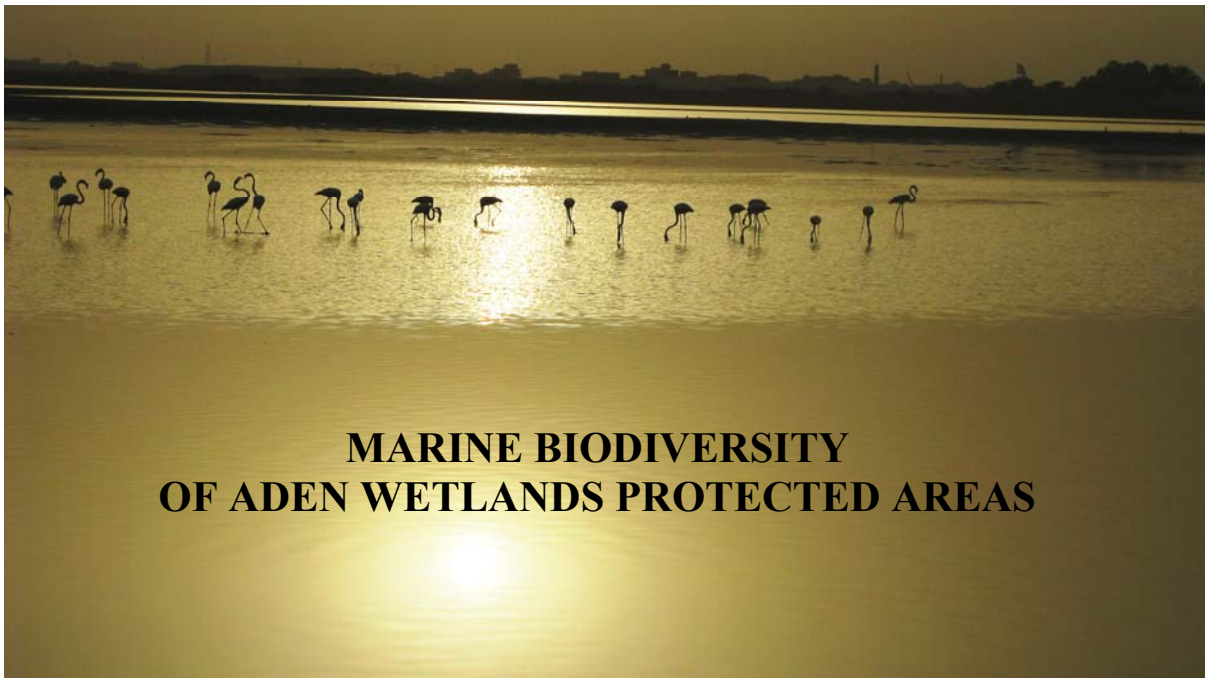
REPUBLIC OF YEMEN
Yemen Society for the Protection of Wildlife
Environmental Protection Authority

Aden Wetlands Conservation Project

wings over wetlands
The UNEP-GEF African-Eurasian Flyways Project



MARINE BIODIVERSITY OF ADEN WETLANDS PROTECTED AREAS

Prepared by:
Gamal M. Bawazir

July 2009

contents

List of Tables

Figures

Executive summary

The Yemen Society for the Protection of Wildlife (YSPW) and BirdLife Middle East Division (BLMED) received funding for Planning and Creation of a Site Management Plan for Aden Wetlands within the United Nations Environment Programme (UNEP) Global Environment Facility (GEF), African Eurasian Flyway (Wings Over Wetlands-WOW) Project. United Nation for Project Service is the executing agencies of the GEF funded project. The project is implemented in 11 countries a long the flyway in Which Aden wetlands, Yemen serves as demonstration project for the Middle East region. The entire project is coordinated by Wetlands International based in the Netherlands and BirdLife International Middle East Division is the executing Agency of the project who subcontracted BirdLife Affiliate YSPW as the field implementing organization on site.

The Aden wetlands are amongst the most important wetlands in Yemen and in the region, they represent a rich natural heritage and are considered a great numbers of marine flora and fauna and provided a suitable habitats for huge numbers of migration water birds which use them as feeding and roosting areas during their annual migration from and to Europe, Asia and Africa.

The government of Yemen through Environmental Protection Authority (EPA) is taking serious steps and great efforts to conserve the natural heritage and there resources in Yemen.

The WOW demonstration project in the Aden Wetlands aims at corroborating the management plan for Aden wetlands Protected areas (PAs) ,they included Aden lagoons, Al Mimlah, Caltex-Al-Heswa swamp and Khor Bir Ahmed.

The Yemen Society for the Protection of Wildlife (YSPW), the BirdLife affiliate in Yemen and BirdLife Middle East Division are jointly executing this demonstration project in close collaboration and synergy with parallel ongoing conservation initiatives of the Environment Protection Authority (EPA) (Ministry of Water and Environment - MWE) and UNDP in the same area.

The five of Aden wetlands PAs were selected to be subjected for a rapid ecological assessment of marine biodiversity and habitats, in addition to identify species abundance and threats to biodiversity as well.

This study represents an inventory of marine Flora & Fauna of five Aden wetlands PAs. based on field survey conduct in June-July 2009 and analysis of acceptable data from previous studies and reports in the area. An inventory of marine Flora and Fauna was carried out.
Aden wetlands are found to be enjoyed a special habitats which include, Khors, lagoons, sabkhas, sand and silt- mud flats. and marine biodiversity such as Sea grasses, macro algae, crustaceans, mollusks, fishes.
Human impacts were Clearly observed in the sites, like land fill ,sewage damping, solid waste, over fishing.

List of Abbreviation

AWCP	Aden Wetlands Conservation Project
BLMED	BirdLife Middle East Division
EIA	Environmental Impact Assessment.
EPA	Environment Protection Authority
GEF	Global Environment Facility
GIS	Geographical Information System
MSRRC	Marine Science Resources Research Center
MEP	Mac Alister Elliot & Partners
MP	Master Plan
MWE	Ministry of Water and Environment,
NE	North East
PAs	Protected areas
PERSGA	Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden.
SW	South West
SNRMP	Sustainable Natural Resources Management Programme
UNEP	United Nations Environment Programme
WOW	Wings Over Wetlands
YSPW	Yemen Society for the Protection of Wildlife

Acknowledgments

I would like to address my special thanks to Mr. Mohammed Masheb for his assistance and companion in the field. and Mr. Abdullah Al-Hendi from University of Aden. Also to my colleagues researchers in Marine Science Research Authority for their assistance and for provide references when needed, in particular: Salem Mohsen, Kasem Obade, Mohammed Saad, and to all people ,who met and helped during the period of the study.

1- Introduction:

The Gulf of Aden represents a unique and divers collection of habitats and biodiversity that have results the unusual geographical and climatic conditions that exist in the area.

The Aden wetlands are amongst the most important wetlands in Yemen and the region, they support unique marine biodiversity and host a large numbers of waterbirds species and considered an important wintering area for migratory waterfowl.

The government of Yemen through Environmental Protection Authority (EPA) is taking serious steps and great efforts to conserve the natural heritage and there resources, where the Ministers Council of Yemen has been issued a decree No.304 in August 2006 announcing Aden wetlands as a protected areas, they comprise Aden lagoons, Al Mimlah, Caltex-Al-Heswa swamp, Al-Wadi Al- Kabir outlet, and Khor Bir Ahmed. (Figure1). Follow this the Ministerial Decree No.249 in July 2008 regarding establishment and manage protected areas of Aden wetlands.

EPA through the Sustainable Natural Resources Management Program (SNRMP), funded by UNDP, has prepared different studies regarding Aden wetlands among them marine biodiversity study for Aden wetlands where conducted in 2006. which covered all 5th PAs.

