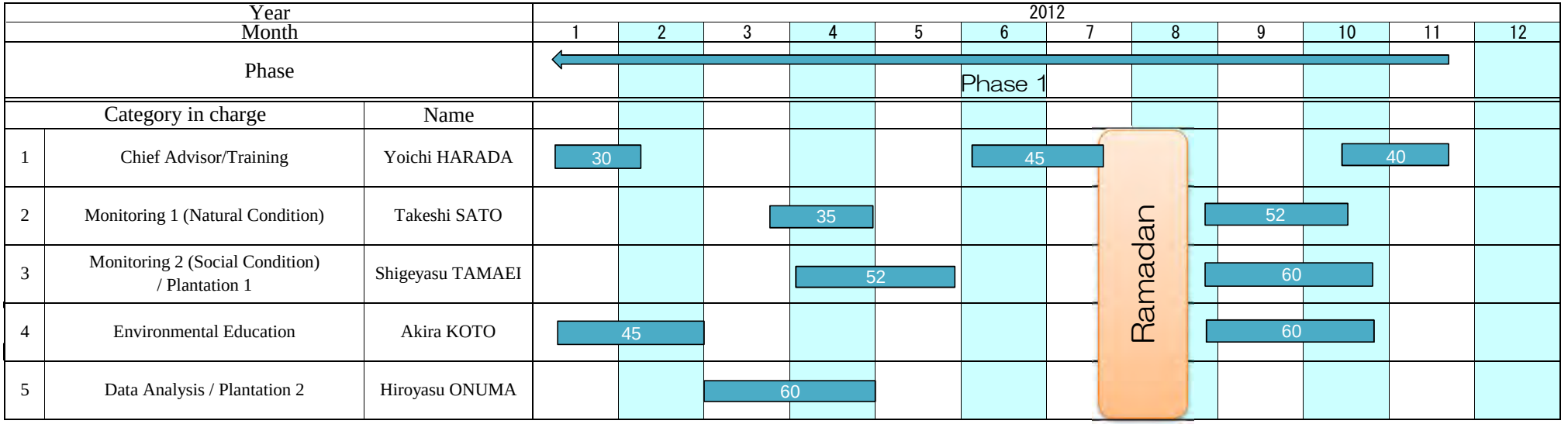
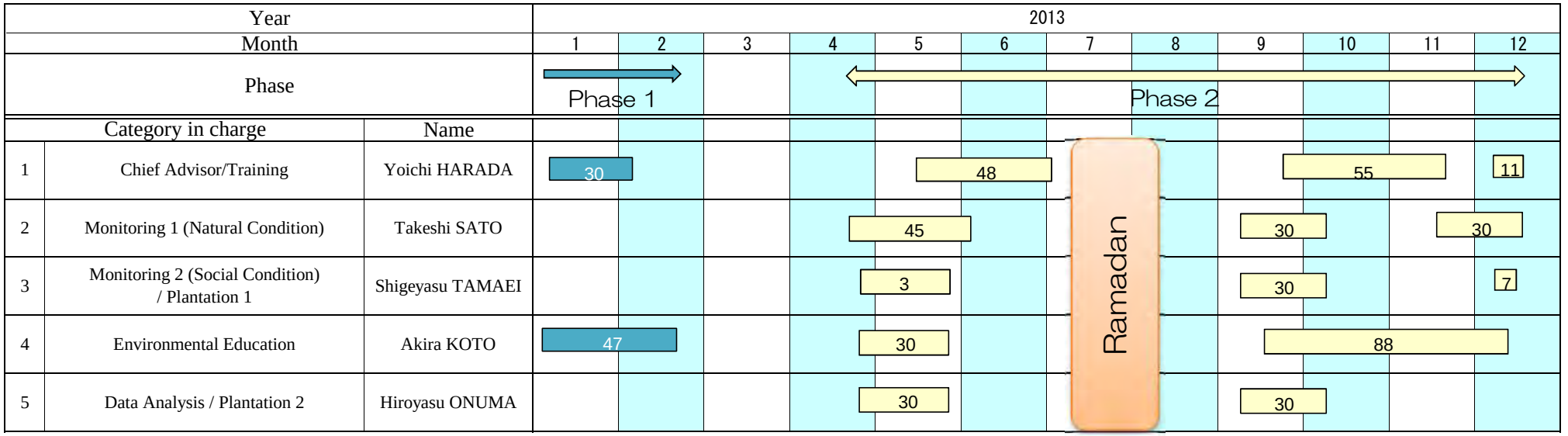
Appendix 1

Assignment period of JICA Expert Team in Oman

Appendix 1 Assignment period of JICA Expert Team in Oman





Note: The numbers in the bar show the assignment period.

Appendix 2

Minutes of JCC (1st-4th JCC)

1st JCC

Appendix 2 Minutes of JCC (1st-4th JCC)

MINUTES OF MEETING
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
THE MINISTRY OF ENVIRONMENT AND CLIMATE AFFAIRES OF
SULTANATE OF OMAN
ON
THE FIRST JOINT COORDINATION COMMITTEE MEETING
ON
JAPANESE TECHNICAL COOPERATION FOR
THE QURM ENVIRONMENTAL INFORMATION CENTER PROJECT

Muscat, February 11th, 2012

Yoichi Harada

Mr. Yoichi HARADA
Leader
JICA Expert Team
of the
Qurm Environmental Information
Center Project

Mr. Ali Amer Al-Kiyumi
Director General of Nature Conservation
Ministry of Environment and Climate Affaires

THE ATTACHED DOCUMENT

The first Joint Coordination Committee (hereinafter referred to as "JCC") meeting was held on February 11th, 2012 at the Meeting Room of the Ministry of Environment and Climate Affairs (hereinafter referred to as MECA) in the Sultanate of Oman, with participants including MECA officials, JICA Experts, representative from Embassy of Japan as listed in the ***Annex-1***.
The main items confirmed in the JCC meeting are summarized as below:

1) **Establishment of JCC**
   As a decision-making body, JCC (Joint Coordination Committee) was established in the meeting. The members of JCC are listed in ***Annex-2***.

2) **Establishment of the project implementation body**
   As a project implementation body, composition of Omani counterpart team and Japanese expert team was set up as shown in ***Annex-3***.

3) **Approval of the Work Plan for the 1st phase**
   The Work Plan for the 1st phase was explained by the leader of Japanese expert team and it was approved by the JCC.
   The front cover of the Work Plan is attached as ***Annex-4***.

4) **Revision of PDM and PO**
   PDM and PO (ver. 0.1 dated April 20th 2011) was revised as ver. 1.0 and they were approved by JCC.
   Revised PDM and PO (ver. 1.0) are attached as ***Annex-5***.

Annex-1	Participations List of the first JCC
Annex-2	Members list of JCC
Annex-3	Members list of project implementation body
Annex-4	Front cover of the Work Plan for 1st phase
Annex-5	PDM and PO (ver. 1.0)
Annex-6	Agenda Items of the first JCC

Appendix 2 Minutes of JCC (1st-4th JCC)

1st Joint Coordination Committee

Venue: Ministry of Environment and Climate Affaires
Date: 11th February 2012
Time: 11:00 to 12:45

List of Participants

	Name	Organization	Mobile	e-mail	Signature
1	Shinichi Yamanaka	Japanese Embassy	99359105	shinichi.yamanaka@mofa.go.jp	S. Yamanaka
2	Kanako FUKUDA	"	99313484	kanako.fukuda@mofa.go.jp	K. Fukuda
3	Thwaiba	MECA (Biodiversity)	99435775	thalsariri@gmail.com	
4	Mauza	MECA	24404846	Muzan23@hotmail.com	
5		Polution operation Monetring Center			
6	Mohammed AL-Rezaiqi	Environment conservation Department	99200240	Rezaiqi@gmail.com	
7	Haitham Said Al-Furqani	Reserve specialist MECA	92626029	al-furqani33@hotmail	
8	Mohamed Alsinaidi	MECA	97188855	Pic meca@hotmail	
9	Ahmed Al-Saidi	MECA	99028064	amksaidi@yahoo.com	
10	Aida Al Fabri	"	—	samalcal483@hotmail	2012
11	Koichi Harada	JICA Study Team	92934185	harada-y@ides-inc.co.jp	
12	Akira Koto	"	92938212	koto@kousk.co.jp	
13	Riham Al-Rumhy	"	92979740	alrumhy83@gmail	
14	Ali Alkiyumi	MECA	95161515	alialkiyumi@gmail.com	
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Annex-2

Members List of JCC

	Organization/position	Name
Chairperson	Director General of Nature Conservation	Dr. Ali Amer Al-Kiyumi
Omani side	Deputy Director General of Nature Conservation	Mr. Mohammed Juma Al-Sharyani
	Director of the Biodiversity Department	Ms. Thuraya Said Al-Sareari
	Director of Marine Environment Conservation Department	Dr. Ahmed Mubarak Al-Saidi
	Acting Director of the International Cooperation Department	Mr. Mohammed Al-Sanadi
	Head of the Wetland Environment Section	Mr. Badar Al-Balushi
	Marine conservation specialist	Ms. Aida Khalaf Al-Jabri
	Environmental inspector of the Pollution Operation Monitoring Section	Mr. Moza Al-Salami
	Environmental planners of the Marine Environmental Conservation	Ms. Aziza Saud Al-Adhubi
Japan side	JICA Expert Team	
	Officials of the Embassy of Japan in Oman	
	Other personnel concerned to be dispatched by JICA (if necessary)	

Annex-3

Members list of project implementation body

	Category	Position/name
Omani side	Project Director	Director General of Nature Conservation Dr. Ali Amer Al-Kiyumi
	Project Manager	Director of Marine Environment Conservation Department Dr. Ahmed Mubarak Al-Saidi
	Training	Head of Training and Education Section of QEIC Mr. Hitham Al-Farqani
	Monitoring and information	Head of Monitoring and Information Section of QEIC Ms. Aida Khajaf Al-Jabri
	Plantation	Head of Mangrove Plantation Section of QEIC Mr. Badar Al-Balushi
	Environmental education	Head of Exhibition/Public Relations Section of QEIC Mr. Salah Al-Salcali
JICA Expert Team	Team leader/training	Mr. Yoichi Harada
	Monitoring (natural condition)	Mr. Takeshi Sato
	Monitoring (social condition)/plantation 1	Mr. Tamaei Shigeyasu
	Environmental education	Mr. Koto Akira
	Data analysis/plantation 2	Mr. Hiroyasu Onuma

Annex-4

The Qurm Environmental Information Center Project

Work Plan

(1st phase)

February 2012

Japan International Cooperation Agency (JICA)

Ides Inc.

AAI Appropriate Agriculture International Co., Ltd. (AAI)

Annex-5

PDM (version 1.0)

Ver. 1.0 edited on 1/2/2012

Project Name: Qurm Environmental Information Center (QEIC) Project

Duration: 2 years (December 2011 - December 2013)

Implementing Agency in Oman: Ministry of Environment and Climate Affaires (MECA)

Implementing Agency in Japan: JICA

Project Site: QEIC Target Group: (primary) MECA staffs

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
(Overall Goal) - Dissemination of sustainable mangrove ecosystem management in Oman and in the region.	By 2016 - Number of mangrove sites managed through partnership programs with local communities increased by twenty (20). - Number of new plantation sites increased by eight (8). - Country experience on mangrove ecosystem management is presented in ROPME regional meetings and other international conference.	- Record of planting and monitoring activities conducted through partnership programs. - List of new plantation sites - Annual report of QEIC - Proceeding of conference, paper presented	
(Project Purpose) - QEIC is established as the center for promoting sustainable mangrove ecosystem management in Oman.	By the end of the Project 1 QEIC is developed into the center for knowledge sharing by professionals, practitioners and scholars specialized in mangrove ecosystem management 2 QEIC is able to counsel policy and technical issues related to management of mangrove ecosystem to private and public sectors concerned 3 QEIC completes mangrove plantation at the proposed artificial lagoon built in Qurm Nature Reserve as scheduled 4 Training on mangrove ecosystem management provided to professionals in Oman	1 Annual report. Interview to agencies/organizations that participated in the Project. Interview to agencies/organizations that did not participate in the Project. 2 List of inquiries from concerned private/public sectors related to mangrove ecosystem management, and recommendations and advises made by QEIC. 3 Annual report, record of planting activity 4 Record of training. List of participants. Interviews to participants and supervisors focusing on the learning goals	- Other ministry and agencies bring and share their resources and expertise in mangrove ecosystem protection and management to QEIC - Similar initiatives in mangrove ecosystem management are carried out by other ROPME countries. - Public – private sector partnership in GCC strengthened.
(Outputs) 0 The project operation unit in QEIC is established.	0.1 Personnel of QEIC are assigned according to the Work Plan. 0.2 Joint Coordinating Committee (JCC) is established. 0.3 Budget for construction of the QEIC center and for operation is allocated. 0.4 Facility of QEIC is installed. 0.5 Material and equipment is procured and installed.	0.1 Organizational chart of QEIC with name list of staff 0.2 Minutes of meeting of JCC 0.3 Financial statement (balance sheet and profit and loss) 0.4 List of QEIC facility 0.5 List of material and equipment	
1 The capacity of training activity for QEIC to promote sustainable mangrove ecosystem management is developed.	1.1 Training Programme is prepared. 1.2 Trial training course are conducted three (3) times.	1.1 Training Programme 1.2 Record of data and information of training	- Participants in the training program secure their own funding to attend the courses
2 The monitoring method for QEIC to promote sustainable mangrove ecosystem management is developed	2.1 Monitoring Guideline including monitoring format is prepared. 2.2 An appropriate format for storing the result of monitoring is prepared.	2.1 Monitoring Guideline 2.2 Appropriate format	

Annex-5

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
3 Methods and techniques for promoting mangrove reforestation are developed.	3.1 Mangrove Plantation Guideline is prepared. 3.2 Mangrove Protection Guideline is prepared.	3.1 Mangrove Plantation Guideline 3.2 Mangrove Protection Guideline	- Unexpected weather related adversary effects to the planting sites are minimal
4 The capacity of Environmental Education Programme activity for QEIC to promote sustainable mangrove ecosystem management is improved.	4.1 Environmental Education Programme is prepared. 4.2 500 participants participated in environmental education events. 4.3 Exhibition Plan is prepared.	4.1 Environmental Education Programme 4.2 List of participants, number of visitors 4.3 Exhibition Plan	
(Activity) 0.1 Review and finalize Work Plan 0.2 Establish Project implementation body 0.3 Prepare budget plan for the Project and construction/operation of QEIC 0.4 Establish the Joint Coordinating Committee 0.5 Prepare Project monitoring plan 0.6 Allocate budget, personnel and facility of QEIC 0.7 Determine tasks of QEIC staff 0.8 Material and equipment provided are properly installed and maintained.	**(Input from Japan)** Personnel (1) Team leader/Training plan (2) Mangrove ecosystem monitoring (natural condition); (3) Mangrove ecosystem monitoring (social condition)/Mangrove plantation 1; (4) Environmental education programme; and (5) Data analysis/ Mangrove plantation 2 **Training of Oman Project Personnel in Japan** **Machinery, Equipment and Materials**	**(Input from Oman)** Personnel Project Director Project Manager Counterparts in the field of; Monitoring and Information Training and Education Mangrove Plantation Exhibition and Public Relation Environmental Education Administrative Personnel **Local Cost** **Land, Building and Facilities** **Procurement of Goods and Consumables**	
1.1 Identify target groups of training courses 1.2 Conduct training needs survey 1.3 Prepare syllabi for each course through conducting resource persons workshops 1.4 Prepare resource persons list corresponding to all the subjects 1.5 Prepare training materials 1.6 Analyze the cost of training courses 1.7 Prepare training schedule 1.8 Conduct trial training courses 1.9 Conduct monitoring of trial training courses			
2.1 Identify parameters to monitor the natural and social condition of mangrove ecosystem 2.2 Identify monitoring methods and schedule for each monitoring parameter 2.3 Prepare Monitoring Guideline including monitoring format 2.4 Conduct trial monitoring survey for the revision of Monitoring Guideline 2.5 Prepare a platform for publicizing results of the monitoring survey 2.6 Conduct monitoring survey based on the final Monitoring Guideline			
3.1 Conduct baseline survey of mangrove plantation sites and nursery facilities 3.2 Develop improved techniques for mangrove plantation through trials in nursery and planting fields and prepare Mangrove Plantation Guideline			

Annex-5

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
3.3 Develop methods and regulations for protection of mangroves and prepare Mangrove Protection Guideline			
4.1 Identify target groups for environmental education 4.2 Develop methods and tools for environmental education 4.3 Analyze the cost of implementing environmental education events 4.4 Develop various publication materials (incl. Web site) 4.5 Develop schedule of environmental education programme 4.6 Conduct trial environmental education events including participatory plantations 4.7 Develop Exhibition Plan of QEIC 4.8 Conduct monitoring survey on environmental education events			(Preconditions) - Schedule of the project is negotiated and agreed. - Construction schedule of QEIC is finalized. - MECA put Construction of the QEIC facility tender prior to the project.

Appendix 2 Minutes of JCC (1st-4th JCC)

Annex-5

PO (version 1.0)

Plan of Operation

Ver. 1.0 edited on 1/2/2012

		Phase 1												Phase 2											
		2011	2012											2013											
		12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Term of the Project																										
Output 0: 0 The project operation unit in QEIC is established																										
0.1	Review and finalize Work Plan																									
0.2	Establish Project implementation body																									
0.3	Prepare budget plan for the Project and construction/operation of QEIC																									
0.4	Establish Joint Coordinating Committee																									
0.5	Prepare Project monitoring plan																									
0.6	Allocate budget, personnel and facility of QEIC																									
0.7	Determine tasks of QEIC staff																									
0.8	Material and equipment provided are properly installed and maintained																									
Output 1: The capacity of training activity for QEIC to promote sustainable mangrove ecosystem management is developed																										
1.1	Identify target groups of training courses																									
1.2	Conduct training needs survey																									
1.3	Prepare syllabi for each course through conducting resource persons workshops																									
1.4	Prepare resource persons list corresponding to all the subjects																									
1.5	Prepare training materials																									
1.6	Analyze the cost of training courses																									
1.7	Prepare training schedule																									
1.8	Conduct trial training courses																									
1.9	Conduct monitoring of trial training courses																									
Output 2: The monitoring method for QEIC to promote sustainable mangrove ecosystem management is developed																										
2.1	Identify parameters to monitor the natural and social condition of mangrove ecosystem																									
2.2	Identify monitoring methods and schedule for each monitoring parameter																									
2.3	Prepare Monitoring Guideline including monitoring format																									
2.4	Conduct trial monitoring survey for the revision of Monitoring Guideline																									
2.5	Prepare a platform for publicizing results of the monitoring survey																									
2.6	Conduct monitoring survey based on the final Monitoring Guideline																									
Output 3: Methods and techniques for promoting mangrove reforestation are developed																										
3.1	Conduct baseline survey of mangrove plantation sites and nursery facilities																									
3.2	Develop improved techniques for mangrove plantation through trials in nursery and planting fields and prepare Mangrove Plantation Guideline																									
3.3	Develop methods and regulations for protection of mangroves and prepare Mangrove Protection Guideline																									
Output 4: The capacity of environmental education programme activity for QEIC to promote sustainable mangrove ecosystem management is improved																										
4.1	Identify target groups for environmental education																									
4.2	Develop methods and tools for environmental education																									
4.3	Analyze the cost of implementing environmental education events																									
4.4	Develop various publication materials (incl. Web site)																									
4.5	Develop schedule of environmental education programme																									
4.6	Conduct trial environmental education events including participatory plantations																									
4.7	Develop Exhibition Plan of QEIC																									
4.8	Conduct monitoring survey on environmental education events																									

Annex-6

The First JCC (Joint Coordination Committee) Meeting
of the
Qurm Environmental Information Center Project

Saturday, 11th of February, 2012

11:00 a.m. in the Meeting Room of the Ministry of Environment and Climate Affairs, 3rd floor
Al-Khuwair, Sultanate of Oman.

Agenda

HOUR	ACTIVITY	SPEAKER
11:00 -11:05	Welcoming words	Dr. Ali Amer Al-Kiyumi Director General of Nature Conservation
11:05 -11:10	Words from the Embassy of Japan	Mr. Shinichi Yamanaka Counsellor, Embassy of Japan
11:10 -11:40	Presentation: Work Plan of the Project	Mr. Yoichi Harada Leader of the Japanese Expert Team
11:40 - 11:45	Words from Deputy Director General of Nature Conservation	Mr. Mohammed Juma Al-Sharyani Deputy Director General of Nature Conservation
11:45 - 11:50	Words from the Marine Environment Conservation Department	Dr. Ahmed Mubarak Al-Saidi Director of the Marine Environment Conservation Department
11:50 - 11:55	Words from the Biodiversity Department	Ms. Thuraya Said Al-Sareari Director of the Biodiversity Department
11:55 - 12:00	Words for the Planning and International Cooperation Department	Mr. Mohammed Al-Sanadi Acting Director of the Planning and International Cooperation Department
12:00 -12:05	Comments and Agreements	All the participants
12:05 - 12:15	Signature Minutes of the Meeting	Authorities

2nd JCC

Appendix 2 Minutes of JCC (1st-4th JCC)

MINUTES OF MEETING
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
THE MINISTRY OF ENVIRONMENT AND CLIMATE AFFAIRES OF SULTANATE OF OMAN
ON
THE SECOND JOINT COORDINATION COMMITTEE MEETING
ON
JAPANESE TECHNICAL COOPERATION FOR
THE QRUM ENVIRONMENTAL INFORMATION CENTER PROJECT

Muscat, February 5th, 2013

Yoichi Harada

Mr. Yoichi HARADA
Leader
JICA Expert Team
of the
Qurm Environmental Information
Center Project

5/2/2013

Mr. Ali Amer Al-Kiyumi
Director General of Nature Conservation
Ministry of Environment and Climate Affaires

THE ATTACHED DOCUMENT

The second Joint Coordination Committee (hereinafter referred to as "JCC") meeting was held on February 5th, 2013 at the Meeting Room of the Ministry of Environment and Climate Affairs (hereinafter referred to as MECA) in the Sultanate of Oman, with participants including MECA officials, JICA Experts, representatives from Embassy of Japan as listed in the ***Annex-1***.
The main items confirmed in the JCC meeting are summarized as below:

1) **Modification of the member of the project implementation body**

As a project implementation body, composition of Omani counterpart team and Japanese expert team was set up at the beginning of the project. After the project started, the necessity of improvement of the member list was realized based on the reality of project activity.
Modified members list of the project implementation body is shown in ***Annex-2***.

2) **Approval of the Progress Report 1 and 2**

During the project implementation in the first year, the Progress Report 1 and 2 were prepared by the Project Implementation Body. The contents of the reports, the project activities and outputs were presented by the leader of the Japanese Expert Team.
Those are approved by the JCC.
The front cover of the Progress Report 1 and 2 are is attached as ***Annex-3***.

3) **Confirmation of the construction of QEIC**

The status of construction of QEIC were reported by Omani counterpart team. The report letter for the status will be sent to JICA representative of the project.

4) **Equipment List for donation**

Necessary materials and equipment were discussed among the project implementation body based on the list of equipment agreed in 2005. The list was modified and divided into two (2) parts, equipment immediately necessary and equipment necessary after QEIC established, based on the experience on the activities of the project such as workshops and field surveys. And the former has been ordered and will be delivered by the middle of February 2013. The later was also discussed between the project implementation body and modified. However this list will be modified based on the progress of the project.
The latest lists of the equipment is attached as ***Annex-4***.

5) **Revision of PDM and PO**

PDM and PO (ver. 1.0 dated February 1st 2012) was revised as ver. 1.1 based on the reality of

the project implementation. And they were approved by JCC.

Revised PDM and PO (ver. 1.1) are attached as ***Annex-5***.

Annex-1	Participations List of the first JCC
Annex-2	Members list of project implementation body
Annex-3	Front cover of the Progress Report 1 and 2
Annex-4	Equipment List for Donation
Annex-5	PDM and PO (ver. 1.1)
Annex-6	Agenda Items of the first JCC

The Qurm Environmental Information Center Project

2nd Joint Coordination Committee

Venue: Ministry of Environment and Climate Affaires
Date: 5th February 2013
Time: 09am - 10am

List of Participants

	Name	Organization	Mobile	e-mail	Signature
1	Aicha Al Jabri	Marine Conservation Environment	–	marinegirl3308@gmail.com	
2	Thuraya Alsariri	Biodiversity Dept.		Halsariri@gmail.com	
3	Hilal AL Nabhani	Marine Conservation Environment	99310090	nabhani-h@hotmail.com	
4	Ahmed Al-Saidi	Director of Marine conservation	99028064	amksaidi@yahoo.com	
5	Badar Al-Bulushi	MECA	92373173	badermoon123@gmail.com	
6	Shinichi Yamanaka	Embassy of Japan	9931 9105	shinichi.yamanaka@mofa.go.jp	
7	Mohamed ALSharyani	Dy. Director General of N.C.	99215056	malsheryani@gmail.com	
8	Ali Al Hiyami	D. G. of Nature	91516155	alialhiyami@gmail.com	
9	Aziza Al Adawi	MECA	99707869	azizc083@gmail.com	
10	Yoichi Harada	JICA Expert Team		haradays@ides-inc.co.jp	
11	Akira Koto	JICA Expert Team		koto@kaishu.co.jp	
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Annex-2

Members list of project implementation body

	Category	Position/name
Omani side	Project Director	Director General of Nature Conservation Mr. Ali Amer Al-Kiyumi
	Project Manager	Director of Marine Environment Conservation Department Dr. Ahmed Mubarak Al-Saidi
	Training	Head of Training and Education Section of QEIC Ms. Aziza Said Al-Adhubi
	Monitoring and information	Head of Monitoring and Information Section of QEIC Mr. Hitham Al-Farqani Monitoring and Information Section of QEIC Mr. Mohammed Al Rezaiqi
	Plantation	Head of Mangrove Plantation Section of QEIC Mr. Badar Al-Balushi
	Environmental education	Head of Exhibition/Public Relations Section of QEIC Ms. Aida Khajaf Al-Jabri
	Database	GIS Specialist Ms. Zayana Salim Sheikhan
	Database	GIS Specialist Ms. Moza Khalaf Said Al-Reiamy
JICA Expert Team	Team leader/training	Mr. Yoichi Harada
	Monitoring (natural condition)	Mr. Takeshi Sato
	Monitoring (social condition)/plantation 1	Mr. Tamaei Shigeyasu
	Environmental education	Mr. Koto Akira
	Data analysis/plantation 2	Mr. Hiroyasu Onuma

Japan International Cooperation Agency (JICA)

Ministry of Environment and Climate Affaires (MECA)

The Qurm Environmental Information Center Project

Progress Report 1

July 2012

Ides Inc.

AAI Appropriate Agriculture International Co., Ltd. (AAI)

Japan International Cooperation Agency (JICA)

Ministry of Environment and Climate Affaires (MECA)

The Qurm Environmental Information Center Project

Progress Report 2

February 2013

Ides Inc.

AAI Appropriate Agriculture International Co., Ltd. (AAI)

Equipment (Purchased: amortized)

Target	Purpose	Equipment	Specification	Number	Unit Price (USD)	Price (USD)	Accessories	Price	Total Price (USD)
QEIC	Training	Computer	laptop(6GB memory, 650GB HD)	1	743	743			743
	Database	Satellite Image	Geoeye (Resolution 0.5m)	4	1,036	4,143			4,143
	Laboratory	Benchtop pH meter		1	935	935	pH electrode, buffer, standard solution		935
		Benchtop ORP meter		1	704	704	ORP electrode, buffer	295	999
		Benchtop DO meter		1	2,255	2,255			2,255
		Benchtop Salinity meter		1	1,359	1,359	Standard solution		1,359
		Benchtop Turbidity meter		1	3,146	3,146	Cuvetts, Standard solutions		3,146
		Electric balance		1	1,434	1,434	Grass case		1,434
		Analytical electric balance		1	1,763	1,763	Grass case, Test weight		1,763
		Oven	30-200oC	1	1,471	1,471			1,471
		Stereo Trinocular microscope		1	2,206	2,206			2,206
		Trinocular microscope		1	5,696	5,696	CCD video camera (cc 2300c)	4,712	10,409

Target	Purpose	Equipment	Specification	Number	Unit Price (USD)	Price (USD)	Accessories	Price	Total Price (USD)
		Distiller		1	4,143	4,143			4,143
Training	Training materials, Exhibitions	Video camera	High definition, Hrad disk	1	337	337			337
Monitoring	Mangrove trees	Leaf color-sample book		3	350	1,049			1,049
		Leaf spectrometer	Miniature Leaf Spectrometer w/ integrated Leaf Probe, CID CI-710	1	9,350	9,350	3 year warranty	2,250	11,600
		Plant canopy imager	Plant Canopy Imager - 24 Par Wand w/ CI-110DLP imaging probe, CID CI-110	1	9,256	9,256	3 year warranty	2,100	11,356
		Laser area meter	Handheld Laser Leaf Area Meter, CID CI-203	1	9,609	9,609	Root tray accessories, 3 year warranty	7,690	17,299
		Telescope		3	3,133	9,399	camera adapter(for compact digital camera,) tripod, tripod head, eye pies module, objective module		9,399

Target	Purpose	Equipment	Specification	Number	Unit Price (USD)	Price (USD)	Accessories	Price	Total Price (USD)
		Camera adapter (for Digital SLA camera SLR)		1	427	427			427
		Binocular		3	2,175	6,525			6,525
		Compact digital camera	Canon S100	3	583	1,748			1,748
	Water quality and soil, Training course	Water-quality testing kits	Laboratory use	1	10,745	10,745	Test tube for, COD, Nitrite, Nitrate, Nitrogen total, Phosphate, Phosphate total	942	11,688
		Water-quality testing kits	Field use	1	2,447	2,447	Test tube for, COD, Nitrite, Nitrate, Nitrogen total, Phosphate, Phosphate total	942	3,389
		pH meter		3	673	2,020	Standard solutions(7,9)		2,020
		DO meter		3	1,222	3,666	Membrane kit		3,666
		Salinity/EC meter		3	854	2,563	Standard solutions(7,9)		2,563
		Portable Depth sounder		3	388	1,165			1,165
		Light quantum meter	Underwater and on-deck	1	5,978	5,978	data logger, lowering fame, mounting & leveling		5,978

Target	Purpose	Equipment	Specification	Number	Unit Price (USD)	Price (USD)	Accessories	Price	Total Price (USD)
		Soil color-sample book		3	463	1,390			1,390
		Soil durometer		1	518	518			518
		Soil sampler	1m	1	129	129			129
		Sediment sampler	Ekman-birge type	1	1,204	1,204			1,204
		Water sampler	Van-dorn type	1	1,157	1,157			1,157
		Plankton net	80um Cat. No. 78-110	1	135	135			135
	For all monitoring, Training courses	Camera	Digital, with 600mm Lens	1	15,147	15,147			15,147
		Video camera		1	337	337			337
		GPS	handy type	2	570	1,139			1,139
		Boat/Kayak	plastic hull, rowboat	3	2,589	7,768			7,768
		Car	4WD	1	55,000	55,000			55,000
		Car	Pickup truck	1	31,599	31,599			31,599

Annex-4

Target	Purpose	Equipment	Specification	Number	Unit Price (USD)	Price (USD)	Accessories	Price	Total Price (USD)
	Nursary	Water pump		2	699	1,398			1,398
Community outreach	Presentation	Tent		5	285	1,424			1,424
		Monitor (PROJECTOR)		1	427	427			427
		Video camera		1	337	337			337
Total Price		-	-	-	-	225,390	-	-	244,322

Annex-4

Equipment (Purchased: consumable)

Target	Purpose	Equipment	Specification	Number	Unit Price (USD)	Price (USD)	Accessories	Price (USD)	Total Price (USD)
Monitoring	Mangrove trees, Training course	Thermometer	0-50oC	10	9	91			91
		Measuring meter	measuring of tree heights	2	83	166			166
		Measuring rod	12 m	3	23	70			70
		Measuring tape	water proof, 50 m, 2 m	3	207	621			621
		Vernier caliper		3	155	466			466
		Survey pole	2 m	100	26	2,589			2,589
		Tree marker		500	0	129			129
		Numbering tape		1000	1	518			518
		Scoop		5	13	65			65
		Sample bottles		100	3	259			259
	Fauna and Flora, Training course	Loupes		5	39	194			194
		Sweeping net		5	52	259			259
		Casting net		5	194	971			971

Annex-4

Target	Purpose	Equipment	Specification	Number	Unit Price (USD)	Price (USD)	Accessories	Price (USD)	Total Price (USD)
		cooler box		3	129	388			388
		Glass jars		3	65	194			194
		Hand net		3	39	117			117
		Portable aquarium		3	26	78			78
		Wadars		5	194	971			971
		Sieve	1mm	3	117	350			350
		Seine net	Rope (3RO), Twitn or thread (0.700), Float (24pieces for 3.200)	3	18	54			54
		Fish catching bottle, cage		3	16	47			47
		Crab cage		3	10	31			31
		Formalin		1	57	57			57
		Sample bottles		40	6	249			249
	Social economy, Training course	Counter		5	16	78			78
		Hand bearing compass		5	72	362			362
	Plantation	Scoop		3	28	85			85

Annex-4

Target	Purpose	Equipment	Specification	Number	Unit Price (USD)	Price (USD)	Accessories	Price (USD)	Total Price (USD)
		Boots		10	67	673			673
Community outreach	Presentation at local communities, Field training	Compact sound system with DVD	transportable	1	220	220			220
		IC recorder	2GB memory	1	140	140			140
		White board		2	129	259			259
		Megaphone		2	220	440			440
Total Price		-	-	-	-	11,889	-	-	11,889

Equipment (Planed: draft)

Target	Purpose	Equipment	Specification	Number	Total Price (USD)
QEIC	Database	Computer	high-end processor	1	11,000
		Color printer		1	2,000
		GIS software	ArcGIS	1	2,500
		Office Software	Ms-Office	1	500
		Security Software	Anti-virus, Anti-spiware, Internet security	6	1,200
		Database software	Oracle	1	20,000
		Plotter	A0 size	1	5,000
		Office Software	Ms-Office	2	1,000
		Drawing Software	Adobe Illustrater	2	1,600
		Picture Handring Software	Adobe Photoshop	2	2,000
		Color printer		10	0
		FAX, photocopier and printer	A3	1	3,000
		Lamination machine		1	160
		Document binding machine		1	2,200
		Color photocopier		1	25,000
	Laboratory	Muffle furnance	100-1100oC	10	0
		Dryer	40-300oC, 30L	1	2,000
		Autoclave	100-150oC	10	0
		Auto analyzer		10	0
		Spectrophotometer		10	0
		Water bath		10	0
		Refrigerator		1	4,000
		Freezer		1	2,000

Target	Purpose	Equipment	Specification	Number	Total Price (USD)
		Distiller		10	0
		Pure water maker		10	0
		Centrifugal separator		10	0
		Evaporator		10	0
		Vibration sieving machine		1	4,500
		Standard solutions		1	800
		Solutions		0.02	200
		Thermometer		10	300
		Drainage treatment	treatment of chemical disposal	0.5	12,500
		Glassware	flasks, beakers, pipettes, templates	0.6	3,000
Exhibition	Exhibition, Training Course	Exhibition panels		1	3,000
		Monitor or screen		5	2,500
		Speakers		5	2,500
		Theater projector		1	5,000
		Megaphone		2	200
		Videocassette recorder		3	900
		DVD player		2	1,000
		Specimen platform		5	7,500
		Glass tanks	pumps and filtering tanks	10	3,000
	Observation in QEIC, Training Course	Binoculars	x20	2	13,500

Annex-4

Target	Purpose	Equipment	Specification	Number	Total Price (USD)
Total Price		-	-	-	145,560

Annex-5

PDM (version 1.1)

Ver. 1.10 edited on 51/2/20132

Project Name : Qurm Environmental Information Center (QEIC) Project Duration : 2 years (December 2011 – December 2013)

Implementing Agency in Oman : Ministry of Environment and Climate Affaires (MECA)

Implementing Agency in Japan : JICA

Project Site : QEIC Target Group : (primary) MECA staffs

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
(Overall Goal) - Dissemination of sustainable mangrove ecosystem management in Oman and in the region.	By 2016 - Number of mangrove sites managed through partnership programs with local communities increased by twenty (20). - Number of new plantation sites increased by eight (8). - Country experience on mangrove ecosystem management is presented in ROPME regional meetings and other international conference.	- Record of planting and monitoring activities conducted through partnership programs. - List of new plantation sites - Annual report of QEIC - Proceeding of conference, paper presented	
(Project Purpose) - QEIC is established as the center for promoting sustainable mangrove ecosystem management in Oman.	By the end of the Project 1 QEIC is developed into the center for knowledge sharing by professionals, practitioners and scholars specialized in mangrove ecosystem management 2 QEIC is able to counsel policy and technical issues related to management of mangrove ecosystem to private and public sectors concerned 3 QEIC continues ~~completes~~ mangrove plantation at the proposed sites ~~artificial lagoon built in Qurm Nature Reserve as scheduled~~ 4 Training on mangrove ecosystem management is provided to professionals in Oman	1 Annual report. Interview to agencies/organizations that participated in the Project. Interview to agencies/organizations that did not participate in the Project. 2 List of inquiries from concerned private/public sectors related to mangrove ecosystem management, and recommendations and advises made by QEIC. 3 Annual report, record of planting activity 4 Record of training. List of participants. Interviews to participants and supervisors focusing on the learning goals	- Construction of QEIC facility is completed. - Other ministry and agencies bring and share their resources and expertise in mangrove ecosystem protection and management to QEIC - Similar initiatives in mangrove ecosystem management are carried out by other ROPME countries. - Public – private sector partnership in GCC strengthened.
(Outputs) 0 The project operation unit in QEIC is established.	0.1 Personnel of QEIC are assigned according to the Work Plan. 0.2 Joint Coordinating Committee (JCC) is established. 0.3 Budget for construction of the QEIC center and for operation is allocated. 0.4 Facility of QEIC is planned ~~installed~~. 0.5 Material and equipment is procured and installed.	0.1 Organizational chart of QEIC with name list of staff 0.2 Minutes of meeting of JCC 0.3 Financial statement (balance sheet and profit and loss) 0.4 List of QEIC facility 0.5 List of material and equipment	
1 The capacity of training activity for QEIC to promote sustainable mangrove ecosystem management is developed.	1.1 Training Programme is prepared. 1.2 Trial training course are conducted three (3) times.	1.1 Training Programme 1.2 Record of data and information of training	- Participants in the training program secure their own funding to attend the courses
2 The monitoring method for QEIC to promote sustainable mangrove ecosystem management is developed	2.1 Monitoring Guideline including monitoring format is prepared. 2.2 An appropriate format for storing the result of monitoring is prepared.	2.1 Monitoring Guideline 2.2 Appropriate format	
3 Methods and techniques for promoting mangrove reforestation are developed.	3.1 Mangrove Plantation Guideline is prepared. 3.2 Mangrove Protection Guideline is prepared.	3.1 Mangrove Plantation Guideline 3.2 Mangrove Protection Guideline	- Unexpected weather related adversary effects to the planting sites are minimal
4 The capacity of Environmental Education Programme activity for QEIC to promote sustainable mangrove ecosystem management is improved.	4.1 Environmental Education Programme is prepared. 4.2 500 participants participated in environmental education events. 4.3 Exhibition Plan is prepared.	4.1 Environmental Education Programme 4.2 Report of the programme ~~List of participants, number of visitors~~ 4.3 Exhibition Plan	

