana*	Poritidae
39	*Alveopora viridis*	Poritidae
40	*Astreopora expansa*	Acroporidae
41	*Astreopora myriophthalma*	Acroporidae
42	*Astreopora suggesta*	Acroporidae
43	*Barabattoia amicorum*	Faviidae
44	*Blastomussa merleti*	Mussidae
45	*Blastomussa wellsi*	Mussidae
46	*Cantharelles doederleini*	Fungiidae
47	*Caulastrea tumida*	Faviidae
48	*Coscinaraea columna*	Siderastreidae
49	*Coscinaraea monile*	Siderastreidae
50	*Ctenactis echinata*	Fungiidae
51	*Cycloseris costulata*	Fungiidae
52	*Cycloseris cyclolites*	Fungiidae
53	*Cycloseris marginara?*	Fungiidae
54	*Cycloseris patelliformis*	Fungiidae
55	*Cynarina lacrymalis*	Mussidae
56	*Cyphastrea chalcidicum*	Faviidae
57	*Cyphastrea microphthalma*	Faviidae
58	*Cyphastrea serailia*	Faviidae
59	*Diaseris distorta*	Fungiidae
60	*Diploastrea heliopora*	Faviidae
61	*Echinophyllia aspera*	Pectiniidae
62	*Echinopora gernmacea*	Faviidae
63	*Echinopora “Egypt”?*	Faviidae
64	*Echinopora fruticulosa*	Faviidae
65	*Echinopora hirsutissina*	Faviidae
66	*Echinopora lamellosa*	Faviidae
67	*Erythrastrea flabellata*	Faviidae
68	*Euphyllia glabrescens*	Euphyllidae
69	*Favia danae*	Faviidae
70	*Favia favus*	Faviidae
71	*Favia helianthoides*	Faviidae
72	*Favia maxima*	Faviidae
73	*Favia speciosa*	Faviidae
74	*Favia stelligera*	Faviidae

75	*Favia laxa*	Faviidae
76	*Favia lizardensis*	Faviidae
77	*Favia pallida*	Faviidae
78	*Favia matthaii*	Faviidae
79	*Favia rotunadata*	Faviidae
80	*Favia rotumana*	Faviidae
81	*Favia veroni*	Faviidae
82	*Favites abdita*	Faviidae
83	*Favites chinensis*	Faviidae
84	*Favites complanata*	Faviidae
85	*Favites flexuosa*	Faviidae
86	*Favites halicora*	Faviidae
87	*Favites pentagona*	Faviidae
88	*Favites rotundata?*	Faviidae
89	*Favites russelli*	Faviidae
90	*Fangia concinna*	Fungiidae
91	*Fangia fungites*	Fungiidae
92	*Fangia granulosa*	Fungiidae
93	*Fangia horrida*	Fungiidae
94	*Fangia klunzingeri*	Fungiidae
95	*Fangia moluccensis*	Fungiidae
96	*Fangia paumotensis*	Fungiidae
97	*Fangia repanda*	Fungiidae
98	*Fangia scruposa*	Fungiidae
99	*Fangia scutaria*	Fungiidae
100	*Fangia seruposa?*	Fungiidae
101	*Fangia valida?*	Fungiidae
102	*Galaxea askcata*	Oculinidae
103	*Galaxea fascicularis*	Oculinidae
104	*Gardineroseris plaulata*	Agariciidae
105	*Goniastrea aspera*	Faviidae
106	*Goniastrea australensis*	Faviidae
107	*Goniastrea edwardsi*	Faviidae
108	*Goniastrea pecdinata*	Faviidae
109	*Goniastrea peresi*	Faviidae
110	*Goniastrea reltformis*	Faviidae
111	*Gonipora columna*	Poritidae
112	*Gonipora djiboutiensis*	Poritidae
113	*Gonipora lobata*	Poritidae

