The Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA)

Regional Status of Breeding Seabirds in the Red Sea and the Gulf of Aden

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Executive Summary
The Red Sea and the Gulf of Aden represent a complex and unique tropical marine ecosystem. The Red Sea formed by northerly extension of Africa rift valley system with 2000 km long, whereas the Gulf of Aden is a branches of the Indian Ocean with 1,400 km long. The region have a long with biological diversity a remarkably high degree of endemism.

A Strategic Action Plan (SAP) has been prepared among the coastal states to conserve the diversity in the region, through the coordination of the Regional Organization for Conservation of the Environment of the Red Sea and the Gulf of Aden (PERSGA). Seven countries are member of this organization; Djibouti, Egypt, Jordan, Saudi Arabia, Somalia, Sudan and Yemen.

Djibouti has a surface of 23,200 km^2, with a coastline of about 370 km, and population estimated as 620,000 km^2 located in the southern part of the Red Sea in African side. The climate is generally hot and dry, with two distinct seasons; cold and hot. While Egypt occupied the northern corner of the Red Sea at the African side, with a surface area of 1,019,000 km^2 and coastline on the Red Sea is about 1,800 km. The climate in Egypt is range between 6^{o}C to 39^{o}C in the northern part and 13.5^{o}C to 42^{o}C near the Sudanese border. Jordan has an area of 90,000 km^2, the climate in the Gulf of Aqaba region is arid with average annual rainfall of 25-30 mm and the mean air temperatures range from 14^o C (January) to 32^o C (August).

Saudi Arabia has the largest coastline in the Red Sea, it extend 1,840 km. The climate is extremely arid, with average rainfall is less than 70mm. While Somalia has an extensive coastline of 2,000 km facing the Indian Ocean and 1,300 km along Gulf of Aden. The climate is arid with an average annual rainfall of less than 300 mm. Sudan has an area of 2,505,815 km^2, with 750 km long of coast line in the Red Sea. Whereas Yemen covering an area of 531,000 km^2 including Socotra archipelago.

Part of the biodiversity component in PERSGA is the conservation of the seabirds in the region. Information available on seabirds was not adequate with majority of studies were carried out one to two decades ago. Species account shows there are 17 true seabirds and 14 other seabirds. In addition there are other birds were recorded breeding in the islands on the Region such as African collared dove lanner and Barbary falcons and two to three species of warblers. Among these birds the Jouanin's petrel and swift tern were the lowest sub-populations counted in the region. The endemic white-eyed gull to the Red Sea and Gulf of Aden has large concentration on the northern Egyptian Red Sea islands. Whereas the sooty gull and spoonbill were apparently abundant in the southern part of the Red Sea.

Lesser-crested, bridled, white-cheeked terns were the most common seabirds in the region. Although the brown booby was recorded at all the countries in the region masked booby were recorded in islands located in the southern part of the Red Sea, with the majority in the Gulf of Aden. Other seabirds like osprey, sooty falcon, little green heron and western reef heron are common breeder on most part of the region.

The threats facing seabird populations are human disturbance, human exploitation, introduced predators, habitat destruction, pollution and over-fishing. However, detailed studies are needed to investigate the effects of these treats on seabirds. Although the conservation measure activities in the region increased with establishment of environmental agencies and protected areas. The seabird conservation still not considered as priorities in the conservation of the marine environment in most countries in the region.

To develop a strategic plan to conserve the seabird populations in the PERSGA region. We believe that it is necessary to discus the main problems to develop strategic action plan to conserve the seabird population. From the available information, we feel that the following points need immediate attention for development and implementation of seabirds conservation strategies: lack of information accuracy and availability, lack of institutions effectiveness in conservation, lack of fund to support seabirds studies and conservation, lack of capacity regarding regional expertise, lack of research related to seabirds conservation and, and lack of awareness on the importance of the seabirds conservation.

For a better protection of seabirds it is necessary to strengthen the capacity on conservation of seabirds, strengthen the protection of the breeding seabird areas, and develop a conservation action plan for the breeding seabird in the region, which should include research and monitoring; legislation; awareness.

1. Introduction

1.1 Introductory of the Red Sea and the Gulf of Aden

The Red Sea and the Gulf of Aden represent a complex and unique tropical marine ecosystem with extraordinary biological diversity and remarkably high degree of endemism. This narrow band of water shared by a number of coastal states is also

important shipping lane linking the world's major oceans. The diversity of corals is greater than anywhere else in the Indian Ocean, and number of species that confined to the Red Sea and found nowhere else is extremely high (Pilcher and AlSuhaibany 2000). The Red Sea is one of the most important repositories of marine biodiversity on a global scale and features a range of important coastal habitats. The Red Sea lies within a deep (maximum depth 2500m) trench formed by northerly extension of Africa rift valley system. It has surface area of ca. 435,000 km^2, and is 2000 km long. To the north, the Red Sea divides into the shallow Gulf of Suez (to 90 m depth) and a deeper (to 1000 m depth) Gulf of Agaba.

The Gulf of Aden, one of the biologically least known branches of the Indian Ocean, holds fishery resources of international importance. The Gulf of Aden is strongly influenced by the upwelling of cool, nutrient rich water during the southwest and northeast monsoons and is characterized by prevailing high energy climate. These pose major constraints on coral reef development; hence only 5% of Yemeni Gulf of Aden coast is lined with fringing reefs Rocky cliffs alternating with long stretches of littoral and sub-littoral sand along coastal plains dominates the coastline. Little is known about the coastal and marine resources of the Gulf of Aden of Somalia.

The Socotra archipelago situated at the eastern extreme of the Gulf of Aden, some 400 km south of the Arabian Peninsula, contains unique aquatic and terrestrial ecosystems and species, with limited impact from human activities. It consists of Socotra island and three outlying islands; Abd al-kuri, Samba and Darsa. Recent survey revealed that the archipelago could be extremely important area for marine biogeography. The archipelago has been described by the World Wide Fund for Nature (WWF) as an "Indian Ocean version of Galapagos," based on the high degree of endemism and unique vegetation types on the islands (PERSG 1998).

1.2 Report Objectives

Seabirds were used as bio-indicators for the healthiness of marine environment, and they were replaced at the top of the food chain at this environment as they feed mainly in fishes (Fox and Weseloh 1987). Therefore, they are important predator in marine ecosystem. Seabirds are not distributed randomly, their distribution pattern being determined by the availability of food and nesting sites. They feed at sea and breed on land, and so are important redistributors of nutrients within and between those two systems. Nutrient enrichment from seabird colonies has been shown to lead to an upgrading of nutrient status and productivity, both at land and in sea, and the effects of this are evident in the plant and animal communities of many islands ecosystem and near shore region.

The importance of the Red Sea and the Gulf of Aden (RSGA) region for the seabirds is great, as several endemic taxa occur, including the white-eyed gull *Larus leucophthalmus*, red-billed tropicbird *Phaeton aethereus indicus*, spoonbill *Platalea leucorodia archeri* and brown noddy *Anous stolidus plumbeigularus*. A further group of taxa, at both specific and sub-specific level, is endemic to the north west of the Indian Ocean area and important sub-populations of many breed in the RSGA region such as Jouanin's petrel *Bulweria fallax*, sooty gull *Larus hemprichii*, swift tern *Sterna bergii*

velox, white-cheeked tern *Sterna repressa* and the Socotra cormorant *Phalacrocorax nigrogularis.*

In order to develop a regional conservation plan for breeding seabirds in the Red sea and Gulf of Aden, the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA) initiated a program of four stages: the first stage was develop a Standard Survey Methodology; secondly training of the national seabirds specialists on this SSM; then conducted surveys at counties needed and develop a countries reports presenting the recent status of the seabirds.

The Standard Survey Methodology (SSM) for seabirds developed by PERSGA to use for determining the status of seabird populations. This will complement other methods developed by PERSGA to conserve marine environment in the Red Sea and the Gulf of Aden (RSGA). In addition, the SSM was used as tool to develop capacity of the region through training of regional specialists on the seabirds monitoring. Furthermore, the SSM will allow comparing data collected across the region and will hopefully allow a greater regional understanding of seabird population fluctuations, which will allow developing a strategic plan to conserve the seabird populations and develop the capacity for the seabirds protection in the region.

In order to develop a countries report, PERSGA conducted four field surveys in the region. The first was a part of biodiversity project carried out in Socotra archipelago (Al-Sagheir *et al*. 1999). The other surveys were carried out during summer 2002 in Djibouti, Sudan and Yemen (Shobrak *et al*. 2002a; Shobrak *et al*. 2002b; Al-Sagheir 2002b). In addition four countries reports were compiled by regional experts to determine the status of the seabirds in countries did not surveyed. The following is a desktop study compiling information on the status of breeding seabirds in the Red Sea and the Gulf of Aden as a regional report out of countries reports developed by PERSGA. The objectives of this report are as follows:

a) to determine the status of the breeding seabirds on the Red Sea and The Gulf of Aden (RSGA).
b) to identify the threats on the seabirds and their habitat in the RSGA
c) to identify the conservation requirements for breeding seabirds in the region and subsequently develop a regional conservation plan for seabirds conservation.

1.3 Introductory of the PERSGA's Countries

Large parts of the Red Sea and Gulf of Aden are still in pristine state, environmental threats are increasing rapidly, requiring immediate action to protect the region's coastal and marine environment. To this end a Strategic Action Program (SAP) has been prepared through a continuous consultative and cooperative process among the coastal states, coordinated by the Regional Organization for Conservation of the Environment of the Red Sea and the Gulf of Aden (PERSGA). This regional organization was established in September 1995 under the umbrella of the Arab League. However, its creation was formally announced in the Cairo Declaration signed by all the parties to the Jeddah Convention. PERSGA members are Djibouti, Egypt, Jordan, Saudi Arabia, Somalia, Sudan and Yemen.

1.3.1 Djibouti

Djibouti is a small country with a surface area of 23,200 km^2 and a coastline of about 370 km. It located at the juncture of the Red Sea and the Gulf of Aden, bordered by Eritrea at the north, Ethiopia to the northwest, west and south, and Somalia to the south-east. The northern coast between Eritrean border and Ras Bir faces the narrow Strait of Bab-al-Mandab. The country is essentially volcanic in origin and largely desert, therefore the landscape is composed of plateaux of medium elevation (500-100m), interspersed with plains of depression of low altitude (below 500 m) and a number of mountain ranges of peaks (Fishpool and Evans 2001).

The human population is estimated at 620,000 (Direction del' Environnment, 1999) of which 65% live in the capital –Djibouti-. The average annual growth rate is 4.9 percent. The economy is highly dependent on tertiary sector (trade, financial services and other services), with the primary and secondary sectors making up just 13% of the gross National Product (Emerton 1998). Djibouti –ville is a busy port, linked by rail and road to Ethiopia, and port activities play a major role in the economy. The potentially rich marine resources are relatively under-utilized and statistics shows a fluctuation in the fisheries production from 1980 and 1994, due to weak marketing structure for fisheries products and to unrest situation in the north of the county early 1990's.

The climate is generally hot and dry, with two distinct seasons. The "cold" season runs from October/November to April, and is characterized by early winds, high humidity (60-85% in the mountains and on the coast, 50-65 % in lower interior regions) and mean monthly temperatures of 22-30^oC in most of the country, dropping to 19-22^oC in the mountainous regions. The "hot" season is from June to September, with monthly mean temperatures of 30-40^oC in most of the country and 26-31^oC in the mountains (FAO, 1987), strong, hot winds from the west (the Khamsin) and a lower humidity. In transition months (May/June and September/October), the winds are variable, and humidity and temperature relatively high (Direction de l' Environnement, 1999).

1.3.2 Egypt

The Arab Republic of Egypt occupies the northern corner of the African continent with a surface area of 1,019,000 km^2. The average temperatures are high with mean in summer 20-30^oC and 10-20^oC in winter. The mean annual rainfall over most of the country is less than 10 mm. The Nile River is the primary source of fresh water, supplying over 95% of the nation's water supply. As of 1995, Egypt's Gross Domestic product (GDP) was US$ 29 billion growing at a rate of 7 to 6% annually. Egypt's population is approaching 70 million with a growth rate at 2.3% per annum (Danida 1995).

Egypt is a large country with a relatively long portion of coastlines on two seas with different marine ecosystem and terrestrial environments. The Red Sea coastline is nearly 1,800 km (PERSGA 2001). It extends in a northwesterly direction between latitude 22^oN 30^oN branching to form two gulfs, the shallow Gulf of Suez and deep Gulf of Ababa. The Gulf of Suez extends about 250 km with a width ranging between 17-45 km and maximum depth of about 83 meters (PERSGA 2001). By contrast, the Gulf of Abaqa is

shorter (150 km) and deeper, reaching about 1,850 meters in the central basin (Friedman 1985). It ranges in width from 25 km in the south to 16 km in the northern part. The Egyptian Red Sea coast in general has very limited freshwater resources due to its geographical location in the arid sub-tropical region. Air temperature ranges between 6^{o}C to 39^{o}C in the north and between 13.5^{o}C to 42^{o}C near the Sudanese border (Morcos 1970).

The population inhabiting the coastal area of the Egyptian Red Sea is concentrated in a number of cities on the coastline and few scattered villages in between (Baha El Din *et al*. 2003). Tourist resorts are spreading down all coastlines. The coastal population is rapidly growing to support the expanding development in the area. Tourism, a large portion of which is nature based represents the main economic activity in the Red Sea and the second largest sector of the nation's tourism industry (PERSGA 2001). The Egyptian Red Sea is also a major transportation route due to the Suez Canal and a key location for petroleum and natural gas production (PRSEGA 2001). Fishing is another important economic activity in the region (PERSGA 2001).

1.3.3 Jordan

The Hashemite Kingdom of Jordan has an area of 90,000 km^2 and bordered by Syria in the north, Iraq in the north – east, Saudi Arabia to the east and south, and Israel and Palestine to the west. Four main physiographic and biogeographic regions are identified; they tend to show a north – south alignment. These three areas are Jordan Rift Valley and wadi Araba, the highlands, Badia region and the marine environment.

The human population in 1990 was 4,009,000 with majority inhabiting the western strip. The highest annual rainfall is received in the Ajlun mountains, 550 mm. The lowest annual rainfall is recorded in wadi Araba and southern Jordan (50 mm). However, the climate in the Gulf of Aqaba region is arid with average annual rainfall of 25-30 mm. whereas the mean air temperatures from 14^{o} C (January) to 32^{o} C (August).

The Jordan's Gulf of Aqaba coastline is 26.5 km long. Within this small area are the country's only port, industrial facilities vital to the national economy, a growing tourism industry, and delicate marine ecosystem which is increasingly threatened.

1.3.4 Saudi Arabia

Saudi Arabia's Red Sea coastline extends southward approximately 1,840 kilometer from the Jordan border north of Haql (29^{o} 30'N) to the border with Yemen at Oreste Point (16^{o} 22'N), accounting for 79% of eastern seaboard of the Red Sea (MEPA/IUCN 1987). The continual shelf extends offshore for distance <1 km in the Gulf of Aqaba to 100 km in the Farasan bank.

The Red Sea coast and islands support a variety of coastal and marine habitats, related largely to oceanographic regime, degree of exposure, and topographic features, particularly the distribution of suitable antecedent topography for development of coral reefs, mangrove stand and sea-grass beds. However, the Saudi Red Sea coast is divisible into several relatively homogeneous areas in term of variety and distribution of coastal

and marine habitats and reefs; the gulf of Aqaba in the north, the northern central section from immediately south of Gulf of Aqaba to Jeddah, and the central southern region from south Jeddah to the Yemen border and including Farasan bank and associated islands.

The climate is extremely arid, and much of Saudi Arabia's biological productivity is confined to narrow coastal strip and originates mostly from habitats such as coral reefs, mangrove and sea-grass communities. Average rainfall is less than 70 mm/year along the broad coastal Tihama (16 mm/year at al-Wajh, 63mm/year at Jeddah and the same quantity at Jizan) (PERSGA 2001). Inland, above the coastal escapements, may exceed 200 mm/year.

In the past three decades, Saudi Arabia has undergone a rapid transformation from a state of underdevelopment with severe constraints to development and public welfare to a modern industrial country, completed with sophisticated infrastructures and modern health care (PERSGA 2001). By 1987, 8% of Red Sea coast had been subject to extensive development (Chiffings 1989). Over 15.2 % of the population lives in the Red Sea coastal zone (Ministry of Planning 1995).

1.3.5 Somalia

The country has an extensive coastline of 2,000 km facing the Indian Ocean and 1,300 km along Gulf of Aden. These two coasts meet at Raas Casyer (Gape Guardafui) the Horn of Africa. The largest town along the Gulf of Aden coast is Berbera. Other larger settlements along the coast are Zaylac, Laas Qoray, Qandala, Xabo and Caluula. Despite rich living marine resources, fisheries account for only 2 % of the GDP (FAO 1995). Other marine based activities are even less important. The western part of the north coast between Saylac and Berbera is shallow with exposed, high energy sandy beaches. The central portion between Berbera and Bosaso consists of mainly shallow, sandy shorelines, rarely broken by protruding rocky outcrops and cliffs which may extend into the shallow water. In the eastern part between Bosaso and Raas Caseyr high mountains reach the sea.

Somalia is presently suffering from a civil strife which broke out in 1988 and resulted in a collapse of the central government and a breakdown of the national economy. In January 1991, inter-clan conflict in the north-west resulted in the displacement of an estimated 100,000 people, many of whom were killed. In May 1991, former British Somaliland declared itself independent and a government was installed, but the "Republic of Somaliland", which controls the western part of the coastline, is not recognized internationally. The Somali people in collaboration with the international community are facing the challenging task of rehabilitation and reconstruction.

The climate is arid with an average annual rainfall of less than 300 mm. Seasonal variations is mainly influenced by the monsoon winds, which also determine the coastal currents. From May to August, the south-west monsoon drives a strong current from the level of Socotra to the east. It influences the water masses in the Gulf of Aden, where the main current direction is eastward during this period. Along the north-eastern coast there is a counter current that flows westward, fed by north-easterly flowing waters passing

between Socotra Island and the mainland into the Gulf of Aden. From October to March, during the north-east monsoon, waters flow from the Arabian Sea into the Gulf of Aden.

The country's two main rivers are the Jubba and Shabeells which flow into southern Somalia from Ethiopia. There are no perennial rivers along the northern coast of Somalia. Freshwater reaches the coast only during irregular flash floods following torrential rains. The surface run-off from land has no significant influence on the marine environment. Most near shore subtidal areas are shallow with sandy substrate, occasionally interspersed by fields of cobbles or boulders and by rocky outcrops. Steep rocky cliffs usually continue as shallow sand areas under the water surface.

There are a number of offshore islands in Somalia's coastal waters; Aibad and Saad ad Din islands lies of Zaylac, by the border with Djibouti. Future east, off the Gulf of Aden coast, lies the Mait or Maydh island. The Saad ad-Din group near Zaylac consists of six small, low-lying, exposed islands with sandy beaches, while Jasiired Mait in the central part near Raas Khatib is a steep-faced rock with little over 1.5 km length and an average high of 100 m

1.3.6 Sudan

The Republic of Sudan is the largest country in Africa, extending 2,075 km along its north –south axis and 1,810 km along its east to west axis. It has an area of 2,505,815 km^2 and is bordered by the Red Sea, Eritrea and Ethiopia to the east; Kenya, Uganda and Democratic Republic of Congo to the south; the Central Africa Republic and Chad to the west; and Libya and Egypt to the north. The population was estimated in 1997 to be 27,889,000, with a 1.1 % annual rate of increase. The population includes also a significant number of refugees from Ethiopia, Chad, Uganda, and Somalia.

Because of the huge latitudinal range, from $03^o31'$ to $22^o00'$N, different parts of the country experience very different climates. Northern Sudan is desert with negligible rainfall and high mean daily temperature, from 20ºC in winter to 35ºC in summer. The Red Sea coastal plain receives winter rainfall, while the rest of the country south of 10ºN experiences rainfall from March to November. Rainfall increases southwards to a maximum of 1,000-1,200 mm recorded annually on the southern border.

