

7. ACTION PLAN

Guiding Principles for the Action Plan

The objective of nature conservation is to balance between the healthiness of ecosystems and human needs. Thus, the goal is to conserve the present healthy ecosystems and to provide for present and future human needs at the same time.

This Study has prepared sufficient biological and social information, the habitat maps and their GIS database as an integrated information tool for the comprehensive approach to nature conservation, including establishment of protected areas in the northern part of the Red Sea. Based on the outputs of the Study, the natural and social environments of the Study Area are categorised into the following three groups in order to establish an effective and feasible protected area system; priority conservation areas, strategic environment management areas and multiple-use areas. This tentative categorisation is basically based on evaluation of the surface coverage and habitat structures, and it is applicable only for the Study Area at the moment.

The goal of nature conservation cannot be achieved only by a protected area system. The comprehensive approach to the nature conservation is essential to achieve the goal. Moreover, public understanding and support are indispensable to achieve the goal. From the Study outputs, many actions needed to achieve the goal effectively are identified.

In the Kingdom, several government organisations are working and responsible for achieving the goal of nature conservation. NCWCD is the core organisation for wildlife and nature conservation, and administers the protected areas in the Kingdom. MEPA is responsible for the physical environment. The Ministry of Agriculture administers agriculture and fishery business and development. The Coast Guard controls human activities in marine and coastal habitats. Many universities and research institutes study the natural environment. Local government units also administer primary education and manage local environment programmes. These organisations need to coordinate and collaborate in order to achieve the

goal effectively and efficiently. NCWCD as the core government organisation in the Kingdom is playing a central role and function for above-mentioned actions. In addition, international cooperation is also essential to achieve the goal of nature conservation in the Red Sea, which is an international water body opened only by the two small channels.

The actions for the comprehensive approach to nature conservation are categorised into the following five groups; Environment Management in the Red Sea, Establishment and Management of Protected Areas, Public Awareness and Education, International Cooperation and Establishment of Core Facilities. Actions related to each group are described at the following three levels; national, NCWCD as the core government organisation, and survey / research, which are also shown in Table 138. The actions in the Survey / Research can be achieved not only by NCWCD but also other research institutes in close collaboration with NCWCD. The schedule, necessary expertise and equipment for NCWCD and Survey / Research Actions are proposed and shown in Table 139 and 140.

1. Environment Management in the Red Sea

Nation

- Implementation of comprehensive environment management in the Red Sea. e.g. management of human activities such as fishing, pollution, grazing, and marine/coastal development.

Objective: To control human activities for the comprehensive environment management in the Red Sea.

Duration: indefinite

Priority: high

Term: long

NCWCD

- Development and implementation of the comprehensive marine and coastal environment management master plan, including management zoning and monitoring plans in the Red Sea.

Objective: To manage marine and coastal environment effectively and efficiently in the Red Sea.

Elements: Delineation of management areas, guidelines, monitoring programmes, control programmes on human activities, feedback mechanism of the monitoring data, others, implementation systems, assignment of personnel, activity plan.

Duration: indefinite

Priority: high

Term: long

- Development and implementation of the comprehensive environment management master plan, including management zoning and monitoring programmes in the southern part of the Red Sea.

Objective: Same as above

Elements: Same as above.

Duration: indefinite

Priority: intermediate

Term: long

- Establishment of coordination and collaboration systems with the government organisations for the nature conservation programmes, including control of human activities.

Objective: To implement comprehensive marine and coastal environment management plan effectively in coordination and collaboration with other government

organisations.

Duration: two years

Priority: high

Term: middle

Survey / Research

- Study for the development of comprehensive marine and coastal environment management master plan in the northern part of the Red Sea.

Objective: To develop marine and coastal management master plan to conserve nature comprehensively and effectively in the northern part of the Red Sea.

Elements: primary environment zoning, guidelines of human activities, monitoring programmes, control programmes, institutional set up, and others.

Duration: two years

Priority: high

Term: short

- Assessment of human impacts for formulation of the control measures, especially by fishing and grazing.

Objective: To develop effective control programmes on human activities.

Duration: two years

Priority: high

Term: short

- Study on the oceanographic characteristics in order to understand species dispersal and identify important areas with ecological functions.

Objective: To identify important areas for nature conservation.