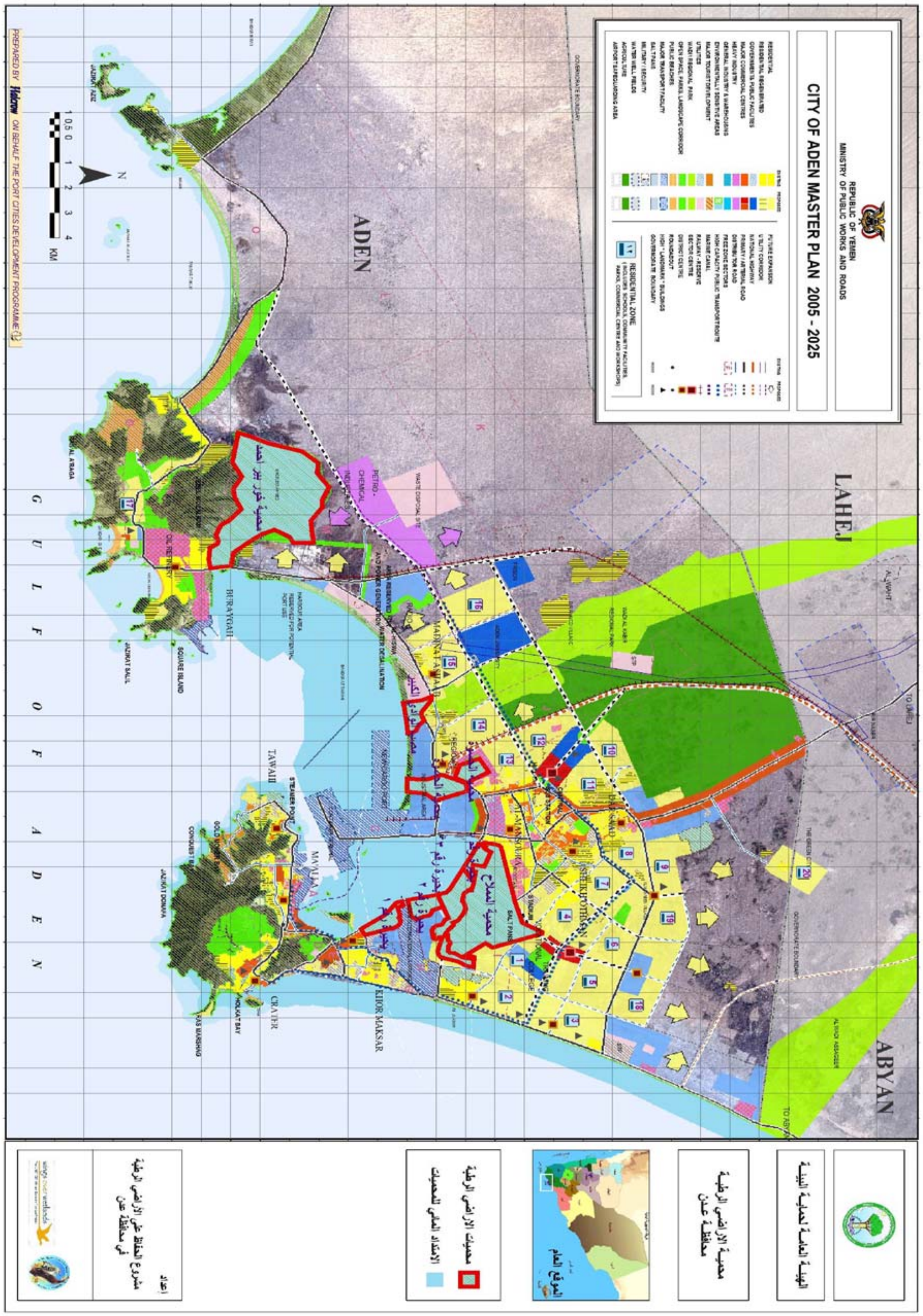
This document was prepared for Aden Wetlands Conservation Project (AWCP) under the UNEP-GEF African Eurasian Flyways(Wings Over Wetlands-WOW) demonstration Project, Where the Yemeni Society for the Protection of Wildlife (YSPW) and BirdLife Middle East Division (Where the BirdLife International Middle Secretariat as the Regional Hub for Wings Over Wetlands) received funding for Planning and Creation of a Site Management Plan for Aden Wetlands within the United nations environment Programme (UNEP) and Global Environment Facility (GEF).

YSPW and EPA through the document of Aden wetlands Conservation Project conducted several activities addressed to conserve habitats and biodiversity of Aden wetlands and raise awareness among different categories in Aden governorate .

The primary objectives of this work is to:

- establish an inventory of marine biodiversity and key species in the Aden wetlands PAs.
- Viewing human activities patterns and key environmental pressures in the Aden wetlands PAs.
- Continuing survey and monitoring to update inventory database.

The report contains background information and methodology. The general inventory of flora and fauna species of Aden wetlands resulting on the field survey provided in tables. Photos are found adjacent to the relevant texts, and provide recommendations.


REPUBLIC OF YEMEN
MINISTRY OF PUBLIC WORKS AND ROADS
CITY OF ADEN MASTER PLAN 2005 - 2025
ADEN
LAHEJ
ABYAN
G U L F O F A D E N
BURAYQAH
TAWAHI
CRATER
KHOR MAKSAR
SHEIKH OTHMAN
MANSOURA
PREPARED BY Halcrow ON BEHALF THE PORT CITIES DEVELOPMENT PROGRAMME
الهيئة العامة لحماية البيئة
محمية الأراضي الرطبة
محافظة عدن
الموقع العام
محميات الأراضي الرطبة
الامتداد المائي للمحميات
إعداد
مشروع الحفاظ على الأراضي الرطبة
في محافظة عدن

2- Marine and Coastal Physical Environment of Aden wetlands

Aden wetlands lies in Aden Governorate on the northern shore of the Gulf of Aden. The coast line of Aden Governorate extends for approximately 180km. from Ras Qawa in the west to Al Alm point in the east.

The coastal area of Aden is part of the south coast area of Yemen, which has a hot climate with low rainfall where not exceeding 50mm annually and may increase to 100mm in exceptional years.

. Climatically Aden is located under influence to distinct monsoonal seasons. The South West (SW) monsoon of the Indian ocean occurs between the months of May and September in summer, while the North East (NE) monsoon is influential between October and April in winter. Where the maximum of temperature 36.5ºC in summer. In winter the minimum temperature reach to 22ºC. the relative humidity in Aden has a mean annual value of 75%.

The coast line of Aden Governorate comprises different topographic features: headlands and cliffs in the volcanic mountains interspersed with sandy bays in Aden and Little Aden peninsulas. Coastal plan and Khors in Abyn beach, Khor Maksar, Bandar Tawahe and Bandar Imran. and Al Wadi Al Kabeer, the down west branch of Wadi Toban the one Wadi outlet in the sea.

The Gulf of Aden is dominated by the Indian Ocean monsoon system. During winter period between November and March, the NE monsoon produces a prevailing easterly winds. During the summer months June to September, the SW monsoon produces a prevailing SW winds. These winds cause the phenomenon of upwelling, which brings cool deep water, rich by nutrients to the surface. These different types of monsoons are responsible for water change between the Gulf of Aden and the Red sea, on one side ,and with the Indian ocean, through the Arabian Sea, on the other. All these produces conductive conditions for the formation of high biodiversity in the marine life in the area.(Spridonov,1985)

3-Objectives and Scope of Work

This survey study was undertaken to the marine biodiversity of Aden wetlands Protected Areas (PAs) under Aden wetlands Conservation Project (AWCP) which implemented by The Yemen Society for the Protection of Wildlife (YSPW) cooperation with Environment Protection Authority (EPA) to establish a baseline data for marine fauna and flora species and threats which facing them in the protected areas and adjoining areas.