Annex-5

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
(Activity) 0.1 Review and finalize Work Plan 0.2 Establish Project implementation body 0.3 Prepare budget plan for the Project and construction/operation of QEIC 0.4 Establish the Joint Coordinating Committee 0.5 Prepare Project monitoring plan 0.6 Allocate budget, personnel and facility of QEIC 0.7 Determine tasks of QEIC staff 0.8 Material and equipment provided are properly installed and maintained.	**(Input from Japan)** Personnel (1) Team leader/Training plan (2) Mangrove ecosystem monitoring (natural condition); (3) Mangrove ecosystem monitoring (social condition)/Mangrove plantation 1; (4) Environmental education programme; and (5) Data analysis/ Mangrove plantation 2 Training of Oman Project Personnel in Japan Machinery, Equipment and Materials	**(Input from Oman)** Personnel Project Director Project Manager Counterparts in the field of; Monitoring and Information Training and Education Mangrove Plantation Exhibition and Public Relation Environmental Education Administrative Personnel **Local Cost** **Land, Building and Facilities** **Procurement of Goods and Consumables**	
1.1 Identify target groups of training courses 1.2 Conduct training needs survey 1.3 Prepare syllabi for each course through conducting resource persons workshops 1.4 Prepare resource persons list corresponding to all the subjects 1.5 Prepare training materials 1.6 Analyze the cost of training courses 1.7 Prepare training schedule 1.8 Conduct trial training courses 1.9 Conduct monitoring of trial training courses			
2.1 Identify parameters to monitor the natural and social condition of mangrove ecosystem 2.2 Identify monitoring methods and schedule for each monitoring parameter 2.3 Prepare Monitoring Guideline including monitoring format 2.4 Conduct trial monitoring survey for the revision of Monitoring Guideline 2.5 Prepare a platform for publicizing results of the monitoring survey 2.6 Conduct monitoring survey based on the final Monitoring Guideline			
3.1 Conduct baseline survey of mangrove plantation sites and nursery facilities 3.2 Develop improved techniques for mangrove plantation through trials in nursery and planting fields and prepare Mangrove Plantation Guideline 3.3 Develop methods and regulations for protection of mangroves and prepare Mangrove Protection Guideline			

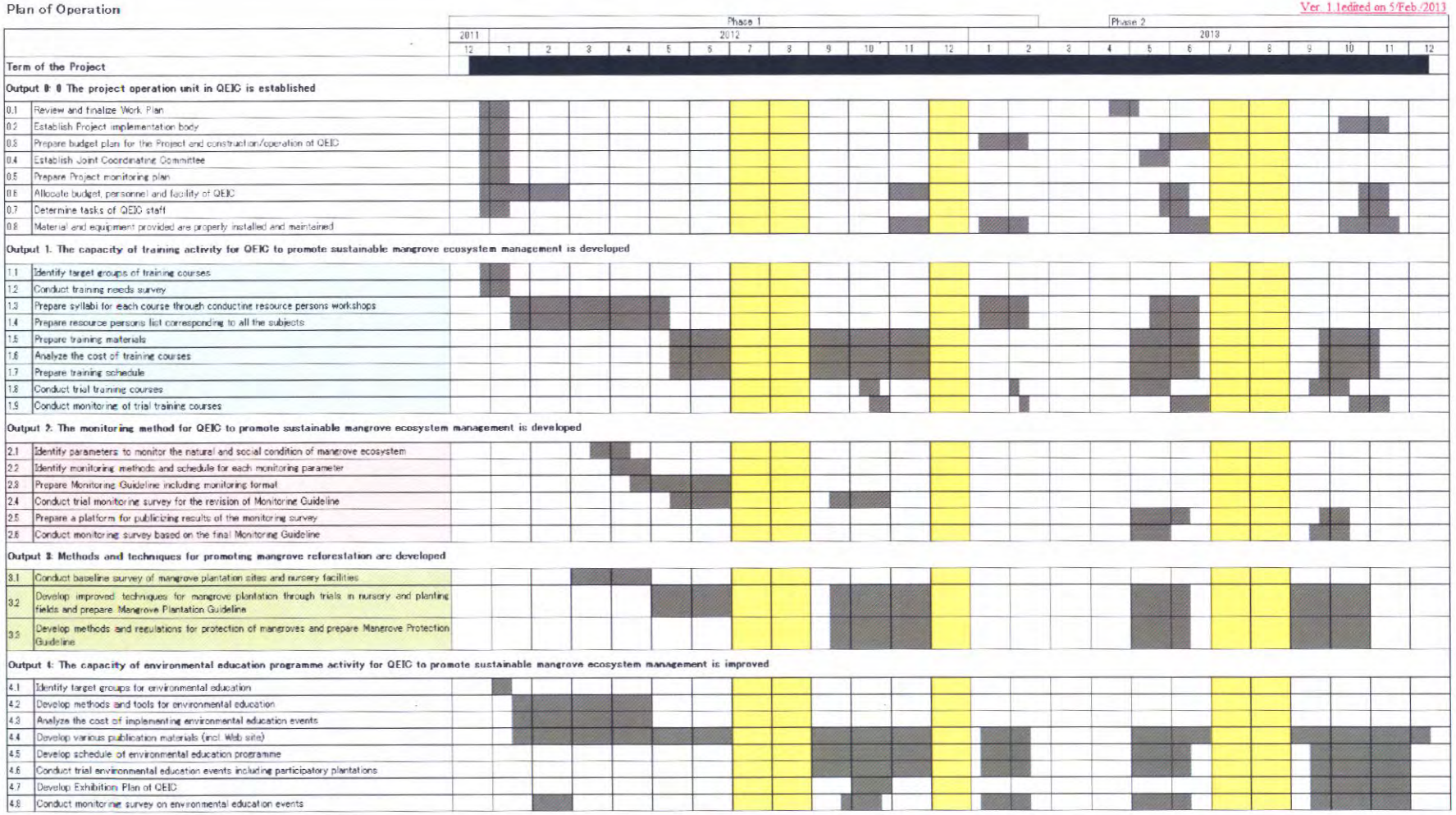
Annex-5

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
4.1 Identify target groups for environmental education 4.2 Develop methods and tools for environmental education 4.3 Analyze the cost of implementing environmental education events 4.4 Develop various publication materials (incl. Web site) 4.5 Develop schedule of environmental education programme 4.6 Conduct trial environmental education events including participatory plantations 4.7 Develop Exhibition Plan of QEIC 4.8 Conduct monitoring survey on environmental education events			**(Preconditions)** - Schedule of the project is negotiated and agreed. - Construction schedule of QEIC is finalized. - ~~MECA put Construction of the QEIC facility tender prior to the project~~.

PO (version 1.1)

Plan of Operation

Ver. 1.1edited on 5/Feb./2013



The Second JCC (Joint Coordination Committee) Meeting
of the
Qrum Environmental Information Center Project

Tuesday, 5th of February, 2013

9:00 a.m. in the Meeting Room of the Ministry of Environment and Climate Affairs, 3rd floor
Al-Khuwair, Sultanate of Oman.

Agenda

HOUR	ACTIVITY	SPEAKER
9:00 -9:05	Welcoming words	Mr. Ali Amer Al-Kiyumi Director General of Nature Conservation
9:05 -9:10	Words from the Embassy of Japan	Mr. Shinichi Yamanaka Counsellor, Embassy of Japan
9:10 -9:40	Report: Progress of the Project Implementation	Mr. Yoichi Harada Leader of the Japanese Expert Team
9:40 - 9:55	Comments and Agreements	All the participants
9:55 - 10:00	Signing Minutes of the Meeting	Authorities

3rd JCC

MINUTES OF MEETING
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
THE MINISTRY OF ENVIRONMENT AND CLIMATE AFFAIRES OF SULTANATE OF OMAN
ON
THE THIRD JOINT COORDINATION COMMITTEE MEETING
ON
JAPANESE TECHNICAL COOPERATION FOR
THE QURM ENVIRONMENTAL INFORMATION CENTER PROJECT

Muscat, June 2nd, 2013

Mr. Yoichi HARADA
Leader of the
JICA Expert Team
for the
Qurm Environmental Information
Center Project

2/6/2013

Mr. Ali Amer Al-Kiyumi
Director General of Nature Conservation
Ministry of Environment and Climate Affaires

THE ATTACHED DOCUMENT

The third Joint Coordination Committee (hereinafter referred to as "JCC") meeting was held on June 2nd, 2013 at the Meeting Room of the Ministry of Environment and Climate Affairs (hereinafter referred to as MECA) in the Sultanate of Oman, with participants including MECA officials, JICA Experts, representatives from Embassy of Japan as listed in the ***Annex-1***.

The main items confirmed in the JCC meeting are summarized as below:

1) Approval of the Work Plan for the second project year

The Work Plan for the second project year including project activities and outputs were presented by the JICA Expert Team and was approved by the JCC.

The presentation material based on the Work Plan is attached as ***Annex-2***.

2) Confirmation of the construction of QEIC

The status of construction of QEIC were reported by Omani counterpart team. The report letter for the status will be sent to JICA representative of the project.

3) Equipment List for donation in the second project year

Necessary materials and equipment in the second project year were discussed among the project implementation body based on the list of equipment agreed in 2005. The list was modified and prepared as a draft version. This list will be further modified based on the progress of the project and situation of the QEIC construction.

Although JICA will provide equipment, which will be necessary in the facility of QEIC, MECA will be responsible for installment and utilization of those after the construction of QEIC is completed.

4) Revision of PDM and PO

PDM and PO (ver. 1.1 dated February 5th 2013) was revised as ver. 2.0 based on the reality of the project implementation. And they were approved by JCC.

5) Agenda of the International Seminar

Agenda of the International Seminar was discussed in the JCC. The agenda will be further refined.

Annex-1 Participations List of the third JCC

Annex-2 Presentation material for the Work Plan of the second project year

The Qurm Environmental Information Center Project

3rd Joint Coordination Committee

Venue: Ministry of Environment and Climate Affaires
Date: 2nd June 2013
Time: 10:00 to 11:00

List of Participants

	Name	Organization	Mobile	e-mail	Signature
1	Badar Al-Balushi	MECA	92373173	badarmoon123@gmail.com	
2	Kanako Fukuda	Embassy of Japan	9931 3484	kanako.fukuda@mofa.go.jp	
3	Shinichi Yamanaka	Embassy of Japan	99359165	shinichi.yamanaka@mofa.go.jp	
4	Aziza Al-Adawi	MECA	91707869	nzizo83@gmail.com	
5	Aida Al Tabri		95190048	marinegirl3308@gmail.com	2013
6	Takeshi Sato	JICA Study Team		sato-t@idea-inc.co.jp	
7	Haitham Said	MECA	92626029	al-furqani33@hotmail.	
8	ALi ALkiyumi	MECA	95161515	alialkiyumi@gmail.com	
9	Thuraya Alsariri	MECA	99435775	thalsariri@gmail.com	
10	Moza Al-riyami	MECA	95757234	al-riyami2010@hotmail.com	
11	Zeyana ALOmairi	MECA	97255513	Zeyana.GIS@gmail.com	
12	Yoichi Harada	JICA Expert Team		harada-y@idea-inc.co.jp	
13					
14					
15					
16					
17					
18					
19					
20					

ANNEX-2

The Qurm Environmental Information Center Project

Work Plan of 2nd Project Phase (April 2013-January 2014)

June 2nd, 2013
JICA Project Team

1

Main topics

- Main activities in the 2nd phase (Chapter 4):
  - ✓ QEIC operation
  - ✓ Training program
  - ✓ Mangrove ecosystem monitoring
  - ✓ Plantation
  - ✓ Education
- Draft agenda of international seminar (Appendix 9)
- Equipment for QEIC (Appendix 10)
- Revision of PDM (Appendix 6)

2

Planned activities — Preparation of QEIC operation plan

- Development of 5-year budget and operation plans
- Development of organizational structure and staff allocation plan
- Development of a program for monitoring QEIC activities

3

Planned activities — Development of training programs of QEIC

- Development of training courses (including training materials) for monitoring, database management, plantation, education etc.
- Target groups: QEIC/MECA staffs, students, NGO, local community, private sector etc.
- Identification of lectures/trainers including outside resources (e.g. University professor)
- Cost estimation
- Implementation of trial training

4

Planned activities — Development of monitoring methods of mangrove ecosystem

- Development and finalization of monitoring method (including by remote sensing)
- Implementation of baseline monitoring surveys (mainly in QNR)
- Finalization of Mangrove Monitoring Guideline
- Development of basic format for QEIC'S monitoring database
- Consideration of methods for publicizing monitoring data

5

Planned activities — Development of methods and techniques of mangrove plantation

- **Development of Mangrove Plantation Guideline**
  - ➢ Efficient and cost effective plantation methods including direct sowing
  - ➢ Methods to identify suitable sites for plantation
- **Development of Mangrove Protection Guideline**
  - ➢ Proposal of methods for protecting mangrove including regulatory measures

6

Planned activities—Environmental education

- **Development of Environmental Education Program**
  - Development of new education programs as well as improvement of current programs (for children and adults)
  - Development of new education methods, including tools and materials
  - Implementation of trial education events
- **Development of publication materials**
  - Poster and booklet introducing Oman's mangrove sites
  - Field guide of mangrove fauna
  - Booklet on mangrove ecosystem
- **Development of Exhibition Plan**

7

International conference (Dec. 9-11th)

- **Aim:**
  - To introduce the QEIC project
  - To share issues related to conservation and management of mangrove ecosystem
  - To discuss ideas for future activities of QEIC
- **Participants:**
  - GCC countries, Iran, Iraq, Yemen
  - International organizations (RAMSAR, ROPME, UNEP, IUCN etc.)
  - MECA regional officers

See Appendix 9 for draft agenda of international seminar

8

Equipment for QEIC

- **Office room:** printer, computers, software
- **Laboratory:** basic equipment for water/soil analysis, fauna identification etc.
- **Training room:**
- **Exhibition:** display equipment etc.
- **Monitoring:** field survey equipment, satellite image etc.
- **Education:** communication tools

Require further revision, especially equipment that is dependent with the design of QEIC's facilities and computer network.

See Appendix 10 for draft equipment list

9

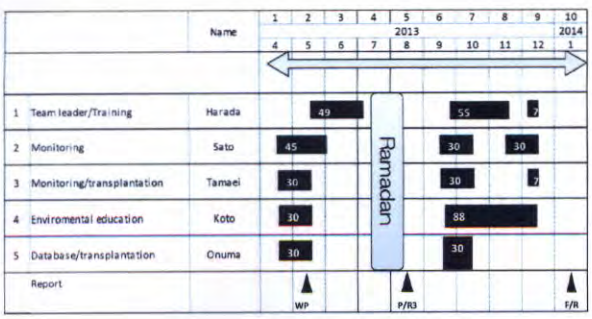
Revision of Project Design Matrix (PDM)

- Revised from version 1.1 to 2.0
- Main revisions:
  - Overall goal: "Activities of QEIC are reported annually to the public" was added as an indicator of achievement of overall goal.
  - Project Purpose: "QEIC is established..."→"QEIC is prepared ..."
  - Consequently, the indicators of achievement of "Project Purpose" was changed accordingly.

See Appendix 6 for PDM version 2.0

10

Assignment and reporting schedule



11

4th JCC

MINUTES OF MEETING
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
THE MINISTRY OF ENVIRONMENT AND CLIMATE AFFAIRES OF SULTANATE OF OMAN
ON
THE FOURTH JOINT COORDINATION COMMITTEE MEETING
ON
JAPANESE TECHNICAL COOPERATION FOR
THE QURM ENVIRONMENTAL INFORMATION CENTER PROJECT

Muscat, December 12th, 2013

Mr. Yoichi HARADA
Leader of the
JICA Expert Team
for the
Qurm Environmental Information
Center Project

Mr. Mohammed Al-Muharrami
Director General of Nature Conservation
Ministry of Environment and Climate Affaires

THE ATTACHED DOCUMENT

The 4th Joint Coordination Committee (hereinafter referred to as "JCC") meeting was held on December 12th, 2013 at the Meeting Room of the Ministry of Environment and Climate Affairs (hereinafter referred to as MECA) in the Sultanate of Oman, with participants including MECA officials, JICA Experts, representatives from JICA Evaluation Team, JICA cost-sharing team and Embassy of Japan as listed in ***Annex-1***. The main items confirmed in the meeting are summarized as below:

1) Confirmation of the construction of QEIC

The construction status of QEIC was reported by Omani counterpart team. The construction status will be regularly reported to JICA representative of the project.

2) Confirmation of the QEIC 8-Year Operation Plan

The basic content of the QEIC 8-Year Operation Plan was explained by the JICA Expert Team. The Plan was confirmed and basically agreed by the Omani counterpart team. Based on the discussion, the Plan will be finalized with the Omani counterpart team and submitted with the Final Report, scheduled in February, 2014. The presentation material of the QEIC 8-Year Operation Plan is attached as ***Annex-2***.

3) Explanation of Joint Terminal Evaluation Report

The leader of JICA Evaluation Team explained the recommendations made in the Joint Terminal Evaluation Report, which were noted by the Omani counterpart team. The report was also submitted to the JCC.

4) Explanation of the JICA cost-sharing scheme

The concept of the JICA cost-sharing scheme was explained by the JICA cost-sharing team. The presentation material is attached as ***Annex-3***.

5) Handover of the procured equipment

Necessary materials and equipment for QEIC activities were procured through the Project. All equipment was handed over from JICA to MECA with the handover note and equipment list. MECA will be responsible for storage, maintenance, installation and utilization of the equipment. The handover note and equipment list is attached as ***Annex-4***.

Annex-1	Participant list of the 4th JCC meeting
Annex-2	Presentation material of the QEIC 8-Year Operation Plan
Annex-3	Presentation material of JICA cost-sharing scheme
Annex-4	Handover note and list of procured equipment

PARTICIPANTS LIST

DATE: December 12, 2013

TIME: 10:00 am

PLACE: Meeting hall / MECA

	Name	Organization	Signature
1	Munehiro Mishima	JICA Saudi Arabia office.	
2	Hiroko Tanaka	Consultant JICA Mission	
3	Akihiro Iwasaki	JICA HQ.	
4	Akira KOTO	JICA Project Team	
5	Shige Tamae'	JICA pro. Team	
6	HATORI, Hiroyuki	JICA	
7	Takeshi Sato	JICA Project Team	
8	Taichi Hawada	JICA project Team	
9	Alomed Al-Saidi	MACA	

10	Haitham Said Al-Furqani	MECA	
11	Aziza	MECA	
12	Buda-Al-Balushi	MECA	
13	Ali Al Kiyumi	MECA	
14	Mohammed Al Mukharrami	DG NC	
15			
16			
17			
18			

Annex 2 2013/12/12

QEIC 8-year Operation Plan

Dec. 12th, 2013

4th JCC of
Qurm Environmental Information Center Project

Why 8-year Operation Plan?

3 Years (2014-2016)

- "mini-QEIC" period (preparation phase)

5 Years (2017-2021)

- 5-year plan after QEIC construction is completed (full operation phase)

Content of the Operation Plan

- Responsibilities of QEIC
- Action plan of QEIC activities (training, monitoring, plantation, education and general activities)
- Organizational structure of QEIC
- Assignment and recruitment plan of QEIC staff
- Budget plan

Appendix:

- Cost breakdown
- Layout and facilities required for mini-QEIC

Main responsibilities of QEIC

- Principal government organization responsible for conservation and management of Oman's mangrove ecosystem
- To promote conservation and management of mangrove ecosystem in Oman and regional countries
- To plan and implement training, monitoring, plantation, education, exhibition and research activities related to conservation and management of mangrove ecosystem

Other responsibilities of QEIC

- National focal point for mangrove-related international treaties (e.g. Ramsar Convention, ROPME)
- Organization of international meetings
- Others (e.g. database, website, publications)

Action Plan of QEIC

- First, we need to determine what you want to achieve (i.e. setting of target)
- Set targets for:

✓Training
✓Monitoring
✓Plantation
✓Education

1

Target of training activities

Mini-QEIC period (2014-2016)

✓ To enhance the capacity of QEIC and MECA/regional staff so that all the planned QEIC programs can be effectively implemented by the end of 2016.

QEIC period (2017-2021)

✓ To expand training courses to potential collaboration partners and interested outside organizations

Target of monitoring activities

Mini-QEIC period (2014-2016)

✓ To monitor and manage 10 high-priority mangrove sites* by 2016

QEIC period (2017-2021)

✓ To monitor and manage 20 high-priority mangrove sites

***High priority mangrove sites:** sites vulnerable to natural/social impacts or have high conservation values

Target of plantation activities

- To transplant 500,000 seedlings by year 2025 and continuously improve the method and success rate of transplantation through monitoring.

Target of education activities

Mini-QEIC period (2014-2016)

✓ To implement regular education program at 5 schools by end of 2016

QEIC period (2017-2021)

✓ To implement regular education program at 2 schools per region (6 region) each year

✓ To implement education programs at 3 private sector companies each year

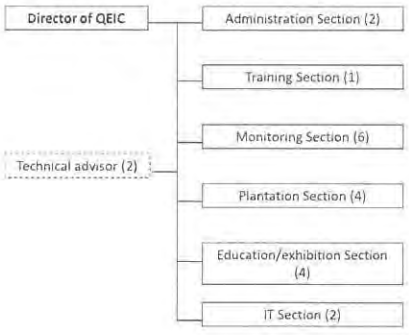
✓ To implement education programs at 1 local community per region (7 regions) each year

Schedule of QEIC activities

- QEIC 8-year operation plan_131211.xlsx

See p. 4-8 of operation plan

Organizational structure (2017)



Responsibility of each Section

Section	Main responsibility
Director	• Overall supervision and management of QEIC activities
Administration Section	• Management of QEIC activities • Management of budget and expenditure • Focal point of ROPME and RAMSAR convention
Training Section	• Planning and implementation of training activities • Organization of national and international workshops
Monitoring Section	• Planning and implementation of monitoring activities • Planning and implementation of protective measures • Planning and implementation of research activities
Plantation Section	• Planning and implementation of plantation activities • Management of seedling nursery • Planning and implementation of research activities
Education/exhibition Section	• Planning and implementation of education activities • Preparation of publication materials • Planning and implementation of exhibition programs • Maintenance and update of exhibition facilities
IT Section	• Management and update of QEIC website • Management of QEIC database • Other IT related works (e.g. remote sensing analysis, GIS)

Responsibility and qualifications of QEIC staff

- QEIC 8-year operation plan_131211.docx

See p. 11-12 of operation plan

Staff assignment and recruitment plan

- Official assignment of staff from 2015

QEIC 8-year operation plan_131211.docx

See p. 13 of operation plan

Budget plan

- **The budget plan does not include:**

✓Salary, allowances for QEIC staff

✓Travel expenses

✓Maintenance cost, electricity, water of QEIC building

✓Database establishment and maintenance

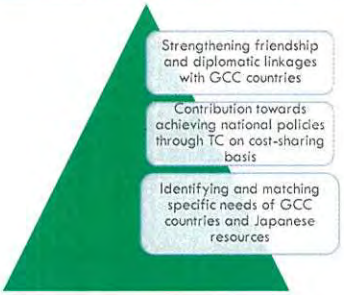
Conclusion

- Need to officially assign and recruit qualified staff a.s.a.p.
- Incorporation of QEIC operation plan into MECA 5-year plan (2015-2020)
- Incorporation of QEIC operation plan into National Biodiversity Strategies and Action Plans (2015-2020)

INTRODUCTION TO JICA'S TECHNICAL COOPERATION (TC) ON COST-SHARING (CS) BASIS

JICA Mission, December 2013

Objectives: 'TC for high-income countries'



Basic CS-TC Schemes

CS-TC Schemes

1. Training	2. Japanese Experts	3. Collaborative projects

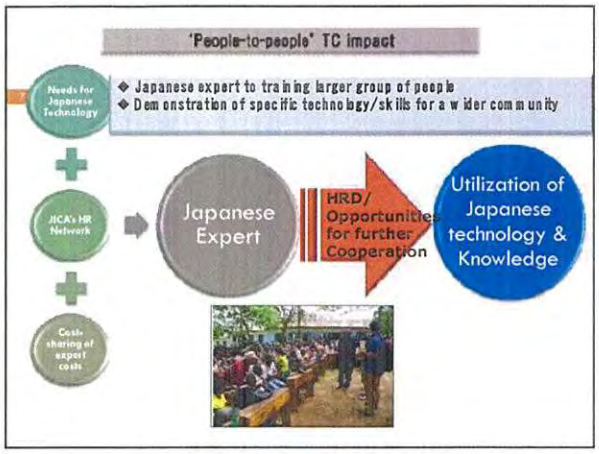
1. Training

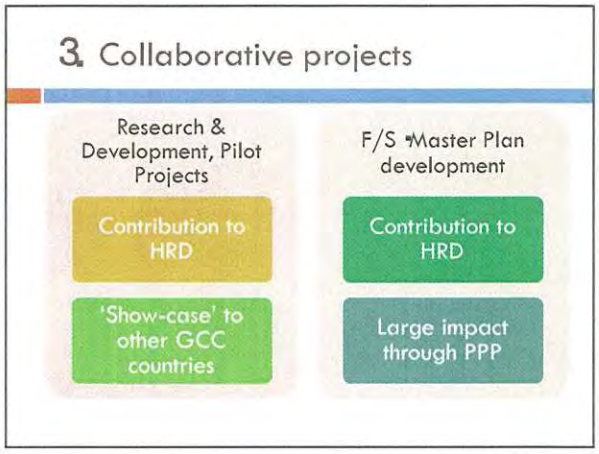
Training

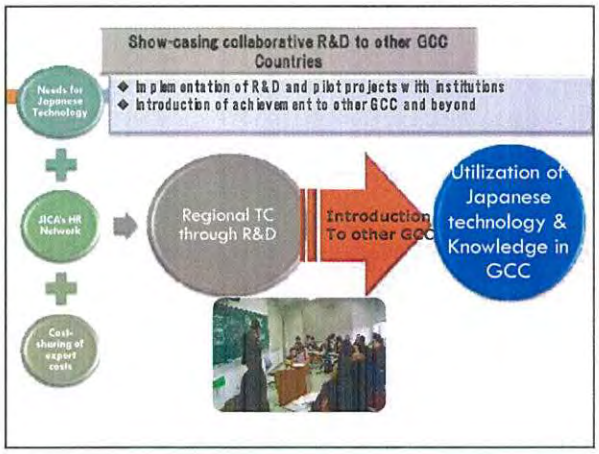
Tailor-made programmes		Regular courses
In Japan	In Third country	In Japan

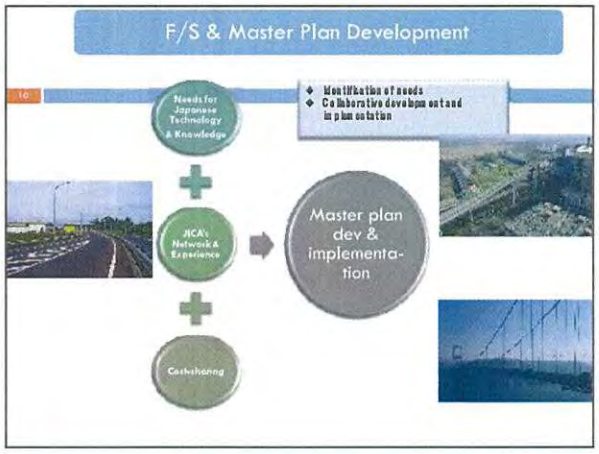
2. Japanese experts

Short-term experts	• World-class technical experts • Pool of HR including the private-sector personnel
Long-term experts	• Advisors with broad experience in the sector • HR including public sector & senior private sector personnel


'People-to-people' TC impact
Needs for Japanese Technology
◆ Japanese expert to training larger group of people
◆ Demonstration of specific technology/skills for a wider community
JICA's HR Network
Cost-sharing of expert costs
Japanese Expert
HRD/ Opportunities for further Cooperation
Utilization of Japanese technology & Knowledge


3. Collaborative projects
Research & Development, Pilot Projects
Contribution to HRD
'Show-case' to other GCC countries
F/S •Master Plan development
Contribution to HRD
Large impact through PPP


Show-casing collaborative R&D to other GCC Countries
Needs for Japanese Technology
◆ Implementation of R&D and pilot projects with institutions
◆ Introduction of achievement to other GCC and beyond
JICA's HR Network
Cost-sharing of expert costs
Regional TC through R&D
Introduction To other GCC
Utilization of Japanese technology & Knowledge in GCC


F/S & Master Plan Development
Needs for Japanese Technology & Knowledge
◆ Identification of needs
◆ Collaborative development and implementation
JICA's Network & Experience
Cost-sharing
Master plan dev & implementa-tion

Appendix 3

Final version of PDM (ver. 2.0)

and

record of amendment

Final version (Ver.2.0) of PDM, PO

Appendix 3 Final version of PDM (ver. 2.0) and record of amendment

Ver. 2.0 edited on 27/5/2013

Project Name :Qurm Environmental Information Center (QEIC) Project

Duration :2 years (December 2011 – January 2014)

Implementing Agency in Oman :Ministry of Environment and Climate Affaires (MECA)

Implementing Agency in Japan :JICA

Project Site :QEIC

Target Group : (primary) MECA staffs

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
(Overall Goal) Dissemination of sustainable mangrove ecosystem management in Oman and in the region.	By 2016 ・Number of mangrove sites managed/monitored through either QEIC or partnership programs increase to twenty (20). ・Activities of QEIC are reported annually to the public. ・Country experience on mangrove ecosystem management is presented in ROPME regional meetings and other international conference.	・Record of monitoring, plantation and management activities including partnership program. ・Annual report of QEIC ・Proceeding of conference, paper presented	
(Project Purpose) QEIC is prepared as the center for promoting sustainable mangrove ecosystem management in Oman.	By the end of the Project 1. A 5-year operation and budget plan is developed for training, monitoring, plantation and education activities. 2. The capacity of QEIC staffs is developed sufficiently enough to counsel policy and technical issues related to management of mangrove ecosystem to private and public sectors concerned. 3. MECA officers who will be assigned as QEIC staffs continue mangrove plantation at the proposed sites. 4. The capacity of QEIC staffs as trainers on mangrove ecosystem management is sufficiently developed.	1. 5-year operation and budget plan 2. Interview to agencies/organizations that participated in the Project. Interview to agencies/organizations that did not participate in the Project. 3. List of inquiries from concerned private/public sectors related to mangrove ecosystem management, and recommendations and advises made by QEIC. 4. Annual report, record of planting activity 5. Record of training. List of participants. Interviews to participants and supervisors focusing on the learning goals 6. Evaluation of capacity assessment check list	・Construction of QEIC is secured. ・Other ministry and agencies bring and share their resources and expertise in mangrove ecosystem protection and management to QEIC. ・Similar initiatives in mangrove ecosystem management are carried out by other ROPME countries. ・Public - private sector partnership in GCC strengthened.
(Outputs) 0. The project operation unit in QEIC is established.	0.1 Department and personnel required for QEIC operation are planned. 0.2 Joint Coordinating Committee (JCC) is established. 0.3 Budget required for QEIC operation is planned. 0.4 Facility of QEIC is planned. 0.5 Material and equipment is procured.	0.1 Draft organization chart of QEIC, including staff allocation plan 0.2 Minutes of meeting of JCC 0.3 5-year budget plan 0.4 List of QEIC facility 0.5 List of material and equipment	
1. The capacity of training activity for QEIC to promote sustainable mangrove ecosystem management is developed.	1.1 Training Programme is prepared. 1.2 Trial training course are conducted three (3) times.	1.1 Training Programme 1.2 Record of data and information of training	Participants in the training program secure their own funding to attend the courses
2. The monitoring method for QEIC to promote sustainable mangrove ecosystem management is developed	2.1 Monitoring Guideline including monitoring format is prepared. 2.2 An appropriate format for storing the result of monitoring is prepared.	2.1 Monitoring Guideline 2.2 Appropriate format	
3. Methods and techniques for promoting mangrove reforestation are developed.	3.1 Mangrove Plantation Guideline is prepared. 3.2 Mangrove Protection Guideline is prepared.	3.1 Mangrove Plantation Guideline 3.2 Mangrove Protection Guideline	Unexpected weather related adversary effects to the planting sites are minimal
4. The capacity of Environmental Education Programme activity for QEIC to promote sustainable mangrove ecosystem management is improved.	4.1 Environmental Education Programme is prepared. 4.2 500 participants participated in environmental education events. 4.3 Exhibition Plan is prepared.	4.1 Environmental Education Programme 4.2 Report of the programme 4.3 Exhibition Plan	

(Activity)	(Input from Japan)	(Input from Oman)	
0.1 Review and finalize Work Plan 0.2 Establish project implementation body 0.3 Prepare budget plan for the Project and construction/operation of QEIC 0.4 Establish the Joint Coordinating Committee 0.5 Prepare Project monitoring plan 0.6 Plan budget, personnel and facility of QEIC 0.7 Determine tasks of QEIC staff 0.8 Material and equipment are procured and maintained.	Personnel (1) Team leader/Training plan (2) Mangrove ecosystem monitoring (natural condition); (3) Mangrove ecosystem monitoring (social condition)/Mangrove plantation 1; (4) Environmental education programme; and (5) Data analysis/ Mangrove plantation 2 Training of Oman Project Personnel in Japan	Personnel Project Director Project Manager Counterparts in the field of; Monitoring and Information Training and Education Mangrove Plantation Exhibition and Public Relation Environmental Education Administrative Personnel Local Cost Land, Building and Facilities Procurement of Goods and Consumables	
1.1 Identify target groups of training courses 1.2 Conduct training needs survey 1.3 Prepare syllabi for each course through conducting resource persons workshops 1.4 Prepare resource persons list corresponding to all the subjects 1.5 Prepare training materials 1.6 Analyze the cost of training courses 1.7 Prepare training schedule 1.8 Conduct trial training courses 1.9 Conduct monitoring of trial training courses	Machinery, Equipment and Materials		
2.1 Identify parameters to monitor the natural and social condition of mangrove ecosystem 2.2 Identify monitoring methods and schedule for each monitoring parameter 2.3 Prepare Monitoring Guideline including monitoring format 2.4 Conduct trial monitoring survey for the revision of Monitoring Guideline 2.5 Prepare a platform for publicizing results of the monitoring survey 2.6 Conduct monitoring survey and finalize Monitoring Guideline			
3.1 Conduct baseline survey of mangrove plantation sites and nursery facilities 3.2 Develop improved techniques for mangrove plantation through trials in nursery and planting fields and prepare Mangrove Plantation Guideline 3.3 Examine and develop methods for protection of mangroves, including regulatory measures if any, and prepare Mangrove Protection Guideline			
4.1 Identify target groups for environmental education 4.2 Develop methods and tools for environmental education 4.3 Analyze the cost of implementing environmental education events 4.4 Develop various publication materials (incl. Web site) 4.5 Develop schedule of environmental education programme 4.6 Conduct trial environmental education events including participatory plantations 4.7 Develop Exhibition Plan of QEIC 4.8 Monitoring and evaluation of environmental education events			(Preconditions) 1 Schedule of the project is negotiated and agreed. 2 Construction schedule of QEIC is finalized.

Plan of Operation

Ver. 2.0 edited on 18/May/2013

		Phase 1													Phase 2												
		2011	2012												2013												2014
		12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1
Term of the Project																											
Output 0: The project operation unit in QEIC is established																											
0.1	Review and finalize Work Plan																										
0.2	Establish Project implementation body																										
0.3	Prepare budget plan for the Project and operation of QEIC																										
0.4	Establish Joint Coordinating Committee																										
0.5	Prepare Project monitoring plan																										
0.6	Plan budget, personnel and facility of QEIC																										
0.7	Determine tasks of QEIC staff																										
0.8	Material and equipment are procured and maintained																										
Output 1: The capacity of training activity for QEIC to promote sustainable mangrove ecosystem management is developed																											
1.1	Identify target groups of training courses																										
1.2	Conduct training needs survey																										
1.3	Prepare syllabi for each course through conducting resource persons workshops																										
1.4	Prepare resource persons list corresponding to all the subjects																										
1.5	Prepare training materials																										
1.6	Analyze the cost of training courses																										
1.7	Prepare training schedule																										
1.8	Conduct trial training courses																										
1.9	Conduct monitoring of trial training courses																										
Output 2: The monitoring method for QEIC to promote sustainable mangrove ecosystem management is developed																											
2.1	Identify parameters to monitor the natural and social condition of mangrove ecosystem																										
2.2	Identify monitoring methods and schedule for each monitoring parameter																										
2.3	Prepare Monitoring Guideline including monitoring format																										
2.4	Conduct trial monitoring survey for the revision of Monitoring Guideline																										
2.5	Prepare a platform for publicizing results of the monitoring survey																										
2.6	Conduct monitoring survey and finalize Monitoring Guideline																										
Output 3: Methods and techniques for promoting mangrove reforestation are developed																											
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Output 4: The capacity of environmental education programme activity for QEIC to promote sustainable mangrove ecosystem management is improved																											
4.1	Identify target groups for environmental education																										
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4.6	Conduct trial environmental education events including participatory plantations																										
4.7	Develop Exhibition Plan of QEIC																										
4.8	Monitoring and evaluation of environmental education events																										

Record of amendment

Record of amendment of PDM and PO (from version 1.0 to 1.1)

	Item	$PDM_{1.0}$	$PDM_{1.1}$	Reason of Revision
PDM	Project purpose - Objectively Verifiable Indicators-	3 QEIC completes mangrove plantation at the proposed artificial lagoon built in Qurm Nature Reserve.	3 QEIC continues mangrove plantation at proposed sites.	Revision based on the reality. The construction plan for artificial lagoon in Qurm Nature Reserve has been canceled due to cyclonic event.
	Output 0 - Objectively Verifiable Indicators -	0.4 Facility of QEIC is installed.	0.4 Facility of QEIC is planned.	Revision based on the progress of QEIC construction status.
	Output 0 - Means of Verification -	4.2 List of participants, number of visitors	4.2 Report of the programme.	Since the number of participants sometimes exceeds 100, difficulty of preparation of participant list was realized. Instead, the report of the programme will be referred.
	Preconditions	MECA put Construction of the QEIC facility tender prior to the project.	MECA put the QEIC facility construction out to tender.	Revision based on the reality.
PO	Schedule	-	Schedule was revised.	Revision of schedule based on the contract modification.

