

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 21. 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 22 and 23.

Table 21. Action Plan for the comprehensive approach to marine and coastal environment management in the Red Sea.

Nation	NCWCD	Survey / Research
<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 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.
	<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). 	<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.
<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. 		
<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. 		
<ul style="list-style-type: none"> • Strengthening of protected area management in the northern part of the Red Sea. 		
<ul style="list-style-type: none"> • Strengthening of international cooperation on marine and coastal protected area management. 		

<p><u>Public Awareness and Education</u> 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><u>International Cooperation</u> 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><u>Establishment of Core Facilities</u> 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 22. 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 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. 	Intermediate	Long						Protected area planning, marine and coastal ecology, mapping, monitoring, zoning, 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. 	Intermediate	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 23. 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	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Protected area planning, protected area management, monitoring survey, facility design, 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	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Ecology, population dynamics, survey 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	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	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	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	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, equipment, financial 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 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 information, communication, education, participatory protected 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 24.

Table 24. Technology obtained through learning by Saudi counterparts in the Study.

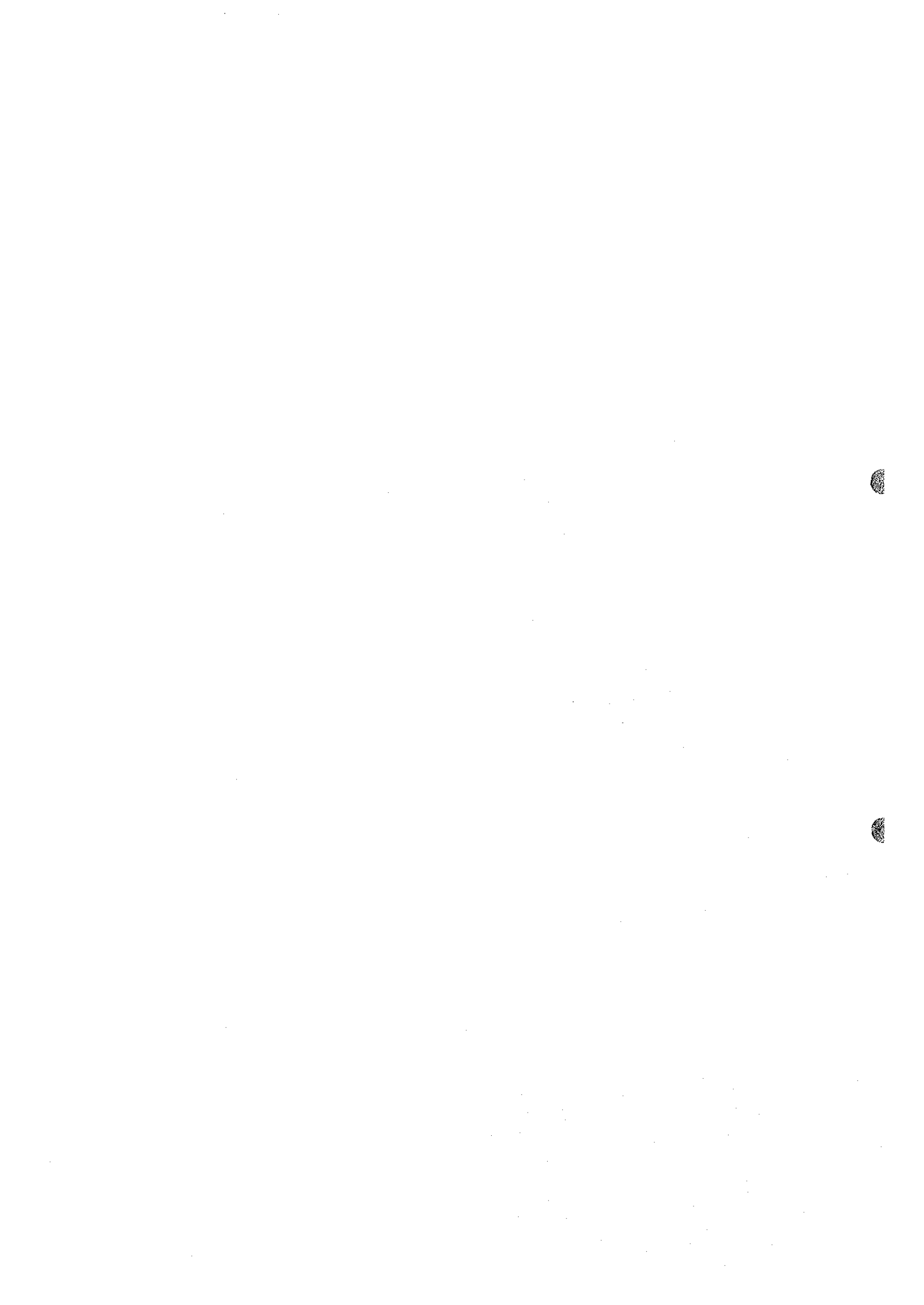
Field	Technology
Coral	<ul style="list-style-type: none"> • Species identification • Reef Check • Global Coral Reef Monitoring • Line transect survey
Seagrasses and Algae	<ul style="list-style-type: none"> • Species identification • Quadrat survey
Fishes	<ul style="list-style-type: none"> • Species identification 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 • 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.

Appendix 1. Project participants.

Name	Field of responsibility	Affiliation
Omar Abdullah Khushaim	Project Manager	NCWCD
Noboru Matsushima, PhD.	JICA Study Team Leader, Social Environment	JICA Stdy Team
I.yndon M. De Vantier, PhD.	Coral	JICA Stdy Team
Khalid Ali AL Shaikh	Coral	NCWCD
Emre Turak	Coral	Study Specialist
Shogo Arai	Seagrasses / Algae	JICA Stdy Team
Anas Zubeir Sambas	Seagrasses / Algae	NCWCD
Yoichi Harada	Fishes	JICA Stdy Team
Hatim Mohammad ALYami	Fishes	NCWCD
Hajime Miyahara	Fishes	NCWCD (JICA Expert)
Toshikatsu Nanjo	Benthos	JICA Stdy Team
Ahmad Mohammad AL Mansi, PhD.	Benthos	NCWCD
Toshinori Tsubouchi	Marine Mammals / Marine Turtles	JICA Stdy Team
Mustafa Al Marghani Mohammad	Marine Mammals / Marine Turtles	NCWCD
Takashi Someya	Mangroves / Coastal Vegetation	JICA Stdy Team
Abdullah Hamad Al Wetaid	Mangroves / Coastal Vegetation	NCWCD
Shunji Usui	Birds	JICA Stdy Team
Mohammad Ibrahim Al Salamah	Birds	NCWCD
Hassan Mohammad AL Mathami	Social Environment	NCWCD
Akira Kishi, PhD.	Aerial Photograph Analysis	JICA Stdy Team
Mohammad Fawaz AL Barodi	Aerial Photograph Analysis	NCWCD
Yoshitaka Gomi	Geographical Information System (GIS) / Database	JICA Stdy Team
Ali Abdulaziz AL Assaf	Geographical Information System (GIS) / Database	NCWCD
Saleh Ahmad Al Shodoukhi	Geographical Information System (GIS) / Database	NCWCD
Aiyed Amer AL Ajmi	Geographical Information System (GIS) / Database	NCWCD
Hideki Yoshida	Project Coordinator	JICA Stdy Team
Capt. David Clark	Aircraft Pilot	NCWCD
Abu-Faisal	Driver	NCWCD
Yae Sano	Project Staff	JWRC





JICA