Duration: two years

Priority: intermediate

Term: middle

- Study for the preparation of habitat maps in the southern part of the Red Sea and systematic evaluation of the habitats on the Saudi Arabian coast of the Red Sea.

Objective: To provide information of the same level in the northern part for the uniform evaluation of the habitats and the development of the comprehensive marine and coastal environment management master plan in the Saudi Arabian coast of the Red Sea.

Duration: two years

Priority: high

Term: short

- Study for the development of the comprehensive marine and coastal environment management in the southern part of the Red Sea.

Objective: To develop marine and coastal management master plan to conserve nature comprehensively and effectively in the northern part of the Red Sea.

Duration: two years

Priority: high

Term: middle

2. Establishment and Management of Protected Areas

Nation

- Establishment of national marine and coastal protected areas in the Red Sea.

Objective: To conserve nature effectively and efficiently in the Red Sea.

Priority: high

Term: middle

NCWCD

- Development and implementation of marine and coastal protected area management master plan, including management zoning and monitoring plans in the northern part of the Red Sea (Tiran, Al-Wajh, Al-Hajir areas).

Objective: To conserve and manage marine and coastal protected areas effectively and systemically in the northern part of the Red Sea.

Duration: indefinite

Priority: high

Term: long

- Development and implementation of international cooperation programmes for the establishment of international marine and coastal protected areas.

Objective: To develop international marine and coastal protected areas.

To conserve and manage marine and coastal protected areas in coordination and collaboration with bordering countries.

Duration: indefinite

Priority: intermediate

Term: long

- Development and implementation of marine and coastal protected area management master plan, including zoning and monitoring programmes in the southern part of the Red Sea (Farasan Nature Reserve, and other areas).

Objective: To conserve and manage marine and coastal protected areas effectively and systemically in the northern part of the Red Sea.

Duration: indefinite

Priority: intermediate

Term: long

- Coordination and provision of the scientific information for the establishment of marine and coastal protected area network in the Red Sea.

Objective: To establish marine and coastal protected area network smoothly in the northern part of the Red Sea.

Duration: till the establishment

Priority: high

Term: short

- Strengthening of the capability for monitoring surveys, data analysis, revision of management programme based on survey results and other factors in the protected areas.

Objective: To monitor nature in the protected area effectively and efficiently for the purpose of protected area management.

Elements:

- 1) Formulation and assignment of monitoring survey team (ex. coral, seagrasses, algae, benthos, marine mammals, marine turtles, coastal vegetation, birds, terrestrial animals, insects, etc).
- 2) Permanent monitoring sites in representative habitats.
- 3) Acquisition and refinement of technology on survey designing, planning and implementation, species identification, data analysis.
- 4) Effective use of GIS technology with the objective of protected area management.
- 5) Investment in GIS database for protected area management.
- 6) Effective formulation and revision of management programmes from the feedback of the survey results.

Duration: five years

Priority: high

Term: short - middle

- Strengthening of protected area management in the northern part of the Red Sea.

Objective: To manage establishing protected areas effectively and efficiently in the northern part of the Red Sea

Element: Human resource development, assignment and training of full-time field officers (rangers), technology acquisition and development, preparation of necessary equipment, effective data analysis with GIS technology.

Duration: five years.

Priority: high

Term: short - middle

- Strengthening of international cooperation on marine and coastal protected area management.

Objective: To conserve marine and coastal protected areas effectively by cooperation and coordination with neighbouring countries.

Elements: Assignment of national coordinators, exchange of monitoring data and their analysis, information exchanges, seminars and workshops for common understanding on bordering protected areas, etc.

Duration: indefinite

Priority: intermediate

Term: middle-long

Survey / Research

- Study for the development of marine and coastal protected area management master plan, including management zoning, guidelines and principal monitoring programmes in the northern part of the Red Sea.

Objective: To develop master plan for the protected area management.

Elements: the objectives, delineation, resource description, physical/biological and sociological features (past and present), issues, policies, monitoring, education, enforcement, maintenance, administration, zoning and guideline of use.

Duration: two years

Priority: high

Term: short

- Study on life cycles and their patterns of important species to understand ecological functions of habitats and time elements.

Objective: To identify important areas with ecological function for the purpose of protected area management.