Prepared by JICA Project Team

Record of amendment of PDM and PO (from version 1.1 to 2.0)

	Item	$PDM_{1.1}$	$PDM_{2.0}$	Reason of revision
PDM	Overall goal - Objectively Verifiable Indicators-	Number of mangrove sites managed through partnership programs with local communities increased by twenty (20).	Number of mangrove sites managed/monitored through either QEIC or partnership programs increase by twenty (20).	The word “local community” was deleted as partnership programs will not necessarily be limited to the local community. Twenty sites may be managed by either QEIC or partnership programs (not all will be necessarily be managed through partnership programs).
		-	(new addition) Activities of QEIC are reported annually to the public.	Publication of annual report was considered as an effective method for dissemination of sustainable mangrove ecosystem management.
		Number of new plantation sites increased by eight (8).	(delete)	This indicator was considered as an inappropriate indicator of the overall goal.
	Overall goal - Means of Verification -	Record of planting and monitoring activities conducted through partnership programs.	Record of monitoring and management activities.	It is uncertain whether partnership programs will be implemented, as QEIC will still be in its early stage of operation.
		List of new plantation sites	(delete)	Deleted, as the corresponding indicator was considered as an inappropriate indicator of the over goal.
	Project Purpose -Narrative summary-	QEIC is established as the center for promoting sustainable mangrove ecosystem management in Oman.	QEIC is prepared as the center for promoting sustainable mangrove ecosystem management in Oman.	The use of the word "established" was considered premature, as QEIC will not be operating by the end of this Project.

	Item	$PDM_{1.1}$	$PDM_{2.0}$	Reason of revision
	Project Purpose - Objectively Verifiable Indicators-	By the end of the Project 1 QEIC is developed into the center for knowledge sharing by professionals, practitioners and scholars specialized in mangrove ecosystem management 2 QEIC is able to counsel policy and technical issues related to management of mangrove ecosystem to private and public sectors concerned 3 QEIC continues mangrove plantation at the proposed sites. 4 Training on mangrove ecosystem management is provided to professionals in Oman	1. A 5-year operation and budget plan is developed for training, monitoring, plantation and education activities. 2. The capacity of QEIC staff is sufficiently developed.	All the indicators in version 1.1 are under the assumption that QEIC is fully established and operating by the end of the Project. However, since QEIC will still be in the preparation stage, the indicators were changed to ones that show how QEIC is sufficiently prepared for operation.
	Project Purpose - Means of	1 Annual report. Interview to agencies/organizations that participated in the Project. Interview to agencies/organizations that did not participate in the Project.	1. 5-year operation and budget plan	Revised in accordance to the revision of Objectively Verifiable Indicators

	Item	$PDM_{1.1}$	$PDM_{2.0}$	Reason of revision
	Verification -	2 List of inquiries from concerned private/public sectors related to mangrove ecosystem management, and recommendations and advises made by QEIC. 3 Annual report, record of planting activity 4 Record of training. List of participants. Interviews to participants and supervisors focusing on the learning goals	2. Evaluation of capacity assessment check list	
	Project purpose - Important assumptions -	Other ministry and agencies bring and share their resources and expertise in mangrove ecosystem protection and management to QEIC Similar initiatives in mangrove ecosystem management are carried out by other ROPME countries. Public - private sector partnership in GCC strengthened.	(delete)	The assumptions were deleted in accordance to the revision of Objectively Verifiable Indicators.
	Output 0 - Objectively Verifiable Indicators -	0.1 Personnel of QEIC are assigned according to the Work Plan.	0.1 Departments and personnel required for QEIC operation are planned.	Personnel of QEIC are unlikely to be assigned by the end of this Project.
		0.3 Budget for construction of the QEIC center and for operation is allocated.	0.3 Budget required for QEIC operation is planned.	Operation budget of QEIC are unlikely to be allocated by the end of this Project. Construction budget has already been allocated.
		0.5 Material and equipment is procured and installed.	0.5 Material and equipment is procured.	Certain material and equipment cannot be installed due to the delay of QEIC construction.
	Output 0 - Means of Verification -	0.1 Organizational chart of QEIC with name list of staff	0.1 Draft organizational chart of QEIC, including staff allocation plan	Revised in accordance to the revision of Objectively Verifiable Indicators.

	Item	$PDM_{1.1}$	$PDM_{2.0}$	Reason of revision
		0.3 Financial statement (balance sheet and profit and loss)	0.3 5-year budget plan	Revised in accordance to the revision of Objectively Verifiable Indicators.
	Activity -Narrative summary-	0.3 Prepare budget plan for the Project and construction/operation of QEIC	0.3 Prepare budget plan for the Project and operation of QEIC	Construction budget has already been allocated.
		0.6 Allocate budget, personnel and facility of QEIC	0.6 Plan budget, personnel and facility of QEIC	Change of wording to avoid misunderstanding.
		0.8 Material and equipment provided are properly installed and maintained.	0.8 Material and equipment are procured and maintained.	Certain material and equipment cannot be installed due to the delay of QEIC construction.
		2.6 Conduct monitoring survey based on the final Monitoring Guideline	2.6 Conduct monitoring survey and finalize Monitoring Guideline	The Monitoring Guideline will be finalized at the end of the Project, by reflecting the experiences gained through field surveys.
		3.3 Develop methods and regulations for protection of mangroves and prepare Mangrove Protection Guideline	3.3 Develop methods for protection of mangroves and prepare Mangrove Protection Guideline	Development of regulation cannot be handled by the Project.
		4.8 Conduct monitoring survey on environmental education events	4.8 Monitoring and evaluation of environmental education events	Change of wording to avoid misunderstanding.
PO	Schedule	Revision of schedule	Revision of schedule	Modification of schedule based on the progress evaluation using WBS.

Prepared by JICA Project Team

Appendix 4

List of donated equipment and handover note

Equipment list

Appendix 4 List of donated equipment and handover note

Target	Purpose	QEIC Number	Equipment	Specification	Accessories	Quantity	Unit Price (RO)	Total Price (RO)	Storage location
Monitoring	Remote sensing	MON-001	Satellite image (QNR, Sawadi)	Geoeye		1	300.000	300.000	IT
QEIC facility	Laboratory	LAB-001	Benchtop pH meter	WTW inoLab 7110	pH electrode, buffer, standard solution	1	361.000	361.000	Lab
QEIC facility	Laboratory	LAB-002	Benchtop ORP meter	WTW inoLab 7110	ORP electrode, buffer	1	272.000	272.000	Lab
QEIC facility	Laboratory	LAB-003	Benchtop DO meter	WTW inoLab Oxi 7310		1	871.000	871.000	Lab
QEIC facility	Laboratory	LAB-004	Benchtop salinity meter	WTW inoLab 7110	Standard solution	1	525.000	525.000	Lab
QEIC facility	Laboratory	LAB-005	Benchtop turbidity meter	Turb 550IR	Cuvettes, Standard solutions	1	1,215.000	1,215.000	Lab
QEIC facility	Laboratory	LAB-006	Water-quality testing kits (Lab use)	DR500 Spectrometer, HACH	Test tube, Digital reactor block	1	4,150.000	4,150.000	Lab
QEIC facility	Laboratory	LAB-007	Analytical electric balance	ABJ220-4M	Glass case, Test weight	1	681.000	681.000	Lab
QEIC facility	Laboratory	LAB-008	Oven	UNB 200		1	568.000	568.000	Lab
QEIC facility	Laboratory	LAB-009	Electric balance	Mettler Toledo ML1602	Glass case	1	554.000	554.000	Lab
QEIC facility	Laboratory	LAB-010	Stereo trinocular microscope	EMTR-3		1	1,350.000	1,350.000	Lab
QEIC facility	Laboratory	LAB-011	Trinocular microscope	MT4300L	CCD video camera (cc 2300c)	1	1,250.000	1,250.000	Lab
QEIC facility	Laboratory	LAB-012	Distiller			1	600.000	600.000	Lab
QEIC facility	Laboratory	LAB-013	Formalin			2	22.000	44.000	Lab
QEIC facility	Laboratory	LAB-014	Sampling bottles	Small		60	1.200	72.000	Lab
QEIC facility	Laboratory	LAB-015	Sampling bottles	Large		40	1.200	48.000	Lab
Monitoring	mangrove	MON-002	Leaf color-sample book			3	135.000	405.000	Lab
Monitoring	mangrove	MON-003	Leaf spectrometer	CID CI-710	3 year warranty	1	3,611.000	3,611.000	Lab
Monitoring	mangrove	MON-004	Plant canopy imager	CID CI-110	3 year warranty	1	3,575.000	3,575.000	Lab
Monitoring	mangrove	MON-005	Laser area meter	CID CI-203	Root tray accessories, 3 year warranty	1	3,711.000	3,711.000	Lab
Monitoring	water/soil	MON-007	Water-quality testing kits (Field use)	DR/890 Colorimeter, Part No. 4847000	Test tube for Nitrogen, COD, Nitrolite, Nitrogen total, Phosphate, Phosphate total	1	945.000	945.000	Lab
Monitoring	water/soil	MON-008	Portable pH meter	SG2-FK SevenGo	Standard solutions(7,9)	3	260.000	780.000	Lab
Monitoring	water/soil	MON-009	Portable DO meter	SG6-FK10 SevenGo DO meter	Membrane kit	3	472.000	1,416.000	Lab
Monitoring	water/soil	MON-010	Portable ORP meter	YSI ORP15A	Replacement batteries, calibration solution	3	90.000	270.000	Lab
Monitoring	water/soil	MON-011	Portable salinity/EC meter	SG3-FK2 SevenGo Conductivity meter	Standard solutions	3	330.000	990.000	Lab
Monitoring	water/soil	MON-012	Light quantum meter	Li-cor	datalogger, lowering fame, mounting & leveling	1	2,309.000	2,309.000	Lab
Monitoring	water/soil	MON-013	Soil color-sample book			3	179.000	537.000	Lab
Monitoring	water/soil	MON-014	Soil sampler	1m		1	50.000	50.000	Lab
Monitoring	water/soil	MON-015	Soil thermometer	TFA		3		0.000	Lab
Monitoring	water/soil	MON-016	Sediment sampler	Ekman-barge type		1	465.000	465.000	Lab
Monitoring	water/soil	MON-017	Water sampler	Van-dorn type	Transparent acrylic sample tube (2.2 liters), messenger, 30m synthetic line, carrying case.	1	447.000	447.000	Lab
Monitoring	water/soil	MON-018	Thermometer	0-50oC		10	3.500	35.000	Lab
Monitoring	fauna	MON-021	Plankton net	80um Cat. No. 78-110		1	52.000	52.000	Lab
Monitoring	fauna	MON-022	Sieve	1 mm		3	52.000	156.000	Lab
Monitoring	fauna	MON-023	Telescope	Swarovski STX 25-60x85	Eyepiese, Case	3	1,210.000	3,630.000	Lab
Monitoring	fauna	MON-024	Camera adapter		Swing adopter	3	140.000	420.000	Lab
Monitoring	fauna	MON-025	Tripod/tripod head			3	195.000	585.000	Lab
Monitoring	fauna	MON-026	Camera adapter (for Digital SLA camera SLR)	Swarovski TLS APO&T2		1	165.000	165.000	Lab
Monitoring	fauna	MON-027	Binocular	Swarovski EL 8x32		3	840.000	2,520.000	Lab
Monitoring	fauna	MON-028	Compact digital camera	Canon S100		3	225.000	675.000	Missing
Monitoring	fauna	MON-029	SLR Camera	NIKON D800, 600MM F/4 IFED	SUPER TELE PHOTO WITH TC CONVERTOR, 8GB Memory card,	1	5,850.000	5,850.000	Badar
Monitoring	General	MON-030	Hand bearing compass	TFA		5	28.000	140.000	Lab
Monitoring	General	MON-031	Rubber boots			9+18	2.300	62.100	QNR
Monitoring	General	MON-032	Diving boots			6	10.000	60.000	QNR
Monitoring	General	MON-033	Vernier caliper			3	60.000	180.000	Lab
Others	Others	OTH-001	Car	Patrol SE T1		1	21,624.000	21,624.000	MECA
Others	Others	OTH-002	Car	Patrol Pickup		1	13,700.000	13,700.000	MECA
Others	Others	OTH-003	Water pump			2	160.000	320.000	Sallalah
QEIC facility	Office	OFF-001	Multifunction	Printer, Fax, scanner,		1	2,361.876	2,361.876	Lab
QEIC facility	Office	OFF-002	Color printer	Laser jet printer 4025N	A4 colour laser, 35ppm black/colour, 1200 X 1200 Dpi resolution, 512MB memory, 1 year warranty	4	419.000	1,676.000	Lab
QEIC facility	Office	OFF-003	Laminator	Saturn 2		1	69.000	69.000	Lab
QEIC facility	Office	OFF-004	Document binder			1	225.000	225.000	Lab
QEIC facility	Office	OFF-007	Personal computer	Laptop x1, Mac x 4, Toshiba x 3		8	635.000	5,080.000	
QEIC facility	Laboratory	LAB-016	Autoclave	100-150 C, ST 19T, Capacity 14 litters. Cat. No. AC/35002, MRS Scientific UK		1	1,650.000	1,650.000	Lab

Appendix 4 List of donated equipment and handover note

Target	Purpose	QEIC Number	Equipment	Specification	Accessories	Quantity	Unit Price (RO)	Total Price (RO)	Storage location
QEIC facility	Laboratory	LAB-017	Water bath	4LTR HYDRAULIC THERMOSTAT BW/85060 MRS Scientific UK		1	325.000	325.000	Lab
QEIC facility	Laboratory	LAB-018	Refrigerator			1	2,000.000	2,000.000	Lab
QEIC facility	Laboratory	LAB-019	Freezer	FREEZER CHEST, 215 LITRE, 1 BASHET RF/75502 MRS		2	775.000	1,550.000	Lab
QEIC facility	Laboratory	LAB-020	Vibration sieving machine	Seive Shaker Test Minor 230V SV/54402. MRS Scientific UK.		1	1,075.000	1,075.000	Lab
QEIC facility	Laboratory	LAB-021	Standard solution	pH Buffer Solution, with each 10 x 20 ml of pH 4.01/7.00/9.21		10	60.000	600.000	Lab
QEIC facility	Laboratory	LAB-022	Standard solution	Conductivity standard solutions, 1413uS/cm. box with sachets 30		10	60.000	600.000	Lab
QEIC facility	Laboratory	LAB-023	Standard solution	Conductivity standard solutions, 12.88mS/cm. box with sachets		10	60.000	600.000	Lab
QEIC facility	Laboratory	LAB-024	Reagent	HACH Nitrate test kit, 25 tests.		2	80.000	160.000	Lab
QEIC facility	Laboratory	LAB-025	Reagent	HACH Nitrite test kit, 25 tests.		2	80.000	160.000	Lab
QEIC facility	Laboratory	LAB-026	Reagent	HACH Ammonia test kit, 25		2	80.000	160.000	Lab
QEIC facility	Laboratory	LAB-027	Reagent	HACH Phosphate test kit, 25		2	80.000	160.000	Lab
QEIC facility	Laboratory	LAB-028	Reagent	HACH COD test kit, 25 tests. Cat.		2	80.000	160.000	Lab
QEIC facility	Laboratory	LAB-029	Reagent	HACH Nitrogen total test kit 25.		2	80.000	160.000	Lab
QEIC facility	Laboratory	LAB-031	Tweezer	Set of Large/medium/small		3	78.000	234.000	Lab
QEIC facility	Laboratory	LAB-032	Plastic cylinder	1L, 500 ml, 100 ml		3	16.500	49.500	Lab
QEIC facility	Laboratory	LAB-033	Auto pipette	Automatic pipet, 100 to 1000ul		3	80.000	240.000	Lab
QEIC facility	Laboratory	LAB-034	Auto pipette	Micro tips for above, 1000*		3	50.000	150.000	Lab
QEIC facility	Laboratory	LAB-035	Auto pipette	Automatic pipet, 1ml to 10ml		3	85.000	255.000	Lab
QEIC facility	Laboratory	LAB-036	Auto pipette	Micro tips for above, 500* pack		3	60.000	180.000	Lab
QEIC facility	Laboratory	LAB-037	Hotplate/stirrer	Ceramic top hotplate / stirer. 450 Deg.200 RPM, SH/15522, MRS Scientific UK		1	220.000	220.000	Lab
QEIC facility	Laboratory	LAB-038	Filter Paper	FP/12406 Whatman 70, Dia,mm x100 packs		2	94.000	188.000	Lab
QEIC facility	Laboratory	LAB-039	pH Paper	pH Paper roll, pH. 1-14		1	7.000	7.000	Lab
QEIC facility	Laboratory	LAB-040	Funnel	PYREX Short steam FF/12108 80mm, 8dia., size.10		10	57.000	570.000	Lab
QEIC facility	Laboratory	LAB-041	Glassware	Graduated glass pipettes, 5ml		3	3.500	10.500	Lab
QEIC facility	Laboratory	LAB-042	Glassware	Graduated glass pipettes, 10ml		3	5.500	16.500	Lab
QEIC facility	Laboratory	LAB-043	Glassware	Graduated glass pipettes, 25ml		3	7.500	22.500	Lab
QEIC facility	Laboratory	LAB-044	Glassware	conical flas;, brosilicate glass, 100ml		3	1.500	4.500	Lab
QEIC facility	Laboratory	LAB-045	Glassware	conical flas;, brosilicate glass, 250ml		3	2.500	7.500	Lab
QEIC facility	Laboratory	LAB-046	Glassware	conical flas;, brosilicate glass, 500ml		3	3.500	10.500	Lab
QEIC facility	Laboratory	LAB-047	Glassware	conical flas;, brosilicate glass, 1000ml		3	4.500	13.500	Lab
QEIC facility	Laboratory	LAB-048	Glassware	Beakers, borosilicate gladd, 100ml		3	1.500	4.500	Lab
QEIC facility	Laboratory	LAB-049	Glassware	Beakers, borosilicate gladd, 250ml		3	2.500	7.500	Lab
QEIC facility	Laboratory	LAB-050	Glassware	Beakers, borosilicate gladd, 500ml		3	3.500	10.500	Lab
QEIC facility	Laboratory	LAB-051	Glassware	Beakers, borosilicate gladd, 1000ml		3	4.500	13.500	Lab
QEIC facility	Laboratory	LAB-052	Glassware	Cylinder polupropylene, 100ml		3	1.000	3.000	Lab
QEIC facility	Laboratory	LAB-053	Glassware	Cylinder polupropylene, 500ml		3	1.900	5.700	Lab
QEIC facility	Laboratory	LAB-054	Glassware	Cylinder polupropylene, 1000ml		3	3.900	11.700	Lab
QEIC facility	Laboratory	LAB-055	Scale Microscopy Eyepiece graticules	MG/13002, 19mm		3	36.600	109.800	Lab
QEIC facility	Laboratory	LAB-056	Scale Microscopy Eyepiece graticules	MS/22002 plain		1	48.000	48.000	Lab
QEIC facility	Laboratory	LAB-057	Forceps	Stainless steel MS/49670, microscope slide forceps, spatulate ends		3	8.800	26.400	Lab
QEIC facility	Laboratory	LAB-058	Petri dishes	Borosilicate glass pyrex.		2	15.200	30.400	Lab
QEIC facility	Laboratory	LAB-059	Microscope (MEIJI TECHNO)	'C-Mounts'' with lence, MA		1	151.000	151.000	Lab
QEIC facility	Laboratory	LAB-060		CCD CAMERA CK3100N-P		1	472.000	472.000	Lab
			Wash bottle	500mL		3	2.800	8.400	Lab
QEIC facility	Training	TRN-001	Interactive projector	EPSON EB-475Wi	Pointer, Table projection mount, USB visualiser, wifi adopter	1	729.000	729.000	Lab
QEIC facility	Training	TRN-002	Projector	EPSON EB-95	Wireless adoptor, Pointer	1	393.000	393.000	Lab
QEIC facility	Exhibition	EXH-002	Liquid Crystal Display	Large		1	79.900	79.900	Lab
QEIC facility	Exhibition	EXH-003	DVD player			1	43.900	43.900	Lab
			Stereo scope	Mirror stereo scope		1	375.000	375.000	Lab

Appendix 4 List of donated equipment and handover note

Target	Purpose	QEIC Number	Equipment	Specification	Accessories	Quantity	Unit Price (RO)	Total Price (RO)	Storage location
Monitoring	Remote sensing	MON-034	Satellite image	35 mangrove sites, Geoeye (0.5m)		23	-	5,050.000	IT
Monitoring	Remote sensing		Extension software for Image processing software	Envi Feature Extraction Module, Network floating licence		1	3,700.000	3,700.000	IT
Monitoring	Remote sensing		ArcGIS Image Extention for Server	max. 4 core server		1	5,000.000	5,000.000	IT
Monitoring	Water/soil	MON-036	Water sampling bottle	Small size. Water sampling bottle propylene, 500ml		6	2.100	12.600	Lab
Monitoring	Water/soil	MON-038	Soil sampler	Oakfield Model B Tube Sampler Soil Probe 36'' Tube Kit, PN. 77015, 50mm diameter		2	175.000	350.000	Lab
Monitoring	Water/soil	MON-039	Soil thermometer	0-50 C		3	29.000	87.000	Lab
Monitoring	Water/soil	MON-040	Portable depth sounder	Hondex PS-7		3	150.000	450.000	Lab
Monitoring	Mangrove	MON-041	Tape measure	100 m		1	9.000	9.000	Lab
Monitoring	Mangrove	MON-042	Tree height measure	AT-12		3	213.307	639.921	Lab
Monitoring	Mangrove	MON-044	Chlorophyl meter	SPAD-502plus	Standard accessories including: SPAD-502 Reading checker, part: 1873-7. Hand strap for SPAD-502,502Plus, Part: 1873-1051. Softcase for SPAD-502, SPAD-502Plus, Part: 1873-600. Manufactutrer: Konica Miniolta-E.E.C Community	2	1,507.000	3,014.000	Lab
Monitoring	Mangrove	MON-045	Tree marker	Tree belt, number tape	Insulock	1000	1.687	1,686.512	Lab
Monitoring	Fauna	MON-046	Bird counter			5	1.800	9.000	Lab
Monitoring	Fauna	MON-047	Portable aquarium			1	7.580	7.580	Lab
Monitoring	Fauna	MON-048	Cast net			1	21.000	21.000	Lab
Monitoring	Fauna	MON-049	Fish cage	Large		1	15.000	15.000	QNR
Monitoring	Fauna		Fish cage	Net type		1	4.000	4.000	Lab
Monitoring	Fauna	MON-050	Gill net	Anchor, float, net, rope		1	16.833	16.833	QNR
Monitoring	Fauna	MON-051	Seine net	Float, net, rope, chain		1	29.400	29.400	QNR
Monitoring	Fauna	MON-052	Crab cage			1	5.000	5.000	Lab
Monitoring	Fauna	MON-053	Hand net			2	4.000	8.000	Lab+QNR
Monitoring	Fauna	MON-054	Animal tracking camera	Rushnell trophy cam. HD-colour viewer LED. Model. 119477. with security case		3	200.000	600.000	Lab
Monitoring	Fauna	MON-056	Ethanol	99%, 100L. 25 Litters drum		1	160.000	160.000	Lab
Monitoring	Fauna	MON-057	Glass jars	Large/medium/small set of one each		10	90.000	900.000	Lab
Monitoring	General	MON-058	Diving boots			3	14.000	42.000	QNR
Monitoring	General	MON-059	Diving boots			1	15.000	15.000	QNR
Monitoring	General	MON-060	Diving boots			2	18.500	37.000	QNR
Monitoring	General	MON-061	Cooler box	Large/medium/small		3	53.980	53.980	Lab
Monitoring	General	MON-062	Video camera	HDR-PJ230		1	169.900	169.900	Lab
Monitoring	General	MON-063	Camera lens	Nikon 28-300 mm		1	450.000	450.000	Badar
Monitoring	General	MON-064	Camera flash	SB-910 speedlight flash		1	200.000	200.000	Badar
Monitoring	General	MON-065	Tarp	4 m x 4m		1	59.000	59.000	Badar
Monitoring	General	MON-066	Sleeping bag			8	19.000	152.000	Lab
Monitoring	General	MON-067	Tent			5	139.970	139.970	Lab
Monitoring	General	MON-068	Scoop			2	4.990	9.980	Lab
Monitoring	General	MON-069	GPS	Garmin		2	180.000	360.000	Lab
Monitoring	General	MON-070	Table based magnifier		Illuminator lamp	3	281.000	843.000	Lab
Monitoring	General	MON-071	Canoe & Kayak	Open Canoe length 4.9m, width 90cm, depth 34cm, weight 32kg, capacity 450kg.	Otter Canadian P/P Blade, 150 cm x 2	1	1,000.000	1,000.000	QNR
Monitoring	General	MON-072	Canoe & Kayak	2 seater. Gemini 2 person sitting kayak. Length 3.8m, Width 83cm, Weight 32 kg, Capacity 250kg	Day touring paddle x 2 Canvas backrest x 2	4	650.000	2,600.000	QNR
Monitoring	General	MON-073	Canoe & Kayak		Waterproof bags	5	40.000	200.000	QNR
Monitoring	General	MON-074	Canoe & Kayak		Safety jacket, centre zip, Bouyancy aid, Red	10	0.000	0.000	QNR
Monitoring	General	MON-075	Canoe & Kayak		Predator centre helmet cut side cut	10	0.000	0.000	QNR
Monitoring	Topography	MON-076	Auto level	Sokkia B40	Tripod	1	235.000	235.000	Lab
Monitoring	Topography	MON-077	Measuring staff	Telescopic 5 m		2	20.000	40.000	Lab
Education	Education	EDU-001	Handheld computer	iPad		10	179.900	1,799.000	Lab
Education	Education	EDU-002	IC recorder	2GB		1	78.300	78.300	Lab
Education	Education	EDU-003	White board			2	75.000	150.000	Lab
Education	Education	EDU-004	Rubber boots	Small		3	1.200	3.600	QNR
Education	Education	EDU-005	Rubber boots	Large		6	3.000	18.000	QNR
Education	Education	EDU-006	Portable receiver	range >200 m	streo earphome	20	138.000	2,760.000	Lab
Education	Education	EDU-006-2	Portable charger	battery charger	carring case	1	744.000	744.000	Lab
Education	Education	EDU-007	Portable transmitter		head worn microphone	2	217.000	434.000	Lab
Education	Education	EDU-008	Back bag			100	1.500	150.000	Lab

Trader list

Appendix 4 List of donated equipment and handover note

Trader	Abbreviation	Contact Person	Mobile	Email	TEL	FAX	Home page	Address
Esri Muscat	EM	Mr. Yashwant Chauhan	96728029	yashwant.chauhan@easrimuscat.com	24693723	24693719	www.easrimuscat.com	Po.Box 1213, PC 113 Al-Khuwair
Business International Group llc.	BIG	Mr. Vimal R		big@bigllcoman.com	24814762	24813924		Po.Box 1268, PC 111 Seeb
Global Source Trading llc.	GST	Mr. K.R. Sarath Chandran	95098943	sm@gstoman.com	24791552	24791627	www.gstoman.com	Po.Box 387, PC 117 AlWadi alKabir
Global Source Trading llc.	GST	Mr. Suvin	97309707	suvin@gstoman.com	24791552	24791627	www.gstoman.com	Po.Box 387, PC 117 AlWadi alKabir
Science & Technology Equipment (Oman) llc.	S&TE	Mr. Nilesh Gandhi Mr. Ashok Kumar	99439581 95169612	scitec@omantel.net.om scitech@mni-llc.com	24490483	24490486		Po.Box 1598, PC 114 Jibroo
Muscat Pharmacy	MP	Mr. Karthikeyan	99385039	karthik@mpmct.com	24814501	4815201/52	www.muscatpharmacy.net	Po.Box 438, PC 100 Muscat
Tecunique LLC	Technique	Mr. Fahad Al-Jabri	99229693	fahad@techniquellc.com	24491244	24494285	www.techniquellc.com	Po.Box 89, PC 111 Seeb
Khimji Ramdas L.L.C	KR	Mr. Lakhoo	99212562		24795901	24795988	www.kr.om	www.kr.om
Suhail Bahwan Automobiles llc.	Nissan	Mr. Nasser Al-Harrasi	99388927	nasserharrasi@suhailbahwanautogroup.com	24560111	24560524	www.nissanoman.com	Po.Box 156, PC 112 Ruwi
Al-Jadyani Trading Co.	JT		99081758					
Loay International llc.	LI	Mr. Ramesh Rajan.K	99323631	rajan@loayoman.com	24794700	24708795	www.loayoman.com	Po.Box 1886, PC 112 Muscat
Loay International llc.	LI	Mr. B. Pereira	99317946	bmp@loayoman.com	24794700	24708795	www.loayoman.com	Po.Box 1886, PC 112 Muscat
Genetco	Genetco	Mr. Suresh Nayak	92907082	sureshn@genetco.net	24704457	24704645	www.genetco.net	Po.Box 3139, PC 112 Ruwi
Al-Assdiqa Integrated Enterprises llc.	AIE	Mr. Baby Joseph	99375239	alassdiqallc@gmail.com				
Al-Darah Trading Establishment	DTE		99316936		24420917	24421615		Po.Box 508, PC 121 Muscat
Al-Qabas Printing Press	QPP	Mr. Muhsin	99062127	printa2z@gmail.com	24478476	24489198		Po.Box 345, PC 113 Muscat
Eastern Engineering Services	EES		99091621	eastern@omantel.net.om		24799827		Po.Box 3365, PC 112 Ruwi
Rahat Computer	RC	Mr. Saif Al-Araimi	24780636		24780636			
Jumbo Electronics Co.LTD.llc.	Sony	Abdulmajid Al-Balouchi	24418358		24780636			
Bahwan Projects & Telecoms LLC	Bahwan				24793741	24796158		Po. Box 169, PC 100 Muscat
Tunes trading & services LLC	Tunes	Mohammed Abdel Daim	97777350	mohammed.abdeldaim@tunesoman.com	24489847	24479950	www.tunesoman.com	Po. Box 2312, PC112 Ruwi
Computer Express LLC	CPE			expressc@omantel.net.om	24705551	24705552		Po. Box 3621, PC112 Ruwi
Lazaward printing press	LPP			lazaward1995@gmail.com	22010671	22010671		Po. Box 741, PC131Muscat
Ubil Muscat	Ubil			yubilmuscat@hotmail.com	22425445	22425445		Po. Box 1177, PC212Muscat
Al-Amiri International LLC	Amiri				96736706	96736706		Po. Box 1000, PC112Ruwi

Handover note

Handover Note on Project Equipment

This agreement is made on the 12th of December 2013 between the Japan International Cooperation Agency (JICA) and the Ministry of Environment and Climate Affaires (MECA) on the handover and use of the project equipment listed hereto under the Qurm Environmental Information Center Project (hereinafter referred to as "the Project"), of which the Record of Discussions was signed by JICA and MECA on June 20, 2005.

The project equipment listed hereto is handed over to MECA on 12th of December 2013 in order to fulfill their tasks and responsibilities for the activities of the Qurm Environmental Information Center (QEIC). On the occasion of the handover of the equipment, it is agreed by JICA and MECA that:

1. The equipment shall be owned by MECA and exclusively used for the QEIC activities;
2. The equipment shall be used and managed by MECA;
3. MECA shall bear primary responsibility to maintain the equipment in good condition for use;
4. MECA shall be responsible for any damages caused on the equipment whenever using any of the equipment;
5. MECA shall handle and use the equipment with great care whenever using any of the equipment;
7. MECA shall take necessary measures including provision of rules and regulations to ensure the proper use of the equipment.
8. MECA shall bear the expenses necessary for or in connection with the respective uses of any of the equipment, and;
9. MECA shall be responsible for any claim for injuries or damages to any persons or property during the respective uses of any of the equipment.

Signed on the 12th of December, 2013

Signed by

H. Hatori

Mr. Hiroyuki Hatori
Senior Advisor
Japan International Cooperation Agency

Mr. Mohammed Al-Muharami
Director General of Nature Conservation
Ministry of Environment
and Climate Affaires

Witnessed by

Yoichi Harada

Mr. Yoichi Harada
Leader
Qurm Environmental
Information Center Project

Dr. Ahmed Al-Saidi
Director of Marine Environment
Conservation Department
Ministry of Environment
and Climate Affaires

Appendix 5

QEIC 8-year Operation Plan

Qurm Environmental Information Center Project

QEIC 8-year Operation Plan (2014-2021)

February 2014

JICA Expert Team

Appendix 5 QEIC 8-year Operation Plan

Appendix 5 QEIC 8-year Operation Plan

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Appendix 5 QEIC 8-year Operation Plan

Appendix 5 QEIC 8-year Operation Plan

1. Introduction

The QEIC 8-year Operation Plan (hereinafter abbreviated as "Plan") was prepared so that the various activities planned through the JICA QEIC project will be implemented and operated effectively. The content of the Plan was developed through discussions with the MECA counterpart, and was basically approved at the 4th JCC held on December 12th, 2013.

The Plan covers the period from 2014-2021. Although the QEIC building is expected to be completed in 2017, it was considered necessary to incorporate the preceding three years (2014-2016) into the Plan, so that MECA will continue the developed QEIC programs even after the termination of the JICA QEIC project. This period was also considered as an important preparation time prior to the full operation of QEIC, hence some of the planned activities will focus on capacity building of QEIC/MECA staff and establishment of QEIC organization. Development of a temporary facility is also planned inside MECA's property, which will function mainly as a temporary storage, laboratory and small-scale exhibition room. This facility has been named as "mini-QEIC", hence the initial three years (2014-2016) was termed as "mini-QEIC period" in this Plan.

The Plan provides an action and budget plan for the period 2014-2021, as well as organizational structure plan for QEIC. Room layout and facilities required for mini-QEIC are also attached in Appendix 2.

2. Responsibilities of QEIC

Under the jurisdiction of Ministry of Environment and Climate Affairs (MECA), QEIC will be primarily responsible to implement the following activities:

- Conservation and management of mangrove ecosystems of Oman
- Promotion of conservation and management of mangrove ecosystem in Oman and regional countries
- Planning and implementation of training, monitoring, plantation, education, exhibition and research activities related to conservation and management of mangrove ecosystem
- Technical focal point for mangrove-related international conventions and treaties (e.g. Ramsar Convention, ROPME)
- Others (e.g. organization of international meetings, management of database and website)

3. QEIC 8-year action plan (2014-2021)

An 8-year action plan for QEIC activities was prepared covering the period from 2014 to 2021. The action plan provides implementation schedule for the various programs planned for QEIC, which includes training, monitoring, plantation, education, exhibition as well as other general activities (see Section 3.1). Targets were set for the core QEIC activities namely, training, monitoring, plantation and education, based on analysis of current status and issues. Table 3.1 shows the targets set for training, monitoring, plantation and education activities.

Appendix 5 QEIC 8-year Operation Plan

Table 3.1 Targets set for training, monitoring, plantation and education activities

	Current status and issues	Target
Training	There are no systematic training courses related to mangrove ecosystem	**[2014-2016]** To enhance the capacity of QEIC staff and other related MECA/regional staff so that the planned QEIC activities can be effectively implemented by the end of 2016. **[2017-2021]** To expand training courses to potential collaboration partners and interested outside organizations.
Monitoring	Mangrove sites are not monitored and managed systematically despite the various threats	**[2014-2016]** To monitor and manage 10 high-priority mangrove sites* by 2016 **[2017-2021]** To monitor and manage 20 high-priority mangrove sites *high-priority mangrove sites: sites vulnerable to natural/social impacts or have high conservation values
Plantation	Plantation activities are not monitored systematically	To transplant 500,000 seedlings by year 2025 and improve continuously the success rate of transplantation through transplanted-seedlings monitoring program
Education	In general, education programs are conducted on a request basis. Need a more active approach to disseminate the importance of mangrove ecosystem conservation.	**[2014-2016]** - To implement regular education program at 5 schools by end of 2016 **[2017-2021]** - To implement regular education program at 2 schools per region (6 region) each year - To implement education programs at 3 private sector companies each year - To implement education programs at 1 local community per region (7 regions) each year

Prepared by JICA Expert Team

3.1 Implementation schedule of QEIC activities

1) General activities

Table 3.2 shows the implementation schedule of general activities. General activities include:

- Regular publication (newsletter, annual report)
- Development and update of website and database
- Participation in international conferences
- Organization of international workshops
- Construction of boardwalk and bird observation hut in QNR
- Research activities
- Maintenance of mangrove forest
- Internal evaluation of QEIC activities
- Reporting of QEIC activities to concerned stakeholders

Appendix 5 QEIC 8-year Operation Plan

Table 3.2 Implementation schedule of general activities

[General activties]																															
Category	Activity	mini QEIC												QEIC																	
		2014				2015				2016				2017				2018				2019				2020				2021			
Regular publication	QEIC newsletter		■		■		■		■		■		■		■		■		■		■		■		■		■		■		■		■
	QEIC annual report				■				■				■				■				■				■				■				■
Web site	Planning, procurement and development	■	■	■	■	■	■																										
	Update												■				■				■				■				■				■
Database	Planning, procurement and development	■	■	■	■	■	■	■	■																								
	Update												■								■								■				
Ramsar	Participation of COP							■												■											■		
	Update of RIS																					■											
ROPME	Reporting at annual meeting				■				■				■				■				■				■				■				■
Organization of international workshop																	■																■
QNR boardwalk and observation hut (phase 1)	Planning, procurement and construction					■	■	■	■																								
	Maintenance																■								■								■
QNR boardwalk and observation hut (phase 2)	Planning, procurement and construction																	■	■	■	■												
	Maintenance																												■				
Research	Planning											■	■																				
	Implementation													■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Publication																				■								■				
Maintenace of mangrove forest	5 sites per year					■				■				■				■				■				■				■			
Internal evaluation of QEIC activities					■				■				■				■				■				■				■				■
Annual reporting of QEIC activity	MECA and stakeholders				■				■				■				■				■				■				■				■

Prepared by JICA Expert Team

2) Training activities

Table 3.3 shows the implementation schedule of training activities. Training consists of courses on general topic, monitoring, plantation, protection, database, education and exhibition. During the mini-QEIC period, training activity will focus mainly on strengthening the capacity of QEIC and MECA/regional staffs. From the QEIC period, training activity is planned to be expanded to potential collaboration partners and interested outside organizations (e.g. NGOs, local community, students). The training courses will be reviewed and updated every 3 years.