The Sudanese Red Sea coast is approximately 750 km long inclusive of bays and inlets. The country lies within the desert and semi-desert sub-zones, and although there are numerous streams-drain from the Red Sea hills, there are no perennial water flows in the lower reaches of the coastal plain and into the Red Sea. Only after torrential rains, which occur mainly in November and December, there are occasional freshwater influxes in the Red Sea. Average annual rainfall is 111 mm (varying from the north to the south), and the coastal plain is very dry. The widest and deepest parts of the Red Sea lies off Port Sudan. Throughout the Red Sea coast, water is extremely transparent, sometimes as deep as 70 meters. Surface temperatures range between 26.2 and 30.5^oC, and salinity is rather high (39-41 ppt). From May to October, surface currents flow in a southerly direction; for the rest of the year they flow northwards. The maximum tidal range is about 55 cm (Schröder 1981; Sheppard and Well 1988; Krupp *et al* 1994). The Sudanese coast is

characterized by the most diverse reefs of the Red Sea, and most of the coast is bordered by fringing reefs 1-3 kilometers wide separated by deep channels from a barrier reef 1-14 kilometers off the coast. At the southern end of Sudan's Red Sea coast lies Suakin archipelago in an area where the coastal shelf widens to 100 km. A second serie of islands lies off the town of Mohammed Qol, and there are further string offshore islands between the town of Dungonab and the Egyptian border in the north. In addition another series of islands appears in summer as a result of the strong variation in wind system between summer and winter monsoons, which causes seasonal changes of up to 0.5m in mean sea level throughout the Red Sea.

1.3.7 Yemen

The Republic of Yemen lies in the south-western corner of the Arabian Peninsula, and includes the Socotra archipelago covering an area of 531,000 km^2. The country boarded by the Red Sea in the west, the Gulf of Aden to the south, Saudi Arabia to the north, and Oman to the east. Yemen contains the highest mountain in Arabia, Jabal al-Nabi Shu'ayb, which reaches 3,666 m. According to the 1994 census the total population of Yemen is around 15 million, and the annual growth rate is 3.7% (PERSGA 2001). Recent information on Yemen population showed that there are over 18 million inhabitants mostly concentrated in the Highlands and Red Sea coastal areas. The main economic activities of the coastal population are farming and fishing. The fishing activities either by foreign vessels or by local fishermen exert a great pressure on the Red Sea. The coastline has a length of about 2,200 km, roughly one third of which is in the Red Sea and the remaining two thirds is in the Gulf of Aden.

Along the Red Sea, the climate is dry with an average annual rainfall of 100-200 mm and a humidity of about 60%. No perennial surface streams discharge into the Red Sea. However, flash floods are widespread feature following torrential rains. The Gulf of Aden is dominated by the Indian Ocean monsoon system. The highest annual rainfall occurs after flash floods between January and March (NE monsoon). Between May and September, the SW monsoon generates winds in a north-easterly direction (SW Monsoon), and the relatively warm surface water of Gulf of Aden is blown offshore and replaced by cooler, nutrient – rich water from deeper layer.

The Socotra archipelago measuring 125 by 42 km, lies 400 km south of Yemen on the Carlsberg Ridge, an extension of mid-Indian Ocean ridge system. The archipelago has many unique features.. Socotra is the largest of four islands long isolated from the mainland and surrounded by water more than 3,000 m deep. The Archipelago is highly exposed to the monsoonal wave climate of the Indian Ocean. Annual rainfall is around 200 mm, mainly falling in June, November, December, and the average temperature ranges from 17^o C in January to 37^o C in July. The Socotra island is home to diverse terrestrial plant and animal life with high degree of endemism.

The great productivity of the Arabian Sea, Gulf of Aden and southern part of the Red Sea caused by upwelling of cold, nutrient-rich water during the summer monsoon, together with the presence of numerous offshore islands makes an ideal feeding and breeding area for seabirds, notably Jouanin's petrel *Bulweria fallax*, Persian shearwater *Puffinus*

lherminieri persicus, masked booby *Sula dactylatra melanops* and probably Socotra cormorant *Phalacrocorax nigrogularis*.

1.4 Review the Seabirds Studies at the Region

The Seabirds populations of the Red Sea and the Gulf of Aden have been reviewed by several authors such as Cooper *et al*. (1998), Gallagher *et al*. (1984), Evans (1987) and Jennings (1995). These works have pulled together information from a wide variety of sources covering a fairly long time span. In the case of the former two papers, the authors have attempted to estimate approximate population size, or orders of magnitude for some breeding species and thereby indicated the potential importance of the Red Sea and the Gulf of Aden region in an international context.

1.4.1 Seabirds Studies in Djibouti

In Djibouti, the majority of ornithological information that is available was a results of observations by Alain and Danielle Laurent (resident in Djibouti between 1981-1993) and Geoff and Hilary Welch, who made nine visits to the country between 1984 and 2001. In addition Thomas Künzel and Chris Magin worked in the country for short periods in the 1990's. More recently, the BirdLife International published the book about the Important Birds Area (IBA) in Africa, which presents an overall review of bird species in Djibouti (Fishpool and Events 2001).

Concerning the seabirds breeding in Djibouti, there is very limited information mentioned on these publications. For instance, Welch and Welch (1998) presented a check-list of birds of Djibouti and their status. Laurent (1987; 1990; 1993) had recorded several breeding seabirds such as lesser crested tern *Sterna bengalensis* and swift tern *Sterna bergii* and the brown booby *Sula leucogaster* at Les Sept Frères islands. Also he recorded the breeding of other birds on Mucha and Maskali islands; for instance the osprey *Pandion haliaetus*, western reef heron *Egretta gularis*, and the sooty and white-eye gulls *Larus hemprichii* and *L. leucophthalmus*. In general the majority of record of breeding seabirds was not definitely conformed.

1.4.2 Seabirds Studies in Egypt

Early last century the first written information about birds in Egypt was published by Meinertzhagen (1924; 1930). In 1989 Goodman and Meininger synthesized the new information on the birds of Egypt and to some extent re-evaluate the material available to Meinertzhagen (1930). The authors presented an atlas for all species recorded in Egypt with a review for most of the records and observations available for each species. In addition, they give a population estimate for each species, which we considered in this report.

Recent studies show that there are more than 470 bird species in Egypt, most of which are non-breeding migrants (Fishpool and Evens 2001). Only about 150 species are considered as resident breeding population (Baha El Din 1999). A total of 16 species of global conservation concern have been recorded in Egypt (Collar *et al*. 1994). Among these species, the white-eyed gull *Larus leucophthalmus*, is the most important for the Egyptian Red Sea islands as they hold the largest breeding population known in the world

(Fishpool and Evens 2001). Jennings *et al*. (1985) estimated that 30% of the world's population of this species breeds on islands at the moth of the Gulf of Suez. The islands of Tiran, Ashrafi, North Qeisum, Tawila and Zabargad are amongst the most important islands in the Egyptian Red Sea for breeding seabirds (Baha El Din 1999).

Inventories of seabirds breeding on the Egyptian Red Sea islands were presented by Jennings *et al*. (1985) and Goodman and Storer (1987). In addition, Frazier *et al*. (1984) presented their observations along the Egyptian Red Sea coast during spring 1982, with notes on the migratory and breeding species. More recently Hoath *et al*. (1997) discussed the breeding birds at islands of the Gulf of Suez. Although the survey did not cover the whole islands covered by Jennings *et al*. (1985), it showed that there are few changes in species composition. Grieve and Millington (1999) produced a report on the northern Red Sea islands representing the most comprehensive survey of the status of breeding seabirds in this area since Jenning's survey; with an appendium of records from a visit to Wadi Gimal Island and Hamata Mangroves in September 2000. Baha El Din (1999) assessed and identified the important bird areas in Egypt according to available information including new records.

1.4.3 Seabirds Studies in Jordan

No island is located in the Jordan Red Sea territory; therefore there are no breeding seabirds in Jordan. However, several seabirds species were recorded along the Gulf of Aqaba, utilizing the marine environment for feeding and roosting (Andrews 1995).

1.4.4 Seabirds Studies in Saudi Arabia

In general, Saudi Arabia has probably received more systematic seabirds' surveys than other countries in the Red Sea Gulf Aden region. The first organized systematic survey on seabirds was carried out by the IUCN and the Metrology and Environmental Protection Administration (MEPA) – renamed recently to the Presidency of Metrology and Environments (PME) - during summers of 1982 and 1983. The surveys aimed to determine the status of the marine habitat. One hundred twenty-nine sites and islands were covered. The results showed the importance of Saudi Arabia for breeding terns and gulls (Ormond *et al*. 1984). After the Gulf war in 1991, seabirds studies were developed. Detailed research and monitoring carried out on the Saudi Arabian Gulf islands between 1991 and 1995 has resulted in refined methodologies for census of summer nesting terns and winter breeding Socotra cormorants (Symens and Evens 1993; Symens and AlSuhaibany 1996; Symens *et al*. 1993; Symens and Werner 1996). Following extensive planning a survey of all Saudi Arabian Red Sea islands was completed using similar methodology applied in the Arabian Gulf (Newton and al Suhaibany 1996).

In addition, several studies targeted single species or areas, such as the studies of the breeding biology of the bridle tern *Sterna anaethetus* and white-cheeked terns *S. repressa* (Sweet 1994; Simmons 1994). The important finding of these studies showed that there is a possible effect of egg predation on the abundance of the terns species at Farasan islands. The two other studies were on the breeding ecology of the osprey *Pandion haliaetus* and Crab plover *Dromus ardeola.* They were conducted between 1995 and 1996 (Fisher 1996; Gregory and Goldspink 1998).

Moreover, a number of other surveys were conducted in-between the above cited surveys, but they were more localized, such as the surveys of the island north of Yanbu (Meadows 1993); Umm al Qamari islands protected area survey (Symens 1988); several surveys to Kutambil island between April-July (Stage 1984); and two other surveys in Farasan islands during spring 1988 conducted by two different surveyors (Jennings 1988; Symens 1988). Gaucher e*t al*. (1995) conducted species/specific surveys on the distribution and conservation of the sooty falcon *Falco concolor* on the Red Sea coast of Saudi Arabia in which they estimate the number of breeding pairs. More recently, a regular ornithological monitoring of Umm al-Qamari protected area has been carried out during different seasons in 2001 and 2002 to determine the breeding avifauna and asses their conservation status (Ostrowski 2001a, b; 2002).

1.4.5 Seabirds Studies in Somalia

Observations on seabirds of Somalia were made during an oceanographic survey of offshore waters of Eastern Somalia on board of R.R.S "Discovery" from 25 July and 21 August and from 28 August to 5th of September 1964 during the International Indian Ocean Expedition. Incidental observations were also made on the seabirds while on passage off the north coast of Socotra on 28 June and in the vicinity of Cape Guardafui and Socotra on 25-26 August and 11-12 November 1963 (Bailey 1966; 1968; 1971). The results summaries the distribution of each seabirds observed during the surveys. The results of these surveys documented the seabirds species breeding on the islands at the Gulf of Aden and western part the Indian Ocean.

Cooper e*t al*. (1984) reviewed the seabirds in East Africa coastline; he showed that this region holds substantial proportion of the total population of several Arabian Sea endemic taxa, and a total population probably between 150,000 and 250,000 pairs of seabirds belonging to 17 species. Brown e*t al*. (1982) summarized the available information on the ecology and biology of the seabird with other birds species recorded in Africa. The resource of the information included at these reports based on the surveys in the 1960's and also from published observations during the British colonization at northern Somaliland such as North (1946). In addition data from the southern part of Somaliland discuss the occurrence of seabirds at the Somali islands such as common and lesser noddy *Anous stolidus*, *A. tenuirostris*, roseate and sooty terns *Sterna dougallii* and *S. fuscata* (Ash 1980; Ash and Karani 1981). More recently the new book on Birds of Somalia was published which include the distribution and status of the seabirds in Somalia based on the observations which made during the 1960's and 1980's (Ash and Miskell 1998).

1.4.6 Seabirds Studies in Sudan

Information on seabirds breeding in Sudan is sparse, anecdotal, and out dated (early 1980's). Moreover, majority of these studies came as part of an overview of the status of seabirds in the Red Sea. Recently, however, Moore and Balzarotti (1983), while studying sea turtles on several islands of the Sudanese Red Sea coast, collected at the request of TMR/IUCN, detailed information on birds species breeding on these islands. This study

was reviewed by a number of authors: Cooper *et al*. (1984); Gallagher *et al*. (1984); Ormond *et al*. (1984); Evans (1987) and Nikolaus (1987, 1989).

Vine (1985) made some observations on the seabirds on the Sudanese side of the Red Sea and recorded their breeding at two sites he visited, namely the Suakin archipelago and Mukawwar and two associated islands "Tails and Mayetib". Brown *et al*. (1982) and Urban *et al*. (1986) made as part of their work on the birds of Africa a review of all records of breeding and wintering seabirds in Sudan. Numbers of species recorded by Moore and Balzarotti (1983) and Vine (1985) were not exhaustive, but give us valuable information on the breeding phonology of a number of seabirds in Sudan.

1.4.7 Seabirds Studies in Yemen

In general, birds in Yemen are poorly studied, especially seabirds. The Ornithological Society of the Middle East (OSME) expedition in autumn 1985 presents observations of seabirds at the Red Sea (Brooks *et al*. 1987). Later Evans (1989) studied the breeding seabirds on some Red Sea islands, especially at Al Luhayyah archipelago. Moreover, Porter and Al-Saghier (1998) listed the seabirds on few islands at Al Luhayyah archipelago.

Porter and Stone (1996) outlined the previous ornithological studies undertaken on Socotra islands. For example, Ripley and Bond (1966), probably the most valuable ornithological information for Socotra archipelago. Additionally, the Ornithological Society of the Middle East (OSME) conducted a one week survey of Socotra in 1993, and presented an overview of the status of birds in Socotra and 'Abd Al-Kuri (Kirwan *et al*. 1996)

Furthermore, between 1997-2002, several surveys were conducted in Socotra archipelago to determine the terrestrial and marine breeding species in the archipelago (Al Saghier 2002a). The results showed that there are 185 species recorded in Socotra, among them there are 12 breeding seabirds. At these surveys the evidence for the breeding of the Socotra cormorant was find in the archipelago. In addition, the surveys carried out to confirm the breeding of the Jouanins' petrel *Bulweria falax* in Socotra archipelago. Taleb (2002) presented the results of the discovery of breeding colony of this species in Socotra. In conclusion, seabirds studies in the Red Sea and the Gulf of Aden are still very limited, even in countries such as Egypt and Saudi Arabia were detailed studies on individual seabirds where developed. The limitation of these studies is probably due to lack of interest and capacity building.

2. Results

2.1 Species Account

The account will be define into three categories: a) the true seabirds which include petrels, tropic birds, boobies, cormorants, gulls and terns, b) other water birds, mostly confined for breeding purposes to marine environment in RSGA region such as pelican, heron, egrets, osprey, crab plover, kentish plover, c) other terrestrial birds that nest on islands, often limited to mangrove such as African collared dove, white-collared kingfishers, clamorous and mangrove warblers

2.1.1 True Seabirds

Jouanin's Peterl *Bulweria fallax*

Jouanin's petrel is endemic to north-west Indian Ocean, and the first description of the species was in 1955 (Jouanin 1957; del Hoyo *et al*. 1992). Jouanin (1957) suggested that nesting sites could be in the upwelling areas off Somalia and Oman. Until 2001, the only observations of this species inland were at Thamarit in the desert north of Salalah, southern Oman, in which one adult and two juveniles were recorded (Walker 1981; Gallagher *et al*. 1984). This suggests that the species may nest in the most inhospitable part of the interior desert. On 22nd July 2001 at the Socotra islands, birds were observed sitting on eggs, which present the first breeding record in the region (Taleb 2002). In addition, fledged birds were observed in November from the same year (Taleb 2002). These observations suggested that the breeding season could be from July to November (Taleb 2002). In August 2000, about 50 birds were counted at the colony in Socotra (Taleb 2002). No estimation of the breeding pairs available for the region, and more study are needed to determine the status of the species and to develop a method of monitoring.

Persian Shearwater *Puffinus persicus*

The species was considered as a subspecies of Audubon's Shearwater *(P. lherminieri persicus)* until recently. Now it is consider as a distinct species under the name *P. persicus* (del Hoyo *et al*. 1992). As the classification of this species is still under investigation, we will consider it as species under the name of the Persian Shearwater. The breeding ground of the species at the PERSGA region was unknown until recently during expedition of UNDP/GEF to conserve and sustainable use of biodiversity of the Socotra archipelago. During the seabird survey under this project, 10,000 birds were estimated breeding inland of Socotra archipelago (Al-Saghier *et al*. 1999). The first breeding record was found in Oman namely at Jazair al-Halaniyat autumn 1982 (Gallagher 1983). Therefore, Socotra population probably represents the most important breeding area for the world population. The breeding season suggest by Gallagher *et al*. (1984) is autumn. According to local villagers in Socotra, the birds visit the breeding cliffs from March- April to December-January (Al-Saghier *et al*. 1999). However, more studies are needed to estimate the breeding season and the number of pairs breeding at the Socotra archipelago.

Red-billed Tropicbird *Paethon aethereus indicus*

This subspecies is endemic to the Red Sea, Gulf of Aden and the Arabian Sea eastwards to the Gulf of Oman and eastern Arabian Gulf (Gallagher *et al*. 1984; del Hoyo *et al*. 1992). It nests commonly on rocky islands and probably in mainland coastal cliffs (Jennings 1995; Gallagher *et al*. 1984; Newton and as Suhaibany 1996). This race probably has only few hundred pairs, but inaccessibility of nests suggest they may be fairly secure and perhaps more numerous (del Hoyo *et al*. 1992). Out of the different surveys the estimated number in the region is nearly 800 pairs. Thus the species is breeds along the entire length of the Red Sea and the breeding season is probably between April and August and possibly later in the Gulf of Aden.

Brown Booby *Sula leucogaster plotus*

This Indio-Pacific race is a widespread breeding species along the length the Red Sea and the Gulf of Aden. Breeding habitats used by this species are varied and include sandy beaches, open rocky islands and occasionally cliffs (Jennings 1995; Newton and as Suhaibany 1996; Shobrak 2001; Al-Saghier *et al*. 1999; Al-Saghier 2002b). The highest number was recorded in Yemen with 13,234 breeding pairs, the majority are in Socotra archipelago (Al-Saghier *et al*. 1999; Al-Saghier 2002b). Observations in Egypt showed that the populations of the brown booby breeding at the islands at the mouth of Gulf of Suez did change from 1984 and 1994 (Jennings *et al*. 1985; Hoath *et al*. 1997). However, the survey in 1999 carried out by Grieve and Millington (1999) estimated the number in the islands northern Red Sea at the mouth of the Gulf of Suez between 57-70 pair. The breeding season in Saudi Arabia Red Sea is complex and may be have several nesting waves at particular colonies and the seasonality of breeding varies with a breeding season beginning in summer in the south, while it may start earlier in the north, probably in April (Shobrak *et al*. 2002c). However, at Umm Al Qamari protected area in Saudi Arabia, nesting was recorded year around and the number of breeding specimens varied in a year with a breeding peak around October December in 2001 (Ostrowski 2001a,b; 2002).

Masked Booby *Sula dactylata*

The subspecies *melanops* is endemic to the western Indian Ocean (del Hoyo *et al*. 1992). The majority of nests found in the region were at the Gulf of Aden. In the Red Sea, the Masked Booby is consider as a rare resident breeder, with about 48 breeding pairs at rocky islands named Abu Ali islands in Yemen (Al-Saghier 2002b). At the Gulf of Aden it breeds at Socotra islands of Yemen and Mait island of Somalia, with estimated number of the breeding pairs range between 1200 and 1500 (Al-Saghier *et al*. 1999; Shobrak 2002). The breeding season probably commences in May and last up to more than six months. The habitat and the colony type is not well described from the region. However, it is mostly recorded at rocky island and there is a possibility that the birds use trees for nesting. The race *melanops* breeds in the region, is declining rapidly and the few remaining individuals are threatened with extinction (del Hoyo *et al*. 1992; Al Saghier *et al*. 1999).