Elements:

- 1) Dispersal pattern of coral larvae.
- 2) Seasonal growth, seeding, flowering and dispersal pattern in seagrasses and algae.
- 3) Reproduction season, dispersal and migration pattern of major fish species.
- 4) Seasonal growth of gonad organs and stomach contents of major fish species.
- 5) Reproduction, dispersal and migration pattern of benthos.
- 6) Reproduction, behaviour, migration pattern of dugong.
- 7) Migration pattern and nesting peak season of marine turtles.
- 8) Changes of coastal vegetation and their habitats.

Duration: three years

Priority: high

Term: short - middle

- Study on isolation level of important species to understand biodiversity conditions.

Objective: To understand biodiversity conditions to evaluate the sensitivity of the species and global uniqueness and importance of the biodiversity of the Red Sea.

Duration: three years

Priority: high

Term: short - middle

- Study for the development of cooperation programmes on the development of international marine and coastal protected area in the Tiran Area.

Objective: To develop cooperation for establishment of an international protected area in the Tiran Area.

Duration: two years

Priority: intermediate

Term: middle

- Study for the development of marine and coastal protected area management master plan, including management zoning, guidelines and principal monitoring programmes in the southern part of the Red Sea.

Objective: To develop master plan for the protected area management in the southern part of the Red Sea.

Elements: the objectives, delineation, resource description, physical/biological and sociological features (past and present), issues, policies, monitoring, education, enforcement, maintenance, administration, zoning and guideline of use.

Duration: two years

Priority: high

Term: short

3. Public Awareness and Education

Nation

- Formulation of framework and institutional arrangement for public awareness and education of nature conservation.

Objective: To develop a national framework for public awareness and education of nature conservation.

Duration: one year

Priority: intermediate

Term: short

NCWCD

- Preparation and distribution of educational materials for nature conservation in the Red Sea.

Objective: To disseminate information for the public on nature and its conservation in the Red Sea.

Duration: indefinite

Priority: high

Term: long

4. International Cooperation

Nation

- Development of multilateral and bilateral cooperation in the field of environment management and nature conservation in the Red Sea.

Objective: To implement multilateral and bilateral cooperation in environment management and nature conservation in the Red Sea.

Duration: indefinite
Priority: intermediate
Term: long

NCWCD

- Participation to international coral reef monitoring programmes and other global environmental monitoring programmes.

Objective: To provide scientific data for global environment monitoring programmes. To acquire and exchange information, experience, technology and knowledge on environmental monitoring.

Duration: indefinite

Priority: high

Term: long

5. Establishment of Core Facilities.

Nation

- Establishment of core facilities for environment survey, research and conservation activities.

Objective: To provide core facilities for natural environment survey, biological studies and research, nature conservation education, information dissemination on the Red Sea.

Duration: five years

Priority: intermediate

Term: long

NCWCD

- Establishment of monitoring survey/study infrastructure in protected areas as an international marine life research centre in the Red Sea.

Objective: To provide infrastructure for effective monitoring surveys and research.

To provide an international cooperation research facility for marine life in the Red Sea since the ecosystem has uniqueness and importance of high global value.

Elements: Survey and research facilities, equipment including survey boats, data processing equipment, training and accommodation facility.

Duration: five years

Priority: intermediate

Term: long

- Establishment of public-awareness and education facilities and materials for the protected areas.

Objective: To disseminate information on the ecosystems and nature conservation in the protected areas.

To provide opportunities for the public to learn about nature in the protected areas.

Elements: Visitor facilities, informative materials including audio-visual information.

Duration: five years

Priority: intermediate

Term: long

Survey / Research

- Study for the development of an international marine life research and conservation centre in the Red Sea.

Objective: To identify necessary and appropriate facilities and survey and study equipment for international marine life research and conservation in the Red Sea.

Duration: two years

Priority: high

Term: middle

- Study for the development of public awareness and education facilities on nature conservation in the Red Sea.

Objective: To identify necessary facilities and equipment for public awareness and education on nature conservation in protected areas.

Duration: two years

Priority: high

Term: middle

Table 138. Action Plan for the comprehensive approach to marine and coastal environment management in the Red Sea.