Appendix 5 QEIC 8-year Operation Plan

Table 3.3 Implementation schedule of training activities

[Training]
Target of mini-QEIC period:
- To enhance the capacity of QEIC staff and other related MECA/regional staff so that the planned QEIC activities can be effectively implemented by the end of 2016.

Target of QEIC period (2017-2021)
- To expand training courses to potential collaboration partners and interested outside organizations.

Course	Target	mini QEIC			QEIC				
		2014	2015	2016	2017	2018	2019	2020	2021
General									
Function of QEIC	QEIC and MECA/regional staff								
	Other target groups								
Introduction on mangrove ecosystem	QEIC and MECA/regional staff								
	Other target groups								
Monitoring									
Introduction on mangrove ecosystem monitoring program	QEIC and MECA/regional staff								
	Potential partners (NGOs, locals, students)								
Monitoring of mangrove forest using remote sensing	QEIC and MECA/regional staff								
	Students								
Introduction on transplanted-seedling monitoring program	QEIC and MECA/regional staff								
	Potential partners (NGOs, locals, students)								
Plantation and protection									
Method of mangrove tree plantation	QEIC and MECA/regional staff								
	Potential partners (NGOs, locals, private companies)								
Guide for mangrove ecosystem protection	QEIC and MECA/regional staff								
	Potential partners (NGOs, locals, private companies)								
Database									
Introduction of QEIC database	QEIC and MECA/regional staff								
Education									
Producing education materials	QEIC and MECA/regional staff								
	Potential partners (NGOs)								
Implementing education programs	QEIC and MECA/regional staff								
	Potential partners (NGOs)								
Exhibition									
Introduction of QEIC exhibition	QEIC staff								
	Potential partners (NGOs)								
Review and update of training course									

Prepared by JICA Expert Team

3) Monitoring activities

Table 3.4 shows the implementation schedule of the “Mangrove Ecosystem Monitoring Program”. The number of monitoring sites will be gradually increased and is planned to cover 20 sites by 2017. The monitoring sites have been tentatively selected until 2016, focusing on high-priority mangrove sites (i.e. sites vulnerable to natural/social impacts or have high conservation values), and will be reviewed at the end of 2016 to determine the monitoring sites from 2017 onwards. Monitoring by remote sensing will focus mainly on large forests where field survey is insufficient and is planned to be conducted at 7 sites from 2017.

Appendix 5 QEIC 8-year Operation Plan

Table 3.4 Implementation schedule of monitoring activities

[Monitoring]
Target of mini-QEIC period:
- To monitor and manage 10 high-priority mangrove sites (e.g. sites vulnerable to natural/social impacts or have high conservation values) by 2016
Target of QEIC period (2017-2021):
- To monitor and manage 20 high-priority mangrove sites

Category	Target/activity	mini QEIC			QEIC				
		2014	2015	2016	2017	2018	2019	2020	2021
Mangrove ecosystem monitoring	Monitoring at 1 site (QNR)								
	Monitoring at 5 sites (Shinas, Harmul, Sawadi, QNR, Sur)								
	Monitoring at 10 sites (Shinas, Harmul, Sawadi, QNR, Sur, Ghawi, Durf, Kabir, Saghir, Auqad)								
	Review of monitoring sites and monitoring guideline								
	Monitoring at 20 sites based on review results								
Mangrove ecosystem monitoring (remote sensing)	1 site (QNR)								
	3 sites (Sawadi, QNR, Sur)								
	5 sites (Shinas, Harmul, Sawadi, QNR, Sur)								
	Review of monitoring sites and monitoring guideline								
	Monitoring of 7 sites based on review results								

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4) Plantation activities

Table 3.5 shows the implementation schedule of transplantation activities including monitoring activities (i.e. Transplanted-seedling Monitoring Program). The number of transplantation sites is 7 sites until 2016 and is planned to be increased to 9 sites from 2017 onwards. Transplantation will be conducted either in the period of January-March or July-September. While the transplantation sites in 2014 have been selected, transplantation sites from 2015 onwards will be determined based on future status. The overall goal is to transplant 500,000 seedlings by 2025.

The status of the transplanted seedlings will be monitored at each transplantation site, and the data and experience obtained through the monitoring activities will be utilized to improve the success rate of transplantation. Monitoring is expected to be conducted for around 1-year after transplantation.

Appendix 5 QEIC 8-year Operation Plan

Table 3.5 Implementation schedule of transplantation activities

[Plantation]
Target:
- To transplant 500,000 seedlings by year 2025
- To continuously improve the success rate of transplantation through transplanted-seedlings monitoring program

Category	Target	mini QEIC			QEIC				
		2014	2015	2016	2017	2018	2019	2020	2021
Transplantation	7 sites (Shinas, Grim, Sur, Ghawi/Aljazar, Duqm, Mashirah, Salalah)								
	7 sites (locations to be determined based on future status)								
	7 sites (locations to be determined based on future status)								
	9 sites/year (locations to be determined based on future status)								
Transplanted-seedling monitoring	7 sites (Shinas, Grim, Sur, Aljazar, Duqm, Mashirah, Salalah)								
	7 sites (locations to be determined based on future status)								
	7 sites (locations to be determined based on future status)								
	Review and update of plantation guideline								
	9 sites/year (locations to be determined based on future status)								

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5) Education activities

Table 3.6 shows the implementation schedule of education activities. In addition to the ongoing education programs (mainly request-based programs), education activities will be expanded by actively inviting or visiting concerned target groups (e.g. primary school, private sector companies and local community) in Muscat and other coastal regions. Education activities in the regional areas are planned from 2017. The education programs will be reviewed and updated every 3 years.

Appendix 5 QEIC 8-year Operation Plan

Table 3.6 Implementation schedule of education activities

[Environmental education]
Target of mini-QEIC period:
- To implement regular education program at 5 schools by end of 2016

Target of QEIC period (2017-2021)
- To implement regular education program at 2 schools per region (6 region) each year
- To implement education programs at 3 private sector companies each year
- To implement education programs at 1 local community per region (7 regions) each year

Category	Target	mini QEIC			QEIC				
		2014	2015	2016	2017	2018	2019	2020	2021
Programs for primary schools	Schools in Muscat (5 schools)								
	Schools in regional area (2 schools/region/year)								
Programs for private sector	e.g. service, transportation, waste sectors								
Programs for local community	Coastal regions (Musandam, North Batinah, South Batinah, Muscat, Sharqiyah, Al Wusta, Dhofar)								
Request-based programs in QNR	All organizations								
Review and update of education programs									

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6) Exhibition activities

Table 3.7 shows the implementation schedule of exhibition activities. Until the QEIC building is completed, development of a temporary and small-scale exhibition is planned inside the mini QEIC.

QEIC will have a permanent and special exhibition, which are planned to be developed by outsourcing to a private company. The special exhibition will be updated annually.

Large-scale maintenance work of the exhibition facilities will also be required 2/year, which will also be outsourced to a private company. Daily maintenance will be conducted by QEIC staff, but they should be trained before full operation by the contracted private company.

Appendix 5 QEIC 8-year Operation Plan

Table 3.7 Implementation schedule of exhibition activities

[Exhibition]																															
Category	Activity	mini QEIC												QEIC																	
		2014				2015				2016				2017				2018				2019				2020				2021			
Mini QEIC (temporary exhibition)	Planning and development																														
QEIC (permanent exhibition)	Planning, procurement and development																														
	Training for daily maintenance																														
	Large-scale maintenance (outsource)																														
QEIC (special exhibition)	Planning, procurement and development																														

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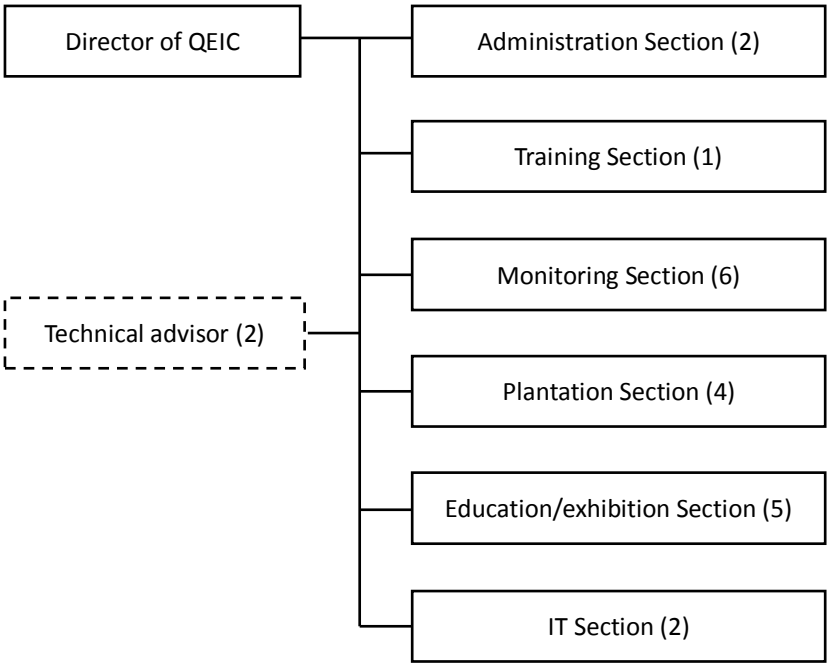
Appendix 5 QEIC 8-year Operation Plan

4. Organizational structure of QEIC

In order to ensure effective and sustainable operation of QEIC, it is important to develop an appropriate organizational structure and assign adequate number of qualified staffs.

4.1 Organization chart (2017)

Figure 4.1 shows the organization chart of QEIC in 2017, which is the year when QEIC is expected to be in full operation. QEIC will consist of 6 sections (5 technical sections and 1 administration section) and a director. To technically assist the QEIC staffs, two technical advisors are assigned as a temporary post.



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Note: The number in the parenthesis indicates the number of staff

Figure 4.1 Organizational chart of QEIC as of 2017

4.2 Responsibility of each QEIC sections

Table 4.1 shows the main responsibilities of each QEIC sections.

Appendix 5 QEIC 8-year Operation Plan

Table 4.1 Main responsibility of each QEIC sections

Section	Main responsibility
Director	・ Overall supervision and management of QEIC activities ・ Evaluation and reporting of QEIC activities
Administration Section	・ Management of QEIC activities ・ Management of budget and expenditure ・ Focal point of ROPME and RAMSAR convention
Training Section	・ Planning and implementation of training activities ・ Organization of national and international workshops
Monitoring Section	・ Planning and implementation of monitoring activities ・ Planning and implementation of protective measures ・ Planning and implementation of research activities ・ Maintenance of equipment and facilities used for monitoring activities, including laboratory equipment
Plantation Section	・ Planning and implementation of plantation activities ・ Management of seedling nursery ・ Planning and implementation of research activities
Education/exhibition Section	・ Planning and implementation of education activities ・ Preparation of publication materials ・ Planning and implementation of exhibition programs ・ Maintenance and update of exhibition facilities
IT Section	・ Management and update of QEIC website and database ・ Others (e.g. remote sensing analysis, GIS)

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4.3 Responsibility and qualifications of QEIC staff

Table 4.2 shows the main responsibilities and qualifications required for each QEIC staff.

Table 4.2 Main responsibilities and qualifications required for each QEIC staff

Section	Position	Main responsibility	Qualifications
Director		・ Overall supervision and direction of administration and operation	
Technical Advisor	1	・ Supervision of monitoring and training activities ・ Training of QEIC staff	・ Have a good understanding on QEIC program ・ Have more than 10-years experiences in coastal monitoring ・ Have a degree in the field of marine environment
	2	・ Supervision of education/exhibition and training activities ・ Training of QEIC staff	・ Have a good understanding on QEIC program ・ Have sufficient experiences in planning and implementation of environmental education and

Appendix 5 QEIC 8-year Operation Plan

Section	Position	Main responsibility	Qualifications
			exhibition ・Have a degree in the field of marine environment
Administration Section	Head of Section	・Management of QEIC activities ・Management of budget and expenditure	・Have a good understanding on QEIC program ・Have more than 5-years experiences in administration works
	Assistant	・Accountant and secretary work	・Have more than 5-years experiences in office work
Training Section	Head of Section	・Organization and implementation of training activities ・Organization of workshops and other meetings	・Have more than 5-years experiences in organization of meetings, events etc.
Monitoring Section	Head of Section	・Management of monitoring activities ・Planning and implementation of monitoring and protective measures ・Training activity	・Have experience in management ・Have more than 5-year experience in coastal monitoring ・Have a degree in the field of marine environment
	Monitoring expert	・Planning and implementation of monitoring and protective measures ・Management of monitoring data ・Maintenance of monitoring equipment	・Have more than 5-year experience in coastal monitoring ・Have a degree in the field of marine environment
	Biologist/ecologist	・Implementation of fauna survey ・Species identification of collected fauna ・Management of collected species ・Maintenance of equipment	・Have more than 5-year experience in field survey works ・Have a degree in the field of marine ecology/biology
	Chemical analyst	・Chemical analysis ・Maintenance of analysis equipment	・Have more than 5-year experience in chemical analysis
	Assistant worker 1	・Assistance of monitoring works	・Have experience in field survey
	Assistant worker 2	・Assistance of monitoring works	・Have experience in field survey
Plantation Section	Head of Section	・Management of plantation activities ・Planning and implementation of plantation activities ・Monitoring of transplanted seedlings	・Have experience in mangrove plantation including seedling preparation

Appendix 5 QEIC 8-year Operation Plan

Section	Position	Main responsibility	Qualifications
		・Training activity	
	Plantation expert	・Planning and implementation of plantation activities ・Management of seedling facility ・Monitoring of transplanted seedlings	・Have a degree in the field of plant biology
	Assistant worker 1	・Assistance of plantation-related works	・Have experience in field works
	Assistant worker 2	・Assistance of plantation-related works	・Have experience in field works
Education/exhibition Section	Head of Section	・Management of education activities ・Planning and implementation of education/exhibition activities ・Training activity	・Have more than 5-year experience in planning and implementation of education activities
	Education expert	・Planning and implementation of education/exhibition activities	・Have a degree in the field of marine environment
	Designer	・Designing of education materials	・Have a degree in the field of designing or have more than 5-year experience in designing
	Guide 1	・Guide work at exhibition hall and QNR ・Maintenance of exhibition facilities	・Have education background on marine environment
	Guide 2	・Guide work at exhibition hall and QNR ・Maintenance of exhibition facilities	・Have education background on marine environment
IT Section	Head of Section	・Management of IT activities ・Management and update of website and database ・Analysis of remote sensing data ・Training activity	・Have experience in GIS and image processing ・Have experience in website and database management
	IT expert	・Management and update of website and database ・Analysis of remote sensing data	・Have experience in GIS and image processing ・Have experience in website and database management

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4.4 Assignment and recruitment plan of QEIC staff

Table 4.3 shows the assignment and recruitment plan of each QEIC staff. Except the administration and training section, all required staffs should be recruited and officially assigned by 2015. By 2017, all recruitment should be completed. Assignment of technical

advisor is planned to be terminated at the end of 2017, as QEIC staff should be fully capable of operating the QIEC programs without assistance from technical advisor.

Table 4.3 Assignment and recruitment plan of QEIC staff

Section	Position	2014	2015	2016	2017	2018	2019	2020	2021
Director		1	1	1	1	1	1	1	1
Technical advisor		2	2	2	2	0	0	0	0
Administration	Head	0	0	0	1	1	1	1	1
	Assisstant	0	0	0	1	1	1	1	1
Training	Head	0	0	0	1	1	1	1	1
Monitoring	Head	1	1	1	1	1	1	1	1
	Monitoring expert	1	1	1	1	1	1	1	1
	Biologist	0	1	1	1	1	1	1	1
	Chemist	0	1	1	1	1	1	1	1
	Assisstant	0	1	1	1	1	1	1	1
	Assisstant	0	1	1	1	1	1	1	1
Plantation	Head	1	1	1	1	1	1	1	1
	Plantation expert	0	1	1	1	1	1	1	1
	Assisstant	0	1	1	1	1	1	1	1
	Assisstant	0	1	1	1	1	1	1	1
Education/exhibition	Head	1	1	1	1	1	1	1	1
	Education expert	0	1	1	1	1	1	1	1
	Designer	0	1	1	1	1	1	1	1
	Assisstant	0	1	1	1	1	1	1	1
	Assisstant	0	1	1	1	1	1	1	1
IT	Head	1	1	1	1	1	1	1	1
	IT expert	0	1	1	1	1	1	1	1
Total		8	20	20	23	21	21	21	21

Note: Temporary assignment in 2014; Official assignment in 2015

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5. Budget plan of QEIC (2014-2021)

Table 5.1 shows the budget required for implementing the various QEIC activities from 2014-2021. Note that the estimated budget does not include the following costs as it will be covered through MECA's budget:

- Salary of QEIC staffs
- Travel expenses of QEIC staffs
- Maintenance cost of QEIC facilities
- Lighting and fuel costs of QEIC
- Cost of development, maintenance and update of QEIC's database and website
- Cost of development, maintenance and update of QEIC's exhibition

Appendix 5 QEIC 8-year Operation Plan

Table 5.1 Budget required for implementing the various QEIC activities from 2014-2021 (US$)

Category	2014	2015	2016	2017	2018	2019	2020	2021
General	11,000	148,000	63,000	136,000	363,000	86,000	113,000	136,000
Training	10,000	11,000	13,000	17,000	17,000	18,000	17,000	17,000
Monitoring	11,500	40,000	62,500	42,000	27,000	27,000	27,000	27,000
Plantation	27,900	35,400	25,400	40,050	28,000	38,000	30,500	38,000
Education	18,200	18,200	18,200	34,350	34,350	34,350	34,350	34,350
Total	**78,600**	**252,600**	**182,100**	**269,850**	**469,350**	**203,350**	**221,850**	**252,350**

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The annual budget in full operation phase is more or less around US$ 200,000. However, budget of 2018 is significantly higher mainly due to construction of new infrastructures (boardwalk and bird observation hut) in QNR.

5.1 Cost breakdown of general activities

Table 5.2 shows the cost breakdown of general activities. The main costs are construction of QNR's boardwalk and bird observation hut, research activities and maintenance of mangrove forest.

Table 5.2 Cost breakdown of general activities (US$)

General										Note
Category	Activity	mini QEIC			QEIC					
		2014	2015	2016	2017	2018	2019	2020	2021	
Regular publication	QEIC newsletter	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
	QEIC annual report	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
Web site	Planning, procurement and development	0	0	0	0	0	0	0	0	MECA budget
	Update	0	0	0	0	0	0	0	0	
Database	Planning, procurement and development	0	0	0	0	0	0	0	0	MECA budget
	Update	0	0	0	0	0	0	0	0	
Ramsar	Participation of COP	0	0	0	0	0	0	0	0	MECA budget
	Update of RIS	0	0	0	0	0	0	0	0	
ROPME	Reporting at annual meeting	0	0	0	0	0	0	0	0	MECA budget
Organization of international workshop		0	0	0	50,000	0	0	0	50,000	
QNR boardwalk and observation hut (phase 1)	Planning, procurement and construction	0	112,000	0	0	0	0	0	0	
	Maintenance	0	0	0	0	0	0	0	0	MECA budget
QNR boardwalk and observation hut (phase 2)	Planning, procurement and construction	0	0	0	0	250,000	0	0	0	
	Maintenance	0	0	0	0	0	0	0	0	MECA budget
Research	Implementation	0	0	0	50,000	50,000	50,000	50,000	50,000	
Maintenace of mangrove forest	5 sites per year	0	25,000	25,000	25,000	25,000	25,000	25,000	25,000	
Equipment maintenance	Procurement of consumables	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	
	Replacement of sensors, etc.	0	0	27,000	0	27,000	0	27,000	0	
Total		11,000	148,000	63,000	136,000	363,000	86,000	113,000	136,000	

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5.2 Cost breakdown of training activities

Table 5.3 shows the cost breakdown of training activities. The costs include the following:

- Cost for printing training materials
- Cost for outsourcing lecturers for courses that require special expertise: Outsourcing after 2017 is not included since it is expected that QEIC staffs will become competent as lecturers after 2017 (except exhibition)
- Invitation cost of trainees: It is the cost for inviting potential collaboration partners (e.g. NGOs, local communities) to QEIC for training activities such as monitoring and plantation.
- Cost for holding workshop to review and update the training courses.

Table 5.3 Cost breakdown of training activities (US$)

Training									
Item	Details	mini QEIC			QEIC				
		2014	2015	2016	2017	2018	2019	2020	2021
General	Material printing	5,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Outsourcing for lecturer	Remote sensing (3 days)	3,000	3,000	3,000	0	0	0	0	0
	Species idetification (1 day)	1,000	1,000	1,000	0	0	0	0	0
	Bird survey (1 day)	1,000	1,000	1,000	0	0	0	0	0
	Exhibition (1 day)	0	0	1,000	1,000	1,000	1,000	1,000	1,000
Invitation of trainee					10,000	10,000	10,000	10,000	10,000
Review and update	Meeting with related organizations	0	0	1,000	0	0	1,000	0	0
Total		10,000	11,000	13,000	17,000	17,000	18,000	17,000	17,000

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5.3 Cost breakdown of monitoring activities

Table 5.4 shows the cost breakdown of monitoring activities. The costs include the following:

- Cost for field survey (e.g. purchase of consumables).
- Outsourcing cost for chemical analysis for cross-checking (only in 2014)
- Outsourcing cost for bird survey and fauna identification: Outsourcing after 2017 is not included as QEIC staffs are expected to be competent by then.
- Cost for purchasing satellite images.

Table 5.4 Cost breakdown of monitoring activities (US$)

Monitoring									
Category	Activity	mini QEIC			QEIC				
		2014	2015	2016	2017	2018	2019	2020	2021
Mangrove ecosystem monitoring	Monitoring at 1 site	11,500							
	Monitoring at 5 sites		40,000						
	Monitoring at 10 sites			62,500					
	Monitoring at 20 sites				42,000	27,000	27,000	27,000	27,000
Total		11,500	40,000	62,500	42,000	27,000	27,000	27,000	27,000

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5.4 Cost breakdown of plantation activities

Table 5.5 shows the cost breakdown of plantation activities. The costs include the following:

- Hiring of workers for nurseries and plantation activities.
- Purchasing of consumables (e.g. plastic pots, soil) for nurseries (4 nurseries).
- Maintenance cost of nurseries (e.g. shade net, painting) (4 nurseries).
- Transportation cost of seedlings to the plantation sites.
- Monitoring of transplanted seedlings (e.g. purchase of consumables).

Table 5.5 Cost breakdown of plantation activities (US$)

Plantation									
Category	Target	mini QEIC			QEIC				
		2014	2015	2016	2017	2018	2019	2020	2021
Transplantation	Transplantation at 7 sites	27,200							
	Transplantation at 7 sites		34,700						
	Transplantation at 7 sites			24,700					
	Transplantation at 9 sites				39,600	27,100	37,100	29,600	37,100
Transplanted-seedling monitoring	Monitoring at 7 sites	700							
	Monitoring at 7 sites		700						
	Monitoring at 7 sites			700					
	Monitoring at 9 sites				900	900	900	900	900
Total		27,900	35,400	25,400	40,500	28,000	38,000	30,500	38,000

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5.5 Cost breakdown of education activities

Table 5.6 shows the cost breakdown of education activities. The costs include the following:

- Preparation cost of education materials (mainly printing)
- Gifts and snacks for the participants (estimated as US$ 17/participant)

Table 5.6 Cost breakdown of education activities (US$)

Environmental education									
Category	Target	mini QEIC			QEIC				
		2014	2015	2016	2017	2018	2019	2020	2021
Programs for primary schools	Schools in Muscat (5 schools)	4,250	4,250	4,250	4,250	4,250	4,250	4,250	4,250
	Schools in 6 coastal regions (2 schools/region/year)	0	0	0	10,200	10,200	10,200	10,200	10,200
Programs for private sector	3 companies/year	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550
Programs for local community	7 coastal regions (1 community/region/year)	0	0	0	5,950	5,950	5,950	5,950	5,950
Request-based programs in QNR	All organizations	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800
Preparation of education material		4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600
Total		18,200	18,200	18,200	34,350	34,350	34,350	34,350	34,350

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Appendix 1 Detailed cost breakdown

Training

Course	Item		2014	2015	2016	2017	2018	2019	2020	2021	Note
General	Print cost of training material		1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
Monitoring	Outsource of lecturer	Remote sensing (3 days/year)	3,000	3,000	3,000	0	0	0	0	0	No outsourcing after 2017
		Species identification (1 day/year)	1,000	1,000	1,000	0	0	0	0	0	
		Bird survey (1 day/year)	1,000	1,000	1,000	0	0	0	0	0	
	Invitation cost of trainee	5 person/year	0	0	0	2,500	2,500	2,500	2,500	2,500	$500/person. Not including MECA/regional staff
	Print cost of training material		1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
Plantation	Print cost of training material		1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
	Invitation cost of trainee	5 person/year	0	0	0	2,500	2,500	2,500	2,500	2,500	$500/person. Not including MECA/regional staff
Database	Print cost of training material		0	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
Education	Print cost of training material		1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
	Invitation cost of trainee	5 person/year	0	0	0	2,500	2,500	2,500	2,500	2,500	$500/person. Not including MECA/regional staff
Exhibition	Print cost of training material		1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
	Outsource of lecturer	Exibition planner (1 day/year)			1,000	1,000	1,000	1,000	1,000	1,000	
	Invitation cost of trainee	5 person/year	0	0	0	2,500	2,500	2,500	2,500	2,500	$500/person. Not including MECA/regional staff
Revision	Invitation cost for revision meeting	10 person/time			1,000			1,000			$100/person.
Total			10,000	11,000	13,000	17,000	17,000	18,000	17,000	17,000	

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Appendix 5 QEIC 8-year Operation Plan

Monitoring

Year	Site	Total	Field survey	Chemical analysis	Bird survey	Fauna identification	Remote sensing	Basis of cost estimation					Note
								Field survey	Chemical analysis	Bird survey	Fauna identification	Remote sensing	
2014	QNR	11,500	2,500	2,000	2,000	4,000	1,000	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)	Frequency: 2/year Cost per survey: $1,000 (outsourcing)	Frequency: 2/year Cost per survey: $1,000 (outsourcing)	Frequency: 2/year Cost per survey: $2,000 (outsourcing)	Frequency: 1/year Cost per survey: $1,000 (satellite image)	- Outsourcing for chemical analysis assumed to be required only for 2014 - Outsourcing for bird survey and fauna identification is assumed to be not required after 2017 - The monitoring sites are tentative
	Total	**11,500**	**2,500**	**2,000**	**2,000**	**4,000**	**1,000**						
2015	QNR	4,000	1,000	0	2,000	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)		Frequency: 2/year Cost per survey: $1,000 (outsourcing)		Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Shinas	8,500	2,500	0	2,000	4,000	0	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)		Frequency: 2/year Cost per survey: $1,000 (outsourcing)	Frequency: 2/year Cost per survey: $2,000 (outsourcing)		
	Harmul	8,500	2,500	0	2,000	4,000	0	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)		Frequency: 2/year Cost per survey: $1,000 (outsourcing)	Frequency: 2/year Cost per survey: $2,000 (outsourcing)		
	Sawadi	9,500	2,500	0	2,000	4,000	1,000	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)		Frequency: 2/year Cost per survey: $1,000 (outsourcing)	Frequency: 2/year Cost per survey: $2,000 (outsourcing)	Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Sur	9,500	2,500	0	2,000	4,000	1,000	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)		Frequency: 2/year Cost per survey: $1,000 (outsourcing)	Frequency: 2/year Cost per survey: $2,000 (outsourcing)	Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Total	**40,000**	**11,000**	**0**	**10,000**	**16,000**	**3,000**						
2016	QNR	4,000	1,000	0	2,000	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)		Frequency: 2/year Cost per survey: $1,000 (outsourcing)		Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Shinas	4,000	1,000	0	2,000	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)		Frequency: 2/year Cost per survey: $1,000 (outsourcing)		Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Harmul	4,000	1,000	0	2,000	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)		Frequency: 2/year Cost per survey: $1,000 (outsourcing)		Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Sawadi	4,000	1,000	0	2,000	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)		Frequency: 2/year Cost per survey: $1,000 (outsourcing)		Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Sur	4,000	1,000	0	2,000	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)		Frequency: 2/year Cost per survey: $1,000 (outsourcing)		Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Ghawi	8,500	2,500	0	2,000	4,000	0	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)		Frequency: 2/year Cost per survey: $1,000 (outsourcing)	Frequency: 2/year Cost per survey: $2,000 (outsourcing)		
	Durf	8,500	2,500	0	2,000	4,000	0	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)		Frequency: 2/year Cost per survey: $1,000 (outsourcing)	Frequency: 2/year Cost per survey: $2,000 (outsourcing)		
	Kabir	8,500	2,500	0	2,000	4,000	0	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)		Frequency: 2/year Cost per survey: $1,000 (outsourcing)	Frequency: 2/year Cost per survey: $2,000 (outsourcing)		
	Saghir	8,500	2,500	0	2,000	4,000	0	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)		Frequency: 2/year Cost per survey: $1,000 (outsourcing)	Frequency: 2/year Cost per survey: $2,000 (outsourcing)		
	Auqad	8,500	2,500	0	2,000	4,000	0	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)		Frequency: 2/year Cost per survey: $1,000 (outsourcing)	Frequency: 2/year Cost per survey: $2,000 (outsourcing)		
	Total	**62,500**	**17,500**	**0**	**20,000**	**20,000**	**5,000**						

Appendix 5 QEIC 8-year Operation Plan

Year	Site	Total	Field survey	Chemical analysis	Bird survey	Fauna identification	Remote sensing	Basis of cost estimation					Note
								Field survey	Chemical analysis	Bird survey	Fauna identification	Remote sensing	
2017	QNR	2,000	1,000	0	0	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)				Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Shinas	2,000	1,000	0	0	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)				Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Harmul	2,000	1,000	0	0	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)				Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Sawadi	2,000	1,000	0	0	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)				Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Sur	2,000	1,000	0	0	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)				Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Ghawi	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	Durf	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	Kabir	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	Saghir	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	Auqad	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	A	3,500	2,500	0	0	0	1,000	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)				Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	B	3,500	2,500	0	0	0	1,000	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)				Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	C	2,500	2,500	0	0	0	0	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)					
	D	2,500	2,500	0	0	0	0	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)					
	E	2,500	2,500	0	0	0	0	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)					
	F	2,500	2,500	0	0	0	0	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)					
	G	2,500	2,500	0	0	0	0	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)					
	H	2,500	2,500	0	0	0	0	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)					
	I	2,500	2,500	0	0	0	0	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)					
	J	2,500	2,500	0	0	0	0	Frequency: 2/year Cost of initial survey: $2,000 (permanent stakes etc.) Cost of regular survey: $500 (consumables etc.)					
	Total	**42,000**	**35,000**	**0**	**0**	**0**	**7,000**						

Appendix 5 QEIC 8-year Operation Plan

Year	Site	Total	Field survey	Chemical analysis	Bird survey	Fauna identification	Remote sensing	Basis of cost estimation					Note
								Field survey	Chemical analysis	Bird survey	Fauna identification	Remote sensing	
2018 - 2021	QNR	2,000	1,000	0	0	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)				Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Shinas	2,000	1,000	0	0	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)				Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Harmul	2,000	1,000	0	0	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)				Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Sawadi	2,000	1,000	0	0	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)				Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Sur	2,000	1,000	0	0	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)				Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	Ghawi	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	Durf	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	Kabir	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	Saghir	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	Auqad	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	A	2,000	1,000	0	0	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)				Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	B	2,000	1,000	0	0	0	1,000	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)				Frequency: 1/year Cost per survey: $1,000 (satellite image)	
	C	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	D	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	E	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	F	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	G	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	H	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	I	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	J	1,000	1,000	0	0	0	0	Frequency: 2/year Cost of regular survey: $500 (consumables etc.)					
	Total	**27,000**	**20,000**	**0**	**0**	**0**	**7,000**						

Appendix 5 QEIC 8-year Operation Plan

Prepared by JICA Expert Team

Plantation

Item	2014	2015	2016	2017	2018	2019	2020	2021	Note
Workers for nurseries	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	$30/Worker 50 workers for 4 nurseries
Workers for plantation	3,900	3,900	3,900	4,500	4,500	4,500	4,500	4,500	$30/worker 130 workers for 7 sites (2014-2016) 150 workers for 9 sites (2017-2019)
Soil for nursery pots	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	$500/nursery 4 nurseries
Rental trucks (7 tons) for transportation	6,300	6,300	6,300	8,100	8,100	8,100	8,100	8,100	$900/site 7 sites (2014-2016) 9 sites (2017-2021)
Plastic pots for seedlings	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	$250/nursery 4 nurseries
Maintenace of shade net	0	10,000	0	10,000	0	10,000	0	10,000	$2,500/nursery (once per 2 years) 4 nurseries
Maintenance of nurseries	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	$10,000/nursery for support pole maintenance and painting (one nursery/year = approximately once per 4 years)
Monitoring of transplanted seedlings	700	700	700	900	900	900	900	900	$100/site 7 sites (2014-2016) 9 sites (2017-2021)
Others	2,500	0	0	2,500	0	0	2,500	0	$2,500/3 years as emergency kit
Total	27,900	35,400	25,400	40,500	28,000	38,000	30,500	38,000	

Prepared by JICA Expert Team

Appendix 5 QEIC 8-year Operation Plan

Education

Category	Target	Basis of cost estimation	2014	2015	2016	2017	2018	2019	2020	2021
Programs for primary schools	Schools in Muscat (5 schools)	- 50 students per school - 17 US$ per person - 5 schools in Muscat	4,250	4,250	4,250	4,250	4,250	4,250	4,250	4,250
	Schools in 6 coastal regions (2 schools/region/year)	- 50 students per school - 17 US$ per person - 2 schools per region	0	0	0	10,200	10,200	10,200	10,200	10,200
Programs for private sector	e.g. service, transportation, waste sectors	- 50 persons per sector - 17 US$ per person - 3 private sectors	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550
Programs for local community	7 coastal regions	- 50 persons per region - 17 US$ per person - 1 community/region/year	0	0	0	5,950	5,950	5,950	5,950	5,950
Request-based programs in QNR	All organizations	- 50 persons per program - 17 US$ per person - 8 programs per year	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800
Preparation of education materials			4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600
Total			18,200	18,200	18,200	34,350	34,350	34,350	34,350	34,350

Prepared by JICA Expert Team

Cost breakdown for preparing education materials

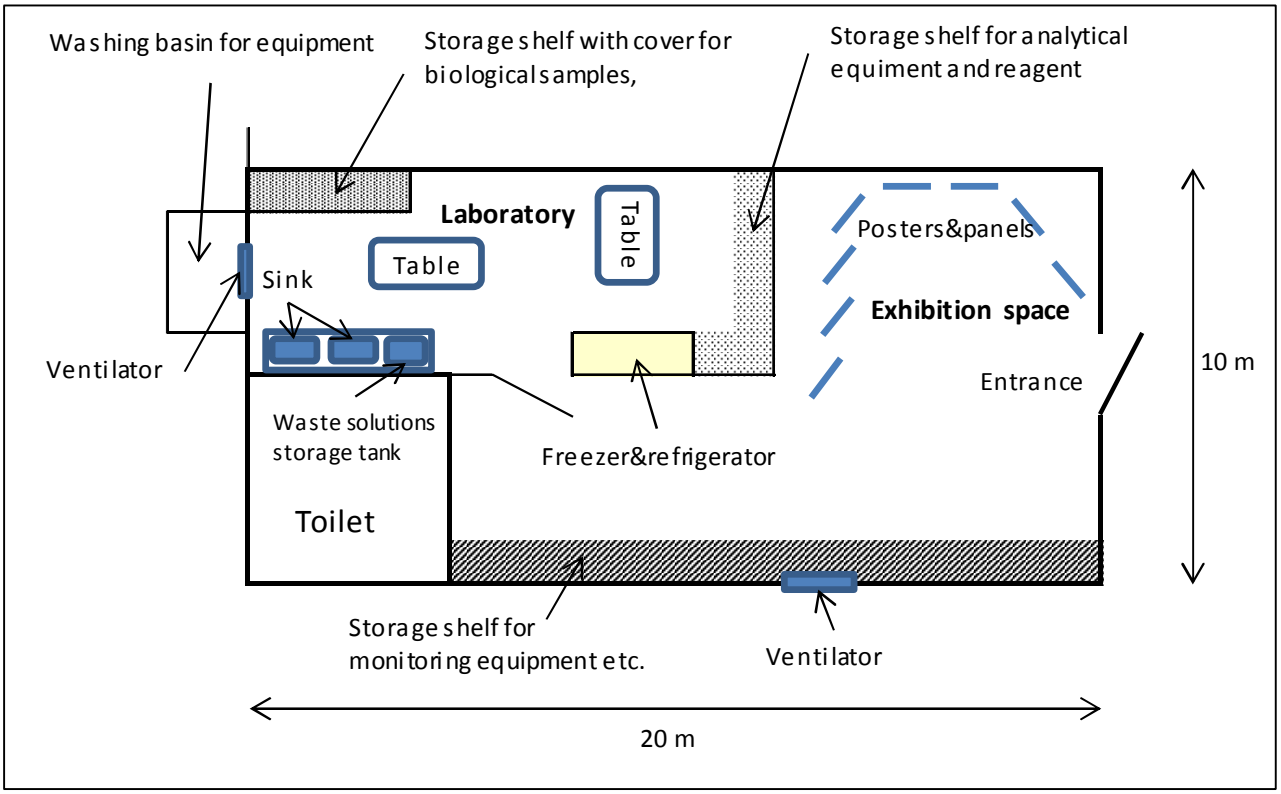
No	Item	Number	Unit cost (RO)	Total cost (RO)	Total cost (US$)
1	Poster	3	30.000	90.000	234.0
2	Poster (panel)	3	40.000	120.000	312.0
3	Rollup banner	4	50.000	200.000	520.0
4	Brochure	500	1.000	500.000	1,300.0
5	Puzzle	200	2.000	400.000	1,040.0
6	Coloring paper	200	0.600	120.000	312.0
	TOTAL	—	—	1,770.000	4,602.0

Note: Calculated at rate of 1 R.O. = US$ 2.6

Prepared by JICA Expert Team

Appendix 2 Room layout and facilities required for mini-QEIC

Room layout:



Prepared by JICA Expert Team

Necessary facilities: sink, tap water, power source, tables, shelves, ventilator, freezer/refrigerator

Appendix 6

Photos of fauna identified through the Project

Appendix 6 Photos of fauna identified through the Project

Photos of fish

		
Aphanius dispar (male)	***Aphanius dispar*** (female)	***Terapon jarbua***
		
Gerres acinaces	***Ambassis gymnocephalus***	***Moolgarda seheli***
		
Oxyurichthys ophthalmonema	***Favonigobius rechei***	***Cryptocentroides insignis***
		
Oreochromis niloticus	***Acanthopagrus latus***	***Ellochelon vaigiensis***

Appendix 6 Photos of fauna identified through the Project

Photos of crustaceans and gastropods

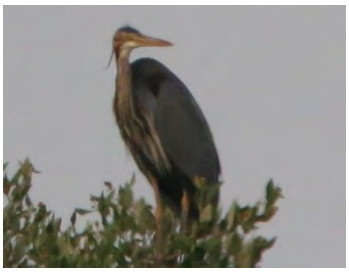
		
Ocypode saratan	***Macrophthalmus*** sp.1	***Macrophthalmus*** sp.2
		
Macrophthalmus sp.3	***Uca lactea*** (male)	***Uca lactea*** (female)
		
Uca sp.1	***Uca*** sp.2	***Uca*** sp.3
		
Uca sp.4	***Metopograpsus*** sp.	***Perisesarma*** sp.
		