The primary objectives were to describe marine Flora and Fauna diversity in Aden wetlands PAs, and establish an inventory of marine fauna and flora and indicating of threats to the biodiversity.

A survey was undertaken to establish a baseline for marine biodiversity within the Aden wetlands PAs. Survey was made in the areas between June – July 2009. the location and designation sites surveyed is as identified in (Table1). The marine areas of Aden wetlands protected areas can understandable as follow: Aden lagoons, Al Memlah Caltex-Al-Heswa and Khor Bir Ahmed.

Abundance of marine flora and fauna was estimated, using a ranked 0-6 scale, particularly for relative abundance. Scale, (Price, 1992) used for abundance estimation of flora species in m^2 and fauna species in whole transect with area of $100m^2$ (100m X 1m), (Table 2).

The sites investigation were recorded by using a Garmin (*etrex*) Global Positioning Satellite (GPS).For each location core samples of sediments were taken (for worms) Infauna samples were collected at each location (8 sites), using a 15 cm by 7.5cm

Table (1): Sites of investigation in Aden wetlands PAs (June-July 2009).

Location	Coordinates		Remarks
1st Aden lagoon	N 12º 49´ 054´´ N 12º 49´ 180´´	E 45º 01´ 393´´ E 45º 01´ 560´´	Two transects on mud-rocky and in shallow water of the lagoon
2nd Aden lagoon	N 12º 50´ 208´´ N 12º 49´ 790´´	E 45º 00´ 636´´ E 45º 00´ 100´´	Transect on mud- rocks behind causeway
3rd Aden lagoon	N 12º 50´ 878´´ N 12º 50´ 380´´	E 44º 59´ 626´´ E 45º 00´ 900´´	Two transects on rocks under the bridge and rocky-mud flat
4th Aden lagoon	N12º 50´ 901´´ N 12º 50´ 596´´	E 44º 59´ 403´´ E 44º 59´ 220´´	Two Transect on mud behind the bridge and behind Al-Burehi Hospital.
Al Memlah	N 12º 51´ 227´´	E 44º 59´ 506´´	Transect on supply channel entrance
Mouth of Al Wadi Al Kabir	N 12º 51´ 229´´ N 12º 49´ 312´´	E 44º 59´ 506´´ E 44º 56´ 096´´	Two transects and observation on sandy beach
Caltex-in front of Al-Heswa PA.	N 12º 49´563´´ N 12º 49´010´´	E 44º 58´ 244´´ E 44º 56´570´´	Two transect and observation on sandy beach
Khor Bir Ahmed	N12º 49´570´´ N 12º 46´510´´	E 44º 58´240´´ E 44º 53´950´´	Two transect on rocky under the bridge and another on mud flats in front of the settlements.

Table(2): Scale of rapid assessment, used during the field survey.

Description	Abundance	Flora species in (m^2) and fauna abundance in($100m^2$)
No record	NR	0
Absent	0	0
Present	+	Unquantifiable
Few	1	1-9
Some	2	10-99
Common	3	100-999
Very common	4	1000-9999
Abundant	5	10000-99999
Super abundant	6	More than 100000

diameter core. Samples were screened through a 2.00mm sieve. Selected samples were preserved in the field.

Results of data analysis for sites and species were shown in tables (3-10).photographs were taken in each site for habitats, flora, fauna and human activities.

Site visits and observation were conducted during the study period to the Aden wetlands PAs. Information has also been obtained from published and non published references and using information supplied by specialists.

Table (3): Taxa major Composition of Aden wetlands PAs.

Location	Finding
Aden lagoons	
1st Aden lagoon	Macro algae (3),Seagrasses (3),Gastropods (3), Crustacean(3) Small fishes (+), Bivalve (+)Cnidaria (+), Polycheata (0)
2nd Aden lagoon	Macro algae (3),Gastropods (2), Bivalves(+),Crustacean (3),small fish (+), Polycheata (0)
3rd Aden lagoon	Macro algae (2) Seagrasses (+),Gastropods (3),Crustacean(3) ,Fish (3), bivalve (+),Cnidaria (+),Polycheata (0)
4th Aden lagoon	Macro algae (2), Seagrasses (1),small fish(4),Gastropods (2), Bivalves (+)Cnidaria (2)
Al Memlah	
Al Memlah supply channel	Macro algae(2),small fish(4), Gastropods (2), Bivalves (+)
Caltex-Al Heswa	
Mouth of Al Wadi Al Kabir	Gastropods (3),Bivalves (3), Crustacean(3), Polycheata (0)
Caltex-in front of Al-Heswa PA	Crustacean(3), Gastropods (3),Bivalves (3), Polycheata (0)
Khor Bir Ahmed	Macro Algae (3), Seagrasses (3), Fish(4), Crustacean(4), Gastropods (3), Bivalves (3), Polycheata (0)

4. Marine Flora and Fauna

The Gulf of Aden enjoys a unique rich marine flora and fauna, due to its geographical location and other hydro meteorological conditions. Two types monsoon occur in the Gulf of Aden and these are responsible for water exchange between the Gulf of Aden and the Red Sea, on one side ,and with the Indian Ocean, through the Arabian Sea ,on the other. This produced conditions conductive to the formulation of high marine biodiversity in the region. Number of studies and researches were done concerning marine biodiversity in northern part of the Gulf of Aden.

4.1 Marin Flora.

The Gulf of Aden supported large areas of various types of marine flora such as sea grasses and macro algae.

4.1.1 Seagrass

Sea grasses are rooted plants found on soft substrate. The importance of the sea grasses beds is very high due to their high primary productivity. As well as providing a direct food source for a number of grazing animals and harbour juveniles of various fish species and crustaceans. Six species of sea grasses have been recorded in Gulf of Aden as follows:(Herth and others,1973, MEP1995, Wat,1996, and Bawazir, 2003).*Halodule uninervis, Halophila ovalis, Halophila stipulacea , Cymodocea serrulata, Cymodocea rotundata and Thalassia hembrichii*.

Seagrasses in Aden wetlands PAs were reported in (Bawazir and Abu Al Fotooh,2001) where 3 species in Khor Bir Ahmed *Halodule uninervis, Halophila ovalis, Cymodocea sp*.. (Bawazir,2003) also reported in Aden lagoons 3 species: *Halophila stipulacea, Halodule uninervis* and *Cymodocea serrulata*. Where *Halophila stipulacea,* where reported as a new record in the south of Arabia.

Halophila ovalis in Khor Bir Ahmed

Halophila stipulacea-Aden Lagoons

(Saad et,al.,2006,) reported *Halodule uninervis* and *Halophila ovalis* in Aden lagoons, but the second it was confused by them it is *Halophila stipulacea.*

During the field survey Seagrasses are essentially restricted to Aden lagoons, in the first lagoon(*Halodule uninervis, Halophila stipulacea*), and the 4th lagoon *Halophila stipulacea*. In Khor Bir Ahmed mainly found *Halodule uninervis* which covered a big area, and *Halophila ovalis* which was observed adjacent to *Halodule uninervis* or mixed in small site. Also observed few pieces of *Cymodocea serrulata* and *Cymodocea rotundata* in the Khor, but it is not clear if they are growing inside the Khor or drifted from the open sea through the bridge. This request to conduct more investigation in the future. *Halophila stipulacea* reported only in Aden lagoons (Table 4).