Nation	NCWCD	Survey / Research
	<ul style="list-style-type: none"> Development and implementation of the comprehensive marine and coastal environment management master plan, including management zoning and monitoring programmes in the northern part of the Red Sea. 	<ul style="list-style-type: none"> Study for the development of the comprehensive marine and coastal environment management master plan in the northern part of the Red Sea. Assessment of human impacts for formulation of the control programmes, especially on fishing and grazing. Study on the oceanographic characteristics in order to understand species dispersal and identify important areas with ecological functions.
<p><u>Environment Management in the Red Sea.</u></p> <p>Implementation of the comprehensive environment management in the Red Sea. e.g. management of human activities such as fishing, grazing, pollution, and development control.</p>	<ul style="list-style-type: none"> Development and implementation of the comprehensive marine and coastal environment management master plan, including management zoning and monitoring programmes in the southern part of the Red Sea. 	<ul style="list-style-type: none"> Study for the preparation of habitats maps in the southern part of the Red Sea and systematic evaluation of the habitats on the Saudi Arabian coast of the Red Sea. Study for the development of the comprehensive marine and coastal environment management master plan in the southern part of the Red Sea.
	<ul style="list-style-type: none"> Establishment of an ad hoc committee as coordination and collaboration systems with government organisations for the comprehensive environment management, including control of human activities 	

<p>Establishment and Management of Protected Areas</p> <p>Establishment of marine and coastal protected area network in the Red Sea.</p>	<ul style="list-style-type: none"> • Development and implementation of marine and coastal protected areas management master plan, including zoning and monitoring programmes in the northern part of the Red Sea (Al-Wajh Bank, Tiran and Al-Hajir areas) • Development and implementation of international cooperation programmes for the establishment and management of international marine and coastal marine protected areas. • Development and implementation of marine and coastal protected area management master plan including zoning and monitoring programmes in the southern part of the Red Sea (Farasan N.R. and other areas). • Coordination and provision of scientific information for the establishment of the marine and coastal protected area network in the Red Sea. • Strengthening of capability for monitoring surveys, data analysis, revision of management programmes based on survey results and other factors in the protected areas. • Strengthening of protected area management in the northern part of the Red Sea. • Strengthening of international cooperation on marine and coastal protected area management. 	<ul style="list-style-type: none"> • Study for the development of the marine and coastal protected area management master plan, including management zoning, guidelines and principle monitoring programmes in the northern part of the Red Sea. • Study on life cycles and their patterns of important species to understand ecological function of the habitats. • Study on isolation level of important species to understand biodiversity conditions. • Study for the development of cooperation programmes on the development of international marine and coastal protected areas in the Tiran area. • Study for the development of the marine and coastal protected area management master plan, including management zoning, guidelines and principle monitoring programmes in the southern part of the Red Sea.
---	---	--

<p>Public Awareness and Education</p> <p>Formulation of framework and institutional arrangement for public awareness and education for nature conservation.</p>	<ul style="list-style-type: none"> • Preparation and distribution of educational materials on nature conservation in the Red Sea. 	
<p>International Cooperation</p> <p>Development of multilateral and bilateral cooperation for environment management and nature conservation in the Red Sea.</p>	<ul style="list-style-type: none"> • Participation in international coral reef monitoring programmes and other global environment monitoring programmes. 	
<p>Establishment of Core Facilities</p> <p>Establishment of core facilities for environment survey, research, and conservation activities.</p>	<ul style="list-style-type: none"> • Establishment of monitoring survey / study infrastructure in protected areas as an international marine life research and conservation center in the Red Sea. 	<ul style="list-style-type: none"> • Study for the development of an international marine life research center in the Red Sea.
	<ul style="list-style-type: none"> • Establishment of public awareness and education facilities and materials for the protected areas. 	<ul style="list-style-type: none"> • Study for the development of public awareness and education facilities for nature conservation in the Red Sea.

Table 139. NCWCD Action Plan: Proposed schedule, necessary expertise and equipment of NCWCD Action Plan for the comprehensive approach to marine and coastal environment management in the Red Sea.