Episesarma sp.	***Perisesarma guttatum***	***Thalamita crenata***
		
Thalamita crenata (juvenile)	***Portunus segnis***	***Portunus*** sp.

Appendix 6 Photos of fauna identified through the Project

		
Alpheus sp.	***Terebralia palustris***	***Cerithidea sp.***

Appendix 6 Photos of fauna identified through the Project

Photos of birds

 Black-crowned Night Heron	 Cattle Egret	 Grey Heron
 Western Great Egret	 Western Reef Heron	 Purple Heron
 Common Greenshank	 Eurasian Curlew	 Pacific Golden Plover
 Lesser Sand Plover	 Common Snipe	 Black-winged Stilt
 Red-wattled Lapwing	 Eurasian Teal	 Common Tern

Appendix 6 Photos of fauna identified through the Project

		
Common Kingfisher	Blue-cheeked Bee-eater	Grey Francolin

Appendix 7

Preliminary study on the relationship between light conditions and seedling growth

Appendix 7 Preliminary study on the relationship between light conditions and seedling growth

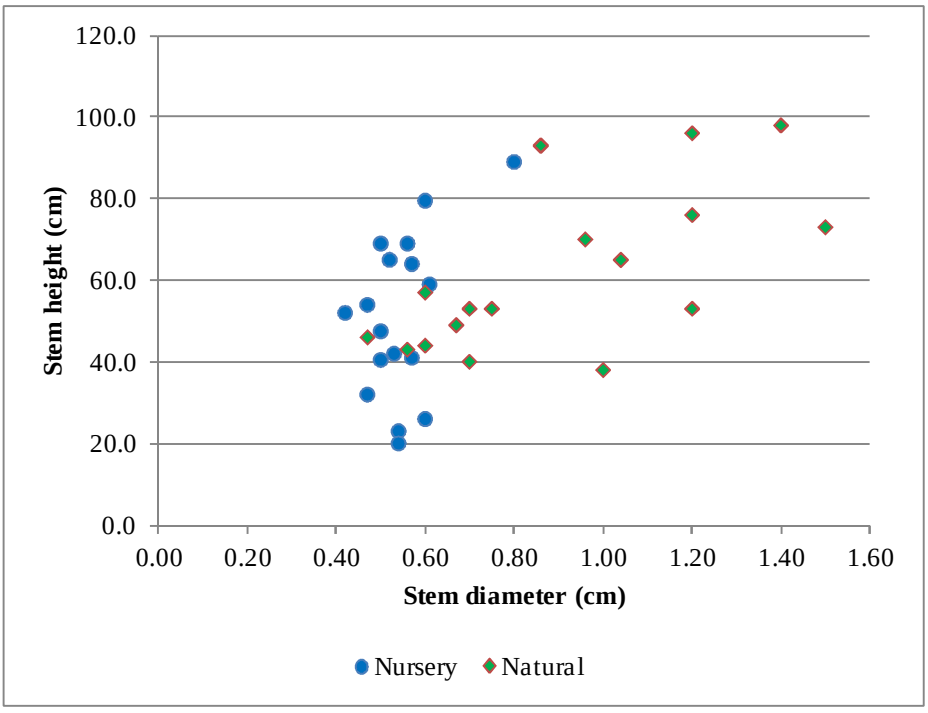
Preliminary Study on the Relationship between Seedling Growth and Light Conditions

Since the seedlings in the QNR nursery were observed to be weaker (spindly) than the natural seedlings in the mangrove forest, a preliminary study was conducted at QNR to investigate whether the shading effect of the nursery affected seedling growth and quality. The quality of the seedling was investigated by using "comparative seedling height (CSH)", as an indicator. CSH is the ratio between stem height and stem diameter, and in general plant biology, seedling quality is considered to be better with lower CSH, and will be more tolerant to stress and diseases after transplantation.

a. Comparison of CSH of nursery and natural seedlings

Stem height and stem diameter (above the soil surface) were measured for seedlings growing under 2 different conditions: (i) nursery seedlings (17 samples) and (ii) natural seedlings growing in the fringe of mangrove forest (17 samples). Measurement was conducted in October 2012.

Figure 1 shows the relation between stem height and diameter of the measured seedlings. The results show that the seedlings in the nursery (blue circle) ranged between 20-90 cm in stem height and 0.4-0.8 cm in stem diameter. The stem height of the natural seedlings (green diamond) ranged between 40-100 cm, which in general was slightly higher than the nursery seedlings. The stem diameter ranged between 0.5-1.5 cm, which was generally thicker than the nursery seedlings.



Prepared by JICA Expert Team

Figure 1 Relation between stem height and diameter of monitored seedlings

Then the CSH was calculated for each seedling. Table 1 shows the average CSH of the measured seedlings. The results show that natural seedlings have on average lower CSH values compared to nursery seedlings. Since natural seedlings appeared stronger than nursery seedlings, CSH was considered as a suitable indicator of seedling quality.

Table 1 Average CSH of measured seedlings

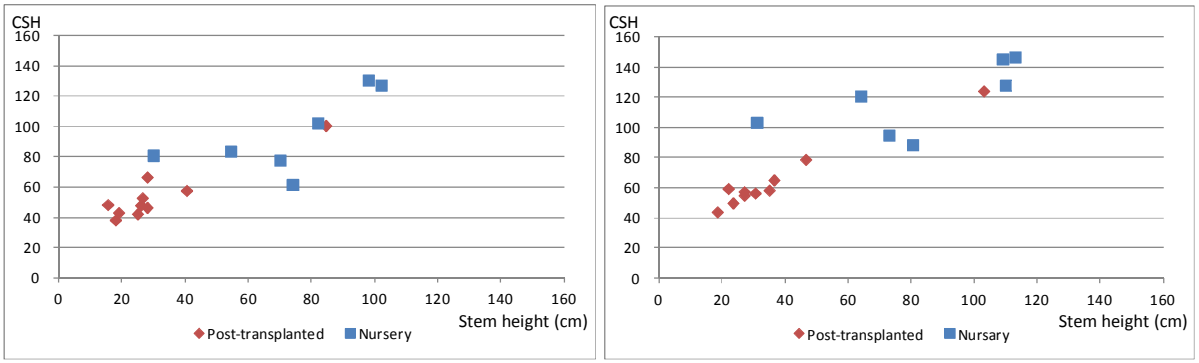
Seedling growth condition	No. of sample	Ave. stem height (cm)	Ave. stem diameter (cm)	CSH
Nursery seedling	17	51.3	0.55	93.3
Natural seedling	17	61.6	0.91	67.7

Prepared by JICA Expert Team

This study was however not sufficient in terms of quality, mainly as the ages of the seedlings between nursery and natural seedlings were variable. Hence additional studies were conducted by improving the survey methodology.

b. Comparison of CSH of nursery and post-transplanted seedlings

Stem height and diameter of nursery seedlings (7 samples) and post-transplanted seedlings (10 seedlings growing near the western bridge of QNR) were measured in October and November 2012. Although the date of transplantation was uncertain, both seedlings were seeded during the same period inside QNR's nursery, hence were same in age. Figure 3 shows the CSH of the measured seedlings in October and November 2012. The results show that in October, the nursery seedlings had tended to have higher CSH than the transplanted seedlings, and this trend continued into November. This result implied that CSH of seedlings will be suppressed more in non-shade (outside) conditions.



(11 October, 2012) (20 November, 2012)

Prepared by JICA Expert Team

Figure 2 CSH of nursery seedlings and post-transplanted seedlings (October and November 2012)

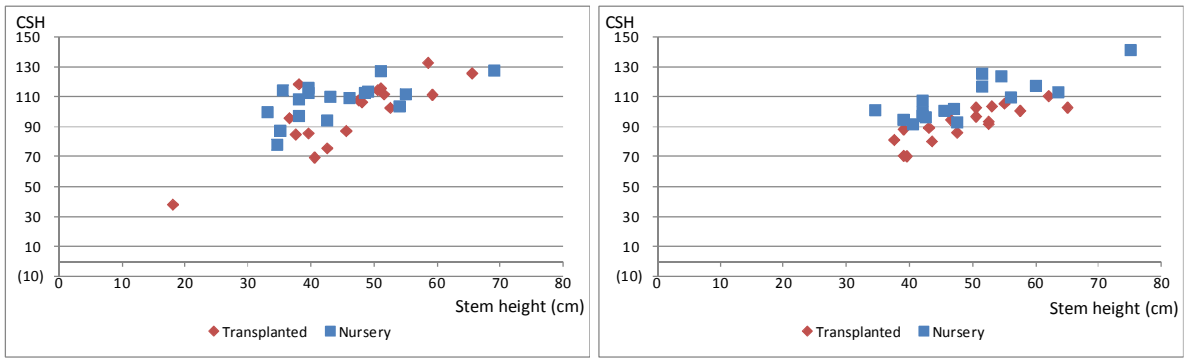
Appendix 7 Preliminary study on the relationship between light conditions and seedling growth

c. Comparison of CSH of nursery and transplanted seedlings

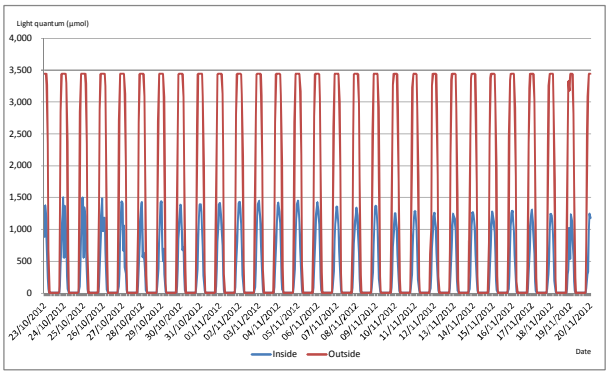
A total of 34 seedlings, growing inside QNR nursery were tagged. All the tagged seedlings were seeded in the same period. Within the tagged seedlings, 17 seedlings were transplanted into a small water channel near the nursery. The seedling pot of each transplanted seedling was kept attached, to keep the same soil condition as the nursery seedlings.

The stem height and diameter of the nursery and transplanted seedlings were then measured at the time of transplantation (October 23, 2012) and one month later in November 20, 2012. Light quantum levels were also monitored both inside the nursery and outside where the seedlings where transplanted. Figure 4 shows the CSH of the measured seedlings at the time of transplantation (October 23, 2012) and November 20, 2012, as well as the light quantum levels during that period.

At the time of transplantation, CSH was relatively scattered with no clear trend between nursery and transplanted seedlings. However, 1 month later, CSH of the nursery seedlings generally became higher than the transplanted seedlings. Light quantum levels inside the nursery were approximately one-third of that of outside during this period, implying that light conditions were the main factor behind this result. This study further reconfirmed that CSH of seedlings are suppressed more in non-shade (outside) conditions.



(23 October, 2012) (20 November, 2012)



Prepared by JICA Expert Team

Figure 3 CSH of nursery and transplanted seedlings and light quantum levels

d. Conclusion

According to the study, CSH was generally lower with seedlings grown under non-shade conditions. Therefore, it can be preliminary concluded that better quality seedlings can be produced without shade-net. However, since young seedlings are prone to sunburn, shading is required during the initial growth period (e.g. until 1 month after germination). To satisfy both conditions, installation of a mobile shade-net is proposed an option.

However, since the study was conducted with limited samples and under non-uniform growth conditions between non-shade and shaded seedlings, additional studies should be implemented for further verification, perhaps as part of QEIC research program. The following factors should be taken into account when conducting the additional studies:

- Sufficient number of samples should be secured.
- Other than light conditions, growth conditions (e.g. soil quality, irrigation period) should be uniform between non-shade and shaded seedlings.
- The validity of CSH as a seedling quality indicator should be verified by continuously monitoring the growth and health of the seedlings after transplantation.
- The installation cost and stress on the nursery structure of mobile shade-net should also be investigated.

Appendix 8

Performance and evaluation results of plantation activities (6 sites)

Appendix 8 Performance and evaluation results of plantation activities (6 sites)

Mangrove Evaluation at Khawr Wadiyat in Batinah

Khawr Wadiyat	Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Plantation Schedule in Master Plan	Number of Seedlings						5,000	5,000	5,000	5,000	5,000					25,000
	Planting Density (m)						1.0	1.0	1.0	1.0	1.0					-
	Area to be Planted in ha						0.50	0.50	0.50	0.50	0.50					2.50
Actual Plantation Performed	Number of Seedlings				14,625	13,200	18,000	18,000	8,000	13,200	12,000			-	-	97,025
	Planting Density (m)				0.85	0.85	0.85	0.85	0.85	0.85	0.85					
	Area actually Planted in ha				1.06	0.95	1.30	1.30	0.58	0.95	0.87			-	-	**7.01**
Plantation Evaluation	Size of Planted Forest Surveyed in 2012 (ha)															**5.17**
	Activity Performance in % (Autually Planted Area/Scheduled Area * 100)															280.4
	Forestation Performance in % (Forest Area/Planted Area*100)															**73.8**

Appendix 8 Performance and evaluation results of plantation activities (6 sites)

Mangrove Evaluation at Khawr Shinas in Batinah

Khawr Shinas	Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Plantation Schedule in Master Plan	Number of Seedlings						5,000	5,000	5,000	5,000	5,000					25,000
	Planting Density (m)						1.0	1.0	1.0	1.0	1.0					-
	Area to be Planted in ha						0.50	0.50	0.50	0.50	0.50					2.50
Actual Plantation Performed	Number of Seedlings											11,000	12,000	-	-	23,000
	Planting Density (m)											0.85	0.85			
	Area actually Planted in ha											0.79	0.87	-	-	**1.66**
Plantation Evaluation	Size of Planted Forest Surveyed in 2012 (ha)															**1.36**
	Activity Performance in % (Autually Planted Area/Scheduled Area * 100)															66.5
	Forestation Performance in % (Forest Area/Planted Area*100)															**81.8**

Appendix 8 Performance and evaluation results of plantation activities (6 sites)

Mangrove Evaluation at Khawr Sawadi in Batinah

Khawr Sawadi	Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Plantation Schedule in Master Plan	Number of Seedlings					10,400	10,400	10,400	10,400	10,400	10,400	10,400	10,400	10,400	10,400	104,000
	Planting Density (m)					1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-
	Area to be Planted in ha					1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	10.40
Actual Plantation Performed	Number of Seedlings	17,250		18,000	18,000	19,200	13,500	14,400						-	-	100,350
	Planting Density (m)	1.00		0.85	0.85	0.85	0.85	0.85						-	-	-
	Area actually Planted in ha	1.73		1.30	1.30	1.39	0.98	1.04						-	-	**7.73**
Plantation Evaluation	Size of Planted Forest Surveyed in 2012 (ha)															**11.80**
	Activity Performance in % (Autually Planted Area/Scheduled Area * 100)															74.3
	Forestation Performance in % (Existing Forest Area/Actually Planted Area * 100)															**152.7**

Appendix 8 Performance and evaluation results of plantation activities (6 sites)

Mangrove Evaluation at Khawr Al Hajr (Ras Al Hadd)

Khawr Al Hajr	Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Plantation Schedule in Master Plan	Number of Seedlings						14,000	14,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	119,000
	Planting Density (m)						1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-
	Area to be Planted in ha						1.40	1.40	1.30	1.30	1.30	1.30	1.30	1.30	1.30	11.90
Actual Plantation Performed	Number of Seedlings								3,000	8,000	9,000	19,000		-	-	39,000
	Planting Density (m)								0.85	0.85	0.85	0.85		-	-	-
	Area actually Planted in ha								0.22	0.58	0.65	1.37		-	-	**2.82**
Plantation Evaluation	Size of Planted Forest Surveyed in 2012 (ha)															**2.51**
	Activity Performance in % (Autually Planted Area/Scheduled Area * 100)															23.7
	Forestation Performance in % (Existing Forest Area/Actually Planted Area * 100)															**89.0**

Appendix 8 Performance and evaluation results of plantation activities (6 sites)

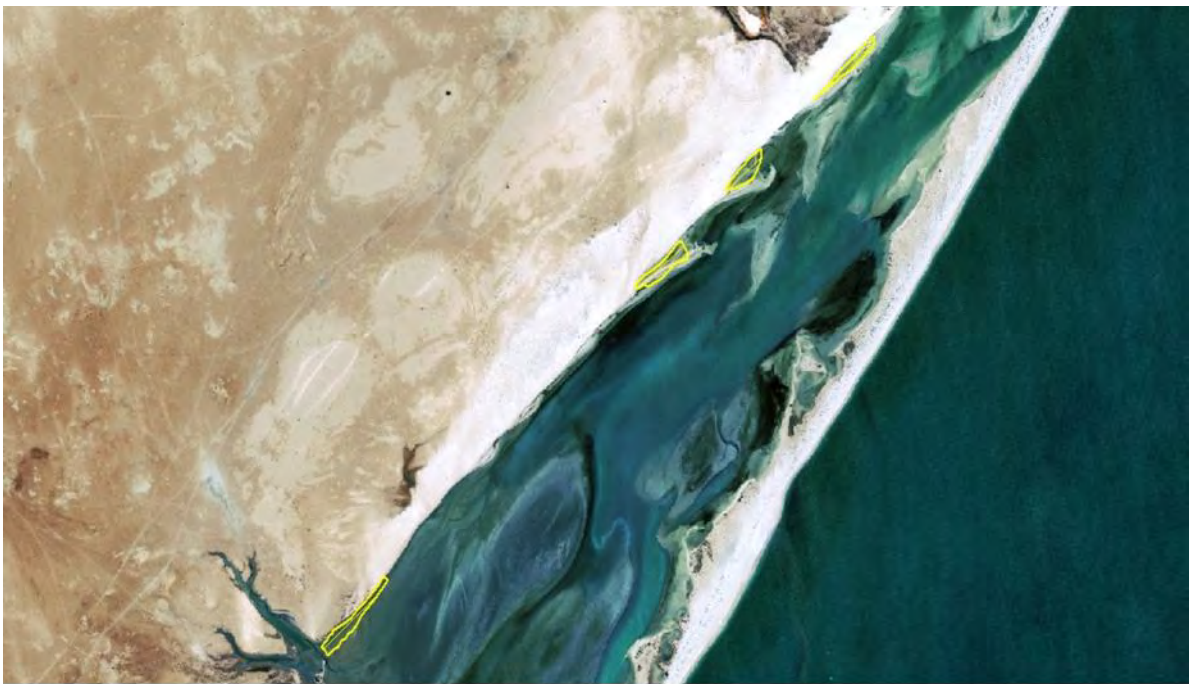
Mangrove Evaluation at Khawr Al Har (Masirah)

Khawr Al Har	Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Plantation Schedule in Master Plan	Number of Seedlings					0	2,500	2,500	2,500	2,500						10,000
	Planting Density (m)					1.0	1.0	1.0	1.0	1.0						-
	Area to be Planted in ha					0	0.25	0.25	0.25	0.25						1.00
Actual Plantation Performed	Number of Seedlings							4,200	2,000		1,500			-	-	7,700
	Planting Density (m)							0.85	0.85		0.85			-	-	-
	Area actually Planted in ha							0.30	0.14		0.11			-	-	**0.56**
Plantation Evaluation	Size of Planted Forest Surveyed in 2012 (ha)															**0.17**
	Activity Performance in % (Autually Planted Area/Scheduled Area * 100)															55.6
	Forestation Performance in % (Existing Forest Area/Actually Planted Area * 100)															**30.3**

Appendix 8 Performance and evaluation results of plantation activities (6 sites)

Mangrove Evaluation at Khawr Gauwi (Al-Jazer/Al-Wusta)

Khawr Gauwi	Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Plantation Schedule in Master Plan	Number of Seedlings															
	Planting Density (m)															
	Area to be Planted in ha															
Actual Plantation Performed	Number of Seedlings					1,800	3,600	3,600	2,000	1,200	5,000	3,400		-	-	20,600
	Planting Density (m)					0.85	0.85	0.85	0.85	0.85	0.85	0.85		-	-	-
	Area actually Planted in ha					0.13	0.26	0.26	0.14	0.09	0.36	0.25		-	-	**1.49**
Plantation Evaluation	Size of Planted Forest Surveyed in 2012 (ha)															**1.47**
	Activity Performance in % (Autually Planted Area/Scheduled Area * 100)															-
	Forestation Performance in % (Existing Forest Area/Actually Planted Area * 100)															**98.8**



Appendix 9

Publication materials prepared through the Project

(Publications are stored in the attached folder)

List of publication materials

The publication materials are stored in the attached folder and CD.

No	Title	Format	Content
1	QEIC Project	Brochure	The brochure introduces the background and outline of the QEIC Project.
2	Introduction of Mangrove Ecosystem	Brochure	The brochure provides brief explanations on mangrove trees, mangrove ecosystem, its benefits and the threats that these mangrove ecosystem face. This brochure is a useful handout for public awareness and education programs.
3	Mangrove Forest in Oman	Booklet	The booklet introduces characteristics of different mangrove forests in Oman.
4	Introduction of Mangrove Ecosystem	Booklet	The booklet provides basic information on mangrove trees, mangrove ecosystem, its benefits and the threats that these mangrove ecosystem face. It can be used for environmental education as well as a text book for QEIC staff and trainees.
5	Introduction of Mangrove Ecosystem (for children)	Booklet	The booklet introduces the characteristics of mangrove ecosystem through using many illustrations. It is mainly intended for children.
6	Animals of Mangrove Forest in Oman	Booklet	The booklet provides basic information on the common fauna (fish, crabs, shells, birds) that are found in mangrove forests of Oman.
7	Animals of Mangrove Forest in Oman	Photo sheet	The photo sheet shows the common animals of mangrove forest in Oman. It can be used in the field during environmental education, so to assist the participants identify the animals they encounter.
8	Basic Procedure of Mangrove Seedling Transplanting	Brochure	The brochure explains the basic procedures of seedling transplantation. It shows both good and bad examples by illustration, so that even small children can understand easily.
9	QEIC Newsletter (No. 1-4)	Brochure	The QEIC Newsletter was published four times during the Project, introducing the various Project activities conducted during the process.

Appendix 10

QEIC exhibition plan

Qurm Environmental Information Center Project

QEIC EXHIBITION PLAN

February 2014

JICA Expert Team

Appendix 10 QEIC exhibition plan

Appendix 10 QEIC exhibition plan

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Attached document 2: Example of Worksheet

Attached document 3: Example of Learning Book

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Attached document 5: Information on Other Nature Centers

Attached document 6: Report on Yeosu Expo 2012 in Korea

Appendix 10 QEIC exhibition plan

Appendix 10 QEIC exhibition plan

1. Exhibition Plan

1-1. Basic concept of the Exhibition Plan

The main objective of the exhibition is to introduce to the public and children the characteristics and values of mangrove ecosystem, in a manner that will be clear even for visitors who have little background knowledge. The exhibition also aims to enhance visitors understanding on the present situation of mangrove forests in Oman and the importance of conserving the precious natural resources of the country.

1-2. Contents of the Exhibition Plan

The exhibition of QEIC will mainly focus on introducing the following topics:

- Characteristics of mangrove tree
- Characteristics of mangrove ecosystem
- Benefits of mangrove ecosystem
- Threats to mangrove ecosystem
- QEIC's activities to protect mangrove ecosystem

Table 1 shows the proposed content of the QEIC exhibition, including possible presentation methods such as poster, photo, movie, model and specimen.

Table 1 Proposed content of the QEIC Exhibition

No	Topic	Proposed content	Presentation methods
1	Characteristics of mangrove tree	What is mangrove	Poster, photo
		Mangrove diversity	Poster, photo
		Mangrove distribution in Oman and the world	Poster, photo
		Characteristics of *Avicennia marina*	Poster, photo, model
		Adaptation to stressful environment (high salinity, low oxygen)	Poster, photo, model
		Reproduction of mangrove (viviparous seeds)	Poster, photo, model
2	Characteristics of mangrove ecosystem	Fish (e.g. main types, what they eat, many juvenile fish)	Poster, photo, sample, model, movie
		Crabs (e.g. main types, main habitats, what they eat)	Poster, photo, sample, model, movie
		Snails (e.g. main types, main habitats, what they eat)	Poster, photo, sample, model, movie
		Birds (e.g. residential and migratory birds, migratory route/season)	Poster, photo, sample, model, movie
		Other fauna (worms, insects, microorganisms)	Poster, photo, sample, model, movie
		Food chain of mangrove ecosystem	Poster, photo
3	Benefits of mangrove ecosystem	Provides precious greenery	Poster, photo
		Nursery for various fauna	Poster, photo
		Feeding and resting area for birds	Poster, photo
		Coastline protection	Poster, photo
		Place for relaxation	Poster, photo

Appendix 10 QEIC exhibition plan

No	Topic	Proposed content	Presentation methods
		Potential source of income for locals (e.g. ecotourism, honey production)	Poster, photo
		Water purification	Poster, photo, model
		CO_2 fixation	Poster, photo
4	Threats to mangrove ecosystem	Animal grazing	Poster, photo
		Overgrowth of algae	Poster, photo
		Intrusion of invasive species	Poster, photo
		Coastal development	Poster, photo
		Discharge of wastewater	Poster, photo
		Waste dumping	Poster, photo
5	QEIC's activities to protect mangrove ecosystem	Monitoring activity	Poster, photo
		Plantation activity	Poster, photo
		Environmental education activity	Poster, photo
		Training activity	Poster, photo

Presentation methods should be considered by referring to similar exhibition events and facilities such as the Yoesu EXPO in Korea and nature observation centers in Japan.

1-3. Permanent and special exhibition

QEIC should have two types of exhibition: permanent exhibition and special exhibition. The permanent exhibition will focus on presenting basic information regarding mangroves and mangrove ecosystem (such as proposed in the previous Section), so that visitors are able to obtain a basic understanding of the subject. On the other hand, the special exhibition provides more detailed information and/or more advanced knowledge that cannot be covered by the permanent exhibition, and should be updated regularly to attract repeaters. Holding of special events will also be an option of special exhibition. For the special exhibition, it may be necessary to cooperate with other exhibitions and organizations, as information within QEIC may be limited for certain themes. Table 2 shows proposed themes for QEIC's special exhibition.

Table 2 Proposed themes for QEIC's special exhibition

Category	Contents
Detailed information on animals of mangrove ecosystem	Introduction of migratory birds in Oman and in Middle East region
	Introduction of animals in mangrove forests in Oman and in the Middle East region
	Introduction of animals in mangrove forests of the world
	Introduction of microorganism and insects in mangrove forests
Advanced knowledge on mangroves	Latest information on physiology and ecology of mangroves
	Introduction of mangrove forests in Oman and in the Middle East region
	Introduction of mangrove forests of the world
	Introduction of how mangroves have been used in people's life.
Progress of QEIC activities	Introduction of results of monitoring and research activities
	Introduction of threats to mangrove ecosystem and implemented conservation measures.
	Results of environmental education events.
Events	Photo, drawing, and poster competition with public participation
	Handy craft and/or dyeing workshop using mangroves
	Presentation of research activities regarding mangrove ecosystem

	Cooking class using animals and plants in mangrove forests

2. Utilization of worksheet and learning book

2-1. Worksheet

A worksheet contains questions related to an exhibition material, so as to enhance visitors understanding of the topic. Through answering questions of the worksheet, the visitors can learn in more depth and also observe exhibition materials more actively, not passively. The questions of worksheet shall be determined based on the contents of exhibition material. Some examples of worksheet are attached to this document.

2-2. Learning Book

A learning book of mangroves contains information on mangroves and mangrove ecosystem along with various questions related to QEIC exhibition, so as to encourage visitors to understand the exhibition better. Answering the questions will help the visitors to observe the exhibition more actively, which will be useful to know the exact aim of the exhibition. An example of the learning book is attached to this document.

3. Lessons learnt from other nature centers

3.1 Exhibition methods

QEIC is a nature center which receives visitors to educate them about mangroves and mangrove ecosystem. There are many other similar centers, and it is useful to learn exhibition methods and operation mechanisms from these existing centers. Many lessons can be learnt from these centers which include centers visited during counterpart training in Japan and other organizations such as bird museum and tropical botanical garden. The Yeosu Expo in Korea was also one of the good sources to provide many good suggestions to QEIC exhibition plan. Figure 1 shows various exhibition methods suggested by lessons learnt from other nature centers, which will be effective to give visitors opportunities to learn more actively from the exhibition. Details of these nature centers are attached as annex reports.

Appendix 10 QEIC exhibition plan

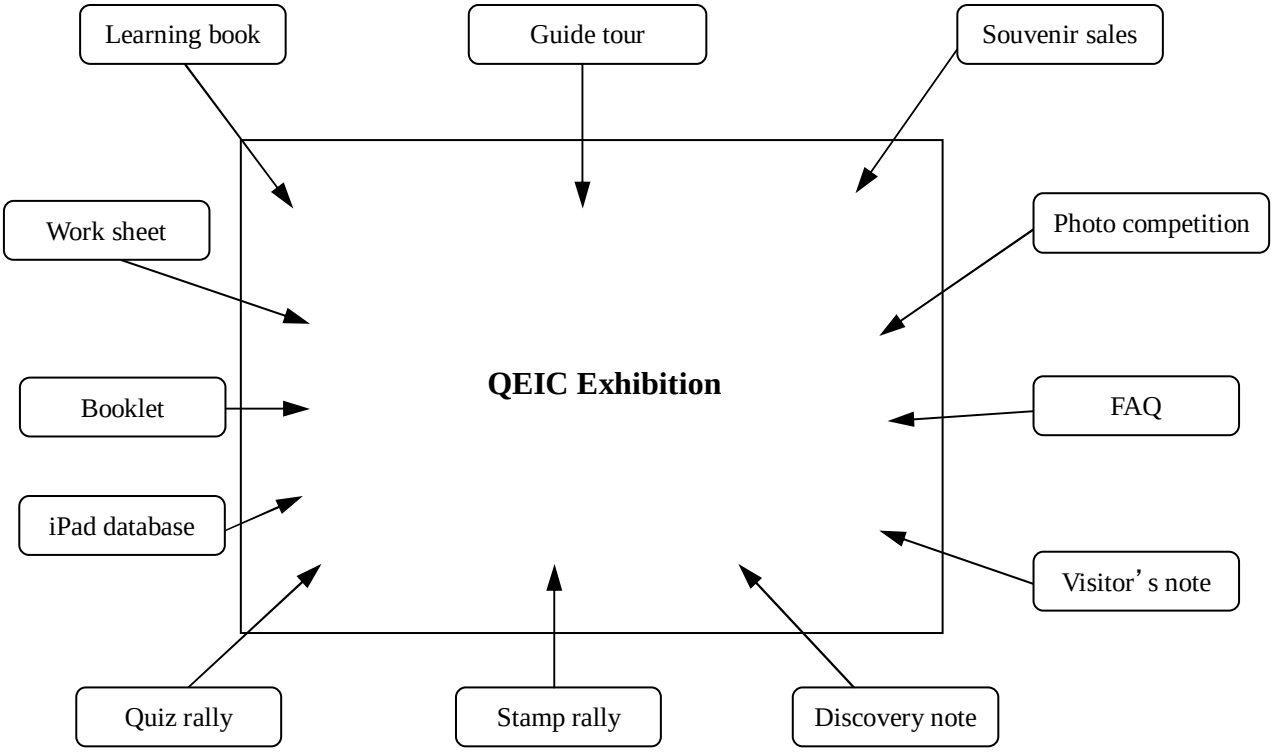


Figure 1 Various exhibition methods learnt from other nature centers

Table 3 Details of various exhibition methods learnt from other nature centers

Item	Description	Remarks
Learning book	Visitors will learn more by themselves about important points of exhibition contents through filling in the answer to the questions of learning book.	Refer the project output.
Booklet	Publications related to the contents of exhibitions, so as to encourage visitor's understanding and/or to provide more information of the exhibits. (Example: description of mangroves and mangrove ecosystem, field guide book of common birds of mangrove forest)	Refer the project output.
Worksheet	A worksheet contains questions related to an exhibition, so as to encourage visitors to understand the content better. Through answering questions of the work sheet, the visitors will learn properly according to the exact aim of exhibition. The work sheet is also effective so that the visitors will observe exhibition more actively, not passively.	The questions of worksheet shall be determined based on the contents of exhibition. Refer the project output.
Quiz rally	Quizzes on mangroves will be placed at several locations in QEIC. Visitors will find the quizzes, and write the answer to the answer sheet.	Perfect scorer will be provided a souvenir.
Stamp rally	Different stamps will be placed in QEIC under the same subject, for example, birds of mangrove forests. Visitors will imprint the stamps with viewing the exhibition.	A "passport" will be provided to visitors to imprint stamps.
Discovery note	Visitors will write what they have noticed and/or newly discovered by observing the exhibition or attending an education program of QEIC. The discovery notes will be stuck together for presenting other visitors.	Not only text, but also drawings will be welcomed.
Visitor's note	Visitors will write comments or impressions about the exhibition of	Comments and requests shall be

Appendix 10 QEIC exhibition plan

Item	Description	Remarks
	QEIC.	corresponded as much as possible for further improvement.
FAQ	Frequently Asked Questions shall be summarized from the feedback sheets or questions of visitors.	
Photo competition	Recruiting photographs for competition, taken by general public under a certain theme (e.g. mangroves, birds, environmental protection, etc.).	Excellent photos will be awarded.
Guide tour	Explaining QEIC and the exhibition to visitors group in 30 minutes to 1 hour.	Establishment of proper tour contents, and training of the guide will be needed.

3.2 Examples of similar nature centers

1) Quiz rally

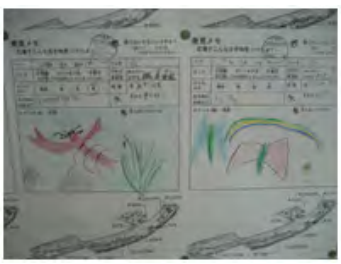
The left photo shows one of the questions of quiz rally. The procedure of quiz rally is as follows;

- Questions related to the exhibits will be placed at several locations in the center.
- Visitors observe the exhibit, and answer the question.
- In the process, visitors can understand the exhibit better, and visitors will have a more interesting.
- Perfect scorer will be provided a souvenir.
- It is also conceivable to compete time by a timed race, in case of children group.

2) Stamp rally

Several stamps are created associated with the exhibition content as shown in the photograph on the left. In this case, the exhibition about shark is implemented, and different types of stamp of shark have been placed with a brief description. Visitors will be able to study related knowledge, while collecting stamps. It is to be noted that providing "passport" to visitors to imprint the stamps is a good way.

3) Discovery note



Visitor's notes are placed on the board. The notes describe what they have noticed from the exhibition, and what they have found in the field. The notes are expressed in text and drawing.

4) FAQ

The answers to frequently asked questions and good questions from visitors are shown in the left photo.
You have to choose suitable location to place the FAQ, so that visitors are able to find it easily.
FAQ would be also useful to consider a new exhibition subject, which many visitors are interested in.

5) Photo competition

Organizing a competition of photographs, which was taken by general public under a certain subject, such as mangroves, birds, environmental protection, etc. Excellent photos are shown in the center, and those photographers are awarded.

6) Guide tour

Staff of the center explains the exhibition to a group of visitors in 30 minutes to 1 hour. It is necessary to explain exact aim of each exhibition including points which visitors often overlook. It would be necessary to go to field for further explanation.

Appendix 10 QEIC exhibition plan

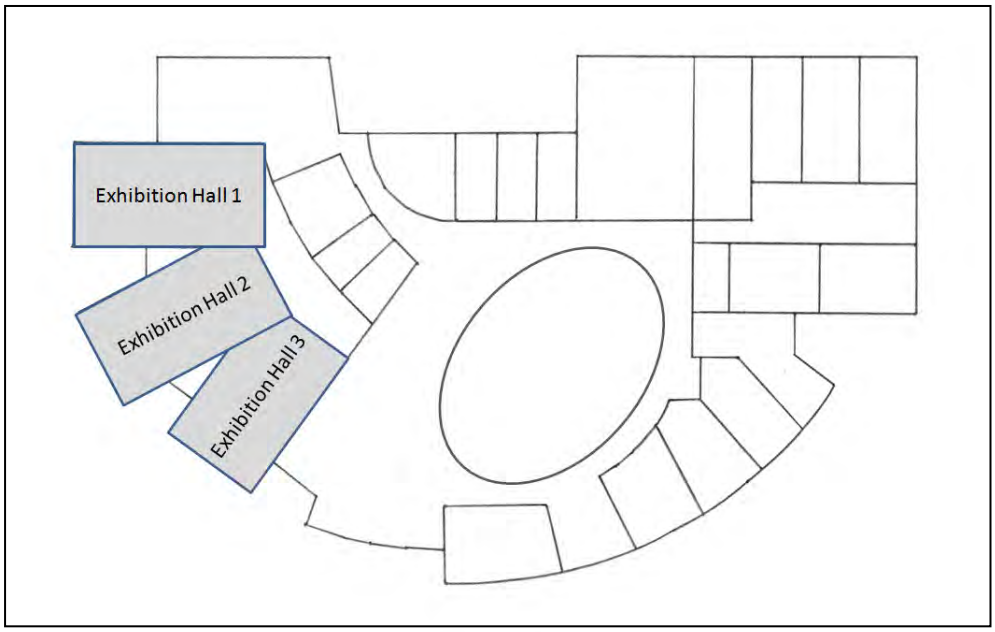
Attached Documents

Appendix 10 QEIC exhibition plan

Attached Document 1: Proposed Exhibition Plan with Floor Map

1. Allocation of the exhibition halls

According to the floor plan of QEIC prepared by MECA, there are three exhibition halls as the following drawing;



The exhibition halls 1 and 2 will be allocated to permanent exhibition of mangroves and mangrove ecosystem. And the exhibition hall 3 will be used for special exhibition, which shall be changed in certain duration, for example, every six months.