Socotra Cormorant *Phalacrocorax nigrogularis*

The species is endemic to the continental shelf from Arabian Gulf to the Gulf of Aden (Gallagher *et al*. 1984). Although it was observed on flocks of 10- 100 on Socotra islands, no evidence of breeding at the region is found until recently, in which eggs and chicks were found at Sabooniah islet, located 10 km off shore at shue'b in Socotra (Al-Saghier 2002a). However, during five days surveys in Bir Ali islands in the gulf of Aden 10,000 breeding pairs were estimated Jennings (2003). This colony seems to be the most western breeding site known for this restricted range species. The Socotra cormorant was known to breed in islands at the Arabian sea of Oman and islands at the Arabian Gulf (Symens and Werner 1996; Gallagher *et al*. 1984; Al-Saghier 1999). However, more studies are needed to investigate the status of the species in the region.

Sooty Gull *Larus hemprichii*

This species is endemic to the north west Indian Ocean. It is a widespread breeding species in the Red Sea and probably the Gulf of Aden. The sooty gull usually nests in

solitary pairs like in Sudan and Saudi Arabia or in loose colonies like on Les Sept Frères islands of Djibouti (Shobrak *et al*. 2002a, b; Shobrak and AlSuhaibany 2002a). Egg laying probably commences earlier in the northern Saudi Arabian Red Sea (April/ May) and in June/July in the southern areas (Newton and al Suhaibany 1996). However, in Egypt, nests were found between July and September (Goodman and Meininger 1989). In addition, Grieve and Millington (1999) believe that there is increase in the population in the northern Egyptian Red Sea islands. It also has been recorded breeding in the southern Egyptian Red Sea, with 45 pairs found on Wadi Gimal island (Grieve and Millington 1999; Baha El Din 2003). Clutch size is usually of 2-3 and nests are often found beside or underneath bushes, and occasionally under rock (Newton and al Suhaibany 1996). Thus the breeding seasons commences in April and probably lasted until September or October.

White-eyed Gull *Larus leucophthamus*

This species is endemic to the Red Sea and the Gulf of Aden. The species is more numerous at offshore islands in the Red Sea than the sooty gull which is more common in the coastal areas. It breeds in all countries surrounding the Red Sea and the Gulf of Aden except in Socotra archipelago where no nests have been reported (Kirwan *et al*. 1996; Al-Saghier *et al*. 1999). Recent estimate of the population in the Egyptian Red Sea showed that there are 10,000 birds (Baha Al Din 1999). The majority of breeding populations were found in Hurghada archipelago at the mouth of the Gulf of Suez, with at least 3,000 breeding pairs (Baha Al Din 1999; Grieve and Millington 1999). The world population was estimated as 20,000 birds (Rose and Scott 1994). According to the estimation of the breeding number in PERSGA countries, the total breeding pairs range between 12,000-13,000 pairs. This estimate is probably higher than we expected. Comparing two surveys carried out in 1982/83 and 1996 in Saudi Arabia we found that there is a significant increase in the population estimated for the species (152-155 *vis-a-vis* 1,500 pairs). This increase could be related to timing or better coverage of islands than actual population increase. In general, we believe that with the potential threats and poor protection in the region, the species will probably decrease than increase. Breeding commence in June and the season last till August. They breed in loose colonies. Clutches were usually two to three eggs, rarely four.

Caspian Tern *Sterna caspia*

A widespread species in the Red Sea and the Gulf of Aden. In Saudi Arabia, it has been recorded nesting in late winter or early spring on the mainland coast south of Yanbu and on several sandy areas at Farasan Islands (Newton and al Suhaibany 1996). Usually nests are solitary (one to two pairs). Dispersed loose colonies of small size were found near Yanbu and Jeddah, Saudi Arabia (Gallagher *et al*. 1984). The latest estimate of the species in Saudi Arabian Red Sea showed that there were between 100 to 200 breeding pairs (Newton and al Suhaibany 1996). Whereas in Egypt there were probably between 250-350 pairs. This suggests that the majority of the population occur in the northern of the Red Sea. Baha El Din *et al*. (2003) reported the finding of eggs between mid-February and late May. Breeding in Saudi Arabia also occurs in spring, February – May (Newton, pers.com.) Thus, the breeding season extends from January/February to April/May.

Swift Tern *Sterna bergii velox*

The subspecies is endemic to the Red Sea and north west of Somalia (del Hoyo *et al*. 1996). The species nests in dense colonies of up to 2000 pairs and may occasionally nests in solitary pairs with other species (Gallagher *et al*. 1984). The nesting season commence in summer. In 1990s, counts showed that there are 3500 breeding pairs in Saudi Arabia. In addition nearly 76% of nesting pairs in Saudi Arabia found by Newton and al Suhaibany (1996) were associated with active colonies of lesser crested tern *Sterna bengalensis*. Additionally, 220-250 pairs were seen nesting in Umm Al Qamari protected island (Ostrowski 2002). Jennings *et al*. (1985) found only "circumstantial evidence" of breeding on Ashrafi and Geisum islands at Hurghada archipelago. Whereas Baha Al Din (1999) reported that the species breeds in Hurghada archipelago, although no actual nests were counted in Egyptian islands. However, Castell (1998) found breeding colony in Hurghada archipelago. In addition Grieve and Millington (1999) estimated 152 pairs on seven islands in Hurghada archipelago, with a majority at Umm el Heimat Saghir island. Studies on the species at the Saudi Arabian Gulf showed that the breeding sites change from year to year (Symens and Alsuhaibany 1996). During survey in Yemeni Red Sea no nests were found for this species (Al-Saghier 2002b). While in Djibouti 500 unfledged young recorded in September 1985 (Laurent 1990). In addition, copulation and courtship behaviour were observed on the coast of Djibouti (Shobrak *et al*. 2002). Breeding season probably commences between June and October. Thus the breeding population of this subspecies in the Red Sea and the Gulf of Aden seems to be significantly less than in the Arabian Gulf (Symens and Alsuhaibany 1996). However, we believe that the status of this important sub-population needs more investigation in the region.

Lesser Crested Tern *Sterna bengalensis*

The species was recorded breeding in the whole of the Red Sea and the Gulf of Aden (Baha El Din *et al*. 2003; Al-Saghier 2002; Shobrak *et al*. 2002a, b, c; Shobrak 2002). The breeding areas seem to be confined to at sandy islands. In Suitable habitat, colonies are large and dense. In addition, it could find associated with other species, such as the swift tern or in the middle of white-cheeked tern (Newton and as Suhaibany 1996; Shobrak *et al*. 2002b). The total number of breeding pairs estimated in the Red Sea is between 13,000 and 15,000. The majority of these breeding colonies were recorded at the southern part of the Red Sea. At the Gulf of Aden, the species was recorded breeding but no breeding pairs were estimated. The breeding season probably commence in June and last till August.

White-cheeked Tern *Sterna repressa*

The species is a widespread in the whole of the Red Sea and at Zaila islands at the Gulf of Aden. Whereas in Socotra archipelago, there is no scientific proof of the breeding for this species. In Saudi Arabia, the largest colonies were recorded at Al Wajh archipelago and Farasan archipelago. Whereas, in Sudan large colonies were found at several location along the Sudanese Red Sea (Shobrak *et al*. 2002b). While in Yemen a large colony was found at She'b island located south of Hodiedah (Al-Saghier 2002b). On this Island, the estimated number of individuals was 12,000 birds (Al-Saghier 2002b). In Djibouti the breeding was not known until recently when 58 nests were located on small islet near

Musha island (Shobrak *et al*. 2002a). In the Egyptian Red Sea the species was recorded breeding in the northern and the southern islands (Jennings 1985; Grieve and Millington 1999; Baha El Din *et al*. 2003). The total number of breeding pairs in the Red Sea is difficult to determine as this species was found breeding at fringing reefs out of the water which are common along the Sudanese coast. However, according to the different count at the PERSGA, countries the number of breeding pairs estimated was 27,000-30,000. The breeding season is probably between May - August.

Sooty Tern *Sterna fuscata*

The species was recorded in a large number at Mait island at the Gulf of Aden of Somalia (Urban *et al*. 1986). The *taxa* occurring on the island is probably *S. f. somaliensis* (Cooper *et al*. 1984). However, Bailey (1968) reported that the species is abundant in the mid of the Indain Ocean and rare in Somali coast. In Socotra archipelago, although the species was recorded, there is no proof of breeding (Kirwan *et al*. 1996; Al-Saghier *et al*. 1999). In the Red Sea no breeding bird was recorded, however, more surveys of the region are needed.

Bridled Tern *Sterna anaethetus*

The bridled tern was probably the most abundant and widespread seabirds recorded in the region, especially in the eastern part of the Red Sea, in which 130,000 breeding pairs were recorded (Newton and as Suhaibany 1996; Al-Sagheir 2002b). In the Sudanese Red Sea, 8,500 breeding pairs were recorded on an island in Suakin archipelago during late July 2002 (Shobrak *et al*. 2002b). Grieve and Millington (1999) noted an increase in the population in the northern Egyptian Red Sea islands. In the Gulf of Aden more than 100,000 breeding pairs were recorded at Saad ad-Din island (Robertson 2001). While in Socotra archipelago, the population was much less than the Somali Gulf of Aden, in which nearly 1,100 breeding are found. More surveys are needed in the western part of the Red Sea to estimate the total breeding population. The species nests under vegetation, rock overhangs, and in crevices holes (Shobrak *et al*. 2002c; Baha El Din *et al*. 2003). The breeding season starts in late May and last up to August.

Little Tern *Sterna albifrons albifrons*

The only breeding record was found in the northern Egyptian Red Sea, in which three pairs scrapping with other terns on a small sandy islet in July 1998 (Grieve and Millington 1999). It was thought that this species could possibility be breeding representing the first evidence that little terns may be colonizing the region. Earlier Egyptian records were found inland in the freshwater and in the Mediterranean wetlands. Eggs are generally laid in Egypt between late March and June (Goodman and Meininger 1989).

Saunder's Little Tern *Sterna saundersi*

The species was recorded breeding in Saudi Arabia, Yemen and at the Somali coast (Cooper *et al*. 1984; Newton and al Suhaibany 1996; Al-Saghier 2000; 2002b). In addition, more breeding population is probably found inshore along the mainland coast of Saudi Arabia with birds commencing breeding in April/ May (Newton and al Suhaibany 1996). If the species breeds in the mainland in other PERSGA's region, similar to the

Saudi population, it will be necessary to survey the suitable areas in the Red Sea and the Gulf of Aden coast to determine the total breeding population in the region. However, the species nests in spring commencing

Brown Noddy *Anous stolidus*

The species in widespread at the southern Part of the Red Sea, and usually on well vegetated or rocky islands and offshore. In Saudi Arabia, it was recorded in 1983 at a small island north of Jeddah, whereas in the 1996 survey, colonies were found in southern Jeddah (Newton and al Suhaibany 1996). In Sudanese Red Sea, a colony of 300 pairs was recorded in an island south of Suakin archipelago (Moore and Balzarotti 1983). A large colony was recorded at Mait island of Somalia in the Gulf of Aden with nearly 20,000 breeding pairs (Robertson 2001). The total number estimated in the region during the last two decades is probably more than 30,737 breeding pairs. The breeding season probably commence in June and last till September.

2.1.2. Other Water birds

Pink-backed Pelican *Pelecanus rufescens*

Although the species is not considered as a true seabird as it is found also in mainland lakes and rivers, in the Red Sea and the Gulf of Aden it is usually associated with marine environments during the breeding season and typically for much of their annual cycle (Brown *et al.*1982). The first description of nesting in Arabia comes from Saudi Arabia Red Sea (Jennings *et al*. 1982). Newton and Symens (1996) recorded the species in the southern part of the Saudi Arabian Red Sea with a major breeding colony at Farasan archipelago. In Yemen, it occurs mainly near the coast. Occasionally it is also found in remote islands surrounded by shallow sea (Al-Saghier 2002b). The species usually nests on top of tall mangroves *Avicennia marina*, occasionally *Rhizopora mucronata*, or lower bushes and exceptionally on the ground. In the Red Sea area, the nesting season is during winter, sometime as early a November, lasting up to March (Newton and Symens 1996).

Little Green Heron *Butorides striatus*

The species is widespread in the whole of Red Sea and the Gulf of Aden. It usually nests in dense vegetation and occasionally in holes and crevices of fossil coral, often among colonies of Western-reef herons and spoonbills (Newton and al Suhaibany 1996). In the Northern islands of the Egyptian Red Sea, eggs and chicks were found between March and August (Jennings *et al*. 1985). In addition, Goodman and Storer (1987) collected an egg in Egyptian Red Sea at the end of August, and found young in early September. In Yemen, 65 nests were recorded at the Red Sea islands (Al-Saghier 2002b). In Sudan birds were flushed from nest with one egg in July (Shobrak *et al*. 2002b). While in Saudi Arabia birds were known spring to be spring nester. Thus the breeding season probably commence in spring and lasted until early autumn. However, no proper estimation of the number of breeding pairs in the PERSGA's region could be made as most of the records were for individuals.

Cattle Egret *Bubulcus ibis*

Similar to the pink-backed pelican and herons, the cattle Egret is not considered as a true seabird, but it is known to use inshore islands for nesting and does not utilize the marine

environment as food source (Jennings 1995). Although, it is known to nests throughout the year, in the Red Sea of Saudi Arabia and Yemen, nests were found between May to July (Newton and al Suhaibany 1996; Al-Saghier 2002b). In Yemen, a breeding colony was found on mangroves at "Al-Gandala Islets close to Hodiedah (Al-Saghier 2002b). While in Saudi Arabia, a total of 1,050 nests were counted in three large active colonies in Qunfudah and Al Lith (Newton and al Suhaibany 1996). However, records from Umm Al Qamari protected area in Saudi Arabia showed that the species seems to use the islands as breeding ground only and leave after the breeding season. It probably changes breeding sites in some years. For instance, in Saudi Arabia the species was not recorded during the IUCN/MEPA surveys in 1982/1983, while Symens (1988) recorded a smaller colony in Umm al Qamari protected area. However, in May 2002 between 120 and 150 individuals and a number of occupied nests were seen at Umm al Qamari protected area. No birds were observed the previous year (Ostrowski, 2002).

Western Reef Heron *Egretta gularis*

The species was recorded in the whole of Red Sea and the Gulf of Aden (Jennings 1995). The species use a variety of vegetation types for nesting, especially mangroves, *Euphorbia*, low bushes and low cliffs (Newton al Suhaibany 1996), while in Al Wajh, in the northern of Saudi Arabia, the species was only recorded nesting on mangrove trees (Ormond *et al*. 1984; Newton and al Suhaibany 1996). In Shobuk islands at Sudanese Red Sea, it uses low bushes for nesting, and fledged chicks were found at nests on large trees in Port Sudan on late July (Shobrak *et al*. 2002b). Western reef heron presumably nests as solitary pairs with a maximum of eight nests at one colony (Newton and al Suhaibany 1996). The largest known colony on the Red Sea coast was recorded in Egypt, with 40-60 pairs in mangroves of Manqata north of Nabq (Goodman and Meininger 1989). Population estimate of the species was not possible to determine at this stage and more data are needed from the region. The breeding season probably commence in March and lasted up to September.

Purple Heron *Ardea purpurea*

The Purple heron was recorded in Red and the Gulf of Aden in two areas. The first was in Saudi Arabian Red Sea, in which birds were recoded incubating in April (Jennings 1995). In addition, he reported the species as a common and widespread migrant with few wintering and breeding birds in Farasan islands and Al Lith lagoon of Saudi Arabia. While Newton and al Suhaibany (1996) did not observe any individual at Farasan islands, but recorded them at the Qishran lagoon in Al Lith. The other area was in at Eounda Dabali island in Djibouti contain two chicks 7-14 days old (Shobrak *et al*. 2002a). The species probably nest on dense mangrove and on rocky islands, and unlikely to be colonial (Jennings 1995). No population estimate of the species at this stage can be guessed. More data are needed from the Region.

Black-headed Heron *Ardea melanocephala*

Although this species is of African origin, a small population was found breeding in Aden and Hodiedah (Al-Saghier 2002b). The group at Hodiedah was breeding on the small islet of Al-Gandala and other high tree in the area. A total of 15 pairs were counted. It is more associated to fresh water habitat and Hodiedah it was found at the sewage treatment plant

and its effluent to the Sea. In other areas in the Red Sea and the Gulf of Aden, no bird was recorded breeding. The breeding season probably last between May to August (Al-Saghier 2002b).

Goliath Heron *Ardea goliath*

This species is widespread in the Red Sea and probably in the Gulf of Aden in low numbers (Jennings 1995). Birds were recorded breeding on the Egyptian Red Sea coast and considered as rare breeding resident of mangrove along the southern Egyptian Red Sea (Goodman and Meininger 1989; Baha El Din *et al*. 2003). In Yemen 10 pairs were recorded (Al-Saghier 2002b). The species usually nests solitarily in areas with plenty of mangrove. The main breeding season in Farasan islands (Saudi Arabia) as recorded by Newton and al-Suhaibany (1996) was winter; but Jennings observed young at nests in April and July. In addition one fledged juvenile was observed in Farasan Islands in August 1988 (Symens 1988). Thus, the breeding season probably commences in spring and last till early winter.

Spoonbill *Platalea leucorodia*

In the Red Sea and the Gulf of Aden of Somalia probably *Platalea leucorodia archeri* race is found . Although the species is widespread, the Red Sea race is probably declining (del Hoyo *et al*. 1992). In the northern Egyptian Red Sea population seems decline up to 50% (Jennings *et al*. 1985; Grieve and Millington 1999). Estimated breeding population in Sudan was 200-500 pairs, while in Saudi Arabia a total of 22 colonies were found during an aerial survey, involving 103 pairs (Newton and al-Suhaibany 1996; Shobrak et al. 2003). In addition, Shobrak (2001) recoded 28 nests with eggs in early April on small islands near Al-Qunfudah port in Saudi Arabia. In Egypt 30-50 pairs were recorded (del Hoyo *et al*. 1992). In Djibouti four nests with eggs were observed on two small islets near Musha island (Shobrak *et al*. 2002a). Additionally, in Yemen two breeding colonies were found on mangrove habitat in Kamaran island (15 pairs) and in Al-Badi islands (18 pairs). The breeding season is from March to September.

Sacred Ibis *Threskiornis aethiopicus*

The species is not associated with marine environment, but high number were recoded breeding on small islands south to Haramous, and on a broken ship south of Djibouti (Shobrak *et al*. 2002a). The species was observed feeding in the mudflat area. In Yemen, It was recorded breeding on flooded land, estuaries, areas around waste water treatment plant in Hodiedah and Aden (Al-Saghier 2002b). Only one pair was recorded in Al-Gandalah Islet at Khour Katib near Hodiedah and surroundings (Al-Saghier 2002b).

Osprey *Pandion haliaetus*

In the Red Sea, the osprey is dependent on the marine environment. Jennings (1995) considered the species as a common breeding bird in all the costal areas of the Arabian Peninsula. They nests in all sorts of habitat –rocky, sandy- and build large nest structure mainly at the open. Studies of the breeding biology of the species in Farasan islands (Saudi Arabia) recorded about 160 birds of which 51-65 were found breeding in late autumn during the seabirds survey of 1993 (Fisher 2001). In addition, the survey carried out by Newton and al Suhaibany (1996) showed that the species was abundant in Al

Wajh archipelago northern Saudi Arabia where nest density appeared to be the highest in the Saudi Red Sea coast. In Yemen Red Sea, 66 pairs were recorded (Al-Saghier 2002b). Whereas the population in Egyptian Red Sea is considered by Goodman and Meininger (1989) as the second largest in world after that of North America. Grieve and Millington (1999) found an increase in by 50% in the northern Egyptian population. Recent surveys in Sudan a total of 20 birds were recorded (Shobrak *et al*. 2002b). However, more studies are needed to determine the status of species breeding in the region.