Action Plan	Priority	Term	2000	2001	2002	2003	2004	after	Expertise	Equipment
<ul style="list-style-type: none"> Development and implementation of the comprehensive marine and coastal environment management master plan, including management zoning and monitoring plans in the northern part of the Red Sea. 	High	Long							Comprehensive environment management plan, management zoning, guideline, monitoring surveys.	Literature, habitats map, GIS, oceanographic data.
<ul style="list-style-type: none"> Development and implementation of the comprehensive marine and coastal environment management master plan, including management zoning and monitoring plans in the southern part of the Red Sea. 	Inter-mediate	Long							Same as above	Same as above
<ul style="list-style-type: none"> Establishment of an ad hoc committee as a coordination and collaboration system with government organisations for the comprehensive marine and coastal environment management including control of human activities 	High	Mid							Institutions	Literature
<ul style="list-style-type: none"> Development and implementation of marine and coastal protected areas management master plan, including zoning and monitoring programmes in the northern part of the Red Sea (Tiran, Al-Wajh Bank and Al-Hajir areas). 	High	Long							Protected area planning, marine and coastal ecology, mapping, guideline, zoning, monitoring, control measure, participatory protected area management, public awareness, education.	Biological and sociological information, habitat maps, GIS, survey vehicles and equipment including boat, mapping equipment.
<ul style="list-style-type: none"> Development and implementation of international cooperation programmes for the establishment and management of international marine and coastal marine protected areas. 	Inter-mediate	Long							Same as above Plus international cooperation programmes.	Same as above

<ul style="list-style-type: none"> Development and implementation of marine and coastal protected area management master plan, including zoning and monitoring programmes in the southern part of the Red Sea. 	Inter-mediate	Long						Protected area planning, marine and coastal ecology, mapping, guideline, zoning, monitoring, control measure, participatory protected area management, public awareness, education.	Same as above
<ul style="list-style-type: none"> Coordination and provision of scientific information for the establishment of the marine and coastal protected area network in the Red Sea. 	High	Short						Coordination	Survey results, literature
<ul style="list-style-type: none"> Strengthening of capability for monitoring surveys, data analysis, revision of management programmes based on survey results and other factors in the protected areas. 	High	Short-mid						Monitoring survey, data analysis, GIS technology, survey equipment, protected area management	Literature, training facilities, GIS equipment
<ul style="list-style-type: none"> Strengthening of protected area management in the northern part of the Red Sea. 	High	Short-mid						Protected area management, control measures, participatory protected area management	Literature. Training facilities.
<ul style="list-style-type: none"> Strengthening of international cooperation on marine and coastal protected area management. 	Inter-mediate	Mid-long						International protected management, participatory protected management	Training facilities
<ul style="list-style-type: none"> Preparation and distribution of educational materials for nature conservation in the Red Sea. 	High	Long						Information, communication, education.	Information / communication equipment.

<ul style="list-style-type: none"> • Participation in international coral reef monitoring programmes and other global environment monitoring programmes. 	High	Long							Global environment monitoring programmes, Monitoring survey, data analysis, presentation	Literature, monitoring survey equipment
<ul style="list-style-type: none"> • Establishment of monitoring survey / study infrastructure in protected areas as an international marine life research and conservation center in the Red Sea. 	Inter-mediate	Long							Facility design, survey equipment,	Facility, survey and research equipment, books, literature.
<ul style="list-style-type: none"> • Establishment of public awareness and education facilities and materials for the protected areas. 	Inter-mediate	Long							Facility designing, equipment, information, education, communication	Facility, information / communication equipment.

Table 140. Survey / Research Action Plan: Proposed schedule, necessary expertise and equipment of Survey / Research Action Plan for the comprehensive approach to marine and coastal environment management in the Red Sea.

Action Plan	Priority	Term	2000	2001	2002	2003	2004	after	Expertise	Equipment
<ul style="list-style-type: none"> Study for the development of the comprehensive environment marine and coastal management master plan in the northern part of the Red Sea. 	High	Short			█				Comprehensive environment management plan, zoning, guidelines, monitoring programmes, institutions	Literature
<ul style="list-style-type: none"> Assessment of human impacts for formulation of the control programmes, especially on fishing and grazing. 	High	Short			█				Assessment of fishing and grazing on the population.	Literature, habitat maps, GIS, oceanographic data.
<ul style="list-style-type: none"> Study on the oceanographic characteristics in order to understand species dispersal and identify important areas with ecological functions. 	Inter-mediate	Mid			█				Oceanography, marine and coastal ecology.	Oceanographic survey equipment.
<ul style="list-style-type: none"> Study for the preparation of habitat maps in the southern part of the Red Sea and systematic evaluation of the habitats on the Saudi Arabian coast of the Red Sea for the purpose of comprehensive nature conservation 	High	Mid			█				Aerial photo analysis, GIS, mapping, environment management.	Aerial color photos, mapping equipment.
<ul style="list-style-type: none"> Study for the development of the comprehensive marine and coastal environment management master plan in the southern part of the Red Sea. 	High	Mid				█			Comprehensive environment management plan, zoning, guidelines, monitoring programmes, institutions	Literature