2. Proposed permanent exhibition

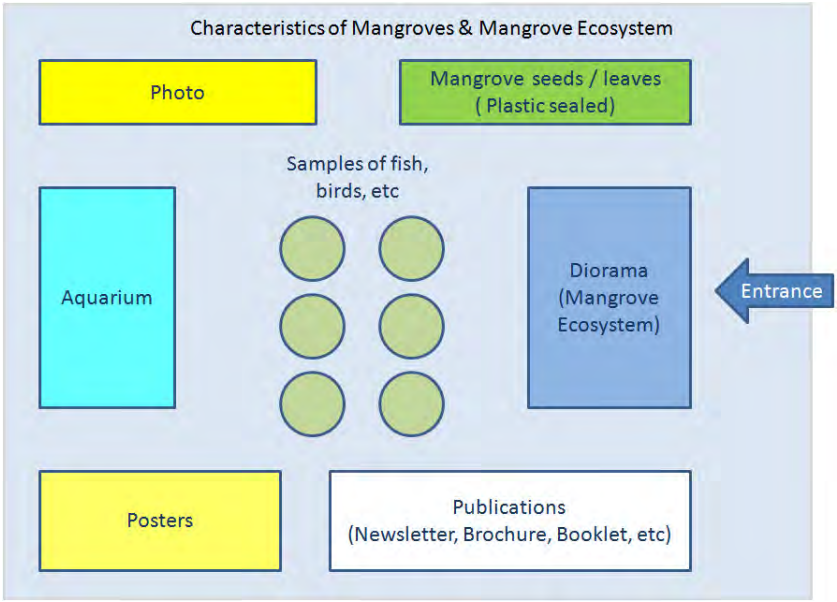
Permanent exhibition will provide essential knowledge and information on mangroves and mangrove ecosystem along with major activities of QEIC. The following tables show possible plans of the permanent exhibition with floor map.

Proposed plan of permanent exhibition for the exhibition hall 1

Title of Exhibition	**Characteristics of mangroves and mangrove ecosystem**	
Objective of Exhibition	Display major characteristics of mangroves and mangrove ecosystem in Oman.	
Contents of Exhibition	- Existing mangrove forests in Oman	Poster, photo, booklet, iPad database
	- Characteristics of mangroves in Oman	Poster, photo, model (plastic sealed samples of mangrove)
	- Characteristics of mangrove ecosystem (including food chain)	Diorama, poster, photo
	- Animals of mangrove forest	Sample, poster, photo, guidebook, iPad database,
	- Fish, crabs and shells of mangrove forest	Aquarium
Floor Map	(See the map below)	

Appendix 10 QEIC exhibition plan

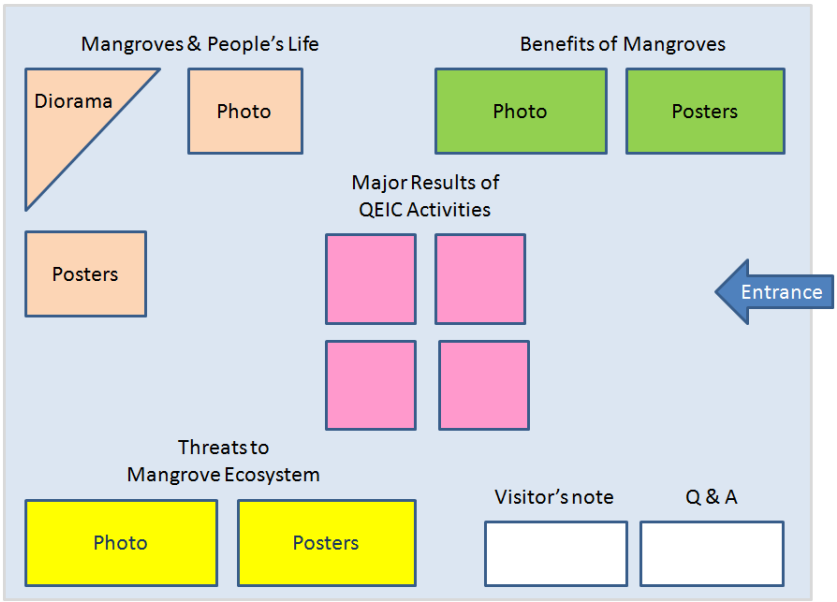
Remarks	Samples of animals, diorama and aquarium will be especially attractive to visitors.



Floor Map of the Exhibition Hall 1

Proposed plan of permanent exhibition for the exhibition hall 2

Title of Exhibition	**Benefits of mangroves and threats to mangrove ecosystem**	
Objective of Exhibition	Display benefits of mangrove ecosystem and threats to the ecosystem, along with introduction of major QEIC activities.	
Contents of Exhibition	- Benefits of mangrove ecosystem (e.g. enrich fisheries, provide precious greenery and relaxation place, potential source of income, etc)	Poster, photo
	- Mangroves and people's life	Poster, photo, diorama
	- Threats to mangrove ecosystem (e.g. Coastal development, wastewater discharge, dumping of waste, grazing by domestic animals, fishing inside mangrove areas, invasive species, etc)	Poster, photo
	- Major QEIC activities	Poster, photo
Floor Map	(See the map below)	
Remarks	Recent and updated information will be presented as much as possible.	



Appendix 10 QEIC exhibition plan

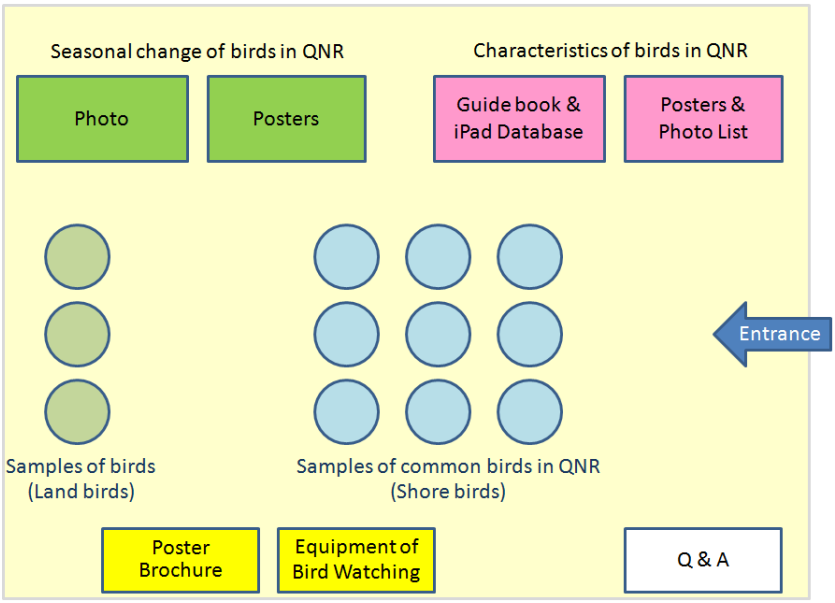
Floor Map of the Exhibition Hall 2

3. Proposed special exhibition

Special exhibition will provide more detailed information and/or more advanced knowledge which cannot be covered by the permanent exhibition. The following tables show possible plans of the special exhibition with floor map.

Proposed plan of special exhibition (1)

Title of Exhibition	Common birds in QNR (with showing seasonal changes)	
Objective of Exhibition	Display common birds in QNR with describing their names and characteristics. The exhibition also covers seasonal changes of bird species and flyway of migratory birds.	
Contents of Exhibition	- Names and characteristics of common birds in QNR	Photo, poster, field guide book, iPad database
	- Samples of common birds in QNR	Sample
	- Seasonal changes of bird species and flyway of migratory birds	Photo, poster, field guide book
	- How to distinguish birds	Poster, brochure
	- Method and equipment of bird watching	Poster, brochure
Floor Map	(See the map below)	
Remarks	Learning book on common birds in QNR will be required.	

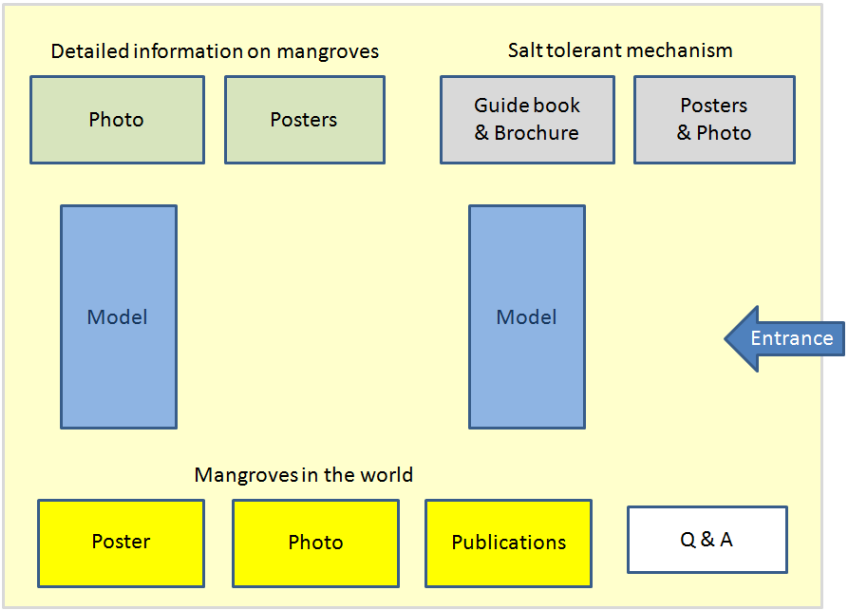


Floor Map of the Special Exhibition (1)

Appendix 10 QEIC exhibition plan

Proposed plan of special exhibition (2)

Title of Exhibition	Physiology and ecology of mangroves	
Objective of Exhibition	Display detailed and advanced knowledge on mangroves, which cannot be fully introduced in the permanent exhibition. In addition, information on mangroves of the world will also be introduced.	
Contents of Exhibition	- Detailed explanation on salt tolerant mechanism of mangrove	Poster, booklet, brochure
	- Detailed explanation on the function of aerial roots	Poster, booklet, brochure
	- Additional detailed information on mangroves	Poster, booklet, brochure
	- Distribution and characteristics of mangroves in the world	Poster, photo, brochure
Floor Map	(See the map below)	
Remarks	Recent research activities on mangroves shall be reviewed.	



Floor Map of the Special Exhibition (2)

Attached Document 2

Worksheet 1: Animals of Mangrove Forest

There are various kinds of animals living in a mangrove forest, which formulate valuable mangrove ecosystem. The following drawings show common animals in the mangrove forest. Let's name to each of animal.

1) _____

2) _____

3) _____

4) _____

5) _____ 6) _____

Worksheet 2: Let's study about mangroves !

The following sentences describe characteristics of mangroves. Fill the blank with a proper word.

1. Characteristics of mangroves

Mangrove trees can live in [(a)] water.

Mangrove trees like [(b)] water, not cold water.

2. Mangrove species in Oman

There are many different species of mangrove trees in the world.
We have only one species, [(c)] in Oman.

3. Root system of mangrove tree

Mangrove trees have [(d)] roots, by which mangrove trees can breathe.

4. Mangrove ecosystem

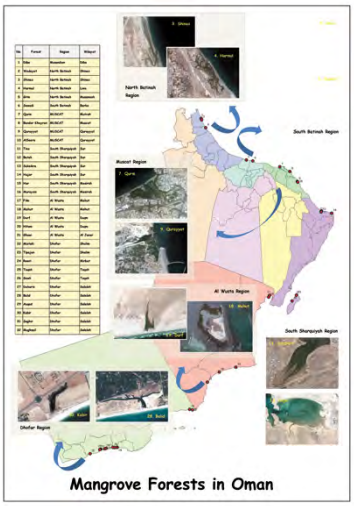
Mangrove forests provide a nursery for [(e)] , [(f)] , and [(g)] .
There is a "food chain" in the mangrove ecosystem.

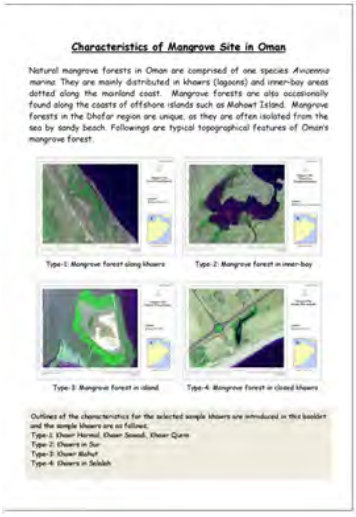
5. Mangrove forest provides benefits to our life.

Mangrove forest enriches [(h)].
Mangrove forest provides precious [(i)] without supplying fresh water.
Mangrove flowers provide [(j)] .
Mangrove forests prevent disasters such as [(k)] .

Appendix 10 QEIC exhibition plan

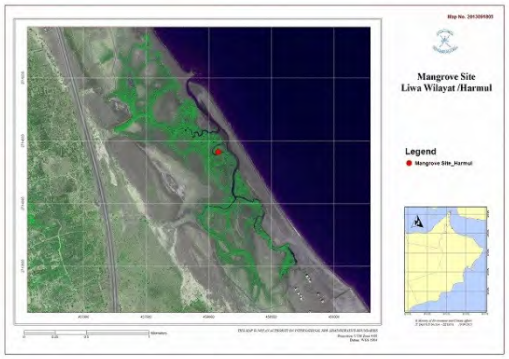
Worksheet 3: Mangrove Forests in Oman





There are more than 30 sites of mangrove forest in Oman, which provides precious greenery and valuable habitat for various animals. Let's study about mangrove forests in Oman !

1) The mangrove forests in Oman are divided into four types as follows. Write the name of each type.



Type 1: _____

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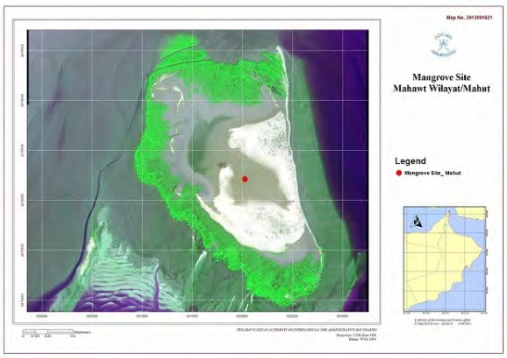

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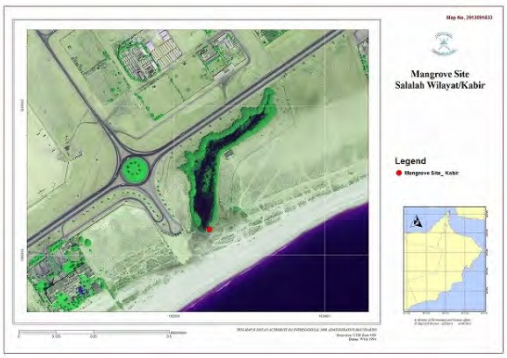


Type 4: _____

2) The following sentences describe major mangrove forests in Oman. Write the name of each mangrove site.

2-1. A natural mangrove forest located in Muscat, which is preserved as a nature reserve. The importance of this natural reserve has been recognized officially, and will be registered as a Ramsar site soon.

_____

2-2. A mangrove forest located in an island of Sharqiyah Region, which is the largest mangrove forest in Oman. The island is surrounded by shallow water with rich sediments and sea grass beds providing important nursery areas for shrimps and fishes, which is wisely and sustainably used by the local community.

_____ island

2-3. A mangrove forest located in South Batinah Region, which was transplanted with the cooperation of local community. The planting was started in 2001, and more than 100,000 seedlings have been transplanted to date, resulting in formulating a mangrove forest of about 12 ha.

_____

3) Mangrove forests in Oman have been facing various kinds of man-made threats. Let's study what kinds of threats are existing against the mangrove forests in Oman.

-
-
-
-
-
-

(Examples of Answer: Coastal development, Tourism, Wastewater discharge, Dumping of waste,

Appendix 10 QEIC exhibition plan

Grazing by domestic animals, Illegal fishing inside mangrove area, Invasive species, etc.)

Appendix 10 QEIC exhibition plan

QEIC Learning Book

Mangroves and Mangrove Ecosystem

Qurm Environmental Information Center (QEIC)

Ministry of Environment and Climate Affairs

Sultanate of Oman

QEIC Learning Book

This Learning Book contains various information and questions related to QEIC exhibition regarding mangroves and mangrove ecosystem, so as to encourage you to understand the exhibition better. Answering the questions will help you to observe the exhibition more actively, which will be useful to know the exact aim of the exhibition.

Let's produce your own "Mangrove Book" by filling up your Learning Book !

Appendix 10 QEIC exhibition plan

Table of Contents

1. What is Mangrove ?

Mangroves are subtropical/tropical plants that are growing coastal areas along the intertidal zone. Most of the plant cannot live in saline water, but mangroves can live even in seawater. This is because mangrove trees have special desalination systems in their leaves and roots. If you look carefully, you can see small salt crystals that were secreted from the leaves. Mangroves also have aerial roots which are adapted to take in oxygen from the air. There are many species of mangrove in the world, but there is only one natural mangrove species in Oman, which is grey mangrove (*Avicennia marina*).

Appendix 10 QEIC exhibition plan

Practice 1: Fill the following blank with a proper word

(a) Habitat of mangroves: Mangroves grow in [ ] areas.

(b) Mangroves can live in [ ] because they have special desalination systems.

(c) Mangroves have [ ] [ ] which are adapted to take in oxygen from the air.

(d) There are more than [ ] different species of mangroves in the world.

(e) We have only one species, [ ], in Oman.

Mangrove Quiz 3

Mangroves can grow in sea water.

True / False

Mangrove Quiz 4

Mangroves like

Warm sea water / Cold sea water

2. What is Mangrove Ecosystem

Mangrove Ecosystem

Various creatures are living in mangrove forest such as shells, crabs, shrimps, fish and birds. They are maintaining the mangrove forest in healthy condition under the ecosystem which is functioning based on the food chain among fallen mangrove leaves and various kinds of animals.

Food Chain in the Mangrove Ecosystem:

The starting point of the food chain is "mangrove leaves". Firstly, fallen leaves are consumed by leaf-eating crabs and snails. Then, their wastes and leaf fragments become food for other organisms such as small shrimps and worms. These are consumed by larger animals such as fishes and birds. The droppings of these animals also become important sources of nutrients for mangrove trees. In this way, mangrove ecosystem is composed by various animals and mangrove trees, and each component plays an important role in keeping the mangrove and ecosystem healthy. A simplified scheme of the food chain is shown in the following drawing.

Appendix 10 QEIC exhibition plan

Practice 2: Fill the following blank with a proper word.

(f) There are various kinds of animals living in mangrove forests, such as _____ _____ _____ _____ and _____ .

(g) Mangrove trees and those animals are connected each other to create a system which is called as _____ _____

(h) There is a food chain in the mangrove ecosystem, which starts from fallen _____ _____ .

Mangrove Quiz 5

Mangrove forest is a home to many kinds of animals.

True / False

Mangrove Quiz 6

Many kinds of bird migrate and nest in mangrove forest.

True / False

3. Benefits of Mangrove Ecosystem

Mangrove ecosystem provides various benefits to our life. Mangrove trees enrich fisheries by providing food and shelter to small fish, crabs and shrimps. Mangrove forest can also prevent the flow of contaminated flooded water into the sea by catching silt and excess nutrient. Due to such functions of the mangrove forest, the health of coral reef is maintained and "red tide" is controlled.

In addition to its ecological importance, mangrove ecosystem also has numerous other benefits such as;

- Provides precious greenery without supplying freshwater, which is especially valuable in arid countries like Oman,
- Provides place for relaxation and recreation,
- Potential source of income for the local community (e.g. ecotourism, honey production), and
- Protects land from high waves.

Mangroves and Omani People's Life

Omani traders sailed with their goods all over the Arab region for sale or barter; their goods included mangrove tree timber, which was previously used by Omani people for various purposes such as house building, ship building, fuel and animal fodder. Mangrove leaves, seeds and roots have also been used for the preparation of numerous medicines.

Appendix 10 QEIC exhibition plan

Practice 3: Fill the following blank with a proper word.

(i) Mangrove trees enrich fisheries by providing _____ and _____ to small fish, crabs and shrimps.

(j) Mangrove forest can improve coastal water _____ .

(k) Mangrove tree timber was previously used by Omani people for _____ , _____ and _____ .

(l) Write more about the benefits of mangrove ecosystem. (You may get more information about the benefits by asking to QEIC staff.)

Mangrove Quiz 7

Mangrove flowers are used for honey production.

True / False

Mangrove Quiz 8

Mangrove leaves, seeds, and roots can be used as medicines.

True / False

4. Threats to Mangrove Ecosystem

Mangrove ecosystem, which is an important coastal resource, faces many kinds of threats mainly due to human pressures in the different regions of Oman. Followings are some of the main threats found in Oman;

- Coastal development (e.g. port and road construction),
- Wastewater discharge,
- Dumping of waste,
- Grazing by domestic animals,
- Fishing inside mangrove areas, and
- Invasive species (e.g. *Prosopis juliflora*)

Practice 4: Write threats to mangroves in Oman which you found from QEIC exhibition. (You may get more information about the threats by asking to QEIC staff.)

Appendix 10 QEIC exhibition plan

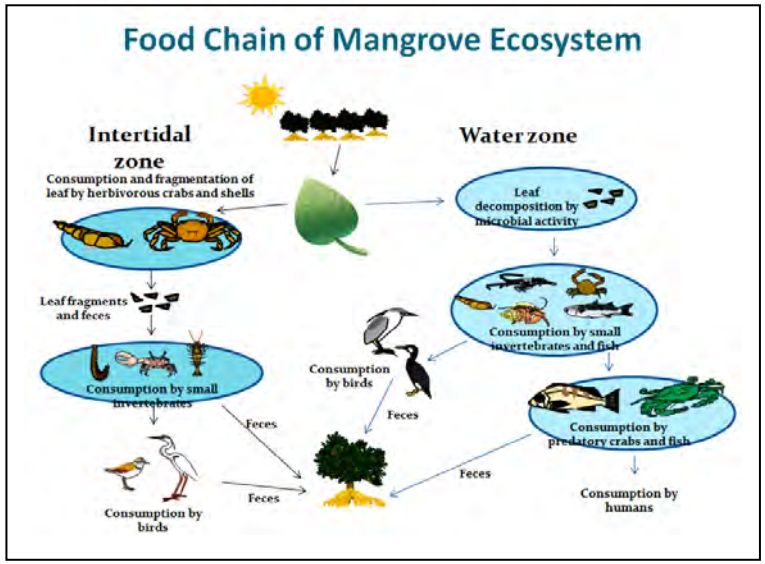
5. Conserving Mangrove Ecosystem

Mangrove trees play very important role through establishing precious ecosystem, and at the same time, they face many kinds of threats due to human pressures. Therefore, the Ministry started the Project entitled "Transplanting Mangroves for Rehabilitation of Khawrs" in collaboration with JICA. In March 2001, as a first step of the transplanting project, mangrove seedlings which were grown in the Qurm nursery were transplanted in Khawr Sawadi. So far, more than 500,000 seedlings have been transplanted in different Khawrs all over the Sultanate.

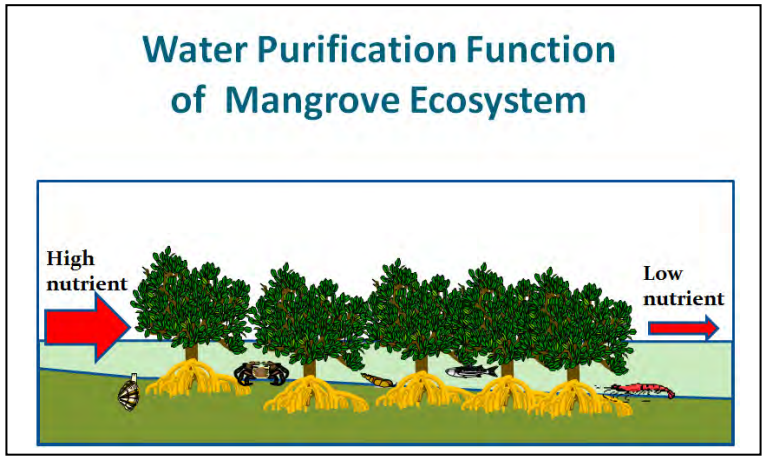
Practice 5: Write your idea and/or opinion regarding actions which you want to take in order to conserve mangrove ecosystem in Oman.
(You may get more information and good suggestion to answer this question by asking to QEIC staff.)

Qurm Environmental Information Center (QEIC)
Ministry of Environment and Climate Affairs
Sultanate of Oman

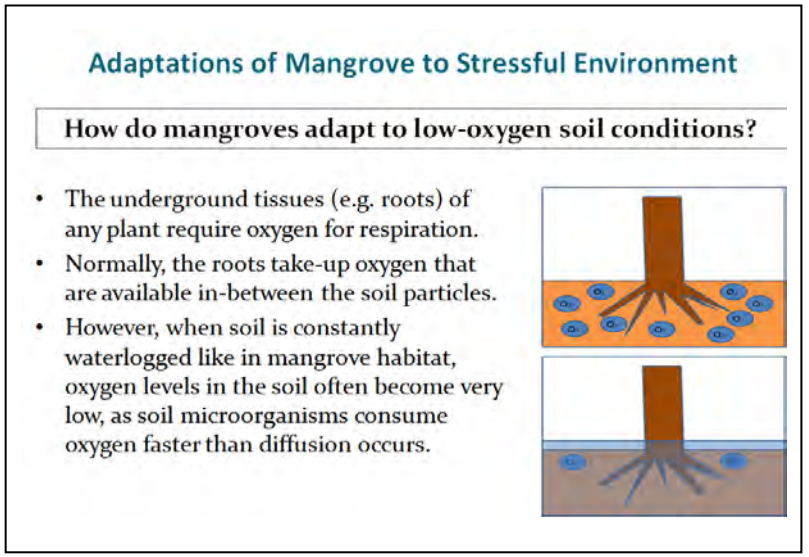
Attached Document 4: Example of Posters for Exhibition



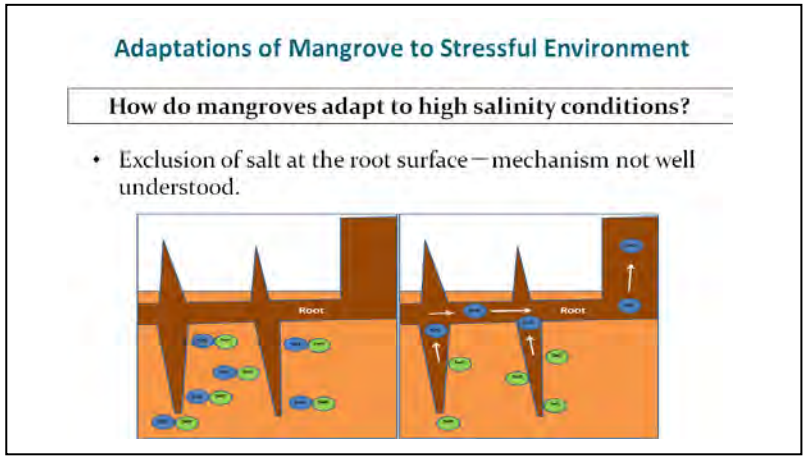
Poster 1: Food chain of mangrove ecosystem



Poster 2: Water purification function of mangrove ecosystem



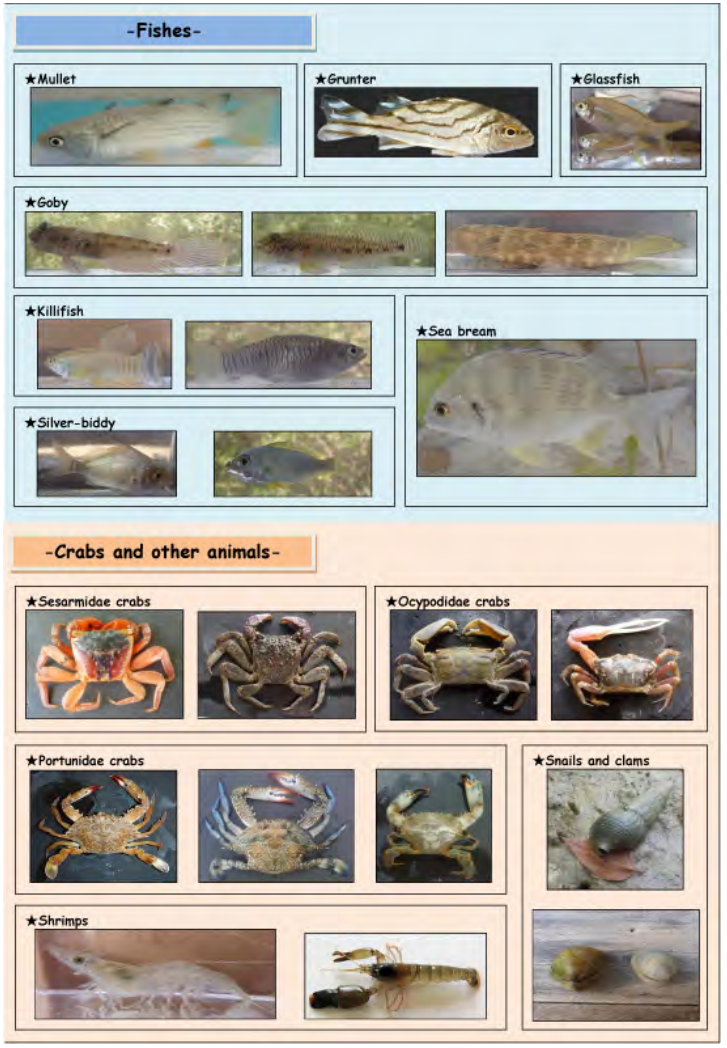
Poster 3: Adaptation of mangrove to stressful environment (1)



Poster 4: Adaptation of mangrove to stressful environment (2)

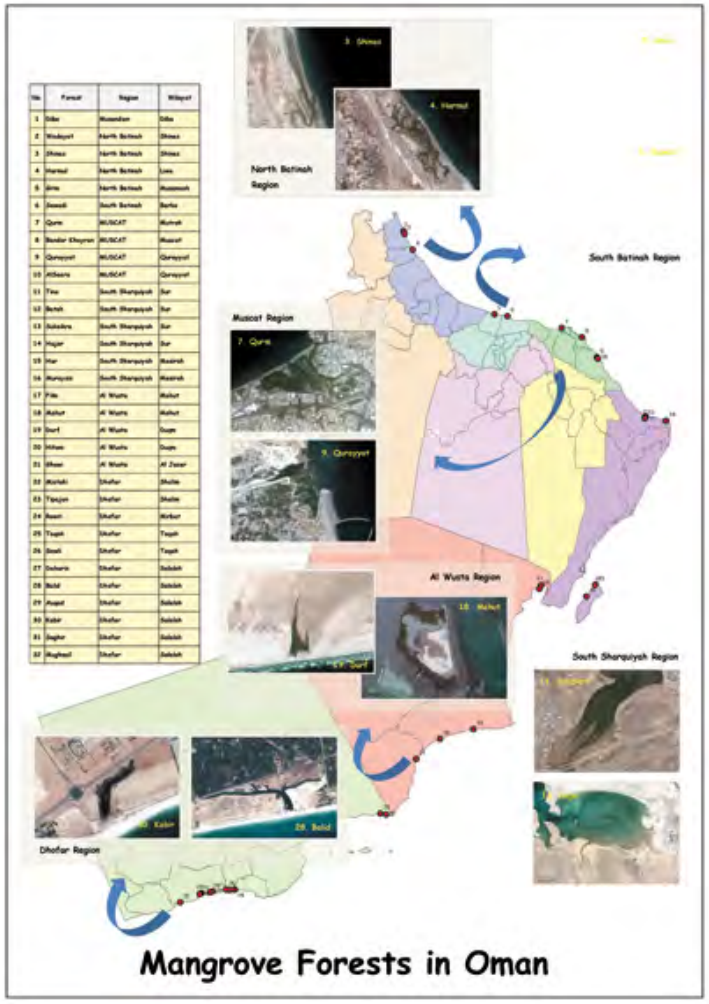
Appendix 10 QEIC exhibition plan

Poster 5: Animals of mangrove forest in Oman (1) – birds -

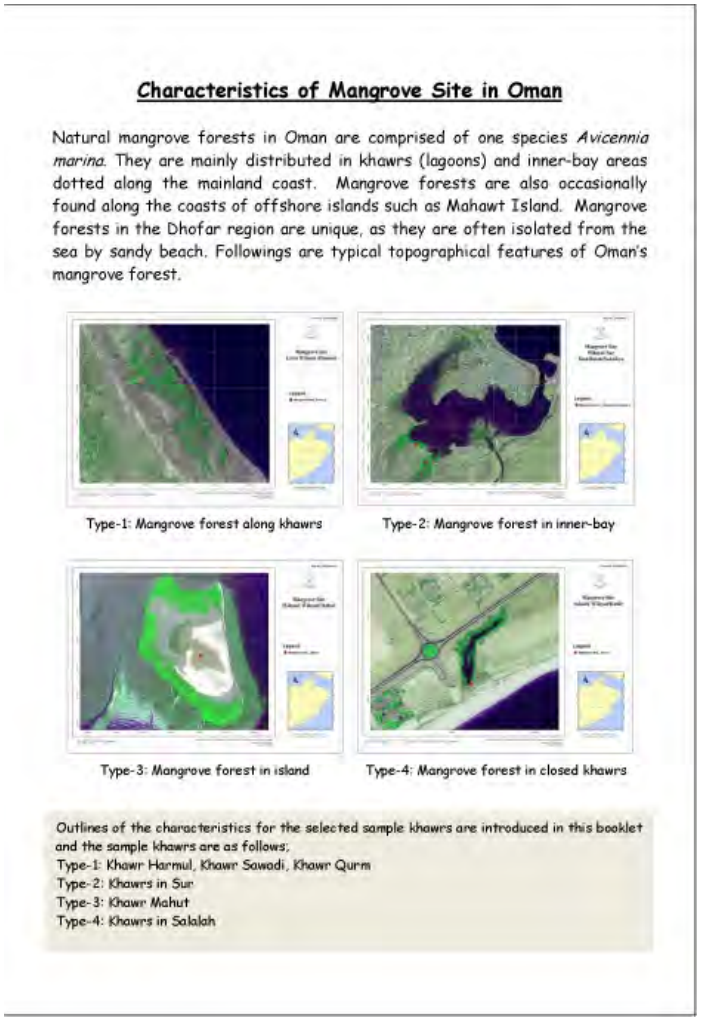


Poster 6: Animals of mangrove forest in Oman (2) – fish, crabs & others –

Appendix 10 QEIC exhibition plan



Poster 7: Mangrove forests in Oman



Poster 8: Characteristics of mangrove site in Oman

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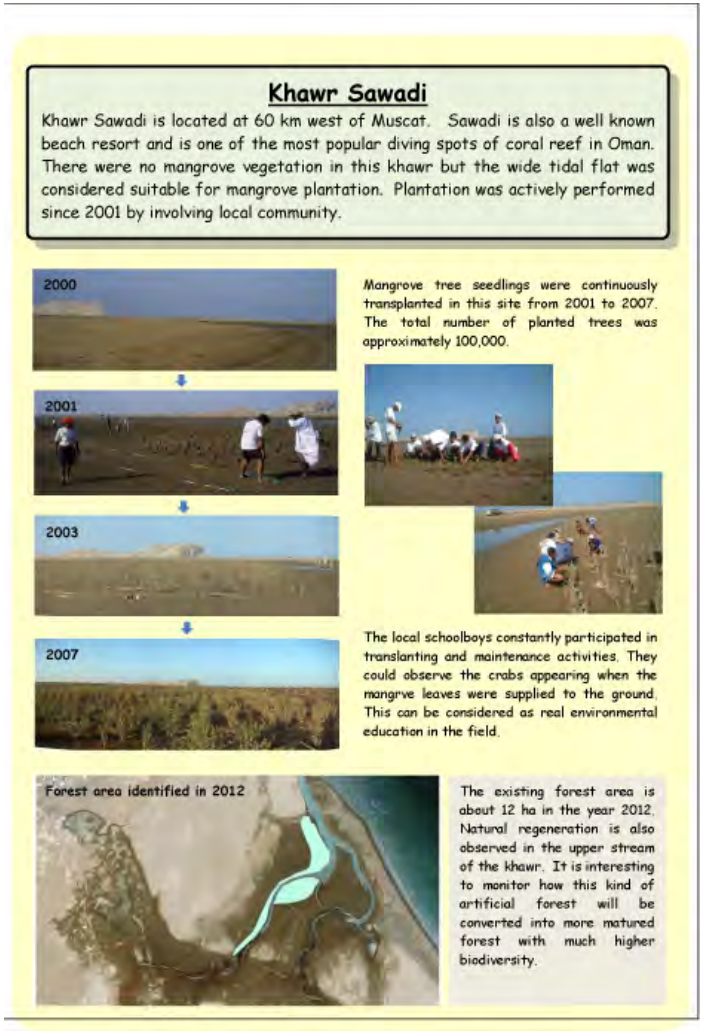
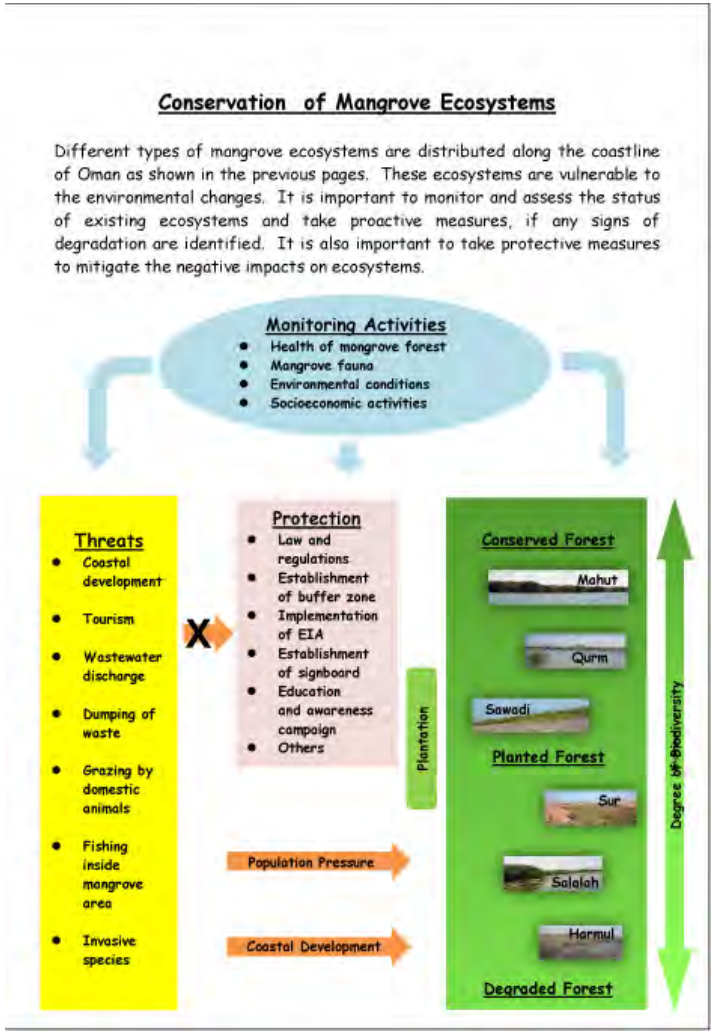
Poster 9: Mangrove forest in Mahut island

Poster 10: Mangrove Forest in Qurm Nature Reserve

Appendix 10 QEIC exhibition plan



Poster 11: Mangrove forest in Sawadi



Poster 12: Conservation of Mangrove Ecosystems

Attached Document 5: Information on other Nature Centers

5-1. Yatsu Higata Nature Observation Center

Date of the visit: November 15, 2012

Purpose of the visit: Learning activities and exhibition methods of nature center which locates capital city outskirts.