African fish Eagle *Haliaetus vocifer*

To our knowledge, only one pair of fish eagle had a nest in the region on the north side of Saad ad-Din island on the Gulf of Aden of Somalia (IUCN 1997). This area seems to be the northern most part of its distribution at the sea site; however, more studies are needed to determine the status of the species on the northern coast of Somalia.

Crab Plover *Dromas ardeola*

Recent surveys in the Red Sea showed that it contain probably between 3000-3500 breeding pairs. Eggs are laid between April and June and adults with juveniles leave the nest in August. The only detailed study on the species was conducted in Saudi Arabia in Farasan islands and provided information on the distribution, status and feeding of this species with particular references to conservation and managements (Gregory and Goldspink 1998). Morris (1992) presented the first breeding biology in Abu Al Abyadh at the Arabian Gulf with 200 pairs breeding. The largest colony of the species was recorded in Yemen at Kadaman island with 680 breeding pairs (Al-Saghier 2002b). The northern populations were found on Al Wajh bank in Saudi Arabia (Newton and al Suhaibany 1996; Shobrak *et al*. 2002c). On the western part of the Red Sea, the populations were recorded in Mohammed Gol in the northern of Sudanese Red Sea and on Shubok islands in the Suakin archipelago located in the southern part of Sudan (Shobrak *et al.* 2002b). Although there is an increase in observations of the species on the Egyptian Red Sea, no confirmed breeding records of the species (Baha El Din *et al*. 2003). The breeding season of the species is commences May to September.

Kentish Plover *Charadrius alexandrinus*

The species was recorded breeding in islands and coastal sandy areas in the eastern part of the Red Sea (Al-Sagheir 2002b; Newton and al Suhaibani 1996). In Saudi Arabia breeding were recorded in Farasan islands (Newton and al Suhaibani 1996). The first other found one chick with its parent in Sumair island on Saudi Arabia. Whereas in the Yemeni Red Sea islands, 40 pairs were recorded breeding in July 2002 (Al-Saghier 2002b). In the northern Egyptian Red Sea less than four breeding pairs were found (Jennings *et al*. 1985). The breeding season probably start in early spring and last up to July.

2.1.3 Other Terrestrial Birds

Sooty Falcon *Falco concolor*

Sooty falcon is utilizes islands for nesting, but their food base typically comprises small passerine and non-passerines migrants. In Yemen the total number recorded in this survey was 99 individual birds and 45 nests (Al-Saghier 2002b). In Saudi Arabia Gaucher *et al*.

(1995) estimated the population as one third of the world population which was 260-381 pairs. The previous unsubstantiated world population estimates of the species were 4,000-10,000 pairs (Moreau 1969; Brown *et al*. 1982; Cade 1982). Grieve and Millington (1999) counted 185 pairs breeding on Wadi Gimal island on the Egyptian Red Sea. Recent survey in some of the Sudanese islands showed that the species occur on all island visited (Shobrak *et al*. 2002b). The breeding season is timed with autumn migration, therefore, it commence in the end of summer and beginning of autumn.

African collared dove *Streptopelia roseogrisea*

The species is considered summer visitor to some islands in south west of Saudi Arabian Red Sea (Ostrowski 2002). The species was also recorded breeding in the vegetated areas along the coast of Saudi Arabian Red Sea (Shobrak 2001). Egg laying in March – April and birds move inland by the early summer (Ostrowski 2002).

Mangrove reed warbler *Acrocephalus avicenniae*

The species from in the north-east Africa and the Red Sea coast of Saudi Arabia were named as subspecies *A. b. avicenniae* by Ash *et al*. (1989). However, the subsequent mtDNA study carried out by Leisler *et al*. (1997) showed that these populations are closer to European reed warbler *A. scirpaceus,* from which it differs in song, upperparts coloration, wing and foot structure, and habitat preferences. Therefore, they proposed to be recognizing as separate species Mangrove Reed Warbler *A. avicenniae*. The species were recorded associated with mangrove habitat in the region (Ash *et al*. 1989; Newton and Newton 1994; Jennings 1995; Hansbro and Sargeant 2000). Egg laying probably start in February (Urban *et al*. 1997) and fledgling were observed in Arabia in July (Jennings *et al*. 1987; Jennings 1995). In addition five pairs were defending the territories in July 2002 in Al-Badi island at the Yemen Red Sea.

Clamorous reed warbler *Acrocephalus stentoreus*,

The species is considered as breeding resident in the coastal region in Arabia especially in the mangrove habitat (Jennings 1995). In Egypt the species was recorded breeding in Sharm el Shaeik and south of Suez Tunnel (Goodman and Meininger 1989). In addition, the remain of the species was found in the sooty falcon nest at a small islets 25 km north of Al Lith, Saudi Arabia. Urban *et al*. (1997) suggested that the subspecies occur in Arabia, coast of Sudan and NW Somali is *A. s. brunnescens*. Laying date probably commencing in March up to June (Urban *et al*. 1997). In Saudi Arabia young were recorded in March and an adult examined in the hand had a well developed brood patch indicating egg laying probably last up to late July.

Graceful Prinia *Prinia haesitata*

The species is considered a widespread and sedentary, mainly in eastern, southern and western Arabia (Jennings 1995). Urban *et al*. (1997) reported that the species is breeding in the Red Sea and the Gulf of Aden. In addition, the species occur in Red Sea Hills south of Gebel Elba, and north west of Somalia (Urban *et al*. 1997). Singing birds were recorded in Umm Al Qamari islands protected area (Shobrak 2001). While in Yemen the species is widespread breeding resident in the vegetated islands and coastal area in the Red Sea and the Gulf of Aden (Martins *et al*. 1996). The first author recorded the species

in vegetated islets in Djibouti and Sudan during PERSGA seabirds survey in July 2002. The breeding season commence in January and probably last until September (Jennings 1995).

Olivaceous warbler *Hippolais pallida*
This songbird was recorded nesting in the mangrove along the Egyptian Red Sea (Baha El Din *et al*. 2003). In addition, the species considered by Goodman and Meininger (1999) as an abundant summer breeding visitor to Egypt. Nest building was recorded in April and young were observed in the nest in May and June (Jennings 1995). A remain of the species was recorded in a sooty falcon nest in small islet north of Al Lith, Saudi Arabia (Gaucher *et al*. 1988). The breeding season probably commences between April and October in Egypt (Baha El Din *et al*. 2003).

White-collared kingfisher *Halcyon chloris*
Jennings (1995) considered the species as very local resident in the mangrove in Ash-Shuqaiq, in the south west of the coastal mangrove are in Saudi Arabia. The first record of the species was in April 1982 when a group of four was seen by Stagg (1984) near Al Birk, Saudi Arabia. In August 1989 Symens (1990) rediscover the population in Ash-Shuqaiq area located 80 km to the south from the previous discovery. In addition, the species was recorded in a sooty falcon nest as one of the remaining prey in the nest (P. Gaucher per com. cited in Newton and Newton 1994). The sooty falcon nest were located 25 to north of Al Lith, which more than 200 km from Al Birk. This mean that the species probably breeding resident in the mangrove area south of Jeddah in Saudi Arabia, however, more surveys are needed to determine the status of the species in the region. The breeding season probably commences in April to June (Jennings 1995).

Additional other terrestrial bird species were found breeding in the islands on the Red Sea and the Gulf of Aden. Among them species were utilize the islands for feeding or breeding such as the lanner falcon *Falco biarmicus* and Barbary falcons *Falco pelegrinoides* (Baha El Din *et al*. 2003). Other species like hoopoe lark , black-crowned finch lark, were known as breeding resident of medium to large flat sandy islands in the Red Sea. Moreover, collared dove *Streptopelia decaocto*, were known to use the vegetated islands for breeding only (Jennings 1995; Baha El Din *et al*. 2003). In addition Hooded crow *Corvus corone*, brown-necked raven *Corvus ruficollis*, were observed recently breeding in a costal islands in the Egyptian Red Sea (Baha El Din *et al*. 2003).

2.2 Threats
Several authors discussed the threats on the seabirds of the Red Sea coast (Gallagher *et al*., 1984; Evans, 1987). Recent national reports published by PERSGA discuss the status of seabirds at PERSGA's countries. These threats are human disturbance, human exploitation, introduced predators, habitat destruction, pollution and over-fishing.

2.2.1 Human Disturbance
Casual human visits to breeding islands, whether by fishermen or for recreational purposes, can cause significant disturbance to nesting birds even if there is no deliberate interference. Fishermen the Red Sea and Gulf of Aden use some islands as meeting

places or for searching in firewood. They established a seasonal fishing camps in some islands. In addition, the region has witnessed an unprecedented development boom for tourists. The majority of these development programs have taken place without any regard to the natural environment. Important islands for seabirds were targeted for tourism development especially in the northern Red Sea, and recently in the southern part also. In Egypt vehicles have be transported to and driven on islands posing a major risk to ground nesting seabirds (Baha El Din 2001; Baha El Din *et al*. 2003) Moreover, due to the political exigencies militaries have established bases on some islands in the Red Sea, especially in the southern part (Al-Saghier 2002b). Presence of militaries on the islands has large impact on the number of breeding seabirds.

2.2.2 Human Exploitation

This can take one of two forms-collection and consumption of eggs or chicks. In the past, egg of seabirds formed an important addition to the principle diet of fish to which Arab fishermen and other coastal people were accustomed (Gallagher *et al*. 1984). In the RSGA region these activities are still practice by fishermen and militaries (Al-Saghier 2002a; Shobrak *et al*. 2002a.b.c). In Yemen, fishermen were recorded feeding in Socotra cormorant chicks and petrel chicks (Taleb 2002; Jennings 2002). The impact of this activity could be significant on the distribution and overall breeding success of seabirds. To illustrate this, the use of powerful motors fitted to even small crafts at most of the countries at the region, any known offshore breeding site is easily reachable. In addition these activities are repeated by the same fisherman or other fishermen and military men, the impact could be significant on the local distribution and overall breeding success of the tern colony.

2.2.3 Introduced Predator

Several species of predators were recorded in the RSGA region, which include feral cats, rats and mice. Feral cats were deliberately brought to offshore islands by fishermen or coastguards, whereas rats and mice were probably introduced accidentally. Evens (1987) reported that in the Red Sea, the black rats *Rattus rattus* is present on a number of islands and is known to prey upon birds' eggs and chicks as he recorded the species on Suakin archipelago islets in Sudan. The species seems to effect the gulls (Clapham 1964). In addition the white-tailed Mongoose *Ichneumia albicauda* has been shown along with other small carnivores a severe affect on the breeding success of the osprey (Fisher 2001). They are probably the principal factor preventing ground nesting seabirds from using certain islands. Spread of Indian house crow *Corvus splendens* in most of the major cites in the Red Sea, and recently on offshore islands like Socotra archipelago and in small villages on the coast of the Red Sea is a cause of deep concern (Shobrak *et al*. 2002a, b; Al-Saghier *et al*. 1999). This species could seriously affect breeding seabirds in the region.

2.2.4 Habitat Destruction

In most cases the effects of habitat destruction upon seabirds relate to destruction of their terrestrial breeding sites rather than their feeding ground. Building of industrial plants, hotel or holiday homes and roads may destroy important breeding sites of seabirds. These activities are ongoing in the vicinity of large coastal cities in the Region. In addition

small islands near these cities are used for camping by different tourist agencies for recreational purposes. Moreover, the expansion of cities and other aspects of urban development constitute great pressure on the costal environment. Another important source of habitat destruction arises from the growing number of shrimp farms in the region. Shrimp-farming activities are often very damaging for the ecological equilibrium of contiguous lagoons. Shrimp farms develop usually in low tide and mangrove areas and inevitably affect these fragile ecosystems recognized as major nurseries for fishes and crustacean life. Additionally camels browsing on mangroves had large impact in the distribution of this habitat (PERSGA 2001).

2.2.5 Pollution

Pollution in small seas with little water exchange such as the Red Sea cause a sever damage to the marine environment. Pollution in the region seems to come from three resources: oil pollution, sewage and industrial waste. As regards to the oil pollution in the Red Sea and the Gulf of Aden, between 20,000-35,000 oil tankers enter the region yearly (PERSGA 1998). Likelihood of accidental oil spill is high. A survey made by Awad (1995) indicated that the Red Sea receives 6,836 metric tons or 14.61 kilograms per square kilometer per year of oil from shipping. Dirty ballast wasters duped from ships results in the formation of tar balls which have been found throughout the coastline of the Gulf of Aden (EC/MFM 1995) and some part of the Red Sea coast (Rushdi 1991; PERSGA 2001). The global refinery input of oil is 0.56 kilograms per square kilometer per year, whereas the Red Sea receives 6.64 kilograms per square kilometer per year, nearly 11 times as much. In 1960 over 800 dead Socotra cormorant were found near Aden due to oil pollution (Gallagher *et al*. 1984). Although there is no assessment of the recent Limburg oil spill occurred between Al Mukallah and Bir Ali in the Gulf of Aden, the affect could be severe in the newly discovered breeding population of the Socotra cormorant. Tour party reported that beaches near Bir Ali were badly fouled with oil from Limburg and covered with thousands of feathers (Jennings 2003).

Although oil pollution affects more diving birds such as cormorants, auks and divers, it can also cause damages to seabirds during various stages of their life cycle. Large numbers of adults can be killed by oil-fouling. Oiling of eggs by contaminated incubating birds can also cause serious problems (Freedman 1989). Furthermore beached oil can have a severe impact on flightless chicks on beaches near the colonies. Baha El Din *et al*. (2003) reported that tar mats melt during hot weather and effect adults and youngs on the northern Egyptian islands. Oil spills can also affect seabirds indirectly through the food chain, as toxic hydrocarbons may damage the ecosystems within which the birds' food resources are produced and the disruption of the breeding cycle of prey fish species could cause a drastic decline in seabirds' breeding success.

Sewage waste is observed near large cities on the Red Sea and the Gulf of Aden as the treatment plants in all the PERSGA countries were not efficiently operated. The composition of sewage varies considerably, but major effects reported in scientific literature result from increased nutrient and suspended solid loading or from human health problems associated with coliform bacteria on recreational beaches. Additionally the effect of swage on fishes may reduce the food availability for the seabirds.

2.2.6 Over-fishing

The status of fisheries in some nations of the region is unknown because of lack of stock assessments and incomplete fisheries statistics. However, over-fishing was documented as one of the threats to the living marine resources in all countries on the region (PERSGA 2001). In Saudi Arabia, the increase of fishing pressure could affect breeding seabirds at Farasan islands (Tatwany *et al*. 1995). In 1993 there were 400 boats based on Farasan Islands, a number likely to increase with the number of fishermen more and more recruited from the mainland (Goldspink and Morgan 1996). In addition, feeding flocks like Socotra cormorant could get trapped in fishing nets. It was reported that fishermen kill cormorants and the pelicans found in the fishing net (Gallagher *et al*. 1984). Unsustainable and environmentally damaging fishery practices were recorded in Egypt (Baha El Din *et al*. 2003). In general this factor needs more investigation at a national and region level.

3. Conservation Implementation

3.1 Marine Protected Area for Breeding Seabirds

3.1.1 Marine protected Area in Djibouti

Djibouti has two declared marine protected areas, which have been established for more than a decade age at Musha and Maskali islands. In addition, two important birds areas proposed for protection are Godoriya and Les Sept Frères islands. Musha and Maskali and Les Sept Frères islands were probably the most important seabirds areas in Djibouti (Shobrak *et al*. 2002a). In general the number of breeding seabirds recorded were too small compared to the nearby islands in Somalia. This probably is due to disturbance especially at Musha and Maskali islands. On these islands, tourist and military are commonly seen on weekend.

I. Musha and Maskali islands

Two coral islands and five associated islets, situated in the Gulf of Tadjoura north of Djibouti city. The large island Musha, has extensive stand of two species of mangroves. The sandy surface was estimated covering 30% of the islands; while the vegetation cover at the islets was estimated between 35 and 90% (Shobrak *et al*. 2002a). Although the islands were big, all seabirds species were recorded at the small islets associated with these islands. Several species of seabirds were recorded breeding on these islets included the red-billed tropicbird, western reef heron, little green heron, spoonbills, osprey, white-eyed gull, sooty gull, bridled tern, white-cheeked tern, lesser crested tern, swift terns and the brown noddy (Shobrak *et al*. 2002a).

II. Les Sept Frères islands

The site is an archipelago of six volcanic islands at the mouth of the Red Sea at Bab el Mandeb straits. The small hillock at Ras Siyyan coast makes the seventh member of the group, which gives the archipelago its name (Les Sept Frères). The islands are rocky and un-vegetated except for Eound Dâbali island, in which the vegetation was estimated covering 2% of island surface. Small sandy beaches were found on Kadda Dabali island were tourist and fishermen use for landing and picnic (Shobrak *et al*. 2002a).

The islands supported breeding colonies of red-billed tropicbirds, brown booby, western reef heron, little green heron, osprey, sooty falcon, white-eyed gull, sooty gull, swift and lesser crested terns. In addition the islands were important for migrating raptor to assist them to complete their crossing of the Bab el Mandeb.

Les Sept Frères islands and Ras Siyyan was proposed to protect the diversity of coral reef, mangrove, endemics fishes from both Red Sea and Gulf of Aden, and the bird migrants passing over the islands. A management plan for the site is planed and sponsored by PERSGA.

3.1.2 Marine protected Area in Egypt

There are at present six protected areas along the Egyptian Red Sea. Additional protected areas are proposed (Baha El Din *et al*. 2003). The protected area system plan for Egypt proposed that the boundaries of Red Sea islands and mangrove should be extended north to include all the islands at the mouth of the Gulf of Suez (Baha El Din 1998).

I. Ras Mohammed National Park

This south Sinai Park protects Ras Mohammed Peninsula and the coral reefs along the southern Sinai coast eastward to the Gulf of Aqaba. Included within the area is Tiran island, which is an Important Bird Area. The island is a large crescent-shaped island situated at the mouth of Aqaba. Mangroves are found on the peninsula and Tiran island. As the island is a military and mined areas so access is restricted. Seabirds breed in the mangrove at Ras Mohammed. The tidal flats along the Gulf of Suez coast are feeding and roosting sites for seabirds**.**

II. Nabaq Protected Area

This protected area in south Sinai includes the terrestrial and marine environment along the southern Gulf of Aqaba coast. The most extensive mangrove in the northern Egyptian Red Sea is included in the reserve and is considered the most northerly mangrove in the world. The mangrove and the associated tidal flats are a breeding habitat for seabirds, as well as an important feeding and roosting site.

III. Abu Galum Protected Area

This marine and terrestrial protected area is situated on the Gulf of Aqaba coast between Dahab and Nuweiba. The area protects the coral reefs, beaches, the coastal plan and mountains. Other than Osprey, no other seabirds are known to be breeding in this area.

IV. Gabel Elba Protected Area

It is the largest Protected Area in the country comprising 30,000 km^2 in the southeast corner of the Eastern Desert from the borders with Sudan to north of Shalatteen. Gabel Elba is a marine and terrestrial protected area including extensive fringing reefs, a number of small islands, mangroves and sandy and rock beaches. Seabirds are said to breed on the islands that are the least known the country. The largest mangrove stand in the country occurs south of Shalateen at Abu Sha'ab and has never properly been surveyed for breeding seabirds.

V. Wadi El Gimal-Hamata Protected Area
This is Egypt's newest reserve declared in January 2003. It is a marine and terrestrial reserve encompassing some 40 km of coastline south of Marsa Allam from Wadi Gimal south to Lahmi Bay. Included within the reserve is a large stand of mangroves at Hamata, coral reefs, seagrass beds and islands, including Wadi Gimal and the Qulân island chain.

VI. Red Sea Island and Mangroves Protected Area
A decree extended the boundaries of the Gabel Elba Protected Area to include all the islands along the Red Sea coast from the borders with Sudan north to Hurghada, as well as all the mangroves along the Red Sea coast. This is now being managed as separate protected areas. This reserve includes the islands off the coast of Hurghada, Zabargad island and the other islands to the south not part of the other protected areas, as well as all coastal mangroves from north of Hurghada south to Wadi Gimal. The management of this area is currently under development and is being zoned into different sectors that will be managed by separate units.