Table (4): Distribution of Seagrass in Aden wetlands PAs.

Species	Aden lagoons	Al Memlah Channel	Caltex-Al Heswa	Khor Bir Ahmed
Family: Potamogetonaceae				
Halodule uninervis	+			+
Cymodocea rotundata.				+
Cymodocea serrulata	+			+
Family: Hydrocharitaceae				
Halophila stipulacea	+			
Halophila ovalis				+

4.1.2 Macro Algae

Marine macro algae like sea grasses play an important role in the web chain and primary production in the marine live. A seasonal upwelling in the Gulf of Aden promotes the growth of macro-algae on most hard substrates. Due to high nutrient level ,algae growth is relatively abundant. 160 species of macro algae were reported in the Gulf of Aden (Ormond and Banaimoom,1994, Dou Abul and Abubakr,1996, MEP and MSRRC,1995,and Samir,et,al,1996).were dominated by Dctyota, and sargassum which relatively high abundance, Padina (brown algae), Halimeda, Udotea (green algae).

Caulerpa sp.

Macro algae in Aden wetlands protected areas was reported for the first time in the study of Marine biodiversity of Aden wetlands(Saad et,al,2006) were reported 13 species green and brown algae such as: *Caulerpa sp*. and *Cladophora sp*. reported in all Aden wetlands, *Padina sp.* and *Turbinaria sp.* Reported in Caltex and Khor Bir Ahmed.

During the field survey macro algae was recorded in Aden lagoons and in Khor Bir Ahmed, green and brown algae were reported nine species where not indicted in the study of (Saad et,al,2006). They were six green algae (2 families) and three brown algae (one family), and they will be identified later on by species (Table 5).

Caulerpa sp.

Table (5): Distribution of Macro algae in Aden wetlands PAs.

Species	Aden lagoons	Al Memlah	Caltex- Al Heswa	Khor Bir Ahmed
Family: caulerpaceae				
Caulerpa sp.	+	+		+
Caulerpa sp.	+			+
…..Filamentous	+			+
…..Filamentous	+			
Family: Caldophoraceae				
Caldophora sp.	+			+
Caldophora sp.	+			+
Family: Chordariaceae				
Dictyota sp.	+			+
…...Brown algae	+			
…..…Brown algae.	+			

4.1.3 Fishes

The Gulf of Aden is a highly productive fishery area, due to the upwelling processes and rich biodiversity which encourage a wide variety of fish ,crustaceans and several species of invertebrates.

Number of surveys and studies were carried out in the south coast of Yemen in the Gulf of Aden where identified about 600 species (MFW,2001). there are a few data available for Aden Governorate. Accordingly to (MEP and MSRRC, 1995, Samir,et.al,1996) there are about 25 families of fishes occruing in the coastal area of Aden. Among them Indian mackerel ,groupers, mullets emperor and snappers.

Fishers in Caltex-Al Heswa (Tawahe bay)

(Faisal,2005) was reported Fishes in Aden lagoons such as: Mugilidae, Platycephalidae. (Saad et,al.2006) 31 species in Aden wetlands protected areas of fish, were recorded, but didn't provid an inventory, amongst them, mullets, emperor, snappers and snub nose pompano were recorded as mostly important species. (Parsons Brinckerhoff Ltd,2008) were recorded 10 of fish species found in marine and wetland environment around Aden Causeway such as: Pinkear Emperor, Bull Cock Graunternaqem and Steaked spine foot.

During the field survey recorded were 24 species of fish from 18 families in Aden wetlands PAs. The main families were Caranggidae, Laethrinidae, Sparidae and Mugilidae (Table: 6).

Crenidens crenidens

Scolopsis taeniatus

The most commonly fishing method are gill nets and hand lines where used from houris and small fiberglass, specially in Caltex-Al-Heswa (Tawahe bay).
In Khor Bir Ahmed fish are generally taken with hand lines by the local habitants in the area and gill nets by fiberglass boats by peoples form out the area.
the swimming crab(*Portunus pelagicus*) is also fished in commercial quantities in Aden lagoons and Khor Bir Ahmed.

Aden lagoons and Khor Bir Ahmed are regarded as providing significant fishery nursery and spawning habitat and feeding ground for shall fish and crustaceans.
Fishing sport is common and was seen exercise specially around the bridge in Aden lagoons of the cause way, in Al Memlah Channel, and in Al Bureka bridge in Khor Bir Ahmed, using hand line.

The most commonly using of fishing method are gill nets and hand lines were used from houris and small fiberglass, specially in Caltex-Al-Heswa (Tawahe bay).
In Khor Bir Ahmed fish are generally taken with hand lines by the local habitants in the area and gill nets by fiberglass boats by peoples form out the area.
the swimming crab(*Portunus pelagicus*) is also fished in commercial quantities in Aden lagoons and Khor Bir Ahmed. Shrimps and small fish fishing in Caltex-Al Heswa by using Mqdaha nets.

Fisherman in Caltex-Al Heswa –using "Mqdaha net"

Sport fishing in Aden Lagoons

Local fishers in Khor Bir Ahmed

Sepia sp.- By-catch in Aden lagoons

4.1.4 Corals

Coral and coral communities in south coast of Yemen are extensive, and wide spread, divers, and generally healthy in areas such as Khor Omera, Aden, Shuqra, Balhaf, Bir Ali and Buroom. (MEP and MSRRC,1995,Wat,1996, Kemp and Benzoni1999, Kemp and Benzoni,2000 and Yemen LNG Project,2005).

Corals in Aden were recorded in Seera, Maashiq, Ras Imran, Ras Mugalab Hadi, Ras Gold Moor, Dunafa Island (Wat,1996, Bawazir and abul Fotooh,2001).
According to (Bawazir,2006) corals in Aden due to the volcanic structure of the area, almost of the headlands and small rocky islands appear to be a largely coral and have divers coral communities, the main species were: *Porites sp., Acropora sp., Stylophora sp., Playtgyra sp.* and *Monitpora sp.* In the investigated areas According to (Bawazir and abul Fotooh,2001) hard corals were presented as patches in Khor Bir Ahmed.

Table (6): Distribution of fish in Aden wetlands.

Species	Aden lagoons	Al Memlah	Caltex-Al Heswa	Khor Bir Ahmed	Arabic name
Family: Gerreidae					
Gerres filamentasus	+				Kas
Family: Sillaginidae					
Sillago sihama	+			+	Maradees
Family: Laethrinidae					
Lethrinus mahsena	+				Gahsh
Lethrinus lentjan				+	Gahsh
Family: Nemipterdae					
Scolopsis taeniatus				+	Abu Senna
Family: Ariidae					
Arius thalassinus	+			+	Kumal
Family: Belonidae					
Srongylura leiurua	+			+	Ba Khother
Family: Haemulidae					
Pomadysis multimaculatum	+			+	Nakem
Family: Scombridae					
Rastrelliger kanagurta				+	Bagha
Family: Caranggidae					
Carangoides fulvoguttatus	+				Safadem
Caranx ignobilis	+				Garam
Scomberoides commersonianus				+	Helfe
Family: Sphyraenidae					
Sphyraena jello	+		+		Kod
Family: Siganidae					
Siganus javus	+			+	Zezan
Family: Mugilidae					
Valamugil seheli	+			+	Arabi
Family: Canidae					
Chanos chanos	+			+	Taliani
Family: Sparidae					.
Rhabdosargus sarba	+			+	Harabt
Crenidens crenidens	+				Mokaresh
Family: Clupeidae					
Sardinella sp.			+		Aid
Family: lutjanidae					
Lutjanus russelli	+			+	Hobera
Lutjanus boher.	+				Kalb
Family: Serranidae					
Epinephelus tauvina	+			+	Kholkhol
Family: Sciaenidae					
Otolithes ruber	+				Karat
Family: Plectorhinchus orientalis					
Plectorhinchus gaterinus				+	Karen

4.1.5 Mollusca

Available data revealed that the north part of the Gulf of Aden is rich and diver by invertebrates. In early time reported occurrence of 729 species of mollusks from Aden inner harbour and little Aden, their were: 506 gastropods, 220 bivalves,1cephalopods and 2 scaphopods. According to (Wranik and Saad,1992) from the shallow water and along beaches of Aden a total of 248 species (188 gastropods, 47 bivalves and 13 Chitons) were recoded during the period 1983-1985. Some species were recorded in Aden such as Neritidae,Nasasariidae,Olividae,Srombidae,Turritellidae,Arcidae,Planaxidae,Chitons,Ost eridae,Turbinidae,Veneridae and Patellidae.