114	*Gonipora minor*	Poritidae
115	*Gonipora stokesi*	Poritidae
116	*Gonipora savignyi*	Poritidae
117	*Gonipora somaliensis*	Poritidae
118	*Gonipora tenella*	Poritidae
119	*Gyrosmilia interrupta*	Meandrinidae
120	*Herpolitha limax*	Fungiidae
121	*Hydnophora exesa*	Merulinidae
122	*Leptastrea inaequalis*	Faviidae
123	*Leptastrea priunosa*	Faviidae
124	*Leptastrea purpurea*	Faviidae
125	*Leptastrea transversa*	Faviidae
126	*Leptoria phygia*	Faviidae
127	*Leptoseris explanata*	Agariciidae
128	*Leptoseris foliosa*	Agariciidae
129	*Leptoseris hawaiiensis*	Agariciidae
130	*Leptoseris scabra*	Agariciidae
131	*Leptoseris mycetoseroides*	Agariciidae
132	*Leptoseris yabei*	Agariciidae
133	*Lobophyllia corymbosa*	Mussidae
134	*Lobophyllia hataii*	Mussidae
135	*Lobophyllia hemprichii*	Mussidae
136	*Lobophyllia robusta*	Mussidae
137	*Madracis kirbyi*	Astrocoeniidae
138	*Merulina scheeri*	Merulinidae
139	*Montastrea annuligera*	Faviidae
140	*Montastrea curta*	Faviidae
141	*Montastrea magnistellata*	Faviidae
142	*Montipora aequituberculata*	Acroporidae
143	*Montipora circumvallata*	Acroporidae
144	*Montipora danae*	Acroporidae
145	*Montipora efflorescens*	Acroporidae
146	*Montipora grisea*	Acroporidae
147	*Montipora informis*	Acroporidae
148	*Montipora meandrina*	Acroporidae
149	*Montipora millipora*	Acroporidae
150	*Montipora monasteriata*	Acroporidae
151	*Montipora nodosa*	Acroporidae
152	*Montipora spongiosa*	Acroporidae

153	*Montipora stilosa*	Acroporidae
154	*Montipora tuberculosa*	Acroporidae
155	*Montipora venosa*	Acroporidae
156	*Montipora verrucosa*	Acroporidae
157	*Mycedium elephantotus*	Pectiniidae
158	*Oulophyllia crispa*	Faviidae
159	*Oxypora crassispinosa*	Pectiniidae
160	*Oxypora lacera*	Pectiniidae
161	*Pachyseris speciosa*	Agariciidae
162	*Pavona cactus*	Agariciidae
163	*Pavona clavus*	Agariciidae
164	*Pavona decussata*	Agariciidae
165	*Pavona duerdeni*	Agariciidae
166	*Pavona diffluens*	Agariciidae
167	*Pavona explanulata*	Agariciidae
168	*Pavona maldivensis*	Agariciidae
170	*Pavona minuta*	Agariciidae
171	*Pavona varians*	Agariciidae
172	*Pavona venosa*	Agariciidae
173	*Physogyra lichtensteini*	Euphyllidae
174	*Plesiastrea versipora*	Faviidae
175	*Platygyra crosslandi*	Faviidae
176	*Platygyra daedalea*	Faviidae
177	*Platygyra lamellina*	Faviidae
178	*Platygyra sinensis*	Faviidae
179	*Plerogyra sinuosa*	Euphyllidae
180	*Pocillopora damicornis*	Pocilloporidae
181	*Pocillopora verrucosa*	Pocilloporidae
182	*Podabacia crustacea*	Fungiidae
183	*Porites echinulata*	Poritidae
184	*Porites lobata*	Poritidae
185	*Porites lutea*	Poritidae
186	*Porites nodifera*	Poritidae
187	*Porites rus*	Poritidae
188	*Porites solida*	Poritidae
189	*Psammocora contigua*	Siderastreidae
190	*Psammocora explanulata*	Siderastreidae
191	*Psammocora babueana*	Siderastreidae
192	*Psammocora superficialis*	Siderastreidae