3.1.3 Marine protected Area in Jordan
In Jordan, at present there is no marine protected areas. The Aqaba Coral Reef Protected Area is the only proposed protected area.

3.1.4 Marine protected Area in Saudi Arabia
The Kingdom of Saudi Arabia has established a number of extensive terrestrial protected areas, but lags behind in the development and implementation of marine protected areas. With exception of Farasan Islands, Umm al Qamari Islands and Yanbu Royal Commission Protected areas, nearly 32 protected areas were proposed for protection dating back to mid-and late 1980s. Several reports had been published presenting these areas (Evans 1994; DeVantier and Pilcher 2000; PERSGA 2001).

I. Yanbu Royal Commission Protected Area: This area is protected by the Royal Commission through an agreement with the MEPA. It covers an area of ca. 5km^2 and encompasses fringing reefs, mangroves, and seabird nesting sites. The site has a representative mangrove avifauna and two species of seabirds breeding at the offshore islands; the Saunder's little tern and the white-cheeked tern.

II. Umm al Qamari: Established in 1977 and covering an area of less than 0.1 km^2, this small protected area in the southern Red Sea is composed of two small islands with surrounding fringing reefs and sand banks. It is an important breeding site for hundreds of African collared doves *Streptopelia roseogrisea*, little green heron, reef heron, cattle egret, swift terns, brown boobies, sooty gulls, and one to two pairs of ospreys.

III. Farasan Islands: Established in 1996 and covering an area of 3,310 km^2, this Terrestrial and Coastal Reserve is an archipelago of small islands at the southern extreme of Saudi Arabia's Red Sea shore. It is an important habitat for mangroves, sea-grasses, coral reefs, marine mammals, marine turtles, seabirds and endemic gazelle, and is threatened by fishing, development and recreational activities. The site is categorized as

an Important Bird Area by BirdLife International as the majority of Red Sea's seabirds breed in the archipelago.

In addition there are other proposed protected areas in the Saudi Red Sea, Straits of Taran, Ras Suwyhil, Sharm Zubayr, Ghubbat Bal'aksh, Al Wajh bank, Qalib islands, Al-Hasani and Libanh islands, Ras Abu Madd and Sharm Hasi, Ras Baridi and Sharm Al-Khawr, Shi'b al Qirin Ras Hatiba**,** Ash-Shu'aybah and Mastaba, Qishran, Outer Farasan bank, Khwr Itwad, Shi'b Abu al-Liqa and Shi'b al-Kabir

Straits of Tiran: Straddling the Saudi Arabia / Egypt boarder, it encompasses islands and extensive coral reefs with diverse reef associated fauna in the transition area between the Gulf of Aqaba and the Red Sea. Is an important marine turtle and dugong habitat. There are tourist activities on the Egyptian side.

Ras Suwayhil: Proposed to cover an area of 267 km^2, the site encompasses pristine and diverse coral reefs and reef associated fauna, and is a prime example of the Gulf of Aqaba reefs and high cliffs. Habitat for seabirds and dugong.

Sharm Zubayr: Covering 80 km^2, the area encloses open coastline and a sharm with fossil reef cliffs, narrow fringing reefs and the northernmost mangroves in the Red Sea. A causeway has been proposed to cut through the area.

Ghubbat Bal'aksh: Covering 33 km^2, this is a sharm and open coastline with coral reefs with particularly high species diversity, sea-grass beds, and seabirds, subject to unregulated recreational activities.

Al Wajh bank: Including Sharm Habban and Sharm Munaybirah, this protected area will cover 2,840 km^2, and is home to the most extensive coral reef system of the entire Red Sea, diverse reef-associated fauna, sea-grass beds and mangroves. It is inhabited by marine turtles and seabirds, and is a key area for dugong.

Qalib Islands: Actually included in the Al-Wajh bank, these islands are surrounded by fringing reefs and are important nesting sites for seabirds and marine turtles.

Al-Hasani and Libanah islands: These are high-aspect islands with extensive fringing reefs and are important nesting sites for seabirds and marine turtles.

Ras Abu Madd and Sharm Hasi: Scenic sharms and high quality fringing coral reefs, fossil reef terraces and important seabird area. To be combined with the Al-Hasani and Libanah Island protected area. Threatened by fishing activities.

Ras Baridi and Sharm Al-Khawr: The area encompasses sand beaches, small islands, high quality coral reefs and sea-grass beds. It is the most important marine turtle nesting site in the Red Sea. It is threatened by unchecked fallout from a nearby cement factory.

Shi'b al-Qirin: Extending over 30 km^2, this a high quality inshore reef complex that is also an important seabird area.

Ras Hatiba: Covering ca. 450 km^2, this is a large lagoon with sandy and coralline spits, small mangrove stands, extensive offshore reefs and is a prime site for environmental and extension education programmes. Currently threatened by recreation and unregulated development.

Ash-Shu'aybah and Mastaba: Proposed to cover ca. 100 km^2, this is a large lagoon with extensive mangroves, fossil reef terraces and good quality offshore reefs. It is a key site for seabirds, and is threatened by unregulated development and mangrove felling, and a possible major highway project.

Qishran: This is a complex of coral reefs, coral spits, sea-grass beds and extensive mangroves. It is important seabird and dugong habitat. It is highly threatened by the development of an extensive shrimp farming project.

Outer Farasan bank: This is a major reef and island system contiguous with the Farasan Islands. It has diverse mangroves, sea-grass and coral reef habitats, and is an important turtle and seabird nesting area.

Khwr Itwad: Proposed to cover ca. 70 km^2, this is a lagoon with fringing corals, sea-grass beds and mangroves.

Shi'b Abu al-Liqa and Shi'b al-Kabir: Proposed to cover ca. 140 km^2, these are two lagoons with abundant fringing corals and mangroves.

3.1.5 Marine protected Area in Somalia

Although there are no declared protected areas in Somalia, two sites at the Gulf of Aden were proposed for protection: Mait Island and Aibat, Saad ad-Din and Saba Wanak, two islands and an adjacent stretch of coastline near Zaylac. These areas are considered as Important Bird Area.

I. Aibat and Saad ad-Din islands

Extending over an area of some 300 km^2, the proposed protected area encompasses low lying mangrove islands with possibly the largest coral reef area in the Gulf of Aden. The site consists of two adjacent islands close to the border with Djibouti in the extreme north-west of the country. The Aibat island lies 16 km north of the coastal town Zaylac. It is low lying and exposed, with Sandy beaches and sandflats plus coral reef that uncovered at the low tide. In contrast Saad ad-Din island has the largest mangrove stands and coral reefs along the Gulf of Aden coast of Somalia. There is no recent information on the avifauna in the islands, but white-eyed gull breed in thousands on both islands during the first half of the twentieth century. Other species found are the brown booby, sooty gull and three species of terns: white-cheeked, swift, and lesser crested terns. Masked booby was recorded at Saad al-Din island. In addition numerous species of Palearctic migrant

wader and waterfowl with a number exceeded 20,000 birds occur seasonally (Fishpool and Evans 2001).

II. Mait islands

The island located in the Gulf of Aden and lies 13 km to the north of town of Maydh. It is a little over 1.5 km in length with maximum with of 300m and average height of 100m. The island is steep-sided, rising abruptly out of sea, and along the southern face rocky buttresses alternate with scree-filled gullies while the northern face is an unbroken precipice. The rock is granitic gneiss which is covered with guano deposits, and the surface is split in places by great fissures. No vegetation occur on the island. Concerning the seabirds breeding at the island, the early record estimated that there used to be 100,000 birds (Fishpool and Evans 2001). Among these birds are the Red-billed tropic bird, Masked booby, sooty terns, and bridled tern.

3.1.6 Marine protected Area in Sudan

The Sanganeb national park is presently the only marine protected areas in the Sudanese Red Sea. In addition there are six marine sites proposed for protection: Shuab Rumi, Mukawwar island and Dongonab Bay, Suakin archipelago, Jebel Elba, Khor Kilab bird sanctuary and Abu Hashish recreational park.

I. The Sanganeb National Park

Sanganeb national park was established in 1990. PERSGA describe the park as atoll with highly diverse and complex coral reef, diverse reef associated fauna, shark, marine mammals. No breeding seabirds were recorded in the park.

II. Mukawwar island and Dongonab Bay

A management plan for Mukawwar island and Dongonab Bay was drown with support of PERSGA. The site include a narrow coastal strip and the mangroves of bay as well as the archipelago and the shallow costal waters in between The area hosts breeding colonies of osprey, sooty falcon, sooty gull, white-eyed gull, bridled tern, white-cheeked tern and crab plover (Shobrak *et al*. 2002b). In addition Mukawwar island is known to be important for breeding turtles.

In addition there are five other proposed protected areas in Sudan; Shuab Rumi, Suakin Archipelago, Jebel Elba, Khor Kilab bird sanctuary, and Abu Hashish recreational park. Among these proposed marine protected areas Suakin archipelago is very important area for breeding seabirds. Moreover, Jebel Elba host a significant number of terrestrial wildlife, while Khor Kilab bird sanctuary is important habitat for migratory species.

3.1.7 Marine protected Area in Yemen

In Yemen only Socotra archipelago was recognized as protected area, established in 1996. In addition there are other six other areas were proposed for protection; Ras Shama, Dhobba (Shihr), Balhaf and Bir Ali Area, Ras Isa/ Kamaran island, Khor Umaira and Bab-al-Mandab and Perim island. Among these proposed coastal and marine protected area three probably important for seabirds nesting; Bir Ali, Kamaran islands are importat site for the breeding of Socotra cormorant (Jennings 2002), while Kamaran islands are

important breeding area of bridled tern and crab plover (Al-Saghier 2002b). On the other hand, Bab-al-Mandab islands were important site for the brown noddy and maskat booby.

Socotra archipelago protected area

Socotra archipelago lies in the Gulf of Aden and consists of Socotra island and three outlying islands: Abd al-kuri, Samba and Darsa. The protected area established in 1996 with size of 3,626 km^2. Recent survey revealed that the archipelago could be extremely important area for marine biogeography. The area has been recently announced as protected area. The archipelago is also important area for the breeding of Jouanin's petrel, Persian Shearwater Masked Booby and probably Socotra cormorant (Al-Saghier *et al*. 1999; Al-Saghier 2000; 2002a).

3.2 Important Bird Areas in the Red Sea and Gulf of Aden

3.2.1 Important Bird's Areas in Djibouti Red Sea

Fishpool and Evans (2001) reported two important birds areas in the Djiboutian Red Sea; Kadda Guéïni-Doumêra and Les Sept Frères islands. The second area was already described above, however, the first area partly included in the proposed protected area. This IBA is a 61km stretch of coast in the north-east of the country (12^o 27'N 43^o 17'E), between the rocky outcrop at Kadda Guéïni and the border town of Doumêra, and includes the peninsula at Ras Siyyan and Doumêra. The shoreline is a mixture of rocky areas, old coral reefs, which are exposed at low tide, and sandy beaches. There is a lagoon with sandy shores and small area of mangrove at Ras Siyyan, a further small are of mangrove at Khôr Angar and Godoriya. Laying at the narrowest point of Bab-el-Mandeb straits, the site is a migration bottleneck, with huge numbers of raptors and significant numbers of other birds crossing the Red Sea from the Arabian peninsula in the autumn.

3.2.2 Important Bird's Areas in the Egyptian Red Sea

Baha EL Din (1999) describes the important birds areas of Egypt, 15 areas are located in the Red Sea. Among these, eight IBAs are important for seabirds: Hurghada archipelago, Tiran island, Wadi Gimal island, Qulân islands, Zabragad island, Siyal island, Siyal islands, and Rawabel islands. Among these important seabirds areas, the southern islands are probably least covered by ornithologists. Therefore, there is a limitation on the ornithological data of the breeding seabirds.

Hurghada Archipelago

An archipelago of 22 uninhabited islands, in which six of these islands were protected as part of Elba national park; Giftun El Sagir, Giftun El Kabir, Abu Mingar, Abu Ramathi, Um Gawish El Saghir and Um Gawish El Kabir. Most of these islands are small or medium size and fairly flat coralline islands and have elevated rocky shores and sloping sandy shores (Baha EL Din 1999). These islands probably hold the largest breeding population of the whit-eye gull in the world with 3,000 breeding pairs (Baha EL Din 1999). In addition the archipelago supports nearly 15 species breeding seabirds, such as Brown booby, Red-billed tropicbird, little green heron, reef heron, spoonbill, osprey, sooty falcon, Kentish plover, sooty gull, Caspian tern, swift tern, lesser crested tern, bridled tern, and white-cheeked tern (Baha EL Din 1999). The archipelago also is

important for migrant to crossing the mouth of the Gulf of Suez and also for turtle breeding. In addition, the mangrove found on the islands is probably among the most extensive in the northern Red Sea.

Tiran island
Tiran island is flat in the northern part and fairly hilly in the southern part with altitude of 524 m. Nine species of birds were recorded breeding on this island; reef heron, little green heron, spoonbill, white-eyed gull, white-cheeked tern, lesser crested tern, Caspian tern, osprey and sooty falcon (Baha EL Din 1999). The island is important for the breeding of the green turtle (Frazier and Salas 1984). In addition, fairly large mangrove stand found in the southern part of the island supports nesting sites for herons and spoonbills.

Wadi Gimal island
This island is also part of the Elba National Park. It is coralline island with small mangrove stand located in the middle of the island and at the southwest shore. Although the island supports nine species of breeding seabirds, their number seems to be small: Red-billed tropic bird, little green heron, reef heron spoonbill, osprey sooty falcon, sooty gull, white-eyed gull, Caspian tern.

Qulân islands
A small archipelago of four small coralline islands: Siyul, Showarit, Um Ladid and Mahbis. The islands are flat and sandy with an elevated rocky area at the northern shore. The islands supports eight species of breeding seabirds: red-billed tropicbird, little green heron, reef heron, spoonbill, sooty falcon sooty gull, white-eyed gull and Caspian tern. The islands are part of Elba National Park. The island is important for the sea turtles.

Zabaragad island
The Zabaragad or the St. John's Island is part of Elba National Park. The island is small triangular shape away from the coast and composed of uplifted mantel and lower crustal metamorphic rocks (Coleman 1993). Eight species of birds have been recorded breeding: brown booby, spoonbill, white-eyed gull, Caspian tern, lesser crested tern, bridled tern, and white-cheeked tern (Baha El Din 1999). In addition, the island also has the largest number of breeding sooty flacons, with 150 breeding pairs recorded in October 1994 (Baha El Din 1999).

Siyal islands
The Siyal islands contain three flat, sandy, coralline islands. Five species of birds have been found breeding: osprey, white-eyed gull, sooty gull, Caspian tern and white-cheeked tern (Baha El Din 1999). The islands are also important for the breeding of turtles (Baha El Din 1999).

Rawabel islands
The islands are part of Elba National Park and they contain two small, flat, coralline islands. The islands known to host four breeding birds species: osprey, white-eyed gull,

sooty gull, and Caspian tern (Baha El Din 1999). In addition the islands are probably visited by turtles for breeding purpose (Goodman 1985).

3.2.3 Important Bird Area in Jordan Red Sea

Is the only marine area in Jordan with limited coastal plain. The area is very economically important for Jordan, therefore, it have been substantially altered by man. The area is a migratory bottleneck, e.g. Levant sparrowhawk *Accipiter brevipes* and common buzzard *Buteo Buteo*. Also the area holding a breeding bird community representative of the Rift Valley such as Tristram's grackle *Onychognathus tristramii* (Evans 1994). In addition there a diverse of non-breeding seabirds were recorded offshore such as the white-eyed gull, wedge-tailed shearwater *Puffinus pacificus*, brown booby, bridled tern and white-cheeked tern.

3.2.4 Important Bird's Area in Saudi Arabia Red Sea

Al Wajh Bank

Al Wajh Bank is a group of islands located at the northern Red Sea. The islands are important for the breeding for several seabirds such as brown booby, osprey, sooty falcon, crab plover, sooty gull, white-eyed gull, white-cheeked tern, bridled tern, Caspian tern and lesser crested tern (Evens 1994). This site is proposed as a resource use reserve in the NCWCD system plan for protected areas.

Qishran Bay

A shallow bay with approximately 525 km^2 in size, almost closed by a long narrow island, and containing eight other islets. It is situated near Al Birk at a point where the Asir mountains run close to the Red Sea. Most islets are surrounded by mangrove *Avicennia* trees and clothed with dense *Salicornia*. This IBA holds the densest population of sooty falcon in Saudi Arabia. The site is proposed as a special natural reserve in the NCWCD system plan for protected areas.

Kutambil island

An island lying 5 km off coast of south-west Saudi Arabia, midway between Shuqaiq and Al Birk. It is dominated by a mound of volcanic clinker rising to 100 m. The site is important breeding area for Eurasian spoonbill of the Red Sea subspecies *P. l. archeri* .

3.2.5 Important Bird's Areas in Somali Gulf of Aden

Four areas were identified as IBA in the Gulf of Aden of Somalia; two were islands (Jasiira Ceebaad or Aibat and Saad ad-Din islands and Jasiira Maydh or Mait islands) and the other two were coastal areas Daalo and Saylac. PERSGA has started to develop a conservation program with the existing authority for the first two areas which has been described above.

Daalo

This IBA is located in the central northern part of Somaliland, extending eastwards along the coast from Maydah village and inland towards the town of Cererigaabo on the top of the scrap of limestone mountain that rise steeply from the costal plain. The coastal section

consists of sandy plains with sparse cover of the grasses. The site is important for *Columba oliviae*, *Turdus ludoviciae* and *Carduelis johannis*.

Saylac

The site consist of an extensive area of arid bushland merging into coastal salt-marsh and swamp. It is lies immediately south of the northern coastal town Zeylac close to Djibouti border (10^o 44'N – 43^o 28'E), and extend to along the coast as far as Lughaye and inland almost as far as the town of Cabdikaadir near Ethiopian frontier. Numerous seasonal watercourses flow through the area carrying run-off to the fringing coastal swamps and mangroves. Large number of Palearctic wader and waterfowl are known to occur on the coastal wetland; *Charadrius alexandrinus*, *C.leschenaullii* and *C. mongolus* in numerous number (Fishpool and Evans 2001). In addition, *Egretta gularis* in known to breed in the mangroves.

3.2.6 Important Bird's Areas in the Sudanese Red Sea

Two Important birds areas occur in the Sudanese Red Sea; Mukawwar island and Dunganab Bay and Sukin archipelago. The first IBAs has already described above, however, more surveys are needed to determine the species breeding in these areas, especially the coastal areas in the southern Red Sea of Sudan.

Suakin archipelago

The archipelago is the largest group of islets on the Red Sea coast of Sudan, extending south-east wards from the former port of Suakin almost to Ethiopian border. The islets at this archipelago host a large number of breeding seabirds, with large colonies of crab plover and bridled, white-cheeked and lesser crested terns (Shobrak *et al*. 2002b). In addition western reef heron, little green heron, osprey, sooty falcon, brown booby and common noddy were found breeding at the archipelago (Moore and Balzarotti 1983; Shobrak *et al*. 2002b). The archipelago is also important for four species of turtles.

3.2.7 Important Bird's Area in Yemen Red Sea and Gulf of Aden

Yemen marine territories have a diversity of breeding seabird species. This probably due to upwelling of cold, nutrient-rich waters during monsoon, together with presences of numerous offshore islands which make it an ideal feeding and breeding area for seabirds. Out of 37 marine IBA's identified in Yemen, 10 were in the Red Sea and 27 in the Gulf of Aden, in which 19 IBA in Socotra island alone. To illustrate these important areas we divided them into four categories; islands IBA's in the Red Sea, coastal IBA's in the Red Sea, coastal IBA's in the Gulf of Aden and islands IBA in the Gulf of Aden.