(Golden AssociatesInc.,1998) had provided data on occurrence of sea shells which belong to many families in the inner harbour (Caltex causeway), such as: Veneridae, Mactridae, Tellinidae and Lunicidae. In addition they reported occurrence of snail *Volema pyrum*, *Nassarius* (*Plicareularia*) *persicus*, and also indicated for two live species pf mussels *pitar sp*. and large *Amniathus umbanella* in the area of Caltex.

Murex scolopax

Tivela sp.

(Masheb and Abdurashed,2000) had provided data on occurrence of sea shells in 11 sites in the coastal area of Aden Governorate belonging many families Potamididae ,Veneridae, Olividae, Arcidae, Strombidae, Melongenidae and Arcidae.
According to(Saad et,al.2006) 67 species in the Aden wetlands protected areas were reported, among them Clam Pitar were reported in Aden lagoons and Khor Bir Ahmed. The study also indicated that Khor Bir Ahmed an important area for strombid and murex snails (*Strombus tricornis* and *Chicoreus ramosus*) and Aden lagoons are important area for *Srombus tricornis.* all of them were subjected to uncontrolled exploitation. Also the *Tivela ponderosa* clam in the area of Caltex and al Heswa was reported exploitation in a heavily harvesting.

During the field survey mollusks were represented in all investigated area in large scale. Gastropoda were recorded 44 sp. and bivalve 19 sp. belonging 33 families such as

Melongenidae Cerithiidae, Neritidae**,** Arcidae was a common families in the investigated areas (Table7).

Some species were found alive from the families: Neritidae, Cerithidae, Melongenidae, Potamididae, Strombidae, Muricidae, Thaididae ,Arcidae, Mytilidae, Pteriidae and Veneridae.
Tibia insulaechorab curta it has been found a live in Caltex- Al Heswa and *Murex scolopax* it has been found a live in Khor Bir Ahmed.
The local people hunt the species *Strombus tricornis* and *Chicoreus ramosus* in Khor Bir Ahmed and Aden lagoons in order to obtain the operculum which is used to make a form of incense, and the others eat the meat.

4.1.6 Crustaceans

24 species of crustaceans in the Gulf of Aden, there were recorded (Abubakr,1997). (Saad et,al.2006) reported 19 species in Aden wetlands.

According to the current survey mollusks were represented in16 species from 8 families. were for brachyuran (true crab) which represented by the families : Portunidae (*Portunus pelagicus*), Ocypodidae (*Ocypodae saratan*, *Uca sp.*), and Grapsidae crabs. False crab (Anomura) was represented by only one species of Paguridae (*Pagurus sp*.). (Table8)

Sand towers and Ghost crabs, are common on sandy beach of Caltex-Al Heswa

Fiddler crab is a common species in the intertidal muddy areas in Aden lagoons and Khor Bir Ahmed. three species have been reported.
Ghost crabs *Ocypoda saratan* are common too on sandy shores only in Caltex-Al Heswa. Local fishers observed occasionally dig deep holes to find bait. Swimming crab *Portunus pelagicus* was common in Aden lagoons and Khor Bir Ahmed where subjected from fishers. In Khor Bir Ahmed crabs reported in 14 species.

Barnacles were represented by two species *Balanus amphitrite* and *Lepas sp.*.
Balanus amphitrite is common in rocky sites in Aden lagoons and Khor Bir Ahmed. and *Lepas sp*. only reported in a few numbers in Khor Bir Ahmed.

Table (7): Distribution of Mollusca in Aden wetlands PAs.

Species	Aden lagoons	Al Memlah	Caltex-Al Heswa	Khor Bir Ahmed
Polyplacophora				
Acanthopleura vaillantii	+			+
Gastropoda 45 sp.	29 species	4 species	10 species	16 species
Family: Fissurellidae				
Diodora ruppelli	+			
Family: Trochidae				
Monodata vermiculata	+			
Euchelus asper	+			
Trochus erythraeus	+			
Minolia sp.	+			
Family: Patellidae				
Cellana radiate				+
Family: Neritidae				
Nerita albicilla	+			
Nerita longii	+			+
Nerita palita orbignyana			+	
Family: Architectonicidae				
Architectonica perspeciva			+	
Family: turritellacea				
Turriella cochlea	+			
Family: Potamididae				
Terebralia palustris	+			
Cerithidea cingulata	+			+
Cerithidae cinulata	+			
Family: Cerithiidae				
Planaxis sulcatus	+	+		
Cerithium sp.	+	+	+	
Cerithium sp.				+
Family: Strombidae				
Strombus tricornis	+			
Tibia insulaechorab curta				+
Strombus sp.				+
Family: Muricidae				
Murex scolopax			+	+
Chicoreus virgineus	+		+	
Murex hustellum	+			
Family: Melongenidae				
Volema pyrum	+		+	+
Family: Fasciolariidae				
Fasciolaria trapezium	+			
Family: Nassariidae				
Nassarius arcularia plicatus				
Nassarius coronatus			+	

Bullia(bullia)semiplicata *Bullia mauritiana*			 +	+
Family: Conidae *Conus terebrathomas*				 +
Family: Terepridae *Terebra sp.*	 +			
F**amily: Thaididae** *Cronia konkanensis* *Thais s p.* *Thais savignyi.* *Rapana bulbosa*	 + + + +	 +		 + +
Family: Olividae *Oliva bulbosa*	 +		 +	
Family: Buccinidae *Babylonia spirata*				 +
Family: Fasciolaridae *Fusus sp.* *Fasciolaria trapezium*	 + +			
Family: Planaxidae *Planaxis sulcatus* *Planaxis sp.* *naxis sp.*	 + +	 +		 +
Family: Bullidae *Bulla ampulla*			 +	
Family: Naticidae *Polinices tumidus*				 +
Bivalvia 19 sp.	11 species	1species	10 species	11species
Family: Arcidae *Anadara ehrenbergi* *Anadara uropmelana* *Arca zebra* *Barbatia sp.* *Anadara sp.*	 + + +		 + + +	 +
Family: Mytilidae *Modoilus auriculatus*	 +	 +		 +
Family: Pteriidae *Pinctada margaritifera* *Pinctada radiata*	 +			 + +
Family: Pectinidae *Chlamys lemnislata*			 +	
Family: Pectinidae *Chlamys lemnislata*			 +	
Family: Osteidae *Ostrea cucullata*	 +			 +
Family: Cardiidae *Trachycardium lacunosum*	 +			 +
Family: Mactridae *Mactra achatina*			 +	 +
Family: Solenidae				

