COASTAL AND MARINE ENVIRONMENTS IN BAHRAIN: ANTHROPOGENIC IMPACTS AND CONSERVATION MEASURES

Dr. Humood Naser
Department of Biology, College of Science, University of Bahrain

Littoral 2012: Coasts for Tomorrow
27-29 November, 2012, Belgium
Outline

• Valued ecosystem components in Bahrain.
• Existing anthropogenic impacts in Bahrain.
• Measures that may contribute to protection of coastal and marine habitats in Bahrain.
Bahrain: 40 islands
Land area: 762 km²
Coastlines: 126 Km
Marine area: 8000 km²
Physical Characteristics of the Arabian Gulf
Fluctuations in seawater temperatures (15 – 35 °C)

Fluctuations in seawater temperatures (15 – 35 °C)
High levels of salinity (43-45 psu)
Lagoons (70 - 80 psu)
Valued ecosystem components in Bahrain
Seagrass beds

High Productivity, Nursery grounds, Feeding areas (turtles and dugongs)

Three seagrass species in Bahrain

Anthropogenic activities contribute directly or indirectly to the loss of seagrass beds due to direct physical removal and burial, and the increase in turbidity levels.

Renewable sources of seafood, maintenance of genetic, biological and habitat diversity, and recreational values.

Impacts on coral reefs: natural stresses such as high levels of temperature and salinity, bleaching events (1998, 37-39 °C); and sediment runoff from dredging and reclamation activities and the increasing levels of domestic, and industrial pollution.

Muddy and Sandy flats

High productivity, benthos diversity, feeding grounds for birds

Mangrove swamps *Avicennia marina*
Provide food, shelter and nursery areas for a variety of terrestrial and marine fauna

Due to reclamation, mangroves are currently limited to sheltered areas in Tubli Bay

Anthropogenic impacts affecting coastal and marine environments in Bahrain
The Arabian is considered among the highest anthropogenically impacted regions in the world.

Reclamation and dredging activities
Presently, reclamation activities have resulted in adding 91 km$^2$ representing an increase of 11% of the total land area.

Bahrain National Land Use Strategy 2030

Coastal environment will continue to be the major focus for developmental projects
Effluents from desalination plants
Wastewater discharges from desalination plants are associated with high temperatures, salinities, and a range of chemical and heavy metal pollutants.

Reduced levels of biodiversity and abundance were recorded in stations adjacent to outlets of desalination plants reflecting severe impacts on macrobenthic assemblages.

Oil refinery, aluminum and petrochemical industries produce effluents associated with hydrocarbons, ammonia, phenols, phosphorous and heavy metals.
Macrobenthos were severely affected by hydrocarbons and heavy metals from the main oil refinery in Bahrain

Reduced biodiversity and abundance of macrobenthos were recorded near the outlet of the major sewage treatment plant in Bahrain; some stations were devoid of macrobenthos reflecting severe sewage pollution.

Measures that may contribute to protection of coastal and marine habitats in Bahrain
Marine protected areas
<table>
<thead>
<tr>
<th>Protected area</th>
<th>Ecological importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hawar Islands</td>
<td>seagrass beds, algal mats, dugongs, turtles and dolphins. Largest breeding colonies of the endemic Socotra Cormorants: 200,000 individuals</td>
</tr>
<tr>
<td>Tubli Bay</td>
<td>sheltered lagoon, last remaining mangrove, ecosystems in Bahrain, breeding birds.</td>
</tr>
<tr>
<td>Mashtan Island</td>
<td>Offshore island, seagrass and algal mats, dugongs and turtles.</td>
</tr>
<tr>
<td>Duwhat Arad</td>
<td>Tidal mudflat, feeding ground for important shorebird populations.</td>
</tr>
<tr>
<td>Fasht bulthama</td>
<td>Small reef characterized by relatively high levels of diversity and cover (&gt; 50 %)</td>
</tr>
</tbody>
</table>

Marine protected areas in Bahrain

1 Hawar Islands
2 Ras-Sanad
3 Mashtan Island
4 Dohat Arad
Fasht bulthama
Al-Areen
EIA was adopted in Bahrain in 1998 to protect the environment and to reduce environmental degradation associated with major developmental projects.

Most of developmental projects in Bahrain are related to the coastal and marine environments.

• Some shortcomings in EIA reports, including limited ecological surveys, inadequate evaluation of impacts, neglecting cumulative and long-terms impacts, and failing to address adequately mitigation and monitoring measures.

Legal instruments and higher environmental policies

• National, regional and international laws and agreements:

• Environmental law, regulation of fishing, protection of wildlife, environmental quality standards for wastewater effluents, declarations of protected areas, and banning of catching endangered species, etc.

• Further enforcement is required.

Legal instruments and higher environmental policies

- Regional and international conventions: Convention on Biological Diversity, Ramsar convention, UN Framework Convention on Climate Change, and Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution.

Bahrain launched the National Environmental Strategy in 2006 (NES), which indentifies mechanisms by which principles of sustainable development can be implemented.

Action plans for implementation and enforcement are required.

Environmental monitoring and scientific research

• Holistic monitoring for the biological, chemical and physical aspects of the marine environment is required.

• Identifying and describing species are required to assess the biodiversity and to understand the structure and function of marine organisms.

Limitation in taxonomic keys and guidelines
Thank you