193	*Seriatopora caliendrum*	Pocilloporidae
194	*Seriatopora hystrix*	Pocilloporidae
195	*Siderastrea savignyana*	Siderastreidae
196	*Stylocoeniella armata*	Astroconiidae
197	*Stylocoeniella guentheri*	Astroconiidae
198	*Stylophora danae*	Pocilloporidae
199	*Stylophora kuchlmanni*	Pocilloporidae
200	*Stylophora mamillata*	Pocilloporidae
201	*Stylophora pistillata*	Pocilloporidae
202	*Stylophora wellsi*	Pocilloporidae
203	*Symphyllia erythraea*	Mussidae
204	*Symphyllia radians*	Mussidae
205	*Trachyphyllia geoffroyi*	Trachyphylliidae
206	*Turbinaria mesenterina*	Dendrophylliidae
207	*Turbinaria reniformis*	Dendrophylliidae
208	*Turbinaria stellulata*	Dendrophylliidae

Appendix 8: NABQ Birds List
n=66

No.	*Latin Name*	English Name
1	*Ciraetus gallicus*	Short-toed eagle
2	*Falco concolor*	Sooty Falcon
3	*Falco tinniculus*	Kestrel
4	*Alectoris chukar*	Chukar
5	*Ammoperdix heyi*	Sand Partridge
6	*Columba livia*	Rock Dove
7	*Streptopelia senegalensis*	Laughing Dove
8	*Clamator glandarius*	Great Spotted Cuckoo
9	*Otus brucei/scops*	Straited scops/Scops Owl
10	*Merops apiaster*	Bee eater
11	*Upupa epops*	Hoopoe
12	*Ammomanes deserti*	Desert Lark
13	*Hirundo fuligula*	African Rock Martin
14	*Cercomela melanura*	Blackstart
15	*Oenanthe monacha*	Hooded Wheatear
16	*Oenanthe xanthoprymna*	White-crowned Black Wheatear
17	*Scotocera inquieta*	Scrub Warbler
18	*Acrocephalus palustris*	Reed Warbler
19	*Hippolais olivetorum*	Olive-tree Warbler
20	*Hippolais pallida*	Olivaceous Warbler
21	*Hippolais languida*	Upcher's Warbler
22	*Sylvia curruca*	Lesser Whitethroat
23	*Sylvia hortensis*	Orphean Warbler
24	*Phylloscopus collybita*	Chiffchaff
25	*Nectarinia osea*	Palestine Sunbird
26	*Pycnonotus xanthopygos*	Yellow-vented Bulbul
27	*Onychognathus tristramii*	Tristram's Grackle
28	*Lanius minor*	Lesser Grey Shrike
29	*Lanius nubicus*	Masked Shrike
30	*Corvus ruficollis*	Brown-necked Raven
31	*Corvus rhipidurus*	Fan-tailed Raven
32	*Passer domesticus*	House Sparrow
33	*Carpodacus synoicus*	Sinai Rosefinch
34	*Bucanetes githagineus*	Trumpeter Finch
35	*Oenanthe lugens*	Mourning Wheatear
36	*Oenanthe leucopyga*	White-Tailed Wheatear
37	*Alaemon alaudipes*	Great-Hoopoe-Lark
38	*Hirundo obsoleta*	Pale Crag Martin
39	*Strix butleri*	Hume's Owl

40	*Bubo ascalaphus*	Pharaoh Eagle-owl
41	*Pterocles lichtensteinii*	Lichtenstein's Sandgrouse
42	*Pterocles coronatus*	Crowned Sandgrouse
43	*Upupa eremita*	Northern Blad Ibis
44	*Falco apivorus*	Honey Buzzard
45	*Neophron percnopterus*	Egyptian Vulture
46	*Tetrathopius ecaudatus*	Bateleur Eagle
47	*Galerida cristata*	Crested Lark
48	*Athene noctua*	Little Owl
49	*Bubo bubo*	Eagle Owl
50	*Falco biarmicus*	Lanner
51	*Falco peregrinus*	Peregrine
52	*Falco pelegrinoides*	Barbary Falcon
53	*Aquila verreauxii*	Verreaux’s eagle
54	*Hieraaëtus fasciatus*	Bonnelli's Eagle
55	*Gyps fulvus*	Eurasian Griffon
56	*Buteo rufinus*	Long-legged Buzzard
57	*Aquila chrysaetos*	Golden Eagle
58	*Gypaetus barbatus*	Lammergeyer
59	*Chlamydotis undulata*	Houbara Bustard
60	*Apus pallidus*	Pallid Swift
61	*Ptyonoprogne fuligula*	Rock Martin
62	*Carduelis chloris*	Green Finch
63	*Streptopelia turtur*	Turtul Dove
64	*Oenanthe lugens*	Mourinig Wheatear
65	*Emberiza striolata*	House bunting
66	*Alaemon alaudipes*	Hoopoe Lark