Solen ceylonensis	+			+
Family: Cultellidae *Siliqua japonica*			 +	
Family: Veneridae *Callista umbonella* *Tivela pondrosa* *Circenita callipyga* *Tivela sp.*	 + +		 + + +	 + + +
Family: Carditidae *Cardita sulcata*	 +			
Family: Sepiidae *Sepia sp.*	 +			 +

Soldier crab is common in Khor Bir Ahmed

Charybdis natator in Khor Bir Ahmed

Fiddler crabs *Uca sp.* in Aden lagoons

Grapsus albolineatus in Aden lagoons

4.1.7 Echinoderms

The Gulf of Aden has a considerable length of coast line and possesses large area of marine habitats suitable for sea cucumber. According to (PERSGA,2009) reported that, a total of 19 of sea cucumber were recorded in the northern part of the Gulf of Aden. the occurrence of sea cucumber in the Gulf of Aden were mentioned also in **(**(MEP and MSRRC,1995, Wat,1996 and Samir,et,al,1996 and Bawazir,2006) were reported species

occurrence in Aden out of the PAs such as: *Halothuria atra*, *Halothuria edulis*, *Halothuria scabra* and *Actinopyga echinites.*
(Saad et,al.2006) reported in Aden wetlands the occurrence of sea cucumber were for sand fish *Halothuria scabra* and lolly fish *Halothuria atra*. Where reported in Khor Bir Ahmed in a few numbers. and also indicated to the threatened of the population.

Sea cucumber collection is more recent threats to Aden wetlands in general. were depleted in many others parts of the Yemen coastal area. During the file survey sea cucumber didn't recorded in the investigated areas.

Table (8): Distribution of crustacean in Aden wetlands PAs.

Species	Aden lagoons	Al Memlah Channel	Caltex- Al Heswa	Khor Bir Ahmed
Cirripedae				
Balanus amphitrite	+		+	+
Lepas sp.				+
Family: Portunidae				
Portunus pelagicus	+		+	+
Charybdis natator				+
Scylla serrata				+
Thalamita admete				+
Family: Ocypodidae				
Ocypodae saratan			+	
Uca triangularis	+			+
Uca lacteal annulipes	+			+
Uca sp.	+			+
Macrophthalmus sulcatus				+
Dotilla myctiroides				+
Family : Grapsidae				
Grapsus alpolineatus	+			+
Family: Dromiidae				
Eriphia smithi				+
Family: Sesarmidae				
Sesarma sp.				+
Family: Pilummidae				
Eurycarcinus orientalis				+
Family: Paguridae				
Pagurus sp.	+		+	+

4.1.8 Worms

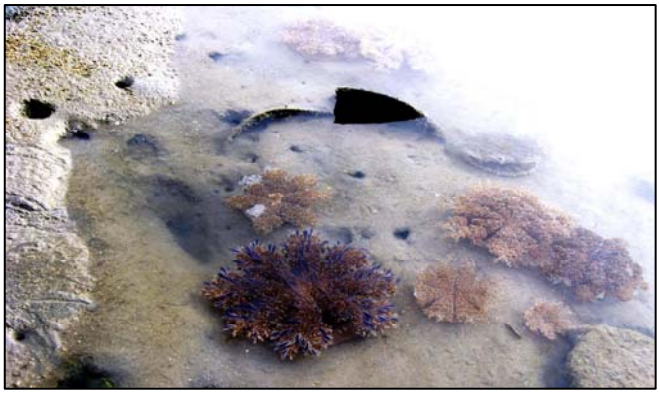
(Masheb and Abdurashed,2000) provided data on occurrence species of worms in the coastal area of Aden Governorate ,but did not identified.
According to (Saad et,al.2006) 7 species of annelids worm were reported in Aden wetlands, but didn't provide an inventory of species.

During the field survey eight samples of sediments were collected as follow: four from Aden lagoons, two from Caltex- Al Heswa and two from Khor Bir Ahmed by core 7-10 cm to investigate worms, but results were negative.

During the field survey observed a tube worms and (Cnidaria) upside-down jelly fish in Aden lagoons (Table 9).

Table (9): Distribution of Tube worms and Jelly fish in Aden wetlands PAs.

Species	**Aden lagoons**	**Al Memlah Channel**	**Caltex- Al Heswa**	**Khor Bir Ahmed**
Family: Sabellidae *Sabellestarte sp.*	+			
Cnidaria				
Family: Cassiopeidae *Cassiopeia andromeda*	+			



Jelly fish up side- down -*Cassiopeia andromeda*

5.Aden wetlands PAs.

5.1 Aden lagoons

Aden lagoons are uniquely located they provide protection to birds against adverse weather and tidal changes. Adjoining intertidal areas are important for birds. The lagoons act as a nursery for juvenile fish. This in turn creates an important feeding ground for the birds.

Aden lagoons are important site for small fish were observed a numbers of small fish for the families such as: Lapridae(*Coris lfavovittata*?) and Mugilidae*(Valamogel speiclevi*)

The lagoons have been subjected to filling over the years, which may affect biodiversity in the site. and subjected to oil contamination from the oil pipe line ,and also subjected from windblown domestic waste and plastic bags.

During the survey notes the pipes which feeding waters for the second lagoon from the third lagoon was begin to grow on it barnacles *Balanus amphitrite*. It means that through the time may will be blocked up and effected to the quntities of waters.

5.2 Al Memlah

Al-Memlah (Salt pans) one of the PAs of Aden wetlands. The produced sea salt from there has high quality and in those lands different naturally growing salt plants spread which tolerate high degrees of salinity and all necessary capacities exist there to produce the sea salt. Establishment this industry due to the existence of marshes and swamp lands. Where waters reaching the basins by tides due to the low surface of the Mimlah below the sea level.

Number of issues faced this area as well as neighboring fuel station and others human activities in the med of Al Memlah PA. which form a serious danger for the industrial and the biodiversity. Water birds using this area for feeding and roosting.

The old windmills used to pump the sea water in to the evaporation pans in Al Memlah PA.

Al Memlah supply channel is an important site for small fish were observed in a big number for the families: Mugilidae(*Liza sp. and Valamogel sp.*) and Jobiidae (*Boleophthalmuc sp.*)

5.3 Caltex –Al-Heswa

This area contains Al Wadi Al Kabeer outlet and Al Heswa PA from the sea side(Tawahe bay). is considered as a fishery area ,numerous of temporal hunts were evident in the site. Also boats of fishers were fishing in the adjacent areas. They fishing crustaceans, fishes and mollusks.

During the field survey persons from adjacent areas were observed, however they collect crabs(*O. saratan*) and bivalve (Tivela pondrosa) apparently a common activity at the site ,which were sales as a bits for fishery.