I. Islands IBA's in the Yemen Red Sea: Evans (1994) identified three groups of islands; islands north of Al-Hudaydah, Jaza'ir al-Zubayr and Jaza'ir al-Hanish. In addition Az - Zuqur islands were presented as part of a coastal IBA of Ba al-Mandab-Mawza. Moreover, the results of PERSGA survey in summer 2002 identify anther group of islands as IBA in the Red Sea which Kamaran island and its associated islets (Al-Sagheir 2002b).

Islands north of Hodiedah: during PERSGA survey in 2002 several of seabirds were recorded breeding in these islands (Al-Sagheir 2002b), with more were found in the southern islands. Most of the islands are flat and sandy. Of this group, the southern islands host more breeding seabirds than the northern islands. In the northern islands white-cheeked tern, crab plover, little green heron, black headed heron, and sacred ibis were recorded breeding. Whereas in the islands south of Hodiedah, a large number of breeding true seabirds such as lesser crested tern (7,000) white-cheeked tern (5,000) and sounder's terns (1,900) were found. In addition 40 crab plover were also recorded on these islands. Moreover, the southern islands seem to be sandy flat, whereas the northern islands are covered partly or fully by mangrove.

Jaza'ir Al-Zubayr (Az Zubayer Archipelago): The islands associated to this archipelago are volcanic with elevation areas up to 173 m on some islands. During PERSGA survey in summer, ten islands were visited (Al-Saghier 2002b). This survey showed that this archipelago seems to be important for the breeding population of the brown booby, with more than 6,000 pairs. The majority of nests were at Al-alam (Jazirat Az-Zubayer) and Al-Asal (Saba) islands. Other seabirds recorded breeding at this archipelago were the white-eyed and sooty gulls, and Masked booby. Other species recorded on the archipelago were sooty falcon, osprey, little green heron and western reef heron.

Bahr Ibn Abbas-Ra's Isa: Ra's Isa is a headland pointing north-west towaeds the adjacent island of Karmaran which is the most populated islands in the Red Sea with a population of nearly 10,000 inhabitants. Six islands are associated with Kamaran islands were surveyed by PERSGA during summer 2002. The islands are the Kadaman island to north, Al Badi and Hataban in the north –west of Kamaran, Uqban island west of Al Badi, Kutamah and Tigfahislands. The islands are mostly sandy flat covered with *Sewada, Limonium, Zygophylum* sp., *Juncus* and *Sevadora persica*. The islands are important for the bridled terns with more than 7,500 breeding pairs. The majority were at Kadaman island. In addition, large colonies of crab plover were found breeding on two islands in this group; the Kadaman island (680 breeding pairs) and Al Badi island (300 breeding pairs). Sooty gull, white-eyed gull, white-cheeked tern, and lesser crested tern were recorded also breeding on these islands.

Jaza'ir al-Hanish (Hanish Archipelago): Most of the islands and islets in this archipelago are volcanic rocky with elevation range from 8 m to 407 m, with scattered batches of sand and vegetation. The largest island is Hinish Al Kubra. In this archipelago, a large colony of bridled terns found with 42,000 breeding pairs in Jabal Al Milh island. The brown noddy also recorded in large number at several islands at the archipelago. Al-Saghier (2002b) suggested the species were breeding is the archipelago. Although white-eyed gull were recoded on almost all the islands in the archipelago, the majority were found at Al-Nuqrah Al Gharbiah island with nearly 1,300 breeding pairs (Al-Saghier 2002b).

Bab al-Mandab-Mawza: A rocky promontory jutting out at the south-west extremity of Yemen towards Djibouti. The site is a major bottleneck for soaring, migratory birds

especially the birds of prey, flying between Africa and their Eurasian breeding grounds, mainly steppe eagle *Aquila nipalensis* and common buzzard *Buteo buteo*. Off shore there are volcanic islands, named as Az-Zuqur which is an archipelago. During PERSGA survey in summer 2002 several species of seabirds were seen breeding in the island. Among them are the bridled tern, which recorded breeding in high number especially at Abu islands were 3,300 were recorded (Al-Saghier 2002b). Although, brown booby was recorded breeding at all islands, the majority were at Qattan islands and Abu Ali island. In addition the white-eyed gull, sooty gull, brown noddy and Masked booby were recorded breeding at Az-Zuqur islands (Al-Saghier 2002b).

II. Costal Important Bird's Area in Yemen Red Sea; Midi-Al-Luhayyah, Al-'Urj, Nukhaylah-Ghulayfiqah, Al-Fazzah, Al-Mukha-Al-Khawkhah.

Midi-Al-Luhayyah is a flat subkhah coastline with extensive offshore sandbars and intertidal mudflats. More than 60 km of coast is fringed by well-developed mangrove *Avicennia marina*. This habitat is ideal for several species such as western reef heron, clamorous reed warbler, mangrove warble and white-collared kingfisher. The area is also important for migratory species like pied avocet *Recurvirostra avosetta* and Terek sandpiper.

Al-'Urj is a 15 km stretch of coast. The mangrove-lined tidal inlet is probably important as a spawning ground and nursery area for shrimsand fish. The site hosts also several species such as little green heron, osprey, and probably mangrove warbler.

Nukhaylah-Ghulayfiqah is about 90 km with patchy mangrove. The area is important for migrating water birds.

Al-Fazzah, A 35 km stretch of Red Sea coast, and it is an important area for water birds, especially the migrating species.

Al-Mukha-Al-Khawkhah is a bout 70km of southern Red Sea coastline, with sandy peaches in the north and sabkhah area in the south. The area is important for migratory species.

III Costal Important Bird's Area in the Yemen Gulf of Aden; Three sites are identified as IBA in the Gulf of Aden; Aden, Qishn Beach and Abdullah Gahrib Lagoons

Aden is an important coastal wetland for wintering and migrating water birds. The site also is important feeding area for waders.

Qishn Beach is a long shallow beach, 6km in length. The site is important non breeding and migratory sooty gull and may be important for passing wader during migration.

Abdullah Gahrib lagoons are a large coastal lagoons separated from the sea by sand-dune. The site is important for feeding and roosting gulls

Ra's Fartak: is a feeding area for a representative assemblage of pelagic birds such as Jouanin's petrel and Persian shearwater.

IV Islands Important Bird's Area in the Gulf of Aden of Yemen;
Islands of Bir Ali: This IBA contain of three islands important for the breeding of Socotra cormorant with 10,000 pair recorded during summer 2002 (Jennings 2002).

Sabuniya and Ka'l Fir'awn is two small islands important for masked boobies, osprey and probably Jouanin's petrel.

Abd al-Kuri is large island with 32 km long and less than 5 km wide, the island probably important for Socotra sparrow *Passer insularis*.

Al-lkhwan is contain two inaccessible islands, both 10-15 km long. The site is important area for brown and masked boobies

Socatra island; the island have 19 sites identified as IBA. Socotra island has several endemic terrestrial bird species such as Socotra sunbird *Nectarinia balfouri*, Socotra starling *Onychognathus frater*, Socotra cisticola *Cisticola incanus* and golden-winged Grosbeak *Rhynchostruthus socotranus*. In addition the island is important site for breeding sooty gull, masked booby and Jouanin's petrel.

3.3 Institutions Framework

3.3.1 Environmental Institutions in Djibouti

A number of institutions in Djibouti are involved with costal and marine areas and resource management. These are the Ministry of Agriculture, stock-farming and fisheries which in charge of hydraulic resources through the Direction of stock-farming and fisheries and Direction of Maritime Affair; Ministry of Youth, Sport and Tourism through the National Office for Tourism; the Presidency of the Republic, through the Study Center for Scientific Research of Djibouti. The Ministry of Housing, Urban Affairs and Environment and Land Management through the Direction of Management and Environment.

3.3.2 Environmental Institutions in Egypt

There are several institutions which carry out monitoring activities along the Egyptian coastline. The Egyptian Environment Affairs Agency, the Tourism Development Agency, the National Institute of Oceanography and Fisheries, and the three Red Sea Governorates. In addition, several scientific institutions and secondary agencies also work in this field.

The Egyptian Environment Affairs Agency (EEAA): This organization was established by the Presidential Decree 631/1982 and amended by Law 4/1992 for the environment to be the central coordinating body for the environment in Egypt. The EEAA is affiliated with the Ministry of State for Environment Affairs. The EEAA is also tasked with overseeing the implementation of environmental protection policy and legislation with other responsible authorities. It has responsibilities for costal zone

management, law enforcement, reviewing environmental impact assessments and monitoring pollution. The EEAA is the body which follow-up on regional and international conventions.

The Nature Conservation Sector (NCS): This department under the EEAA responsible for nature conservation. It oversees the national network of Protected Areas and supervises the management of the 6 Protected Areas in the Red Sea. It also follows up on species conservation and the implementation of international conventions related to biodiversity.

The Tourism Development Agency (TDA): This body under the Ministry of Tourism is established to support the private sector tourism industry and to develop an institutional framework for environmentally sound tourism development, which includes developing guidelines for hotel management and follow-up application of environmental regulations and procedures.

The Red Sea Governments (RSG): There are three Governorates on the Egyptian Red Sea: South, Suez and Red Sea. The governorates are responsible for regional administration, planning and development. They are involved in promoting tourism and regulating land allocation and hotel construction within city limits through zoning and the issue of permits. Additionally the RSG is responsible for environmental management in their Governorates in cooperation with the relevant national authorities.

Scientific Institutions: There are a number of scientific research centers that have conducted research on the marine environment. The National Institute of Oceanography and Fisheries (NIOF) has carried out investigations of fisheries and corals and associated fauna in the Hurghada region for 70 years. The Academy of Science has supported research in the region. Universities in Egypt, including Suez Canal and Al-Azhar also have conduct research on a variety of topics related to the Red Sea, including coastal zone planning and management, fisheries, coral reefs, mangroves, pollution and other environment issues. Little if any research has been conducted on breeding seabirds.

Secondary Agencies: These bodies are playing a role in environmental management, such as the Egyptian General Petroleum Corporation (EGPC), which is responsible for oil and gas exploration, controls the activities of international oil companies and has developed an oil spill response capability in Ras Ghareb on the Gulf of Suez. The National Committee for Integrated Costal Zone Management (NCICZM) coordinates costal activites among competent authorities by developing guidelines for all activities. In addition, the NCICZM is responsible for harmonizing development with carrying capacity of coastal ecosystems, and for coordinating and specifying mandates for authorities in the coastal area.

3.3.3 Environmental Institutions in Jordan

The responsibility for development of Aqaba region is borne by the Aqaba Regional Authority (ARA), with conservation works carried out through the ARA Environment Unit. ARA supervises town planning, tenders and public works, finance, administration,

regional planning and research and studies. Although Jordan has no islands which could used for breeding of seabirds, there are activities such as monitoring of birds migration and other seabirds at Aqaba. However, the majority of birds works in Jordan were carried out by NGOs such as The Royal Society of the Conservation of Nature (RSCN), Jordan Royal Ecological Diving Society (JREDS) which organizes underwater cleanups, awareness programs and monitoring of coral reef. In addition, there are several governments institutions in Jordan involved with the protection of the marine environment. The Water Authority of Jordan (WAJ) is responsible for monitoring industrial discharges on a semi-monthly basis to ensure compliance with Jordan Sandard Specifications (212).

The Aqaba Marine Science Station (MSS) monitors on coral reef and provides facilities for training and research. Studies are conducted on water quality, impacts of pollutants and baseline coral reef ecology. MSS also administers the Aqaba Marine Science Center which occupies 500 m of the coastline.

3.3.4 Environmental Institutions in Saudi Arabia

Although the aspect of environment protection and its related issues are shared among several government agencies and scientific institutions in Saudi Arabia, they all come under the umbrella of **the Ministerial Committee for Environment**. The Committee is in charge of the overall strategies for the Kingdom in the environmental issues. Several government agencies have the responsibility for implementing these strategies in the Kingdom. These agencies are:

Presidency of Metrology and Environments (PME): is responsible for marine conservation and environmental protection through setting up policies guidelines and standards for pollution control (both aquatic and atmospheric).

National Commission for Wildlife Conservation and Development (NCWCD): deals dealing with wildlife conservation and managements of protected areas.

Ministry of Agriculture: deals with range-land managements, controlling pests, developing fish and marine resources and forestry.

Ministry of Water: deals with water resources managment.

Ministry of Interior: is playing the role of protection of the environment and wildlife in coastal areas including hunting control and guarding of pastures and national resources.

Ministry of Municipal and Rural Affairs: through its municipalities is responsible for reforestation and control rain water drainage network projects inside urban areas.

Ministry of Health: manages medical wastes and the effect of chemicals on the well being of people.

High Commission for Tourism: is a new government agency established in 2001. It is involved in environmental issues through the development and management of eco-tourism in natural sites and the protection of resources to the benefit of local communities.

The Ministry of Petroleum and Mineral Resources and the Ministry of Industry and Electricity are operational agencies. On the other hand PME sets environmental criteria such as standards of actual operational management. Thus the operational agencies retain actual regulatory control over activities carried out under their respective mandates, while PME sets environmental performance standards, monitoring the activities of operational agencies and serves as a central coordinator for environmental managements.

Scientific Institutions: include the King Abdul Aziz University through the faculty of Marine Sciences, the King Fahd University of Petroleum and Minerals Research Institute and the King Abdul Aziz City for Science and Technology. The functions of the universities are to undertake direct studies and applied researches on the natural environment and wildlife and to develop monitoring and development methods. In contrast, the King Abdul Aziz City for Science and Technology has a positive role in financing and organizing studies related to wildlife and environment.

3.3.5 Environmental Institutions in Somalia

Under current condition in Somalia it is unlikely that there is any conservation infrastructure remaining. A detailed description of the former institution in charge of the marine environments and conservation in general in Somalia is given by Roberson (2001). However, since the outbreak of civil strife hardly any fisheries development work has been carried out. In the absence of government, Regional and District Councils and Councils of Elders took up the role of principal coordinating organizations for the inflow of aid to their respective jurisdictions. However, with the current situation there are a number of institutions charge with activities that indirectly addressed seabirds protection. It is hopes that with continued stability these institutions will be re-established.

National Marine Affairs Committee: Established to oversee the overall development of the maritime sector, include minerals and water resources, fisheries and marine resources, foreign affairs, education and defense ministries.

National of Marine Transport and Ports: Mandated with the development of maritime transport and improvement of port facilities, and responsible for environment control of coastal areas, include ports, prevention of marine pollution and safety of navigation. The implementation of Maritime code, other laws and regulations related to the marine environment applicable to ships in ports, and implementation of regional and international convention were under the responsibilities of this ministry.

Ministry of Fisheries and Marine Resources: Established in 1977 to develop and manage Somalia's fisheries resources. Basic marine fisheries legislation is contained in the Maritime Code of 1959. The Ministry is the Focal point for PERSGA, through which current conservations were measures are being implemented.

National Range Agency and Ministry of Tourism: Responsible for national parks and establishing MPAs. Legislation was prepared for a network of protected areas before the political unrest.

3.3.6 Sudan

Environmental management in Sudan is under the responsibility of the Ministry of Agriculture and Natural Resources. In 1972, however, responsibility for wildlife resources in the south fell to the Southern Region Administration but since 1977, it has been the remit of the Regional Ministry of Wildlife Conservation, Fisheries and Tourism. In the Northern Region, the Wildlife Conservation and National Parks Forces of the Ministry of Interior are responsible for implementing wildlife policies and the establishment and management of terrestrial and marine protected areas. The management of forests comes under the National Forestry Corporation within the Ministry of Agriculture and Natural Resources. Its activities are currently almost exclusively confined to the north of the country due to the continuing civil war, but it has responsibility for the creation and management of forest reserves. Marine conservation work was undertaken by the Sudanese Marine Conservation Committee, a subcommittee of the National Committee for Environment. Presently the Ministry of Environment and Tourism and the Ministry of Animal Wealth and their research center departments are directly involved in the use and management of coastal and marine areas and their resources. Scientific support is provided by the university of Port Sudan and the university of Khartoum and several research institutions located at Port Sudan and Suakin.

3.3.7 Environmental Institution in Yemen

A number of governmental agencies have responsibility for the coastal and marine areas. There is no authority solely in charge of the management of the coastal zone in Yemen.

Ministry of Tourism and Environment was established in the new Government formulation in Yemen in April 2001 by merging the Tourism sector and formetly Environmental Protection Council (EPC). The ministry has two authorities, which are Environmental Protection Authority (EPA) and General Tourism Authority (GTA).

a) Environmental Protection Authority (EPA): responsible for coordination and implementation of environmental protection activities in Yemen. On other word, the EPA is the official agency in charge of development and implementation of general national policy planning for environmental protection and control. This is achieved by direct execution or coordination with other related ministries and institutions. In addition it plan, implement project and natural conservation policy implementation at field level with coordination of line ministries. There are four directorates under EPA, which are DG for planning and data, DG for natural resources and biodiversity, and DG for monitoring and DG for administrative and finance. It is planned to establish a new DG for Environmental awareness

b) General Tourism and Authority (GTA): is responsible for tourism activities throughout the country including eco-tourism. In addition the GTA is in charge of issuing permission for building tourist villages along the coast or islands. In 1995 the GTA develop a set of regulations and guidelines for tourists to regulate snorkeling or and diving.

Ministry of Fish Wealth (MFW): The MEW regulates fishing, issues licenses, supervises processing and marketing of fish and fisheries products for local consumption and export. Import and/or manufacturing of fishing gear and other relevant equipment must be in accordance with specifications of the MFW. The ministry is responsible for the management and development of Yemen's fish resources. The MFW, through the department of monitoring and surveillance, is responsible for the enforcement of law and regulation concerning marine resources. The MFW has two marine research centers in Aden and in Hodiedah and both are capable of marine environment and fish stock.

Public Corporation for Maritime Affairs (PCMA): This is the main governmental body concerned with maritime safety and marine pollution control. It also plays an important role in developing a legislative framework to protect the marine environment.

3.4 National and International Agreements

3.4.1 Djibouti

Djibouti has national regulation on the protection of the marine environment; include provisions on marine pollution, protection of endangered species and creation of protected areas. However, the majority of these regulations concern sea pollutions and fisheries. Additionally, a law banning hunting of wildlife was passed in 1971: but some hunting or capture of animals still occur.

Internationally the Republic of Djibouti is a signatory to the London Convention (modified 1954), which is applicable through National Law No. 64/83; the London Convention (1971) on international compensation funds; the London Convention (1973, modified 1978) and its four annexes; the Brussels Convention (1969) on intervention at high sea; and the United Nations Convention on Law of the sea (UNCLOS 1982). The first three were approved by Law No. 94/AN/89 2^{o} L in 1989, while the last one was approved by Law in 1985.

The country is also a signatory to CITES Convention. Decree 80-62/PR/MCTT of 25 May 1980 provides for the protection of seabed and marine fauna, whereby the capture of marine mammals and turtles is illegal, as well as the trade with or export of these animals. Spearfishing is also illegal in Djibouti. The Country also has ratified the Convention on Biological Diversity, the Convention to Combat Desertification and the Convention on Climate Change. At the regional level, an agreement was signed with Yemen and Somalia on the establishment of sub-regional center to combat oil pollution in the Gulf of Aden. Currently Yemen and Djibouti are negotiating a bilateral agreement regarding the use of the equipment for oil spill response.

3.4.2 Egypt

A number of Presidential decrees and public laws have been formulated dealing with birds protection and marine environment conservation. Part of these decrees and laws are:
* Law 4/1994 for the Environment: This low focuses largely on pollution, but has provisions addressing the protection of threaten species. Environmental impact assessments and coastal and marine management are mandate under this legislation.
* Law 102/1983 for protected areas: This law concerning protected areas and it established a legal framework for creation and management of the protected areas in the country.
* Law 53/1966 The Agriculture Law: This law provides protection to birds useful to agriculture, as well as to a number of endangered birds, mammals, and reptile.