Information on Yatsu Higata tidal flat

Yatsu Higata is a tidal flat of about 40ha in Narashino, Chiba. Tidal flats of Tokyo Bay in Chiba Prefecture have been reclaimed and developed as residential and industrial areas during 1960-70. But Yatsu tidal flat was left with escaped landfill since it was state owned property. The area is a rare habitat of migratory birds such as snipes and plovers, and was registered as a Ramsar Convention wetlands in 1993.

Outline of the Nature Observation Center

Yatsu Higata nature observation center is an observation and learning center with focusing on birds flying to the Yatsu tidal flat, which is a very precious flat left in the city against continuous urbanization. The center equips telescopes and field guide books for visitors, so that they can enjoy bird watching. Rangers of the center also perform guidance of bird observation. In addition, lectures and movies are presented to visitors at the lecture room, and observation events of birds, benthos and plankton are conducted on weekends. The visitors, from infant to adult, can learn about birds through observing exhibitions and playing with various education materials of the center.

Environmental Education of the Center

The center has implemented a variety of environmental education programs targeted at school children and members of nature observation groups. Lots of volunteer citizens are cooperating to rangers of the center in implementing these programs, which provides the citizens the opportunity to know the tidal flat and its ecosystem through participating in the activities. It is also useful to increase understanding to the tidal flat, and to promote activities to conserve the area by citizens.

Junior Ranger System

The center runs a unique and effective mechanism in environmental education activities, called "Junior Ranger System", in order to raise awareness of school children. In this system, children of third grade or more of elementary school can register to the program. Registered children challenge to different activities from STEP1 to STEP3, and they get certificate and commemorative badge when they complete each step. STEP 1 and 2 include various field activities such as observation of animals in tidal flat, crab fishing, etc. STEP3 has more diversified programs through the year, such as bird count survey (to know the tidal flat), picking up trash (to protect the tidal flat), and helping to implement events of the center (to convey information on the tidal flat).

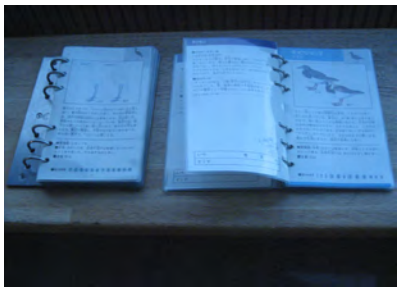
By making the step-wise program, registered children come to the center frequently as a "repeating visitor", which is effective for the children to have a wide range of knowledge about the tidal flat, and to grow awareness to protect it through participating a variety of activities. In

addition, through the activity of “convey information on the tidal flat”, children can learn more actively, not passively as a "recipient of information", in disseminating information to others by themselves, which is likely to promote better understanding on the subject and to enhance actions based on their notice. So, it is a very effective approach of environmental education, which is to be considered and to be implemented in other similar centers.

watching

Lecture room for visitors

Telescopes for Bird

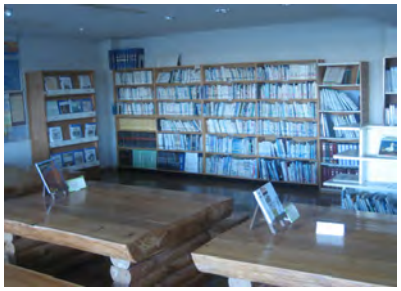


Field Guide Book of Birds Data

Recording Table of Bird Watching

Exhibition of Bird Observation

Diorama of Tidal Flat Volunteers



Library of the Center

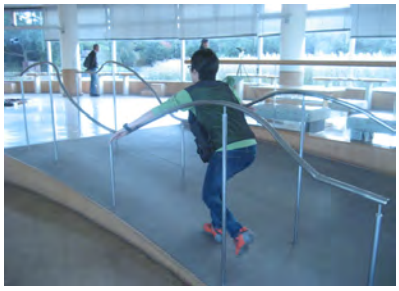
Carving Birds produced by

Stuffed Birds to feel their actual weight Visitors

Notice Board of the Events

Commemorative Photo Panel for

Appendix 10　　QEIC exhibition plan



Experiencing how to fly the bird

Fishing Game

Cubic Puzzle of Birds

5-2. Whole Earth Nature School

Date of the visit: November 28, 2012
Purpose of the visit: Learning activities on eco tourism

Eco Tourism

"Eco tourism" is a coined word that combines tourism and ecology. There is no one unified definition of eco-tourism, and is much different from country to country depending on the situation. This is because there are various ways to deal with eco tourism, and the purposes of promoting eco tourism are also different. Although there are various definitions, eco tourism is not just a tourism. Ecological elements of natural resources are core components of eco tourism, and conservation of resources and its sustainable use are the important foundation.

Eco Tourism and Whole Earth Nature School

Whole Earth Nature School (WENS) is a private company based in Fujinomiya, Shizuoka. WENS aims at recovering Japanese-style of way of living in which human, nature and regions coexistent, through providing a variety of nature experience and environmental education programs to general citizens and companies. Major activities include eco-tours of crater trekking, climbing mountain, and caving, with fully utilizing a vast field of Mount Fuji. The programs also cover to review the style of urban daily life through participating rural agricultural works. Guide fees of eco-tours are one of the important revenue for WENS to manage the organization properly and sustainably.

The Roles of Interpreter

Eco-tour of WENS is accompanied by a guide called "interpreter". WENS has more than 30 of interpreters, who make the eco-tour more enjoyable and fruitful. Interpretation of the interpreter leads to awareness of the participants, which makes them better understood and improves the quality of eco-tour. One of the important roles of the interpreter is "to convey what you can not see through what you can look". For example, you can convey amazing animal evolution from feather of owl, or you can remind the depth of unique Japananese culture of color from various kinds of fallen leaves. In order to convey the message successfully, it is necessary to develope practical and attractive education amaterials, and to create comfatable atmosphere and the "place". In conducting farming practices, it is also one of the important duties of interpreter to build a good relation with local people so that they accept eco-tour participants.

Eco Tourism and Environmental Education

From the viewpoint of business activities, it is required to provide high quality of eco-tour so that the participants are able to have great exitement from the tour, which will result in securing profits. On the other hand, from the aspect of environmental education side, enjoying the experience is important, but raising awareness through the experience is also focused.

In order to encourage actions based on the awareness, WENS is trying to incorporate nature conservation activities in the eco-tour. For example, eco-tour participants carry out conservation works as volunteers to protect the natural environment of the region, such as management of Satoyama woodlands and bamboo forests. Some participants also enjoy farming practices with the cooperation of local farmers, growing rice including planting, weeding and harvesting. As a post-harvest activity, they will learn how to use rice straw to make craftworks in a workshop.

Appendix 10 QEIC exhibition plan

Making a series of activities related to these farming practices, is also a good mechanism of ensuring repeating visitors.

Regardless to business-oriented or environmental education-oriented, improving the quality of the program is very important in both cases, which will lead to sustainability of the activities.

Appendix 10　　QEIC exhibition plan

Office of Whole Earth Nature School

The Area for Rural Agricultural Works

An Education Material Using various Kinds of Leaves

Explanation of WENS Activities

Wooden Path Way in the Forest

Sign Board of “Forestry School”

Lecture on “Interpretation”

Putting the passion in "Things"

Appendix 10 QEIC exhibition plan

5-3. Bird Museum in Abiko

Date of the visit: June 29, 2013

Purpose of the visit: Learning exhibition methods of birds

Outline of the Bird Museum

The bird meseum is operated by Abiko city in Chiba Prefecture, which is located on the bank of Teganuma swamp. The museum was established in 1990, adjacent to Yamashina Institute for Ornithology which was transferred to Abiko in 1984. This is the only museum to study and exhibition comprehensively for birds in Japan. The museum is aiming to achieve co-existence of birds and people, with appealing a message of "Harmony among Birds and People!". More recently, the museum has been conducting various activities as a Field Museum, such as nature observation events "Abiko nature observation corps" and regular bird watching events (second Saturday of each month).

Remarkable Exhibition Methods of the Museum

Method	Contents
Learning through Experience	Learning about birds by bird samples, coloring sheet of birds, and puzzle of birds.
Guide Tour	Ranger guides the museum in 30 minutes on weekends and holidays.
Bird Quiz	Various questions to answer the name of common birds. (The answer is shown with photo of the bird.)
Crossword puzzle	Questions of the puzzle are prepared based on the contents of exhibition.
Listen to birds	Visitors can hear the voice of common birds.
Opinion box	Visitors write their opinions or requests to the museum.
Questionnaire	Feedback sheet on the contents of special exhibition.
Diorama	Diorama of Teganuma swamp with showing common birds of the area.
Associations	They have four associations for photographing, drawing birds, bird kite, and bird watching. Annual fee is 2,000 yen (8 RO).
Shop	They sell souvenirs and publications including badge, coaster, T-shirt, bird list, paper folder, guide books, and learning books.

Typical Education Materials of the Museum

- Learning book of birds
- Guide book of the Bird Museum
- Guide book for the special exhibition: Life and shape of birds III - Wings of Birds
- Newsletter of the Museum: No.1 - No. 15
- List of Birds in Teganuma Swamp (drawings)
- Paper folder

Appendix 10 QEIC exhibition plan

Entrance of the Museum Swamp

Information Board of the Museum

Diorama of Teganuma

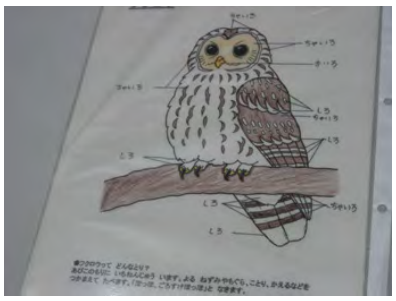
Sample of Birds

Sample of Bird Skelton

Puzzle of Bird

Shop for souvenirs and publications

Listen to birds



Coloring of Bird

Showing Results of Survey Exhibition

Quiz of Common Birds

Poster for Special

Appendix 10 QEIC exhibition plan

[Guide Tour by the Ranger]

Explaining Feathers of Bird Swamp

Touching Feathers of Sample Birds

Explaining Birds of

Appendix 10 QEIC exhibition plan

5-4. Tropical Botanic Garden in Itabashi

Date of the visit: June 16, 2013

Purpose of the visit: Learning various exhibition methods for tropical flora and fauna including mangroves

Various Exhibition Methods of the Garden

Exhibition Method	Contents
News from the Garden	Informing visitors about recent topics and notice of ongoing special exhibition.
Visitor's Note	Visitors write their opinions or requests to the garden.
FAQ	FAQ (Frequently Asked Questions) and its answer are presented.
Today's hot Topics	They explain important topics by providing panels, which visitors should not miss (i.e. particular plant which is fruiting or blooming now).
Guide Tour	Ranger of the garden guides exhibitions on Sundays and holidays (required time: one hour).
Stamp Rally	In conjunction with the special exhibition of "sharks and rays", they create stamps of sharks and rays, and visitors collect imprints on a stamp book. (Quiz rally will be combined to the stamp rally, so that visitors will understand more about the exhibition.)
Photo competition	They display photographs (of flowers) taken by visitors.
Event Posters of related Centers	They display posters to introduce ongoing of coming events of related centers or similar facilities.
Diorama	The diorama shows tropical rainforest in Southeast Asia, introducing insects in the forest. * Diorama of mangrove ecosystem can be useful for visitors to understand the ecosystem as a whole.
Souvenir Shop	The shop sells souvenirs and guide books. * It is also possible to sell cards of animals, badges, notebook, mug cup, T-shirt.
Notable Door Knob	Fallen leaves are sealed in clear plastic, to use as a door knob (see the photo below).
Other remarks	Admission free for elementary and secondary school children on weekends and summer holidays. (Generally the charge is 120 yen (500 baisa), and 240 yen (1 RO) for adults.)

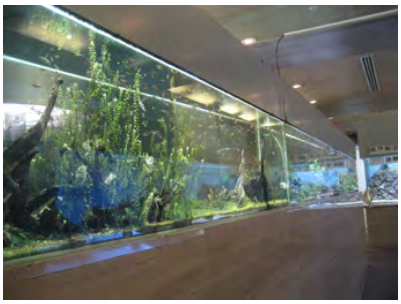
Exhibition of Mangroves

- They have eight different species of mangroves in the garden, such as ***Rhizophora mucronata, Bruguiera gymnorhiza, Kandelia obovata, Avicennia marina,*** and others.
- They explain the food chain of mangrove ecosystem referring from "Adventure of green" written by Mr. Motohiko Kougo.
- They publish and sell a booklet of mangroves, which is a series of booklets introducing different kinds of tropical trees.

Appendix 10　　QEIC exhibition plan

Sign Board of the Garden

News to the Visitors and FAQ



Aquarium

Rhizophora mucronata

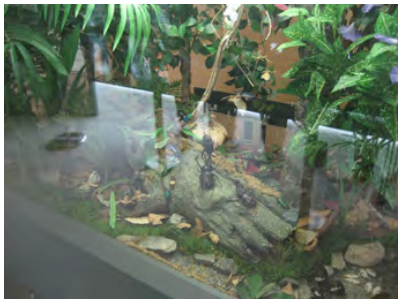
Food Chain of Mangrove Ecosystem

Seedlings of different mangrove species

Today's hot topics Competition

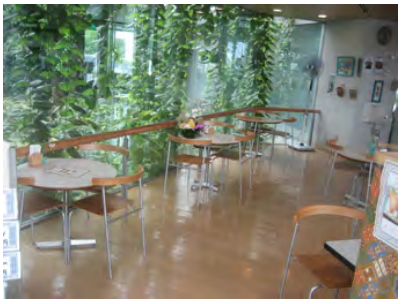
Stamp Rally

Flower　　Photo



Diorama: Insects in the Forest

Coloring of Drawings



Coffee shop of the Garden

Appendix 10 QEIC exhibition plan

Fallen Leaves are sealed in Door Knob

Information Room and Souvenir Shop

Hall for the Special Exhibition

Appendix 10 QEIC exhibition plan

5-5. KEEP (Kiyosato Educational Experiment Project) in Yamanashi

Date of the visit: July 15, 2013

Purpose of the visit: Learning environmental education programs conducted by KEEP

Environmental Education Projects of KEEP

They have been conducting environmental education projects since 1983, including operation of nature centers such as Yamane (dormouse) Museum and Yatsugatake nature center, implementation of environmental education programs in KEEP nature school, and training of interpreters by running “forester's school” course.

As an "Entrance of the Forest"

Yatsugatake nature center provides various exhibits and education programs, and visitors are able to enjoy learning about natural and cultural heritages of Yatsugatake mountain. The center is aiming to be an “entrance of the forest”, so that the visitors will be interested in the forest. In addition to these "entrance" which are rather prepared for beginners, the center also offer various programs with payment in combination with accommodation, such as Yamane school, weekend forester’s course, etc.

Cooperation with Schools and Private Companies

In addition to these ready-made programs, they also specially develop a program for schools and private companies. These special programs are carried out as open-air school for schools, and performed as a part of employee training or CSR activities of companies. The most important point in developing the special program is to clarify the purpose of the program through having close meetings with schools and companies prior to the program implementation. Furthermore, conducting a post-program is necessary to assure effects of the special program, or to encourage actions induced by the program. They sometimes visit schools as a post-program activity.

Human Resource Development Activities

They commit to leaders training as a human resource development activity, as well as implementing various environmental education programs. The leaders are divided into three categories such as interpreter (actor), organizer (writer), and administrator (producer). Training course is often carried out as a participatory workshop. They also accept trainees as an intern, in order to train future leaders through 1 year OJT.

Interpretation by the KEEP Method

In conducting nature observation in the field, KEEP focuses on providing the participants opportunity to feel amazing nature by themselves through their own five senses, so that they could learn how to get along with nature. So, teaching species name, such as "The name of this bird is XXX", is not very important. Therefore, the interpreter is required to deliver a message to the participants, which is derived from their experiences, with sharing discovery and excitement of the participants. The interpreter is not just a guide of nature, but an interface

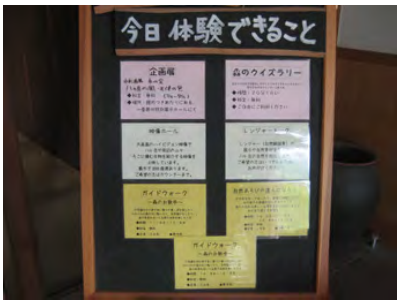
between "human and nature", with good communication skills. KEEP is aiming to train such interpreters through running operation of the organizational.

“It is not half so important to know as to feel.” (The Sense of Wonder; Rachel Carson)

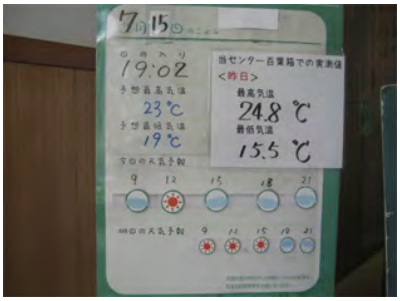
[Yatsugatake nature center]

Entrance of the Center Center

Sign Board of the Center



Today’s Menu of the



Today’s Temperature & Humidity

Information Board of the Center

Sample of Deer (Stuffing)

Quiz of Earthworm

A Question of Quiz Rally

Library of the Center

[Guide Walk with the Interpreter]

Walking in the Forest “Yamane”

Explaining about Yatsugatake

Game: Let’s find

Appendix 10 QEIC exhibition plan

Game: Find the Difference iPad

Game: Find the same shape of leave

Showing bird photo by

Appendix 10 QEIC exhibition plan

Attached Document 6: Report on Study Tour to Expo 2012 Yeosu in Korea

1. General Information on Expo 2012 Yeosu

Full title:	International Exposition Yeosu Korea 2012
Shortened title:	Expo 2012 Yeosu Korea
Venue:	New Port area in Yeosu, Korea
Period:	May 12 – August 12, 2012
Site area:	2,710,000 ㎡ (consisting of exhibition area of 250,000 ㎡)
Main Theme:	"The Living Ocean and Coast"
Sub-Theme:	"Diversity of Resources and Sustainable Activities"

The ocean has emerged as an important element in resolving various problems humankind faces, including those related to resources, food, space and the environment. However, industrial activities have damaged the marine ecosystem and subsequently reduced fish stocks. As a result, the ocean faces severe crisis. A damaged marine ecosystem, global warming and natural disasters are not limited to a certain country or region, but are issues that have global implications. Thus, Expo 2012 Yeosu Korea themed on "The Living Ocean and Coast," will pave the way for reaffirming global effort to resolve such issues.

Yeosu Expo's main theme, "The Living Ocean and Coast," was divided into three sub-themes: Coastal Development and Preservation, New Resources Technology, and Creative Maritime Activities. These sub-themes have been further developed into 6 thematic groups, namely, Climate & Environment, Marine Life, Marine Industry & Technology, Marine City & Marine Civilization, and Marine Arts, each of which will be demonstrated in the respective sub-theme pavilions.

Sub-theme 1: Coastal Development and Preservation
This sub-theme aims to inspire a new level of cooperation in the international community so as to combat climate change and create a paradigm where development and preservation find a better balance.

Sub-theme 2: New Resource Technology
This sub-theme illustrates the progress and future prospects of marine technology, a new growth driver for the advancement of humankind.

Sub-theme 3: Creative Maritime Activities
This sub-theme intends to demonstrate the relationship between the oceans and humankind through

culture and art and promote the new ideals of the seatizen and seavilization.

2. **Visited Pavilions**

Name of Pavilion	Theme of Exhibition	Major Contents	Remarks
Theme Pavilion	Coexistence of the Ocean and Humanity	Right from the entrance to the Theme Pavilion, visitors are immersed in the mystery of our oceans and their importance to the survival of humankind. The Main Show Room, which features touching and memorable friendship between a dugong (a mammal near extinction) and a human boy.	Capacity: 1,200 persons Tour time: 30 minutes Exhibition sections: Lobby → Exhibition Hall 1 → Exhibition Hall 2 → Main Show Room → Exhibition Hall
Aquarium	Living in Harmony with Marine Life: Protection of Endangered Marine Species and the Marine Ecosystem	A key site of the Expo, the Aquarium seeks to expose visitors to the various marine cultures and the necessity of marine resource conservation and protection efforts. It is also a site for research on endangered species and marine ecosystems of the five great oceans of the world.	Capacity: 1,620 persons Tour time: 60 minutes Exhibition sections: Marine Life → Aqua Forest → Ocean Life
Marine Life Pavilion	Diversity and Beauty of the Ocean: the Value of the Marine Ecosystem and Biodiversity	Visitors have the opportunity to observe mudflat animals, take a virtual journey deep under the sea in a 4D submarine, and peek into the beauty and mystery of marine life. Visitors are sure to come away with a deeper understanding of the value and importance of preserving the marine ecosystem and its fascinating creatures after the visit to this pavilion.	Capacity: 200 persons Tour time: 20 minutes Exhibition sections: Zone 1 → Zone 2 (Located in the Aquarium.)
The OCBPA (Ocean and Coast Best Practice Area)	Best Ocean Practices and New Visions	The OCBPA is a key space of the Expo site that introduces the world's best ocean and coast-related policies, technologies, knowledge and products, with the aim of spurring the development of the world's economy, science, industry and technology through such practices. The OCBPA is host to a variety of academic and other events and displays rare specimens collected from around the world, and actual marine observation equipment.	Capacity: 200 persons Tour time: 30 minutes Exhibition sections: Cone1→Lobby1→Cone2 →Lobby2→Cone3→ Communication Lab (Located on the second floor of the Theme Pavilion.)
Marine Industry & Technology Pavilion	Realizing the Blue Economy through Marine Industry and Technology	Designed to resemble a ship docked at a pier, the Pavilion sits on the ocean's edge. Visitors are sure to be impressed with the advanced, environmentally-conscious technologies showcased at this pavilion.	Capacity: 250 persons Tour time: 20 minutes Exhibition sections: Lobby→ Theater →Performance Hall → Exhibition Hall
Climate & Environment Pavilion	The Ocean - Moderator of Environmental Changes on Earth	This pavilion enlightens visitors about the ocean and Earth under threat, inviting you to become active participants in keeping our Earth alive.	Capacity: 360 persons Tour time: 27 minutes Exhibition sections: Lobby→Blizzard→Adventure Room→ Panoramic Theater
Korea Pavilion	The Maritime Spirit and Capacity of Korea: From the Sea of Miracles to the Sea of Hope	Exhibition Hall 1, Sea of Miracles, where visitors can experience the Korean people's respect and admiration of the ocean through videos, dioramas, and the Gang-gang-sulae performance. Move on to Exhibition Hall 2, Sea of Hope,	Capacity: 500 persons Tour time: 15 minutes Exhibition sections: Exhibition Hall 1 (Sea of Miracles) → Exhibition Hall

		where films on the ocean and environment are screened on the world's largest dome screen.	2 (Sea of Hope)
Japan Pavilion	Future of Japan and the sea	The Japan Pavilion focuses on not only activities related to the Ocean and Coast but also the Great East Japan Earthquake and its subsequent tsunami. By seriously addressing the recent disaster in the exhibit, Japan intends to report the terror of the natural disaster and announce to the world that Japan is resolutely progressing toward recovery and revitalization from that disaster.	

Name of Pavilion	Theme of Exhibition	Remarks
German Pavilion	Advancement of marine technology and science	Exhibition was designed well, so that visitors can learn in interactive ways. (www.expo2012-germant.com)
Oman Pavilion	Development of marine resources	
UAE Pavilion	Living seas	Conservation of sea turtles. Ban of plastic bags to conserve turtles.
Qatar Pavilion	Rhythm and rejuvenation	
Vietnam Pavilion	Vietnam: Sea, island, and human being	Rice production will be deteriorated by sea level rise in the delta areas.
Indonesia Pavilion	The wonderful ocean of Indonesia: sustaining tropical zone's diversity	Conservation of coral reefs.
Thailand Pavilion	Development and preservation of the coast (Diversity: Capacity of Thailand)	Conservation of sea turtles and coral reefs.
Australia Pavilion	Harmony with the sea	
USA Pavilion	Diversity, miracle, and solution	Environmental crisis and solutions.
Denmark Pavilion	Horizon: Colorful scenes of the sea and coast	Educational exhibitions through experience.

3. **Oman Pavilion**

3.1. Main Theme: Nurturing Marine Wealth

3.2. Major contents of the exhibition

- Sultan Qaboos Prize for Environmental Preservation
- Program for sea turtle conservation
- Oman's Maritime History & Culture
- Many roles of Oman's coastal mangrove forests
  - Exhibition of posters and plastic-enclosed mangrove seeds & leaves
  - Exhibition of mangrove ecosystem including birds, crabs, fish, etc
- 4D immersive theater
  - Animation movie featuring rich marine and terrestrial resources in Oman
  - The theater will be relocated in Oman after the EXPO

Appendix 10 QEIC exhibition plan

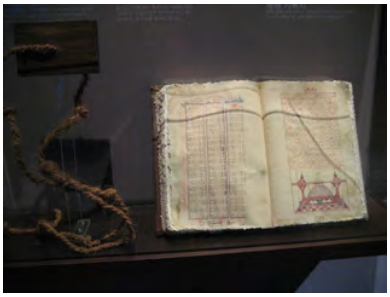
Entrance of Oman Pavilion Prize

A long queue before entering the pavilion

History of the Sultan Qaboos

Turtle Friendship Programme

Virtual Aquarium

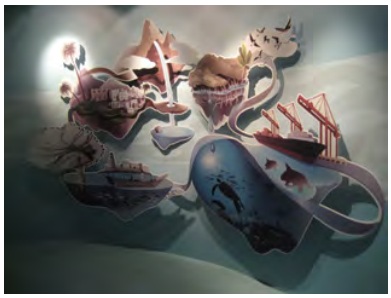


Pioneers of Astronavigation and Astronomy

Oman's Maritime History & Culture

Appendix 10 QEIC exhibition plan





Oman's Ban on Trawl Fishing

Many Roles of Oman's Mangrove Forests






Appendix 10 QEIC exhibition plan

4. Remarks to be useful for QEIC exhibition plan

4.1 OCBPA (Ocean and Coast Best Practice Area) Pavilion

- Displaying real marine observation equipment. Visitors can learn how to use the equipment through movie show.
- Q&A section; Visitors can feel pressure changes according to ocean depth, hear various ocean sounds, and learn about how far light can travel in the ocean.
- Display pictures in photo frame: pictures in photo frame were changed every 5-10 seconds.

Real marine observation equipment

Q&A section

Pictures in photo frame

4.2 Marine Industry & Technology Pavilion

- Animation film of Dugong: A dugong was used as a mascot, which talked about the importance of environmental conservation, so that audience could learn and think about the environment.

4.3 Aquarium

- Huge aquarium and dome-shaped aquarium was very impressive.
- Display of jellyfish was beautiful.

Huge aquarium and many visitors

Dome-shaped aquarium

Display of Jellyfish

4.4 Marine Life Pavilion

- Diorama of artificial tidal flat was informative and attractive.

Appendix 10 QEIC exhibition plan

- Movie clips explained the life of tidal flat, including different living things such as mud hopper, shells and crabs.

Diorama of Artificial Tidal Flat Exploitation

Movie clip of Tidal Flat Life

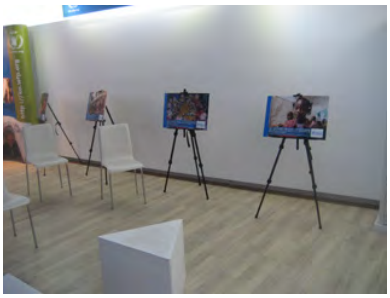
Theater for underwater

4.6 Other Pavilions

Tubes of Animal Cries (German)

Q & A about United Nations (UN)

Display of UNESCO (UN)

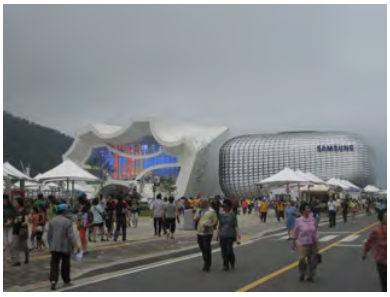


Display using tripods (UN)

Video-show of Mangroves (UAE)

Sky Tower

Big-O



Pavilions of Samsung & Hyundai

Appendix 10 QEIC exhibition plan

EXPO Hall

EXPO Digital Gallery

Yoni & Suni as EXPO mascots

Building of Aquarium

Entrance of Indonesia Pavilion

Renewable Energy Park

EXPO Plaza

Music show at the Vietnam Pavilion

Music show at the Qatar Pavilion

Appendix 11 Database related files

(attached CD)

Appendix 11 Database related files

Following are stored in the attached CD as database related files.

No	Item	Format	Contents
1	Mangrove site database	FileMaker	Relevant information about all the mangrove sites in Oman. It include information such as: site photographs, satellite image, surface area, the number of planted seedlings, natural and social conditions, and so on.
2	Fauna database	FileMaker	A database that stores information on mangrove fauna such as birds, fish, crabs and shells. It includes information such as: photographs, ecological characteristics and identified sites.
3	Photo database	FileMaker	A database that stores photos taken through the Project.
4	Photo list	Microsoft Excel	A photo list stored in the Photo database. Information of each photograph (e.g. photographed data, time, location, file name) is listed.

Note: Database No.1 and No.2 in the table were proposed as an image for newly developed by MECA. So that the information in the database is limited.

Appendix 12 Report of Project training courses

(1st and 2nd Project phases)

Report of Project training course

(1st Project phase)

Appendix 12 Report of Project training courses (1st and 2nd Project phase)

Report of the Training in Japan on Management of Mangrove Ecosystem

1. Outline of the Training Course

1.1 Title of the Training Course: Management of Mangrove Ecosystem

1.2 Period of the Training Course: November 10 – December 2, 2012

1.3 List of the Trainees:

Name	Age	Organization	Title
Dr. Ahmed Al Sa'idi	35	Marine Environment Conservation, MECA	Director
Mr. Badar Al Bulushi	51	Marine Environment Conservation, MECA	Head of Marine Environment
Mr. Issam Al Boosi	38	Marine Environment Conservation, Salalah, MECA	Head of Wetland Environment

1.4 Objectives of the Training Course:

The objectives of the training course were to enhance and improve knowledge and capability of the counterparts in their specialties through learning Japanese experiences and activities concerning mangrove/wetland ecosystem management and environmental education. The activities in Japan included having lectures and practices about related issues, visiting relevant organizations and facilities, and exchanging their views with Japanese experts/officers.

1.5 Structure of the Training Course:

The training course curriculum was established with focusing on the three subjects including a) monitoring of mangrove forests and mangrove ecosystem, b) conservation of mangrove and wetland ecosystems, and c) environmental education. The following figure illustrates the structure of the training program in Japan, with showing the relationship of each training topic under the three important categories.

Appendix 12 Report of Project training courses (1st and 2nd Project phase)

Monitoring of Mangrove Forests & Mangrove Ecosystem	Conservation of Mangrove & Wetland Ecosystems	Environmental Education
[Lecture] Mangrove Ecosystem: Mangrove plantation, monitoring, evaluation and fisheries		
	[Lecture] Coastal ecosystem: Management of swamp & tidal flat	
[Lecture] Physiological and Ecological Study on Mangrove Plantation in Oman		
	Bird Observatory/ Seaside Park/ Nature Centre: Management of observation centres for tidal flat and wild birds in urban area	
		Aquarium: Environmental education/ Exhibition
[Lecture/Practice] Factors affect Mangrove Ecosystem		
[Lecture/Practice] Monitoring Methods of Mangrove Forest		
[Lecture/Practice] Monitoring Methods of Mangrove Ecosystem / Water Analysis		
[Lecture/Practice] Identification of shellfish		
		Ground Work Mishima: Environmental conservation activities by participation of citizens
		Whole Earth Nature School: Eco-Tourism, Environmental Education
Laboratory Analysis of plankton, shellfish and fish		
Wrap-Up Meeting		
Evaluation of the Training in Japan / Closing		

Appendix 12 Report of Project training courses (1st and 2nd Project phase)

2. Schedule of the Training Course

Day		Contents	Lecturer
Nov10	Sat	Departure from Oman	
11	Sun	Arrival to Tokyo	
12	Mon	Briefing Program orientation	JICA Tokyo JICA Headquarters
13	Tue	Lecture: Coastal ecosystem / plantation, monitoring, evaluation and fisheries	Dr. Tamaei
14	Wed	Field trip: Environmental education and facilitating	Fukushima aquamarine
15	Thu	Field trip: Exhibition and management / Management of observation center for tidal flat and wild bird observation hut in urban area	Gyoutoku wild bird observation center / Sanbanze Seaside Park / Yatsu tidal flat natural observation center
16	Fri	Lecture: Coastal ecosystem/ Management of swamp and tidal flat	IDEA
		Lecture and training: Physiological and ecological study on mangrove plantation in Oman	Dr. Yoshikawa, Okayama university
17	Sat	Day off	
18	Sun	Move to Okinawa	
19	Mon	Lecture and practice: Factors affect Mangrove Ecosystem	Professor Baba Ryukyu university/ISME
20	Tue	Lecture and Practice: Monitoring Methods of Mangrove Forest	Professor Kawamitsu Ryukyu university/ISME
21	Wed	Lecture and Practice: Monitoring Methods of Mangrove Ecosystem / Water Analysis	IDEA
22	Thu	Lecture and Practice: Monitoring of Mangrove Ecosystem	IDEA
23	Fri	Move to Tokyo	
24	Sat	Day off	
25	Sun	Day off	
26	Mon	Lecture and Practice: Identification of shellfish	Dr. Tsuchiya; Tokyo university of Marine Science and Technology
27	Tue	Move to Shizuoka Field trip: Environmental conservation activities by participation of citizens	Ground Work Mishima
28	Wed	Field trip: Eco tourism / Environmental Education	Whole Earth Nature School
29	Thu	Lecture and Practice: Laboratory Analysis of plankton, shellfish and fish Move to Tokyo	IDEA/Shizuoka
30	Fri	Wrap-up meeting and evaluation of the course	
Dec 1	Sat	Departure from Japan	
2	Sun	Arrival to Oman	

3. Achievements of Training in Japan

3.1 Remarkable Results of the Training in Japan

a) Monitoring of mangrove forests and mangrove ecosystem

Dr. Tamaei explained about case study in UAE regarding mangrove transplantation and ecosystem management, which is useful to prepare transplantation guideline in the Project. Prof. Yosikawa delivered research results of mangroves in Oman, which gave suggestions on necessary research subjects in QEIC.

Practice on topographic survey (ISME)

Prof. Baba/ISME provided lecture about characteristics of mangrove distribution, disadvantage and advantage of mangrove forest, and practice on topographic monitoring with the observation of mangrove forest in Iriomote island. Prof. Kawamitsu of Ryukyu university introduced methods and equipment of CO2 fixation amount by mangroves and chlorophyll concentration in leaves. Mr. Hiranaka of IDEA company presented activities on conservation and monitoring of mangrove forests in Okinawa. He also explained monitoring parameters and survey equipment, which is very useful to monitoring activities of the QEIC project.

Mangrove forest in Iriomote Island

Assist. Prof. Tsuchiya of Tokyo marine science university explained classification and identification of shells in mangrove forests. He also showed good field guide books which are inevitable to conduct precise identification. IDEA research institute showed various kinds of laboratory equipment and provided lectures and practices on classification of shells and fishes.

Measurement of chlorophyll content (Ryukyu university)

Observation of shells and fishes (IDEA research institute)

b) Conservation of mangrove and wetland ecosystems

Three different organizations related to conservation of tidal flat were visited, including Gyotoku wild bird observatory, Sanbanze seaside park, and Yatsuhigata nature observation center. The visits were useful to know how to operate the centers with conducting environmental education programs, which locate in urban areas like the QEIC.

Mr. Mitsumoto of IDEA company presented creation of artificial tidal flat in Kuwait to evaluate its capacity of water quality improvement. Mr. Ikeda explained techniques to create an artificial sea grass bed. Mr. Fujiwara provided lecture about conservation of coastal areas and techniques to restore coral reef in Okinawa. These lectures were useful to have good ideas about methods of coastal area management.

Conservation of wetland in Gyotoku

Bird watching at the seaside park

c) Environmental education

The participants learned exhibition methods of mangrove ecosystem and aquarium at Aquamarine Fukushima. Especially, exhibition of mangrove ecosystem was really impressive and attractive.

Through visiting Gyotoku bird observatory and Yatsuhigata nature observation center, the participants were provided knowledge and skills to conduct environmental education activities. “Kids Ranger System” would be an effective way for children to learn about environment and ecosystem. Manko water bird and wetland center in Okinawa also provided useful suggestions to prepare plans of environmental education and exhibition at the QEIC.