At the time of the survey birds were observed, Swift tern (*Sterna bergii*), Sooty gull (*Larus hemprichii) and* Black backed gull*(Larus fuscus).*

Bait digging for collection of crabs and bivalve takes place in Caltex-Al- Heswa (Tawahe bay)

5.4 Khor Bir Ahmed

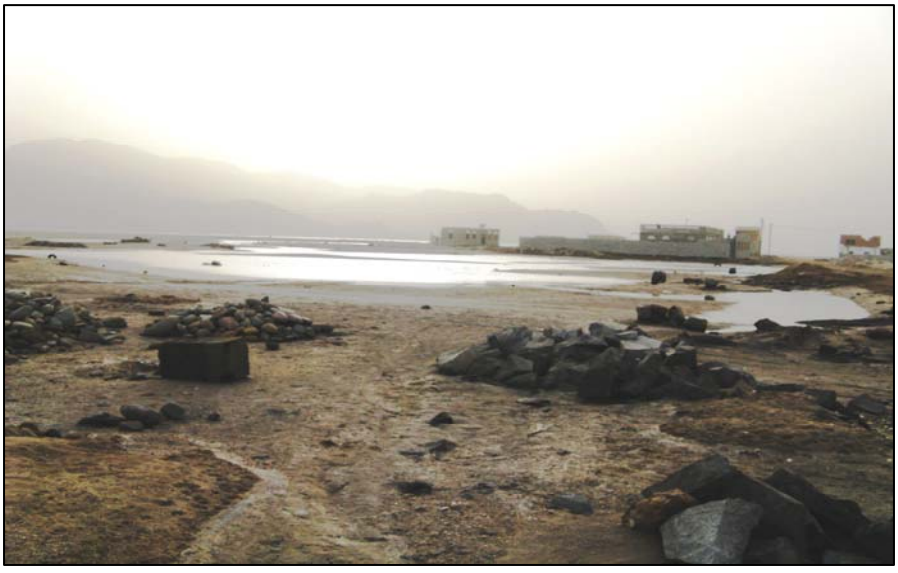
Khor Bir Ahmed is a big mud flats as a natural refuge area for marine species, where it is possible to find different habitats that allow the growth of a rich flora and fauna. Although this Khor is located between human settlements, studies are scarce in this area. It is a reservoir of high diversity in flora as well as fauna. and considered a big marine biodiversity among the 5th PAs. Is an important site for fish, mollusks and crustaceans as breeding and spawning grounds. This in turn creates an important feeding ground for the birds.

Khor Bir Ahmed was in the past an important area for sea cucumber were reported sand fish *Halothuria scabra* and lolly fish *Halothuria atra*, was targeted in a big scale in the few last years.

Local fishers reported that some times Sea turtles were seen in the site in the time of high tide (Pers. Comm.).fishing was seen in the Khor by the local habitants were using a small woody boats.

Boats of fishers take place in the Khor as a temporal anchorage, were fishing in the adjacent areas. They fishing crustaceans, fishes and mollusks.

Settlements near Khor Bir Ahmed from the west site



Illegal Expansion of settlements in Khor Bir Ahmed from the east site

Table (10): Species summary

	Abundance by locations			
Species	**Aden lagoons**	**Al Memlah**	**Caltex-Al Heswa**	**Khor Bir Ahmed**
Sea grasses				
H.univervis	**c**	**nr**	**nr**	**c**
H. stipulacea	**c**	**nr**	**nr**	**nr**
H. ovalis	**nr**	**nr**	**nr**	**a**
Macro algae				
Caulerpa sp.	**c**	**a**	**nr**	**nr**
…..Filamentous	**c**	**nr**	**nr**	**a**
Caldophora sp.	**c**	**nr**	**nr**	**a**
Dictyota sp.	**nr**	**nr**	**nr**	**a**
Chiton				
Acanthopleura vaillantii	**c**	**nr**	**nr**	**c**
Crustacea				
Balanus amphitrite	**c**	**nr**	**nr**	**c**
Lepas sp	**nr**	**nr**	**nr**	**a**
P. pelagicus	**c**	**nr**	**a**	**c**
O. saratan	**nr**	**nr**	**c**	**nr**
Uca sp.	**c**	**nr**	**nr**	**c**
Dotilla myctiroides	**nr**	**nr**	**nr**	**vc**
Pagurus	**c**	**nr**	**vr**	**c**
Tube worms				
Sabellestarte sp.	**vr**	**nr**	**nr**	**nr**
Jelly fish				
Cassiopeia andromeda	**c**	**nr**	**nr**	**Nr**

c – Common
vc – Very common
a – Abundant
nr – Not recorded

6. Threats to biodiversity

The coast of Aden extend approximately 180 km along from the point of al Alm in the east to Ras Qawa in the west. Potential threats to Aden marine environment due to human activities seems the same impacts found in Yemeni ports cities like Mukala and Hodiedah. They identified as oil spill, dredging ,filling, eutrophication , over fishing , non planed urban development, litters and sewage discharge.

Although to advertising the five wetlands protected areas in Aden but they are facing threats by human activities.

6.1 Oil pollution

wetlands due to its surrounded by Aden Port (Tawahe bay) subjected to oil pollution due to the big activities of ships in Aden port and Aden oil refinery. Oil may leak from terminals or tankers and ballast water. Some of oil spills were occurred in Aden port.(Bawazir,2007).during the field survey was observed some of an old tar balls relatively low level were scattered along the area of Caltex- Al Heswa. layer of tar balls also were observed covered the rocks under the bridge of the causeway, and it seems as an old.

Tar balls observed in Caltex-Al Heswa beach

6.2 Sewage

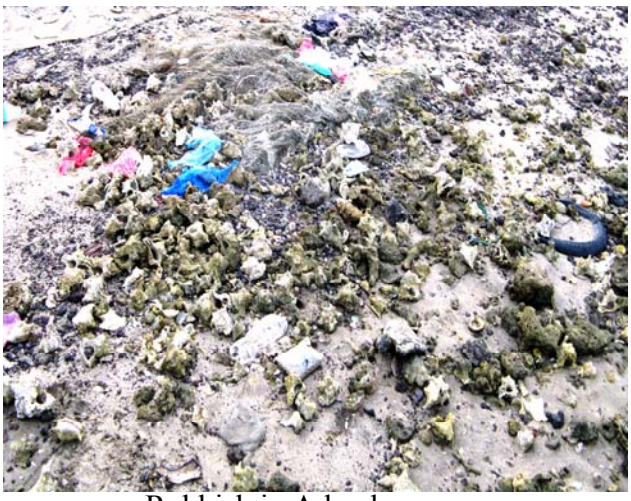
Raw sewage from adjoining unplanned settlements enters the wetlands areas, destroying aquatic life which ultimately affects the livelihood of fishermen catching fish in the area. There is also an obvious health risk to people living nearby or using the wetland**.**

Tow of Aden wetlands are affected by sewage they are Al- Heswa and Khor Bir Ahmed PAs. In Al- Heswa, sewage is discharged directory treatment plant of Kabouta Project to the Protected area of Al Heswa to the sea. sewage treatment plant of Kabouta where do exist, it is usually poorly maintained and the volume of sewage exceeds it capacity. In Khor Bir Ahmed, sewage disposal system do not exist where seen sewage was discharged directory to the mud flats from settlements.

Sewage contains viruses and other pathogens which can causes disease.
It is needed to joining Khor Bir Ahmed settlement to the sewage system in the district.

6.3 Litter

Sources of litter are mixture from land – based pollution from coastal urban communities, and water-born pollution, from vessels and boats using coastal waters. Discarded materials from the ships or from land is noticeable in the beaches of areas. Littler can affect marine species by entanglement or by ingestion. Most of the litter observed in the areas include plastic bags, bottles, glass bottles, wood and plastic sheets, old tires, nets ,batteries, ropes and an old broken shells.



Rubbish in Aden lagoons

All beaches of PAs were relatively affected by letters in large scale. In Aden lagoons specially in the first lagoon and around the edges of causeway of the 4th lagoons. Along the beach of Caltex-Al Heswa. In Khor Bir Ahmed municipal wastes were seen in the side of random houses and near the bridge of al Bureka where temporary fisherman settlement.