Internationally, Egypt is a member of the Regional Organization for the Protection of Marine Environment of the Red Sea and Gulf of Aden (PERSGA), and subscribes to protocol for Regional Cooperation for Combating Pollution by Oil and other Harmful Substances Cases of Emergency (1982). It is a signatory to the Convention on Wetland of International Importance (RAMSAR), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on Biological Diversity (CBD), the Convention on Conservation of the Migratory Species (CMS) and the African-European Waterbirds Migration Agreement (AEWA). In addition, there are other conventions related to oil pollution.

3.4.3 Jordan

A number of national laws exists that directly or indirectly are pertinent to birds conservation and also to marine environment especially the reef conservation; Agriculture Law no. 20 1973 (Chapter 3, “Protection of wildlife and birds. Regulations for their hunting” articles 144-155; as amended by Act no. 14 of 1974), and Regulation no, 113 (1973; issued in accordance with article 199 of Agriculture Law no. 20) provide the legal tool for monitoring all hunting activities. Law of the Agaba Region Authority No. 7 (1987)- Delegates the power to plan and execute tourism, industrial and agriculture projects in the region. The Law has been the key instrument for strengthening environmental controls including the use of Environmental Impact Assessments (EIAs) and control zone management guideline. Regulation for Jordanian Red Sea Marine park are being developed under this Law.

Law of the Environmental Protection No. 12 (1995) – Establishes a *national framework* for environmental policy, including the formation of a Higher Council for Environmental Protection (HCEP). The HCEP sets national environmental policy and reviews proposed laws, specifications and standards prepared by the General Corporation for Environmental Protection (GCEP). The GCEP implements pollution prevention regulations including inspection and monitoring. The Law also harmonises existing laws and settles jusrisdictional conflicts.

Law of Environmental Protection (Article 35) – Bans the removal, damage to and use of corals and shellfish from the Gulf of Aqaba. Jordan Standard Specifications No. 212 (1982 updated 1991) – Establishes maximum allowable limits for pollutant use and discharges into stream, *wadis* or the sea, and includes standards for the protection of

aquatic life. Jordan Standard Specifications No. 893 (1994 updated 1995) – Sets maximum limits for pollutants in sewage plant discharges, which include publicly owned waste water works operated by the WAJ.

Shipping Law No. 51 (1961) – Bans ships from dumping soils, stones, sand, scum, toxic and chemical waste or any other material into the sea. Spills which occur during the loading and unloading of ships are also classified under this Law. Aqaba Port Quarantine Law No. 32 (1972) – Bans the discharge of ship-based pollution including bilge water. The Law may imposed fines and order remediation works. Agricultural Law No. 20 (1973) – Issues fishing licenses and prohibits the removal of corals.

3.4.4 Saudi Arabia

A number of national decrees and laws affect positively the conservation of marine environment in the Kingdom in general and seabirds in particular, including hunting law, wildlife trade law (fauna and flora), and protection of protected areas. In addition, the environmental protection standards (document no. 1401-01, 1402), the national oil spill and hazardous substances contingency plan, the resolutions adopted by EMCCOM and proposed to the council of ministers for their consideration (in protectorates), the council of ministers decision no. 271 (23.11.1404) obliging the use of best available technology to reduce pollutant emissions (such as cement dust), the rules and regulations for seaports, and the draft national fisheries regulations are important resolutions that could help, if implemented, protecting the marine environment.

Saudi Arabia is signatory to regional and international agreements which place obligation upon it for protection of the environment. Among these, the protocol concerning regional cooperation in combating pollution by oil and other harmful substances in cases of emergency (1978); the regional convention for the conservation of the Red Sea and Gulf of Aden against pollution from land-based sources (1982); the declaration of the regional organization for the conservation of the environment of the Red Sea and Gulf of Aden (1995), also called the Jeddah Convention have been designed to limit the risk of accidental or chronic pollution.

Internationally, Saudi Arabia is a contracting party to Bonn Convention for the protection of the migratory species; the Convention on the International Trade in Endangered Species of wild fauna and flora (CITES), and recently the Convention of the Biodiversity. The Kingdom has acceded to the World Heritage Convention and plans to ratify the Ramsar Convention.

3.4.5 Somalia

National environment legislation is poorly developed and inadequate for environmental management and conservation. Somalia has not formulated a national policy for the exploitation of marine resources. In the present situation any existing laws and regulations are not enforced and national institutions are of no relevance.

Internationally, Somalia is a signatory to Bamako Convention on Ban of the Import into Africa and Control of Trans-boundary Movement and Management of Hazardous Wastes

within Africa (1993), and ratified the following conventions and protocols which are relevant to the marine environment: the Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region (1988); the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (1985); the Convention on the Conservation of Migratory Species of Wild Animal (1986); the protocol Concerning Co-operation in Combating Marine Pollution in Cases of Emergency in the Eastern African Region (1988); the Protocol Concerning Regional Co-operation in Combating Pollution by Oil and other Harmful Substances in Cases of Emergency (1988); the Regional Convention for Conservation of the Red Sea and Gulf of Aden Environment (1988); and the United Nations Convention on the Law of the Sea (1989).

3.4.6 Sudan

National laws and regulations related to coastal and marine environment and resources were initiated in the region with the marine fisheries ordinance in 1937. Followed by amendments to marine fisheries regulation in 1975 and 1978. This regulation prohibits overfishing, dumping refuse, including oil, into the sea and the collection of corals, shells, aquarium fish and seabirds eggs. In addition, the Enviromental Health Act, Establish in 1975, prohibits the dumping into the sea of any item that is harmfull to humans or animals.

Internationally Sudan has ratified the Convention on Biological Diversity in 1995, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1982, the Convention concerning the protection of World Cultural and Natural Heritage in 1974, the African Eurasian Waterbirds Migration Agreement, the protocol concerning Regional Cooperation in Combating Pollution by Oil and other Harmful Substances in Cases of Emergency in 1984, the United Nations Convention on the law of the sea in 1985 and finally the regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment in 1984.

3.4.7 Yemen

In recent years Yemen has established a number of significant instruments, laws and regulations which concern the conservation of marine environment. Law No. 11 (1993) established in 1993 for protection of sea from pollution. In mainly concerned with pollution by oil and pollution from passing ships. The Law No. 42 in 1991 for fisheries; this is the main legal framework for organization, exploitation and protection of fishing and aquatic resources. Law No. 37 in 1991, defines the territorial waters and the exclusive economic zone of 200 nautical miles, the boundaries of islands. It emphasize on the prohibition of dumping any wastes into these zones.

Internationally, Yemen is party to the Basel Convention on Control of Trans-boundary Movements of Hazardous Wastes and their Disposal (1996); the Convention on Biological Diversity (1996); the Montreal Protocol on Substances that Deplete the Ozone Layer (1996); the Protocol Concerning Regional Cooperation in Combating Pollution by Oil and other Harmful Substances in Cases of Emergency (1992); The Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment (1982);

the United Nations Convention on the Law of the Sea (1987); the United Nations Framework Convention on Climate Change (1996); the Vienna Convention for Protection of the Ozone Layer (1996); the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) -1997.

4. General Discussion

The main goal of this report is to review the status and the threats affecting the seabird populations in the Red Sea and the Gulf of Aden, which will help to develop a strategic plan to conserve the seabird populations in the PERSGA region. Therefore, we believe that it is necessary to discus the main problems to develop strategic action plan to conserve the seabird population. From the available information, we feel that the following points need immediate attention for development and implementation of seabirds conservation strategies: lack of information accuracy and availability, lack of institutions effectiveness in conservation, lack of fund to support seabirds studies and conservation, lack of capacity regarding regional expertise, lack of research related to seabirds conservation and, and lack of awareness on the importance of the seabirds conservation.

4.1 Lack of Information and Accuracy

Overview of the status of the breeding seabirds in the Red Sea and the Gulf of Aden presented above showed that there were many gaps regarding the information availability and accuracy. These gaps could be summaries as follow: the majority of data about the breeding seabirds on the region were out of the surveys carried out more than one to two decades ago. For example, the data from Egypt were based on the work from the 1980s like Jennings *et al*. (1985) and Goodman and Meininger (1989). In addition in Somalia the observations on seabirds were made during an oceanographic survey offshore water of eastern Somalia on board of R.R.S "Discovery" from 25 July and 21 August and from 28 August to 5th of September 1964 during the International Indian Ocean Expedition. In Sudan the majority of information was based on the observations by Moore and Balzarotti (1983) and Vine (1985).

Secondly there is no systematic monitoring of the seabirds in the region. Most of the observations carried out in the region as part of international afford to identify the breeding species in the region and to assess the status of the seabird species in the region, but not to develop a systematic monitoring. However, these surveys were very important and used to assess the seabird population. The only systematic survey was carried in Arabian Gulf in Saudi Arabia (Symens and al Suhaibany 1996). The first organized systematic survey on seabirds was carried out in Saudi Arabia by the IUCN and the MEPA (the new name is PME) during summers of 1982 and 1983. Unfortunately, follow up of this survey was done fourteen years later. Due to this situation PERSGA conducted surveys this year in Djibouti, Sudan and Yemen. These surveys presenting the bases of the future monitoring of the seabird in the region

Thirdly, some of the surveys which were carried out in the region were made outside the breeding season (spring or autumn). Thus the accuracy of species estimation is questionable. In addition, some species were estimated according to the number of

individuals seen and not of the actual breeding pairs. This may increase the possibility of overestimate for the species. This probably was the case with the population of the white-eyed gull in Hurghada archipelago in Egypt. To illustrate, this, Jennings *et al*. (1985) suggested counting individuals in April – May 1983 that there are probably between 1,500 to 2,000 breeding birds in Hurghada archipelago. Thirteen years later this populations was estimated by Grieve and Millington (1999), also based on counting individuals in May 1996, between 2,700 and 3,000 breeding pairs. However, we believe that the large number of individual observed in northern Egyptian Red Sea, is probably a gathering or movement of breeding and non-breeding individuals of the northern Red Sea populations. The gathering behavior is known in most of the seabirds (Croxall 1987). In addition Goodman and Meininger (1989) documented that there were regular northward movements at Fayid between 20th of April and 9th of May 1955, with about 25 birds passing per hour during three mornings. However, the number of active nests counted during the breeding season in summer 1994 was found much less than the 1984 survey. In addition several surveys carried out on the region were to assess a particular site or islands, but did not cover the region. Therefore, the population estimate was not presenting for that particular country. These mean that counting of seabirds should be carried out during the actual breeding season and should cover the large areas as possible.

Finally, there is a lack of detailed studies on seabirds in the region; we are aware of studies carried out in Saudi Arabia on terns, crab plover, osprey and sooty falcon (Sweet 1994; Simmons 1994; Fisher 1997; Gregory and Goldspink 1998). However, more work is needed for important species in the region.

In general we believe that there was insufficient data to formulate current estimate of breeding seabird numbers in the Region. However, the information gathered in this report probably can be use as a based-line data for future conservation and monitoring of the breeding seabird populations in the Red Sea and the Gulf of Aden and to gather information on the threats affecting these populations.

4.2 Lack of Institutions Effectiveness on Seabirds Conservation

Although most of the PERSGA countries have national laws and regulation protecting the marine environment and even they were a member of international conventions concerned on the conservation of the seabirds such as Ramsar, CMS, and CBD, there is no effectiveness of these regulation or the conservation legislations. This isprobably due to the fact that seabirds are not considered as priority for management. Most of the works carried out in the seabirds in the region was done by foreign institutions. As soon as the work is finished no affords is done to continue the work.

Most of the institutions were recently started to activate the marine environmental protection issues as part of security of the economy. Thus responsibilities of marine environment are shared between different departments, which probably will create conflicts in the long run. On the other hand, most of the protected important seabirds areas are not properly managed, and other seabirds areas in the region were protected for political reason and became military areas. For instance, in Saudi Arabia, Farasan islands were protected since late 1980’s and up to now, egg collection is still practiced by the

local fishermen (Shobrak *et al*. 2002c). Moreover, Umm Al Qamari protected area supposed to be guarded by coastal guards, but during the two years human activities were recorded at the islands (Ostrowski 2001a, b; 2002). In Egypt, although some islands are protected partly as they were important for a number of breeding birds, they were under pressure from tourists which have already caused a negative impact on breeding terns on inshore islands (Hoath *et al*. 1997). Similar effect is seen in Musha and Maskali islands protected area in Djibouti (Shobrak *et al*. 2002a).

Furthermore, all the threats known to be affecting the breeding seabird in the region occur in islands which have military activity. Disturbance, eggs and chicks consumption, introduce predators (cats rates and dogs) and pollution are the main threats on these islands. The threats caused by military were probably the most serious threats to the breeding seabirds in the region. In Yemen, several important islands for seabirds occupied by the military were assessed the results showed that the threats is severe (Al-Saghier 2002b).

In conclusion the institutions in the region should increase their affords in the protection at least in the existing protected areas and areas with high diversity of seabirds species. Table in Appendix 3, show the important seabirds areas in the region, with high priority for conservation and where immediate action should be started to protect these areas. Three criteria were used to qualify a site to take high priority in the protection; the site host some breeding seabirds of local or national interest, the site host a significant number of breeding seabirds in the region and the site supporting > 1% of biogeographical population of one or more species. The northern islands in the Egyptian Red Sea are important for the endemic white-eyed gull and osprey, while the two areas in Sudan (Mukawwar & Dongonab Bay and Suakin archipelago) are important for terns, crab plover, osprey and sooty falcon. In Saudi Arabia, Al Wajh bank in the north of the Red Sea and Farasan archipelago in the south are important for the diversity and high number of breeding seabirds. The islets associated to Mush and Maskali islands and Les Sept Frères should given a priority in protection in Djibouti. The Yemeni islands in the Red Sea are probably the most important areas for seabirds in the region. Additionally the threats seems more severe at these islands. At the Gulf of Aden, the Somali islands (Mait and Aibat & Saad ad-Din islands) need more investigation to asses the threats. While Socotra in Yemen need more affords to increase the protection. This classification is not mean that the other sites are not important, but it give help the countries and PERSGA to start with sites that representative to the region.

4.3 Lack of Fund to Support of the Seabird Monitoring and Conservation Studies

As seabirds are not the priority of institutions in the region, funding of seabirds survey come from outside these institutions. Overview the works carried out on the seabirds in the region, showed that the majority of these surveys were sponsored financially by foreign institutions. Although the region hosts large funding companies and institutions like oil companies which could support these studies, no effort was made to look for these funds. At present PERSGA is carrying out baseline habitat assessment studies in the region, but further funding is needed to establish long-term research, monitoring and conservation activities.

4.4 Lack of Capacity at the Institution Level and Regional Expertise on Seabirds

In the region, the experts are limited, the majorities are expatriates. Even at the management level, there is lack of capacity on the marine environment. There is a clear need for strengthening the skills of manpower base to improve assessment, planning and management of coastal and marine environments. Manpower development must be an integral component of all conservation activities.

4.5 Lack of Research related to Seabirds Conservation

Although there is an increase in the number of scientific institutions in the region, and specialist on marine environment, no research programs related to the seabirds conservation are carried out in the region. This is probably due to the lack of interest, regional experts and funding. Seabirds were known to be important as bio-indicator as they are placed at the top of the food chin. Sampling of eggs, feathers or tissues of these can allow monitoring of level of organchlorine and heavy metal in marine environment. Seabirds monitoring can be used to examine the level of oil and plastic pollution. In addition monitoring the seabirds diet, breeding number and breeding success can be used to obtain the health of the fisheries in the region. Thus research institutions and conservation agencies should work together to develop research programs to monitor the seabirds population and assess the threats on these populations.

4.6 Lack of awareness about the important of the seabirds

Most of the factors affecting the seabird populations resulted from human activities. Egg collection is a traditional activity for local fishermen in the region, with increase of the equipped boats and foreign fishermen, the activities become serious. In addition the increase of the tourists activities in the important seabird areas increase the level of the threats on the seabirds. In addition, most of these fishermen probably do not know the laws and regulation regarding the seabirds. Therefore, it essential to start pubic awareness program for the conservation of the marine environment in general and the seabirds in particular.

5. Recommendations

5.1 Strengthen the Capacity on Conservation of Seabirds

Action (1)

Training of the managerial staff of the key national institutions in seabirds monitoring techniques and in marine resources management.

Action (2)

Training of biological staff in the biology and ecology of birds in generals and seabirds in particular.

Action (3)

Improve the coordination between the institutions in charge on the marine environment.

Action (4)

Strengthen the involvement of NGOs in the seabirds monitoring and management.

5.2 Strengthen the Protection of the Breeding Seabird Areas

Action (1)
Establish protected areas for the breeding seabirds in the region

Action (2)
Increase the effectiveness of existing protected area, by establishing marine conservation force or ranger force.

Action (3)
Include the seabirds area in the coastal zone management plan for each country in the region.

5.3 Develop a conservation action plan for the breeding seabird in the region, which should include Research and monitoring; Legislation; Awareness.

5.3.1 Research and monitoring

Action (1)
Carry out complete surveys of seabirds on the Region.

Action (2)
Establish a monitoring program for the RSGA countries

Action (3)
Encourage the cooperation with scientific institutions to carry out applied research in all aspect of ecology of the seabirds in the region, and to assess the threats on the seabirds population.

Action (4)
Develop a mechanism for funding the seabirds research and monitoring

Action (5)
Develop monitoring mechanism for the threats effecting the seabirds population.

5.3.2 Legislation

Action (1)
Develop a regulation in the Law protecting the seabirds population.

Action (2)
Develop a management plan for the protected area

Action (3)
Develop legislation for the seabirds according to the conservation conventions such as the RAMSAR and CMS.

5.3.3 Awareness

Action (1)
Develop awareness programs for the fishermen around the important seabird areas in the region.

Action (2)
Establish education center near important seabirds areas to promote environmental awareness among the local and also the tourists.

Action (3)
Produce pamphlets and poster presenting the important of seabirds to the marine environment and distribute to fishermen, schools, government offices and tourists at costal cities in the region.