<ul style="list-style-type: none"> • Study for the development of the marine and coastal protected area management master plan, including management zoning, guidelines and principle monitoring programmes in the northern part of the Red Sea. 	High	Short-middle	█	█		Protected area planning, protected area management, monitoring survey, facility design, equipment, financial analysis, participatory protected area management.	Survey equipment, books, literature.
<ul style="list-style-type: none"> • Study on life cycles and their patterns of important species to understand ecological function of the habitats. 	High	Short-middle	█	█		Ecology, population survey dynamics, biological planning, biological data analysis.	Survey equipment, satellite tracking.
<ul style="list-style-type: none"> • Study on isolation level of important species to understand biodiversity conditions. 	High	Short	█	█		DNA analysis, satellite tracking, radio telemetry	Literature, DNA and genetic analysis, satellite tracking, radio telemetry.
<ul style="list-style-type: none"> • Study for the development of cooperation programmes on the development of international marine and coastal protected area in the Tiran area. 	Inter-mediate	Mid	█	█		International protected area, international cooperation programme, participatory protected area management, marine and coastal ecology.	Literature, GIS.

<ul style="list-style-type: none"> Study for the development of the marine and coastal protected area management master plan, including management zoning, guidelines and principle monitoring programmes in the southern part of the Red Sea. 	Inter-mediate	Mid					Protected area planning, protected area management, monitoring survey, facility design, financial equipment, participatory analysis, participatory protected area management.	Survey equipment, books, literature,
<ul style="list-style-type: none"> Study for the development of an international marine life research conservation center in the Red Sea. 	Inter-mediate	Mid					Survey facility design, survey and study equipment.	Literature, designing equipment
<ul style="list-style-type: none"> Study for the development of public awareness and education facilities for nature conservation in the Red Sea. 	Inter-mediate	Mid					Facility design, information, communication, education, participatory protected area management.	Literature, designing, information, communication and education equipment

8. TECHNOLOGY TRANSFER

The counterparts have obtained field survey skills and improved their knowledge on the respective fields through the Study. The technologies acquired and/or experienced by Saudi counterparts in the Study are shown in Table 141.

Table 141. Technology obtained through training by Saudi counterparts in the Study.

Field	Technology
Coral	<ul style="list-style-type: none"> • Species identification • Reef Check • Global Coral Reef Monitoring • Line transect survey
Seagrasses and Algae	<ul style="list-style-type: none"> • Species identification • Quadrat survey
Fishes	<ul style="list-style-type: none"> • Species identification skill • Spot survey method • Reef Check method • Specimen preparation • Underwater photo
Benthos	<ul style="list-style-type: none"> • Species identification skill • Sampling skill • Spot and quadrat survey methodology
Marine Mammals and Marine Turtles	<ul style="list-style-type: none"> • Questionnaire / interview survey • Beach survey • Shore line aerial survey to identify marine turtle nesting beaches • Aerial transect survey for population estimate
Mangrove and Coastal Vegetation	<ul style="list-style-type: none"> • Species identification skills • Quadrat survey • Soil examination
Birds	<ul style="list-style-type: none"> • Species identification skills • Spot survey • Line transect survey
Social Environment	<ul style="list-style-type: none"> • Questionnaire and interview skill • Data analysis
Aerial Photo Analysis	<ul style="list-style-type: none"> • Aerial photo analysis skill

	<ul style="list-style-type: none">• Principal Habitat map drawing technology
GIS Database	<ul style="list-style-type: none">• Principle computer operation• Principle of GIS database software• GIS database operation• Application of GIS database on protected area management.







JICA