An old small-mesh net in Khor Bir Ahmed

6.4 Over fishing

Bottom gill nest were used in a big shape and still popular in the coastal area of Yemen in general. This causes extensive damage to bottom habitat and small organisms.
Collection activities of shellfish was observed in Aden lagoons, in the first lagoon ,the targeted was Strombid gastropod (*S.triconis*) where found quantity in a big area it is seems old.
In Caltex-Al Heswa.(Saad,et.all,2006) reported Ark shells, which was recorded alive only in this area among the shoreline of Aden. and snails in Khor Bir Ahmed

In Khor Bir Ahmed collection of shellfish covered the area behind the of fiberglass boats was found in a big scale of Muricid (*Chicoreus ramaosus*) and Strombid (*Srombus tricornis*), but appeared these quantities were brought from the out side of the Khor. But swimming crabs *P. pelagicus* were targeted in this site were collected in the past time till now in a big quantity for trades. control is un urgent need for such a kind of human activities. No more collection for sea cucumbers were seen in the area, perhaps due to the strong harvest in the past.

Very small – meshed nets(locally name Israilian nets) although they are banned in Yemen where common and popular use for fishing in all the coastal area of Yemen, because of their effectiveness at catching fish of all sizes, in particular juveniles. they are used in the coastal area of Aden in general and particularly in Aden wetlands PAs because the law is not effectively enforced.
By-catch from the use of these nets included many small fish and causes damage to the bottom habitat. If there are no juvenile fish, then there can be no larger fish to catch.

Non-sustainable gears such as bottom gill nets(local name Salaliq) , Regularly seen fishermen in Aden lagoons, Caltex Al Heswa and Khor Bir Ahmed using this gears were caused damages to the bottom habitats and fishing small fishes.

Fisher with small-mesh nets at Caltex-Al Heswa

An old *Srombus tricornis* shells in Aden lagoons

6.5. Others threats

Land filling is a clear phenomenon in the coastal area of Aden. In Aden lagoons were reclaimed about 3m in deep along of the 4th lagoons to establish clean water pipes and expansion of the marine road and bridge in Khor Maksar district and bridge of Al Bureka, all these projects did not passed to Environmental Impact Assessment (EIA). The EPA has a clear mandate to implement the environmental legislation and conserve the natural ecosystems.but it seems all these projects were done with out EIA studies.
In Aden lagoons observed numbers of dogs in the area where may be forming a threatens to the birds.

Land fill in the entrance under the bridge in 3rd of Aden lagoons

Land fill in Aden lagoons

Land fill in the entrance under the bridge in Khor Bir Ahmed

7. Recommendation

- Increase awareness for general public and among peoples and fishers adjoining the Areas regarding the importance of Aden wetlands
- Control collecting clams in the area of Caltex –Al Heswa in addition to protect this area fully, as area of Ark shells, which was recorded alive only in this area among the shoreline of Aden. and snails in Khor Bir Ahmed.
- Banned using small-mesh nets in the water area of Aden wetlands, due to negative results for sustainable resources particular fish.
- Manage fishing activities for sustainable use.
- Conduct regularly research and scientific investigations of fauna and flora in Aden wetlands protected areas.

8. References:

- **Abubakr,M.1997.** The Republic of Yemen Marine Biotic Ecosystems Resources-Habitat and Species.

- **Bawazir, G. and Abu Al-Fotooh, A. 2001**. Preliminary study for the current status in the Coastal Zone of Aden Governorate (in Arabic) Integrated Coastal Zone Management Component – PERSGA.

- **Bawazir, G. 2004**. "*Halophila stipulacea* (forsskal) Asherson. New record for the South of Arabia / Northern Coast of the Gulf of Aden". University of Aden, *Journal of Natural and Applied Sciences* > Vol. 7. No3.

- **Bawazir, G. 2006.** Preliminary Survey Study of the Coral Reef sites in the Coast of Yemen (Red Sea and Gulf of Aden). (in Arabic) Ministry of Fish Wealth - Marine Science & Resources Research center (MSRRC), Aden.

- **Bawazir,G.2007**. Upgrading regional capability to asses marine contamination in the ARASIA Member States. Country report, Republic of Yemen. Marine Science Research Center.

- **DouAbul and Abubakr M.,1996.** Marine Conservation Survey along the Southern Coast of Yemen in the Gulf of Aden./Arabian Sea. Sponsored by the Royal Netherlands Governorate.

- **Faisal, S.O Al Thalabi,2005.** The Management Plan for the Conservation Zone of Aden Governorate Wetlands(Aden Lagoons , Al-Mimlah and Caltex – Al-Heswa). Ministry of Water and Environment, Environment Protection Authority, UNDP and SNRMP.

- **Kemp,J.M. and Benzoni,F.1999**. Nonspecific coral areas of the northern shore of the Gulf of Aden, Yemen. *Coral Reefs*.

- **Kemp,J.M. and Benzoni,F. 2000**. A preliminary study of coral communities of the northern Gulf of Aden. *Fauna of Arabia.*

- **Khemitsa,1985.** Seasonal Changes of physic-chemical characters of sea water masses in the Gulf of Aden.

- **Ministry of fish wealth,2001**. GUIDE TO FISHES. Marine Science and Resources Research Center. Financed by/Fourth Fisheries Development Project.
- **MEP and MSRRC,1995.**Coastal Marine Habitat Survey. Gulf of Aden. Primarily habitat classification and an assessment of the coastal resources, use and impacts.
MEP1996

- Masheb, A. and Abdurashed, M.2000. Report on Benthic Fauna in the coastal area of Aden Governorate. Marine Science Research Center. Aden

.

- Mac Alister Elliot & Partners Ltd and Marine Science Research Resources Center, 1995. Coastal Marine Habitat Survey Gulf of Aden, IV Fisheries Project, Yemen. Phase I: Preliminary Habitat Classification and an assessment of Coast's Recourses User and Impact. Report submitted to European C omission and Ministry of Fish Wealth.

- Ormond, R and Banaimoom,S,1994. Ecology of intertidal macro algae assemblages on the Hadramot Coast of Southern Yemen, an area of seasonal upwelling. Marine Ecology Progress. Series105

- Parsons Brinckerhoff Ltd,2008. Environmental Impact Assessment for the Rehabilitation and Expansion of the Aden Causeway. Final version prepared for Port Cities Development Programme. Aden, Yemen.

- PERSGA,2009. Sea Cucumber Fisheries of Yemen. Status and Recommendations.

- Price A.R.G.,1990. Detailed instructions for completing site information forms.

- Saad, M.; Maiad, R. and Al- Kadasi,J.2006. On Marine Biodiversity of Aden's Wetlands. Sustainable Natural Resources Management Programme. EPA, UNDP.

Samir,H,Saad,M.,Naser,G.,Mutlak,F.1996. Visual Survey study of the Gulf of Aden/ Arabian Sea, Final Report. Environment Protection Council, Dutch support project to technical secretariat EPC, Yemen.

Spridonov,V.L.1985. Baseline of Hydrochemistry of the Gulf of Aden. Sci.Inves. Gulf of Aden. MSRRC. (B13).

- **Watt, I. 1996.** Coastal Habitat Survey of the Gulf of Aden. IV Fisheries Project, Yemen. Final Report, Phase II : South Coast of Yemen. Mac Alister Elliott & Partners Ltd., UK / Marine Science Resources Research Center, Aden.

Wranik and Saad,1992.

- **Yemen LNG Project, 2005**. Intake area Coral Transplantation, Yemen- Balhaf Pipeline construction project. Final Report. CREOCEAN**,** 39 rue Jean Giroux. Montpellier – France.

الجمهورية اليمنية
الجمعية اليمنية لحماية الحياة الفطرية بالمشاركة
مع الهيئة العامة لحماية البيئة
مشروع الحفاظ على الأراضي الرطبة في محافظة عدن

wings over wetlands
The UNEP-GEF African-Eurasian Flyways Project

دراسة التنوع الحيوي البحري لمحميات الأراضي الرطبة بمحافظة عدن

إعداد/
جمال محمد باوزير

يوليو 2009