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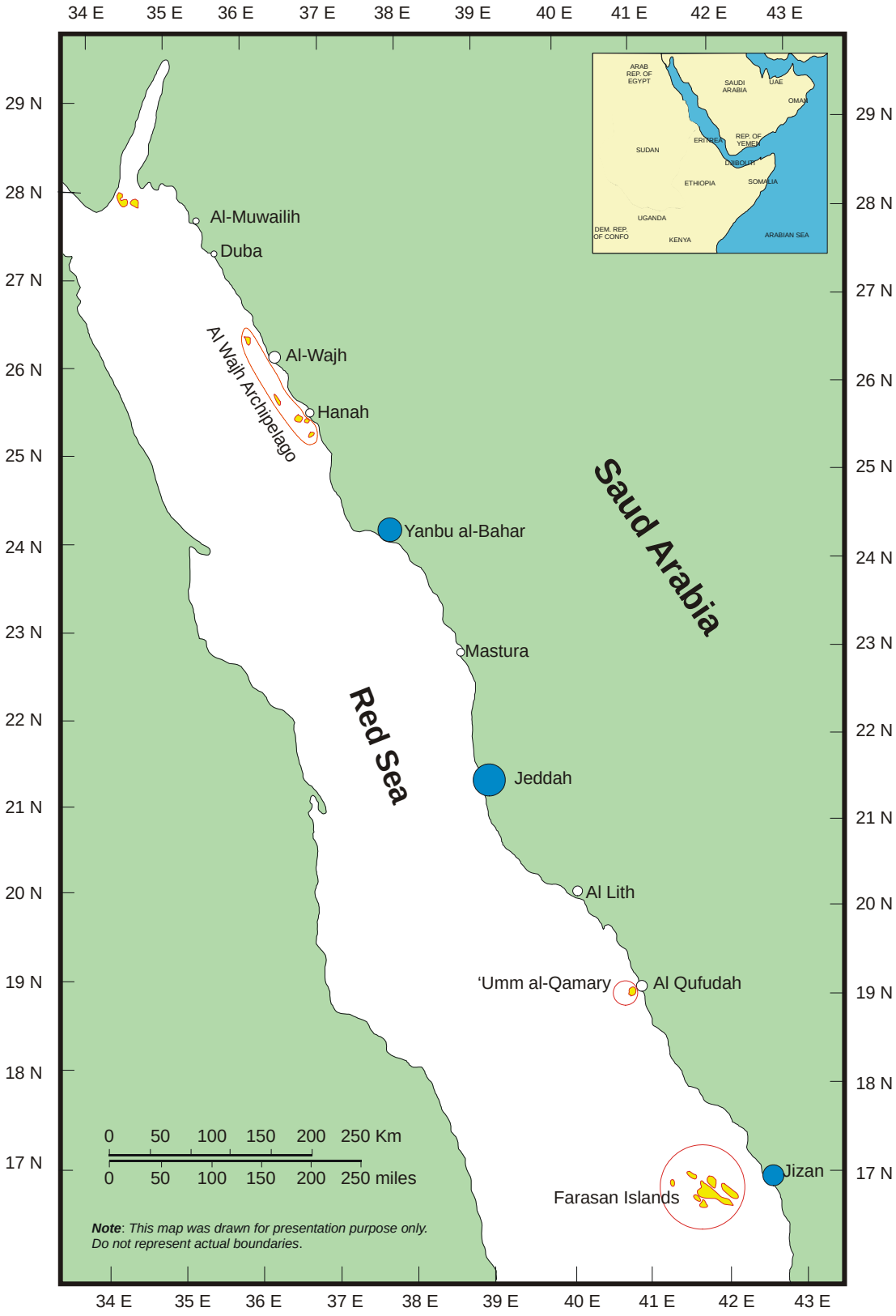
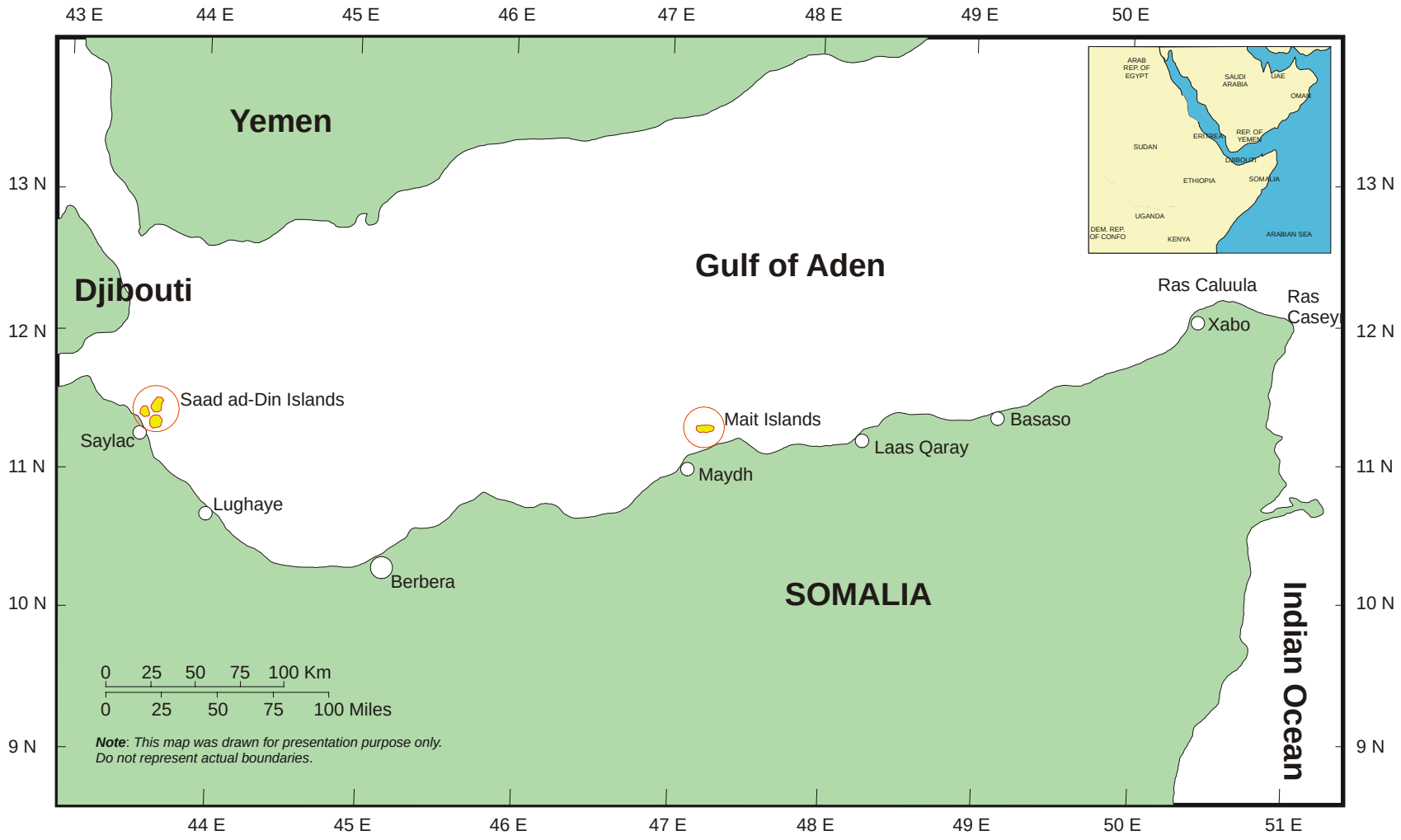
Map (1) Djibouti Costal Area

Map (2) Egyptian Red Sea Coastline showing the highly important site for protection



Map (3) Saudi Arabian Red Sea Coastline, with highly important site for protection



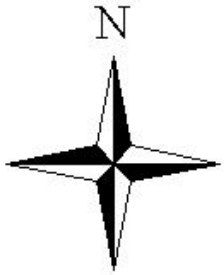
Map (4) Northern Somali Coast at the Gulf of Aden, with the highly important site for protection

Map (5) Sudanese Red Sea coast showing the highly important site for protection

Map (6) Yemen.

Map presenting the priority for protection of the important seabirds area

1. Hargada Archipelago (Egypt)
2. Tiran Island (Egypt / Saudi Arabia)
3. Al-Wajh Bank (Saudi Arabia)
4. Mukkawar with its associated islands & Dunngonab Bay (Sudan)
5. Suakin Archipelago (Sudan)
6. Farasan Archipelago (Saudi Arabia)
7. Kamaran and its associated islands (Yemen)
8. Al Zubair islands (Yemen)
9. Az-Zaqur & Hanish Archipelago (Yemen)
10. Les Sept Frères islands (Djibouti)
11. Musha and Maskali islands with its associated islands (Djibouti)
12. Aibat & Saad ad Din islands (Somalia)
13. Mait islands (Somalia)
14. Socotra Archipelago (Yemen)



Appendix I. Number of Breeding Pairs of Seabirds Recorded at Different PERSGA Countries

Species	Estimated Number at Different PERSGA's Countries						
	Djibouti	Egypt	Jordan	Saudi Arabia	Somalia	Sudan	Yemen
Jouanin's Peterl	0	0	0	0	0	0	+50
Persian Shearwater	0	0	0	0	NK	0	10,000*
Red-billed Tropicbird	3-7	10	0	11-100	B	BA	520-700
Masked Booby	0	0	0	1	100-240	0	800-1,150
Brown Booby	100-150	57-70	0	2000	B	B	13,230
Socotra Cormorant	0	0	0	0	NK	NB	B
Pink-backed Pelican	NK	0	0	>310	NK	BA	>100
Little Green Heron	B	40-60	0	Ca. 1,000	B	B	B
Cattle Egret	0	0	0	1,900*	BA	BA	30
Western Reef Heron	20-40	130-200	0	Ca. 1,000	B	B	B
Gray Heron	-	0	0	NK	NK	NK	NK
Purple Heron	B	0	0	10-20	NK	NK	NK
Goliath Heron	BA	<10	0	50-100	BA	BA	BA
Spoonbill	B	30-50	0	110-250	B	B	B
Osprey	10-20	150-200	0	340	100	B	+66
Sooty Falcon	5-10	+300	0	260-380	NK	B	+45
Crab Plover	-	BA	0	1100-1500	1,000	333-500	1060
Kentish Plover	NK	+100	0	B	NK	B	+70
Sooty Gull	B	+100	0	1,000-1,500	50-100	B	+2525
White-eyed Gull	600-700	2,500	0	>1,500	1,200-2,200	300-1,000	+3900
Caspian Tern	0	250-350	0	100-200	NK	BA	BA
Swift Tern	500-600	B	0	2,000	<1,000	B	B
Lesser Crested Tern	1,000 (1985)	+-1,500	0	2,000-4,000	B	3,000-5,000	5,000
White-cheeked Tern	60-80	+2,500	0	7,500	BA	BA	+8,910
Bridled Tern	530	+1,200	0	60,000	+100,000	8,000	70,230
Saunder's Little Tern	0	0	0	B	NK	BA	B
Brown Noddy	5-10	0	0	7,500	10,000-20,000	B	3,940

B= breeding confirmed, BA= breeding should be attempt, NK= not known, * counted as individuals.

Appendix 2. Population estimated extracted from Delany and Scott (2002)

Species	Population estimate individuals	Potential Pairs (individuals/3)	Biogeographic population / Subspecies
Pink-backed Pelican	750	250	Tropical Africa & Red Sea
Socotra Cormorant	6,000	2,000	Arabian Coast
Goliath Heron	1,000	330	Sub-Saharan Africa
Purple Heron	250	85	SW Asia
Cattle Egret	1,000	330	E Mediterranean and SW Asia
Little Green Heron	100	33	*brevipes* Red Sea, N Somalia
Western Reef Heron	1,000	330	*schistacea* NE Africa / Red Sea
Eurasian Spoonbill	15	5	*archeri* Red Sea and Somalia
Crab Plover	700	230	NW Indian Ocean (Red Sea / Arabian Gulf)
White-eyed Gull	200	70	Red Sea
Sooty Gull	2,300	770	NW Indian Ocean (Red Sea)
Caspian Tern	None given for relevant population		
Lesser Crested Tern	300	100	*bengalensis / arabica* (Gilf of Aden
Swift Tern	1,000	330	*velox* Red Sea / NE Africa
Saunders Tern	400	130	N & W Indian Ocean, Red Sea
White Cheeked Tern	6,000	2,000	N & W Indian Ocean, Red Sea
Bridled Tern	1,500	500	*fuligula* Red Sea, Arabian Gulf, Arabian Sea, W India
Sooty Tern	20,000	6,700	*nubilosa* W & N Indian Ocean, IncludingGulf of Aden
Brown Noddy	750	250	*plumbeigularis* S Red Sea & Gulf of Aden

Appendix 3. Protected area and Important Birds Area in the Red Sea and the Gulf of Aden (Based on PERSGA, Fishpool and Evans 2001 and Evans 1994).

Country	Site	Coordinate (N-E)	MPA name	IBA	International important site supporting > 1% of the biogeographical population	Significant breeding seabirds species in the Region and National	Degree of overlap Priority for protection
Djibouti	Associated islets to Musha and Maskali islands	11 43.367-43 12.921 11 42.851-42 10.102 11 42.586-43 10.582 11 42.598-43 10.914 11 43.008-43 11.090	Musha Territorial Park		White-eyed Gull, Brown noddy	White-eyed Gull Brown noddy	It is same area (High priority)
	Les Sept Frères islands (six islands involve)	12 27.824-43 23.005 12 27.811-43 27.005 12 27.296-43 26.480 12 28.030-43 26.108 12 27.615-43 24.880 12 27.739-43 21.891	Sept Frères islands and Ras Siyyan	Kadda Guéïni – Doumêra,	White-eyed gull Sooty Gull Brown booby Swift tern Lesser-crested tern	White-eyed Gull Sooty Gull Brown booby Osprey	The IBA is larger and include most of the mangrove are to the south (high priority)
	Godoriya mangrove	12^o 27’- 43^o 17’		Kadda Guéïni - Doumêra	African reed warbler		Part of IBA (Medium priority)
Egypt	Ras Mohammed	27^o 56 - 34^o 33’	Ras Mohammed National Park (480 km^2)	Tiran island 27^o 56’ – 34^o 33’ (31km^2)	Imperial Eagle Lesser kestrel Pallid Harrier White-eyed gull White-cheeked tern Caspian tern Sooty falcon	White-eyed gull Imperial Eagle	Both IBAs, Mid
	Nabq protected area	28^o 03’-28^o 30’ to 34^o 17’- 34^o 35’	Nabq protected area	Nabq protected area	Sooty falcon Spoonbill Reef heron	Spoonbill osprey	Low
	Abu Galum Protected Area		Abu Galum Protected are			Osprey	Low
	Gabel Elba National park	Between 22^o 00’-23^o 30’ and 36^o 00’ -36^o 40’	Gabel Elba Protected Area 5000 km^2	Qulân islands (24^o 22’ 35^o 23’) 3 km^2 Wadi Gimal island	Sooty falcon White-eyed gull White-eyed gull	White-eyed gull Osprey White-eyed gull	Marine and terrestrial habitat

				24^o 40’ – 35^o 10’ 2 km^2	Sooty falcon		
				Zabargad Island 23^o 37’ 36^o 12’ 4.5 km^2	Sooty falcon White-eyed gull	White-eyed gull	
				Siyal islands 22^o 47’ - 36^o 11’	White-eyed gull	White-eyed gull	
				Rawabel islands 22^o 25’ – 36^o 32’ <1 km^2	White-eyed gull		
	Wadi El Gimal-Hamata Protected Area						The marine part of Elba national park, which include Wadi El Gimal, Qulân islands (High)
	Red Sea Island and Mangroves Protected Area			Hurghada Archipelago Between 27^o 05’ – 27^o 51’ and 33^o 32’ - 34^o 05’ 1500 km^2	White-eyed gull White-cheeked tern Caspian tern Lesser crested tern Sooty facon	White-eyed gull Sooty falcon	An extension of Elba national park to include all the coastal areas and islands from the border of Sudan to Hurghada, including all the mangrove areas (High)
Jordan	Aqaba	29^o 30’ - 35^o 00’	Aqaba Marine park	Aqaba mountains	Non breeding white-eyed gull Migrating Levant sparrowhawk	Sooty falcon Lanner falcon Arabian warbler	(same area) (Low)
Saudi Arabia	Farasan Islands	16^o 45’ – 42^o 00’	Farasan Islands protected area	Farasan islands	Brown booby White-eyed gull Sooty gull Red-billed tropicbird Saundures tern Bridled tern	Egyptian vulture Sooty falcon Goliath heron	(same area) (High)
	Umm Al Qamari island	18^o 59’ – 41^o 06’	Umm al-Qamari protected area	Umm al-Qamari protected area	Brown booby Swift tern	African colored dove Cattle egret	(same area) low
	Yanbu Royal commission	23o 56’ – 38o 14’	Yanbu Royal commission	Madinat Yanbu al-Sinaiyah	Wintering terek sandpiper	Goliath heron	

	protected area		protected area 5 km^2				
		25^o 35’ – 36^o 45’		Al Wajh Bank	White-eyed gull Sooty gull White-cheeked tern	Sooty falcon	High
		18^o 59’ – 41^o 06’		Qishran Bay		Goliath heron Sooty falcon White-colored kingfisher Crab plover	Mid
		17^o 59’ - 41^o 42’		Kutambil island	Eurasian spoonbill	Sooty falcon	Mid
		17^o 48’ – 41^o 52’		Shuqaia mangrove		Mangrove reed warbler White-colored kingfisher	Mid
		16^o 53’ – 42^o 32’		Jizan Bay	Crab plover Grey plover Lesser sand plover Whimbrel Red shank	Crab plover	Mid
		21^o 26’ - 39^o 09’		Jeddah south cornice and port	Non breeding of Eurasian spoonbill Grey heron Slender-billed gull Western-reef heron		Mid
		18^o 26’ – 41^o 26’		Khawr ‘Amiq		White-colored kingfisher	Mid
		16^o 45’ - 42^o 40’		Khawr Wahlan		Crab plover	
Somalia	Aibat, Saad ad-Din and Saba Wanak	11^o 28’ – 43^o 28’	Aibat, Saad ad-Din and Saba Wanak	Jasiira Ceebaad and Jasiira Sacaada Diin	White-eyed gull Bridled tern	White-eyed gull Crab plover	(Same area) High
	Maydh island	11^o 14’ - 47^o 15’	Maydh island	Jasiira Maydh	Brown noddy Masked booby		(Same area) High
		11^o 06’ – 47^o 39’		Daalo			Low
		10^o 44’ – 43^o 28’		Saylac			Low
Sudan	Sanganeb	19^o 45’ – 37^o 26’	Sanganeb National Park 12 km^2				Low
	Mukawwar islands and Dongonab bay	20^o 50’ – 37^o 17’	Mukawwar islands and Dongonab bay	Mukawwar islands and Dunganab bay	White-eyed gull Bridled tern Crab plover	White-eyed gull Sooty falcon	High

	Suakin Archipelago	18^o 50’ - 38^o 00’	Suakin Archipelago Reserve	Suakin Archipelago	Bridled tern Whit-cheeked tern Crab plover	Sooty falcon osprey	High
Yemen	Socotra Archipelago	12^o 19’ &12^o 42’E and 53^o 22’ & 54^o 29’	Socotra islands protected area It is include the three islands to the east of Socotra (Abd al-Kuri, Sabuniya and Ka’l Fir’awn and Al-Ikwan). (3625 km^2)	Several IBA’s were identified in this protected area - Qalansiya lagoon - Jabal Ma’lih Escarpment - Ra’s Hebaq - Airport Dunes - Muqadrihon Pass - Shidahah - Wadi Ayhaft - Rewgid and Regid Plateaus - Jebal Jef - Rookib Hills - Hamaderoh Plateau and Scarp - Coast of Bindar Di-Sha’b - Hajhir montains - Firjih - Di-Ishal Foothills - Diksam - Ra’s Momi and Fikhah - Firmihin near Jebal Keseslah - Noged plain	Socotra cormorant Sooty gull Jouanin’s petrel Masked booby Persian Shearwater	Socotra cormorant Jouanin’s petrel Masked booby	High
		13^o 50’ – 48^o 20’		Bir Ali islands	Socotra cormorant Sooty gull	Socotra cormorant Sooty gull	High
		16^o 21’ -52^o 21’		Abdullah Gahrib lagoons	Sooty gull Swift tern Lesser black headed gull	Sooty gull	Mid.
		15^o 26’ 51^o 45’		Qishn Beach	Socotra cormorant Sooty gull	Socotra cormorant	Mid

			Sooty gull	
15° 35’- 52° 10’	Ra’s Fartak	Jouanin’s petrel Persian shearwater Sooty gull	Jouanin’s petrel Persian shearwater Sooty gull	Mid
12° 45’ – 44° 15’	Aden	White-eyed gull Imperial eagle Swift tern	White-eyed gull	
16° 00’ 42° 50’	Midi-Al-Luhayyah	Western reef heron Lesser sand plover	Whit-eyed gull Pink-backed Pelican Crab plover White-cheeked tern	High
15° 40’ – 42° 30’	Islands north of AlHudaydah	White-eyed gull Red-bill tropicbird brown booby Lesser-crested tern	White-eyed gull Crab plover	High
15° 20’ – 42° 50’	Bahr Ibn Abas-Ra’s Isa	White-eyed gull Caspian tern Goliath heron Sooty falcon	White-eyed gull Sooty falcon Pink-backed pelican Crab plover Sooty gull White-cheeked tern	High
15° 05’ - 42° 55’	Al-‘Urj	Whimbrel Saunders tern	Crab plover	Low
14° 30’ - 43° 00’	Nukhaylah-Ghulayfiqah	White-eyed gull White-cheeked tern	Gabar goshawk	Low
14° 08’ - 43° 07’	Al-Fazzah	Kentish plover White-eyed gull	White-eyed gull	Low
13° 52’ – 42° 45’	Jaza’ir al-Hanish	White-eyed gull Brown booby	Persian shearwater Sooty gull White-eyed gull White-cheeked tern	High
12° 50’ - 43° 26’	Bab al-Mandab-Mawza	White-eyed gull	Persian shearwater Crab plover	High