Appendix 9: NABQ Mammals List
n=39

No.		Scientific name	Common Name
	family	**Erinaceidae**	**Hedgehogs**
1	1	*Paraechinus aethiopicus*	Desert Hedgehog
	family	**Soricidae**	**Shrews**
2	1	*Crocidura suaveolens*	Lesser white-toothed shrew
	family	**Canidea**	**Dogs**
3	1	*Canis aureus*	Golden Jackal
4	2	*Canis lupus*	Arab wolf
5	3	*Vulpes vulpes*	Red fox
6	4	*Vulpes cana*	Blanford fox
7	5	*Vulpes rueppellii*	Rueppelli fox
	family	**Hyaenidae**	
8	1	*Hyaena hyaena*	Striped hyaena
	family	**Felidae**	**Cats**
9	1	*Felis silvestris*	Wild cat
10	2	*Caracal caracal*	Carcal Lynx
11	3	*Panthera pardus*	Sinai leopard
	family	**Procaviidae**	
12	1	*Procavia capensis*	Rock hyrax
	family	**Bovidae**	
13	1	*Capra ibex nubiana*	Nubian ibex
14	2	*Gazella dorcas*	Dorcas gazelle
	3	*Gazella arabica*	Arabian gazelle
	family	**Leporidae**	
15	1	*Lepus capensis sinaitcus*	Sinai hare
	2	*Lepus capensis afyptius*	Egyptian hare
	family	**Dipodidae**	
16	1	*Jaculus orientalis*	Greater Egyptian Jerboa
17	2	*Jaculus jaculus*	lesser Jerboa
	family	**Gliridae**	
18	1	*Eliomys melanurus*	Asian Garden Dormouse
	family	**Muridae**	
19	1	*Acomys cahirinus*	Egyptian Spiny Mouse
20	2	*Acomys russatus*	Golden spiny mouse
	family	**Cricetidae**	**Gerbils & Hamsters**
21	1	*Gerbillus henleyi*	
22	2	*Gerbillus nanus*	
23	3	*Gerbillus dasyurus*	
24	4	*Gerbillus gerbillus*	Egyptian Gerbil
25	5	*Meriones crassus*	Sundevall Jird
26	6	*Sekeetamys calurus*	Bushy-Tailed Jird
		Gerbillus quadrimaculatus	Wadi Hof Gerbil
	family	**Pteropodidae**	
27	1	*Rousettus aegyptiacus*	Egyptian Fruit Bat
	family	**Rhinolophidae**	
28	1	*Rhinolophus clivosus*	Horseshoe Bat

29	2	*Rhinolophus hipposideros*	Lesser Horseshoe Bat
30	3	*Rhinolophus acotis*	Heuglin s Horseshoe
	family	**Hipposideridae**	
31	1	*Asellia tridens*	Trident Leaf-nosed bat
	family	**Molossidae**	
32	1	*Tadarida teniotis*	European Free-Tailes bat
	family	**Vespertilionidae**	
33	1	*Hypsugo ariel*	
34	2	*Hypsugo bodenheimeri*	
35	3	*Plecotus christii*	
36	4	*Barbastella leucomelas*	
37	5	*Eptesicus bottae innesi*	
	family	**Emballonuridae**	
38	1	*Taphozous perforatus*	Tomb Bat
	family	**Nycteridae**	
39	1	*Nycteris thebaica*	Egyptian Slit-Face Bat