Groundwork Mishima suggested the importance of participation of local community in successful environmental conservation activities, which is also necessary in mangrove ecosystem management in

Exhibition of mangrove ecosystem

Telescopes for bird watching

Oman. Whole Earth Nature School explained environmental education and conservation activities through eco-tourism. They also mentioned role of the ministry of environment to promote eco tourism with cooperating private sectors.

Observation cabin for bird watching

Well-maintained river-side walk (Groundwork Mishima)

Example of education materials (Whole earth Nature School)

3.2 Results of the Wrap-up Meeting

At the end of the training program, a wrap-up meeting was held to evaluate the training course in Japan. During the wrap-up meeting, the participants expressed their impressions, comments and suggestions on the training course. They also mentioned about possibilities to utilize and extend information and skills in the QEIC Project, which they obtained in Japan through the training.

- Establishment of monitoring methods for mangrove ecosystem is one of the most important project activities, and the methodologies which have been learned through the training at ISME will be utilized in the Project.
- Measurement of chlorophyll concentration in leaves will be useful as a monitoring method of the mangrove health, which will be considered in the Project.
- Knowledge and skills on monitoring parameters and survey equipment, which were provided during the training in Okinawa, will be utilized in the Project activity.
- Kids ranger system will be introduced in environmental education activities, which will be effective to encourage children to attend education programs repeatedly, and to enhance their knowledge about mangrove ecosystem.

- Observation cabin for bird watching will be constructed in QNR, which is useful to observe birds with hiding ourselves from birds.
- Environment cards will be created concerning conservation of mangrove ecosystem, and will be used in environmental education programs.
- It is necessary to establish guidelines for promoting eco tourism in Oman, and to conduct training program on eco tourism to educate private sectors.
- Exhibition of mangrove ecosystem using real mangrove trees will be attractive as an exhibition method for QEIC.

Report of Project training course

(2nd Project phase)

The Qurm Environmental Information Center Project

Report of Project training course in Japan

July 2013

JICA Project Team

Appendix 12 Report of Project training courses (1st and 2nd Project phase)

Appendix 12 Report of Project training courses (1st and 2nd Project phase)

1. Outline of the training course

(a) Title: Mangrove Ecosystem Management

(b) Period: June 17th-July 5th, 2013

(c) No. participants: Following 4 members

Name	Age	Sex	Organization	Position
Mr. Haitham Said Al-farqani	28	M	Ministry of Environment and Climate Affairs (MECA), Marine Environment Conservation Department	Nature reserve specialist
Mr. Mohammed Abood Al-washahi	38	M	MECA, Nature Conservation Department, Shinas	Nature supervisor
Mr. Mohammed Salim Hardan	36	M	MECA, Marine Environment Conservation Department, Salalah	Marine environment specialist
Mr. Yareb Ali Khadam Al-Hashmi	26	M	MECA, Marine Environment Conservation Department, Sur	Nature reserve specialist

2. Content of the training course

(a) Basic framework of the training course

The main objective of the training course was to acquire basic knowledge and experience required for implementing mangrove ecosystem monitoring and plantation activities. Hence, the training course was structured from the following courses:

- Lectures that focus on acquiring basic knowledge on mangrove and mangrove ecosystem.
- Lectures and field practice on monitoring methods, focusing on parameters that will be employed in Oman.
- Lectures on plantation methods and techniques

Figure 1 shows the basic framework of the training course.

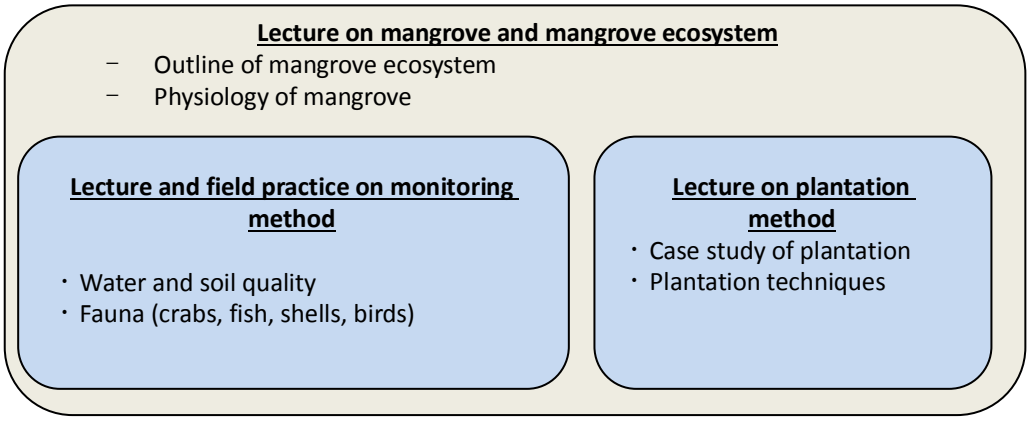


Figure 1 Basic framework of the training course

(b) Schedule of training course

Table 1 shows the schedule of the training course.

Table 1 Schedule of "Mangrove Ecosystem Management" training course

Day	Content	Time	Organization	Location
6/17	Briefing	9:30-12:00	JICA Okinawa	OIC
	Orientation	14:00-15:00	JICA Project Team	
6/18	Lecture: Introduction on mangrove ecosystem	10:00-16:30	ISME, Dr.Baba	Ryukyu University
6/19	Lecture: Plantation technique of mangrove	10:00-16:30	ISME, Dr.Baba	Ryukyu University
6/20	Lecture: Case study of mangrove plantation	10:00-16:30	ISME, Dr.Baba	Ryukyu University
6/21	Lecture: Biology of mangrove tree	9:30-16:30	Okayama Uni., Dr. Yoshikawa	Idea Consultants
6/22	Holiday			
6/23	Holiday			
6/24	Lecture/field work: Survey methods of water and soil quality	9:30-15:00	Idea Consultants, Mr. Tabata/Hiranaka	Idea Consultants Nearby river
6/25	Lecture/field work: Survey methods of fauna (fish, crabs)	9:30-16:30	Idea Consultants, Mr. Tabata/Hiranaka	Idea Consultants Ginoza
6/26	Lecture/field work: Survey methods of mangrove tree	9:30-16:30	Idea Consultants, Mr. Tabata/Hiranaka	Idea Consultants Yagachi
6/27	Lecture/field work: Survey methods of mollusks	10:00-16:30	Tokyo University of Marine Science and Technology, Dr. Tsuchiya	Manko Waterbird and Wetland Center
6/28	Lecture: Utilization of mangrove	10:00-16:30	ISME, Dr.Baba	Ryukyu University
6/29	Holiday			
6/30	Holiday			
7/1	Site visit	10:00-12:00	Okinawa Churaumi Aquarium, Mr. Matsumoto	Okinawa Churaumi Aquarium
7/2	Lecture/field work: Survey methods of birds	9:00-16:00	Okinawa Yachono-kai, Dr. Yamashiro	Manko Waterbird and Wetland Center
7/3	Lecture: Assessment of health of mangrove	10:00-15:00	Ryukyu University, Dr. Kawamitsu	Ryukyu University
	Okinawa-Tokyo	Depart 16:45		
7/4	Lecture: Monitoring with remote sensing	9:30-16:30	Japan Space Systems, Dr. Hirose	Japan Space Systems
7/5	Rap-up meeting	9:30-11:00	JICA Project Team	JICA Tokyo
	Evaluation of training course	11:00-12:00	JICA Tokyo	
7/6	Depart Tokyo			

3. Results of the training course

(a) Training courses on mangrove and mangrove ecosystem

The following courses were implemented to acquire basic knowledge on mangrove and mangrove ecosystem:

- Introduction on mangrove ecosystem (ISME, Dr. Baba)
- Biology of mangrove tree (Okayama University, Dr. Yoshikawa)
- Mollusks in mangrove ecosystem (Tokyo University of Marine Science and Technology, Dr. Tsuchiya)
- Birds in mangrove and mudflats (Okinawa Yachono-kai, Dr. Yamashiro)
- Assessment of health of mangrove (Ryukyu University, Dr. Kawamitsu)

Lecture of Dr. Baba, covered varying themes such as mangrove distribution, food chain and salt tolerance mechanism of mangrove.

Dr. Yoshikawa explained about mangrove tree structure, photosynthesis, adaptation to high salinity and reproduction. He also introduced his research activity in Red Sea, which is about genetic diversity of mangrove.

Dr. Tsuchiya, explained about diversity, distribution and physiology of mollusks in mangrove area. *Terebraria* and *Cerithidea* species have important roles in the mangrove food chain, as they directly consume fallen mangrove leaves. These species may be candidates as indicator species.

Mr. Yamashiro, explained about diversity and characteristics of birds found around mangrove area. He also explained that excessive growth of mangroves can have negative influence on birds by reducing their feeding area (mudflats). This is an important point to consider when planning plantation activities.

Dr. Kawamitsu explained about plant photosynthesis mechanism and impacts of global warming.

(b) Training courses on mangrove ecosystem monitoring

The following courses were implemented to learn about monitoring methods of mangrove ecosystem:

- Survey methods of mangrove ecosystem (Idea Consultants, Mr. Tabata/Hiranaka)
- Survey methods of mollusks (Tokyo University of Marine Science and Technology, Dr. Tsuchiya)
- Survey methods of birds (Okinawa Yachono-kai, Dr. Yamashiro)
- Monitoring with remote sensing (Japan Space Systems, Dr. Hirose)

Idea's courses mainly involved field practices on water quality, soil quality, fauna and mangrove surveys. Water quality survey included water sampling and field measurement. In the fauna survey, benthic organisms and fishes were collected. Mangrove survey was conducted by establishing a quadrat.

In Dr. Tsuchiya's course, mollusks were collected by using sieve. The collected mollusks were then later identified by using field guide book.

In Mr. Yamashiro's course, birds were observed by using binocular and scope. He also explained the main points to look when identifying birds.

Mr. Hirose explained about the basic concept of remote sensing monitoring, followed by practice work on estimating mangrove forest with GPS and GIS.

(c) Training courses on mangrove plantation

The following courses were implemented to learn about mangrove plantation:

- Plantation technique of mangrove (ISME, Dr. Baba)
- Case study of mangrove plantation (ISME, Dr. Baba)
- Utilization of mangrove (ISME, Dr. Baba)

Courses on mangrove plantation were conducted by Dr. Baba. He introduced plantation examples of other countries, as well as the factors to consider when selecting appropriate plantation sites.

4. Conclusion

On the final day, a Q&A session was conducted to confirm the trainees level of understanding. While all trainees showed relatively good basic understanding, it is essential that they continue to participate in training activities for further improvement. QEIC's training program will have an important role in this aspect. The trainees also made the following recommendations regarding future QEIC activities:

- Future plantation activities should be conducted by setting clear targets and also by considering negative aspects of plantation (e.g. possible reduction of bird feeding area)
- In order to effectively carry out QEIC activities, it will be necessary to increase the number of staffs

Appendix 13 Agenda and participant list of international workshop

Agenda

INTERNATIONAL WORKSHOP ON ENVIRONMENTAL SUSTAINABILITY OF MANGROVE ECOSYSTEM

(9-11TH DECEMBER 2013)

Day 1 (9th Dec.2013) -Situation of the mangrove conservation-

Time	Topic	Presenter
08:30-09:00	Registration	
09:00-09:05	Opening remarks	Mohammed Al-Muharrami Director General of Nature Conservation, MECA
09:05-09:10		Ambassador, H.E. George HISAEDA, Embassy of Japan
09:10-09:15		Mr. Hiroyuki Hatori Environmental adviser, JICA
09:15-09:30	Documentary film about the mangrove project in Oman	MECA
09:30-10:00	**Coffee break**	
Session (1) (Chair, Thuraya AL_ Sariri)		
10:00-10:20	Introduction of the QEIC and QNR	Dr. Ahmed Al-Saidi, QEIC project team
10:20-10:45	Introduction of the QEIC project (Technical support for the QEIC)	Mr. Yoichi Harada, QEIC project team
10:45-11:15	Convention on wetlands and the conservation of mangrove ecosystems Regional Conference - Environmental Sustainability of Mangrove Ecosystems	Dr. Llewellyn Young, Secretariat of the Ramsar
11:15-11:45	My experience on collaborations and partnerships when implementing mangrove-related activities	Professor\ Shigeyuki Baba, Executive Director of ISME
11:45-12:00	**Discussions and Questions**	
12:00-13:30	**Lunch and Pray**	
Session (2) (Chair, Anas Zubair)		
13:30-14:00	Study on gray mangrove plantation for greening of Abu Dhabi sabkha	Dr. Shigeyasu Tamaei, QEIC project team
14:00-14:30	Mangrove plantation project in Oman	Mr. Badar Al-Bulushi, QEIC project team
14:30-15:00	Contribution to Ramsar Implementation in the Maghreb	Dr. Faouzi Maamouri, WWF North Africa Programme coordinator
15:00-15:10	**Discussions and Questions**	
15:10-15:20	**Coffee break**	
15:20-16:15	Group Discussions (Needs for QEIC: Mangrove conservation and plantation)	
19:30-21:30	**Welcome Dinner**	

Appendix 13 Agenda and participant list of international workshop

Day 2 (10th Dec.2013) -Toward the future on mangrove conservation

Time	Topic	Presenter
Session (3) (Chair, Faouzi Maamouri)		
08:30-09:00	Development of the Monitoring System for Photosynthesis and Biomass Production in Mangrove	Professor\ Yoshinobu Kawamitsu Ryukyu university (Japan)
09:00-09:30	Concentrations of carbon dioxide in the mangrove	Dr. Ahmed Al-Saidi, QEIC project team
09:30-10:00	Environmental education program in the mangrove forest	Ms. Aida Al- Jabri, QEIC project team
10:00-10:15	**Discussions and Question**	
10:15-10:25	**Coffee break**	
Session (4) (Chair, Dr. Ahmed AL saidi)		
10:25-10:55	Ecosystem Based Management of Marine ecosystems in west Asia	Dr. Fouad Abousamra, UNEP
10:55-11:25	Monitoring and control program in the mangrove forest	Mr. Hitham AL- farqani, QEIC project team
11:25-11:55	Master Plan for the rehabilitation of mangrove forests of sultanate of Oman	Mr. Tomoo shoji, Former JICA Expert
11:55-12:25	Strengthening conservation of mangroves	Dr. Hany EL shaer, Programme Manager, IUCN Reginal Office for West Asia
12:25-12:35	**Discussions and Question**	
12:35-14:00	**Lunch and Pray**	
Session (5) (Chair, Badar Al-Burushi, Akira Koto)		
14:00-15:15	**Group Discussions** (Needs for QEIC: Mangrove Monitoring and Environmental Education)	
15:15-15:45	Distribution of certificates and commemorative shield for lecturers	
17:00-20:30	Evening Tour to Suq Muttrah	

Day 3 (11th Dec.2013)

Field Trip

Time	Topic
08:00-09:30	Site visit of Qurm Nature Reserve
09:30-12:00	Site visit of Khwar AL_ Sawadi mangrove \ Transplanting site
12:00-14:00	Lunch and Pray at Sawadi Beach Hotel
15:30	Return to Hotel

Note: Please wear for field purpose.

Abbreviation:

MECA: Ministry of Environment and Climate Affaires
JICA: Japan International Cooperation Agency
QEIC: Qurm Environmental Information Center
QNR: Qurm Nature Reserve
MFF: Mangrove For the Future
ISME: International Society of Mangrove Ecosystem
WWF: World Wildlife Fund
UNEP: United Nations Environmental Programme
IUCN: International Union for Conservation of Nature

Participant list

Appendix 13 Agenda and participant list of international workshop

Names of Participants of the International Workshop

From outside of Oman

	Country	Name of the participant	Job title	Organization
1	Saudi Arabia	Anas Zubair Sambes	Director of the Department of Wildlife Research	
		Ali Abdullah Al-Musaabi	Marin Researcher	
2	Kuwait	Fatma Mohammed Al-Qahtani	Head of Costal Zone	
		Iman Abdullah Faisal	Monitoring Costal Zone	
3	United Arab Emirates	Ahmed Ismael Al-Hashmi	Director of Biodiversity	Invitee
4		Ahmed Abdullah Al-Ali	Director of Nature Reserve	Participants by own expense
5		Mohammed Abdulrahman Al-Awadhi	Head of Agriculture	
6		Nabeel Mahfudh Haidar	Head of the Agricultural Services Division	
7		Ibrahim Abdullah Masuod		
8		Ahmed Ali Mohammed Al-Dahmani		
9		John Pereira		
10	Bahrain	Dr. Shakir Khamdn	Head of Environmental Monitoring	Supreme Council of Environment
		Mr. Adel Ahmed Abdulla Ali	Environmental Inspector	Supreme Council of Environment
11	Yemen	ENG. Anwar Faisal Al-Hamairi	Deputy of General	Authority for Environmental Protection
12	Iran	Ali Sabir	Environment Organization expert	
13	Iraq	Mr. Ali Sami Khashan	Biologist	Ministry of Environment
14	WWF	Mr. Faouzi Maamouri	North Africa Programme Coordinator	WWF in North Africa
15	UNEP	Dr. Fuad Abu Samra	Regional Coordinator of Ecosystems for Western Asia	UNEP
16	RAMSAR	Dr. Llewellyn Young	RAMSAR coordinator	RAMSAR
17	MFF, IUCN	Dr Steen Christensen	Coordinator of the Mangroves for the Future Initiative	IUCN Asian Regional Office
18	Japan	Dr. Shigeyuki Baba	Director-General	International Society of Mangrove Ecosystem

Appendix 13 Agenda and participant list of international workshop

	Country	Name of the participant	Job title	Organization
19		Dr. Yoshinobu Kawamitsu	Professor	Ryukyu University, Japan
20		Mr. Hatori	Advisor	JICA

From Oman

	Group of Participants	From:	Number
1	Governments and private sectors	Ministry of Agriculture and Fisheries	1
		Ministry of Regional Municipalities and Water Resources	1
		Sultan Qaboos University	1
		The Research Council	1
		Oman Center for Animal Genetic Resources and Plant	1
		Muscat Municipality	1
		ESO + 2 volunteers	4
		Omani Society for Water	1
		Research and Studies Center	1
		Office of Environmental Conservation	1
		Ministry of Tourism	1
		Five Oceans Environmental Consulting company	1
		Mitsubishi Company	1
		Alhaya Water company	1
2	MECA	Department of Environment and Climate Affairs (Dhofar)	3
		Department of Environment and Climate Affairs (South Sharqeya)	3
		Department of Environment and Climate Affairs (South Batinah)	2
		Department of Environment and Climate Affairs (North Batinah)	2
		Department of Environment and Climate Affairs (Alwustah)	2
		Department of Environment and Climate Affairs (Musandam)	2
		Department of Biological Diversity	2
		Department of Nature Conservation	2
		TOTAL	35

Appendix 14 WBS evaluation sheet

WBS Evaluation — Revised: May 2013

<Output>	<Activity>	<Tasks>		Level of progress (level 0-5) 2012 Nov	2013 Jun	2013 Nov
Output 0:The project operation unit in QEIC is established.	0.1 Review and finalize Work Plan	0.1.1 Preparation by Japanese Expert Team as a draft		4.4	4.7	4.4
		0.1.2 Discussion in Oman	0.1.2.1 Confirmation of the member	4.0	3.8	4.0
			0.1.2.2 Announcement of the meeting	3.8	4.5	4.6
			0.1.2.3 Revision of the draft	3.0	4.5	4.6
		0.1.3 Aprroval by JICA		4.0	4.0	4.2
		0.1.4 Aprroval by JCC	0.1.4.1 Confirmation of the member's schedule	3.0	3.3	3.5
			0.1.4.2 Announcement of the meeting	2.0	3.7	4.2
			0.1.4.3 Preparation of handout	2.0	4.3	4.5
	0.2 Establish project implemetation body	0.2.1 List of members	0.2.1.1 Preparation of list of members	5.0	3.8	4.1
			0.2.1.2 Discussion	5.0	3.7	4.2
		0.2.2 Noification	0.2.2.1 Notification to members	5.0	3.7	4.1
			0.2.2.2 Finalization of the list	5.0	3.5	4.0
		0.2.3 Approval by JCC	0.2.3.1 Confirmation of the member's schedule	5.0	3.3	4.1
			0.2.2.2 Announcement of the meeting	5.0	4.0	4.7
			0.2.2.3 Approved by JCC	5.0	3.3	4.2
	0.3 Prepare budget plan for the Project and operation of QEIC	0.3.1 Management plan	0.3.1.1 Preparation of management plan	1.8	2.5	3.6
			0.3.1.2 Discussion	1.8	2.8	3.5
		0.3.2 Framework	0.3.2.1 Interview	4.6	3.7	4.3
			0.3.2.2 List of present issue	3.8	3.3	4.3
		0.3.3 Planning	0.3.3.1 Discussion	3.6	3.0	4.3
			0.3.2.2 Planning	3.4	2.7	3.5
			0.3.2.3 Finalization of the plan -> go to 0.5.1.1	0.4	2.8	3.8
	0.4 Establish the Joint Coordinating	0.4.1 Discussion and confirmation of the member		4.8	3.3	4.0
		0.4.2 Announcement of the meeting		5.0	3.7	4.3
		0.4.3 Preparation of presentation, handout. Translation of the		5.0	3.8	4.5
	0.5 Prepare project monitoring plan	0.5.1 Baseline data	0.5.1.1 Preparation of interview materials	5.0	3.8	4.2
			0.5.1.2 Distribution of the materials	4.0	3.8	4.4
			0.5.1.3 Retrieval of the materials	5.0	4.2	4.2
			0.5.1.4 Evaluation	4.0	3.7	4.5
		0.5.2 Monitoring plan	0.5.2.1 Discussion on monitoring strategy, WBS	4.4	4.0	4.4
			0.5.2.2 Establishment fo monitoring plan	4.0	3.8	4.2
		0.5.3 Conducting monitoring		2.6	3.3	4.1
	0.6 Plan budget, personnel and facility of QEIC	0.6.1 Agreement <- from 0.2.2.3		3.2	3.0	3.4
		0.6.2 Budget securement plan		3.0	3.2	3.9
		0.6.3 Reporting in the progress report		2.0	3.3	3.5
	0.7 Determine tasks of QEIC	0.7.1 Discussion and confirmation		3.4	2.8	3.8
		0.7.2 Reporting in the progress report		2.0	3.2	4.2
	0.8 Material and equipment are procured and maintained	0.8.1 Establishment of monitoring and exhibition plan <- from work		2.2	3.8	3.8
		0.8.2 Order of the equipment	0.8.2.1 Quotation	5.0	4.7	4.6
			0.8.2.2 Approval by JICA	4.0	4.2	4.3
			0.8.2.3 Place of order	2.0	3.7	4.0
		0.8.3 Receive of the equipment	0.8.3.1 Acceptance inspection and the	0.0	3.7	4.1
			0.8.3.2 Payment	0.0	3.0	3.8
		0.8.4 Reporting to JIC		-	2.8	3.5
		0.8.5 Inatallation of the equipment		0.0	2.8	3.2
		0.8.6 Development of maintenance plan		0.0	2.2	3.0
		0.8.7 Handover of the equipment		0.0	2.8	3.8

The result is shown as averaged evaluation.

Level of progress

Level 0: Not started, Level 1: Just started, Level 2: 25% is completed
Level 3: 50% is completed, Level 4: 75% is completed, Level 5: 100% is completed

Appendix 14 WBS evaluation sheet

WBS Evaluation

<Output>	<Activity>	<Tasks>	Level of progress (level 0-5) 2012 Nov	2013 Jun	2013 Nov
Output 1:The capacity of training activity for QEIC to promote sustainable mangrove ecosystem management is developed.	1.1 Identify target groups of training courses	1.1.1 Preparation of draft plan	5.0	4.5	4.9
		1.1.2 Wrokshop	5.0	4.3	4.6
		1.1.3 Confirmation	5.0	4.3	4.3
		1.1.4 Update	1.0	3.2	3.7
	1.2 Conduct training needs survey	1.2.1 Workshop	5.0	4.7	4.7
		1.2.2 Confirmation	5.0	4.7	4.4
		1.2.3 Finaliztion	2.0	3.5	3.8
	1.3 Prepare syllabi for each course through conducting	1.3.1 Preparation of draft	1.0	2.8	3.5
		1.3.2 Modifcation	1.0	2.7	3.4
		1.3.3 Finalization	1.0	2.7	3.8
	1.4 Prepare resource persons list corresponding to all the subjects	1.4.1 Selection of the resource person	2.0	2.7	3.5
		1.4.2 Contact with the resource person	2.0	2.7	3.7
		1.4.3 Discussion and negotiation	2.0	2.5	3.2
		1.4.4 Finalization	1.0	2.5	3.4
	1.5 Prepare training materials	1.5.1 Preparation of draft	2.0	3.7	4.0
		1.5.2 Modifcation	1.0	3.0	3.5
		1.5.3 Finalization	1.0	3.0	3.4
	1.6 Analyze the cost of training courses	1.6.1 Discussion and confirmation	1.0	3.2	4.0
		1.6.2 Finalization	1.0	2.8	3.8
	1.7 Prepare training schedule	1.7.1 Preparation of draft	3.0	3.7	4.1
		1.7.2 Modifcation	2.0	3.5	4.1
		1.7.3 Finalization	2.0	3.2	3.9
	1.8 Conduct trial training courses	1.8.1 Planning	2.0	3.8	4.1
		1.8.2 Announcement	2.0	3.7	4.0
		1.8.3 Preparation of materials	2.0	3.8	4.1
		1.8.4 Implementation	2.0	3.7	4.1
		1.8.5 Evaluation	2.0	3.7	4.2
		1.8.6 Finalization	1.0	3.7	4.2
	1.9 Conduct monitoring of trial training	1.9.1 Preparation of draft monitoring form	3.0	3.7	4.1
		1.9.2 Modifcation	2.0	3.7	3.6

The result is shown as averaged evaluation.

Level of progress

Level 0: Not started, Level 1: Just started, Level 2: 25% is completed
Level 3: 50% is completed, Level 4: 75% is completed, Level 5: 100% is completed

WBS Evaluation

<Output>	<Activity>	<Tasks>		Level of progress (level 0-5) 2012 Nov	2013 Jun	2013 Nov
Output 2 The Monitoring method for QEIC to promote sustainable mangrove ecosystems management and development	2.1 Identify parameters to monitor the natural and social condition of mangrove ecosystem	2.1.1 Field survey	2.1.1.1 Natural condition	3.0	3.8	4.0
			2.1.1.2 Social condition	1.6	3.3	3.8
		2.1.2 Extraction of monitoring parameters from the results of field		4.8	3.7	4.2
		2.1.3 Discussion of parameters by the staff concerned by comparing with the baseline results of Master Plan		4.8	3.5	4.0
		2.1.4 Finalization of parameters list		4.6	3.5	4.0
	2.2 Identify monitoring methods and schedule for each monitoring parameter	2.2.1 Monitoring trials in the mangrove forest by considering the seasonality of mangrove ecosystem		3.2	3.3	3.7
		2.2.2 Identification of monitoring tools for sample collection and measurement along with reference photos		1.6	2.8	3.6
		2.2.3 Preparation of monitoring tools mentioned above		1.6	3.2	4.0
		2.2.4 Decision of monitoring schedule according to the seasonality of mangrove ecosystem		1.6	2.8	3.9
	2.3 Prepare Monitoring Guideline including monitoring format	2.3.1 Compile the monitoring parameters, monitoring methos and monitoring schedule		2.2	2.7	4.0
		2.3.2 Prepare draft monitoring manual along with all necessary monitoring tools		2.2	3.0	4.0
		2.3.3 Distribute the roles of monitoring activities among monitoring staff and identify monitoring system		2.2	2.8	3.6
	2.4 Conduct trial monitoring survey for the revision of Monitoring Guideline	2.4.1 Trial run of monitoring activities according to the Monitoring Guideline prepared		1.6	2.2	3.8
		2.4.2 Extraction of problems, difficulties and tasks from through the trial run		1.6	2.5	3.7
		2.4.3 Revision of the Monitoring Guideline based on the above extraction -> to 2.6		1.6	2.7	3.8
	2.5 Prepare a platform for publicizing results of the monitoring	2.5.1 Preparation of recording format for the collected monitoring data		2.4	3.2	3.9
		2.5.2 Analysis of the collected monitoring data and report preparation		0.8	3.3	4.0
		2.5.3 Utilization of analytical results through brochures and posters by using GIS techniques		0.0	1.5	4.1
	2.6 Conduct monitoring survey and finalize Monitoring Guideline	2.6.1 Final trial montoring		-	2.2	3.8
		2.6.2 Evaluation of the effectiveness of the Monitoring Guideline		-	1.5	3.3
		2.6.3 Modificaion of the Monitoring Guideline based on 2.6.2		-	1.5	3.4
Output 3 Methods and techniques for promoting mangrove reforestation are developed	3.1 Conduct baseline survey of mangrove plantation sites and nursery facilities	3.1.1 Preparation of field survey for nursery and planting field		3.2	3.3	4.5
		3.1.2 Implementation of field survey for nersery and planting field		2.4	3.3	4.3
		3.1.3 Analysis of survey results and preparation of recommendation		0.0	2.7	4.4
	3.2 Develop improved techniques for mangrove plantaton through trials in nursery and planting fields and prepare Mangrove Plantation	3.2.1 Confirmation of current techniques for seedling production and afforestation of mangrove applied by MECA		3.2	3.3	4.4
		3.2.2 Improvement of seedling production techniques through trials in nursery		4.0	3.2	4.3
		3.2.3 Improvement of plantation techniques through trials in planting fields		4.0	3.2	4.4
	3.3 Develop methods for protection of mangroves and prepare Mangrove Protection Guideline	3.3.1 Survey for the present situation of the utilization of mangrove forest by the regional inhabitant		0.6	1.8	3.7
		3.3.2 Survey for the countermeasures to protect mangrove forest by the public administration		4.0	3.2	3.9
		3.3.3 Development of appropriate methods for protecting mangrove forest based on the survey results		3.2	3.2	4.0

The result is shown as averaged evaluation.

Level of progress

Level 0: Not started, Level 1: Just started, Level 2: 25% is completed
Level 3: 50% is completed, Level 4: 75% is completed, Level 5: 100% is completed

WBS Evaluation

<Output>	<Activity>	<Tasks>	Level of progress (level 0-5) 2012 Nov	2013 Jun	2013 Nov
Output 4 The capacity of Environmental Education Programme activity for QEIC to promote sustainable mangrove ecosystem management is improved.	4.1 Identify target groups for environmental education	4.1.1 Studying target groups of the existing environmental education programme	4.6	4.0	4.5
		4.1.2 Discussion with counterparts and related personnel to identify target groups for environmental education	4.8	4.0	4.6
		4.1.3 Finalizing target groups based on the results of 4.1.1 and 4.2.2	4.8	4.0	4.8
	4.2 Develop methods and tools for environmental education	4.2.1 Reviewing existing methods and tools for environmental education (including organizing workshop)	4.8	4.0	4.9
		4.2.2 Gathering information from the results of monitoring and reforestation activities to develop the methods and tools for environmental education	3.8	4.0	4.6
		4.2.3 Improvement of the existing methods and tools through trials	3.2	4.0	4.3
		4.2.4 Development of new methods and tools through trials	2.4	3.8	4.0
	4.3 Analyze the cost of implementing environmental education events	4.3.1 Financial reviewing of existing environmental education events	3.8	3.5	4.3
		4.3.2 Studying necessary cost of implementing environmental education events	3.8	4.2	4.2
		4.3.3 Finalyzing the cost of implementing environmental education events	2.8	3.7	4.2
	4.4 Develop various publication materials (incl. Web site)	4.4.1 Reviewing the existing publications for environmental education	4.4	3.8	4.3
		4.4.2 Gathering information from the results of monitoring and reforestation activities to develop the publications	4.4	4.5	4.9
		4.4.3 Improvement of the existing publications through trials	2.4	3.7	4.5
		4.4.4 Development of new publications through trials	2.4	4.0	4.7
	4.5 Develop schedule of environmental education programme	4.5.1 Reviewing the existing schedule of environmental education programme	4.4	4.0	4.4
		4.5.2 Identification of necessary events for environmental education along with considering the seasonality of mangrove ecosystem	3	3.3	4.2
		4.5.3 Drafting the schedule of environmental education programme	4.2	3.7	4.0
		4.5.4 Finalizing the schedule of environmental education programme	4	3.7	4.5
	4.6 Conduct trial environmental education events including participatory plantations	4.6.1 Trial run of environmental education events according to the schedule drafted in 4.5	4.4	4.2	4.4
		4.6.2 Extraction of problems, difficulties and tasks from through the trial run	4.4	4.2	4.4
		4.6.3 Revision of methods and tools for environmental education based on the above extraction	4	3.8	4.1
		4.6.4 Revision of the event schedule based on the above extraction	4	4.0	4.6
	4.7 Develop exhibition plan of QEIC	4.7.1 Discussion with counterparts and related personnel to develop exhibition plan of QEIC	1	2.2	3.7
		4.7.2 Studying necessary equipment for implementing the exhibition plan	1	2.8	4.0
		4.7.3 Studying necessary materials for implementing the exhibition plan	1	3.0	3.8
		4.7.4 Drafting exhibition plan of QEIC based on the results of 4.7.1, 4.7.2, and 4.7.3	0.8	2.0	3.3
	4.8 Monitoring and evaluation of environmental education events	4.8.1 Studying indicators for the monitoring survey on environmental education events	1.6	2.7	3.3
		4.8.2 Preparing questionnaire/check sheet for the monitoring survey	1.6	2.7	3.8
		4.8.3 Implementing monitoring survey by using the prepared questionnaire/check sheet	1.6	2.3	3.5
		4.8.4 Analyzing results of the monitoring survey to have suggestions to improve environmental education events	0.8	2.5	3.5

The result is shown as averaged evaluation.

Level of progress

Level 0: Not started, Level 1: Just started, Level 2: 25% is completed
Level 3: 50% is completed, Level 4: 75% is completed, Level 5: 100% is completed

Appendix 15 Questionnaire for capacity assessment

Questionnaire (Individuals)

Appendix 15 Questionnaire for capacity assessment

Capacity Assessment Checklist (Individuals)

Output	Item	Evaluation Please mark one of the four levels corresponding to **YOUR** situation.	Comments
Output 1: The capacity of training activity for QEIC to promote sustainable mangrove ecosystem management is developed.	Technical knowledge and skill on identifying training needs	☐ 1. Poor technical knowledge and skill for identifying training needs. ☐ 2. Certain level of technical knowledge and skill for identifying training needs. ☐ 3. Good level of technical knowledge and skill for identifying training needs. ☐ 4. Enough technical knowledge and skill for identifying training needs.	
	Technical knowledge and skill on preparing training curriculum	☐ 1. Poor technical knowledge and skill for preparing training curriculum. ☐ 2. Certain level of technical knowledge and skill for preparing training curriculum. ☐ 3. Good level of technical knowledge and skill for preparing training curriculum. ☐ 4. Enough technical knowledge and skill for preparing training curriculum..	
	Technical knowledge and skill on preparing teaching material	☐ 1. Poor technical knowledge and skill for preparing teaching material. ☐ 2. Certain level of technical knowledge and skill for preparing teaching material. ☐ 3. Good level of technical knowledge and skill for preparing teaching material. ☐ 4. Enough technical knowledge and skill for preparing teaching material.	
	Administrative capability for training course management	☐ 1. Poor administrative capacity for the management of training course implementation. ☐ 2. Existence of an idea to achieve good management of training course implementation, but not realized yet. ☐ 3. Some efforts have been implemented to achieve good management of training course implementation. ☐ 4. Smooth administration to achieve good management of training course implementation.	
	Technical knowledge and skill as a trainer	☐ 1. Poor technical knowledge and skill as a trainer. ☐ 2. Certain level of technical knowledge and skill as a trainer. ☐ 3. Good level of technical knowledge and skill as a trainer. ☐ 4. Enough level of technical knowledge and skill as a trainer.	
	Evaluation of training course efficiency and trainer performance	☐ 1. Few opportunity to conduct the evaluation. ☐ 2. Existence of opportunity to conduct the evaluation, but not actualized. ☐ 3. Existence of opportunity to conduct the evaluation and utilized. ☐ 4. Existence of effective opportunity to conduct the evaluation and fully utilized.	

Appendix 15 Questionnaire for capacity assessment

Output	Item	Evaluation Please mark one of the four levels corresponding to **YOUR** situation.	Comments
Output 2: The monitoring method for QEIC to promote sustainable mangrove ecosystem management is developed.	Sense of understanding and responsibility on monitoring	☐ 1. Few sense of understanding about necessity of monitoring the natural and social condition of mangrove ecosystem. ☐ 2. Understanding the necessity of monitoring the natural and social condition of mangrove ecosystem, but few sense of responsibility. ☐ 3. Understanding the necessity of monitoring the natural and social condition of mangrove ecosystem, and strong sense of responsibility. ☐ 4. Strong sense of responsibility for monitoring the natural and social condition of mangrove ecosystem as highly prioritized issue.	
	Technical knowledge and capability on monitoring parameter for natural condition	☐ 1. Poor technical knowledge about parameters to monitor the natural condition of mangrove ecosystem. ☐ 2. Understanding certain level of the technical knowledge about parameters to monitor the natural condition of mangrove ecosystem. ☐ 3. Understanding most of the technical knowledge about parameters to monitor the natural condition of mangrove ecosystem. ☐ 4. Enough technical knowledge about parameters to monitor the natural condition of mangrove ecosystem.	
	Technical knowledge and capability on monitoring parameter for social condition	☐ 1. Poor technical knowledge about parameters to monitor the social condition of mangrove ecosystem. ☐ 2. Understanding certain level of the technical knowledge about parameters to monitor the social condition of mangrove ecosystem. ☐ 3. Understanding most of the technical knowledge about parameters to monitor the social condition of mangrove ecosystem. ☐ 4. Enough technical knowledge about parameters to monitor the social condition of mangrove ecosystem.	
	Technical knowledge and capability on monitoring methods and schedule	☐ 1. Poor technical knowledge about monitoring methods and schedule for each monitoring parameter. ☐ 2. Understanding certain level of the technical knowledge about monitoring methods and schedule for each monitoring parameter. ☐ 3. Understanding most of the technical knowledge about monitoring methods and schedule for each monitoring parameter. ☐ 4. Enough technical knowledge about monitoring methods and schedule for each monitoring parameter.	
	Technical skill and capability on conducting monitoring	☐ 1. Poor technical skill for conducting monitoring. ☐ 2. Certain level of the technical skill for conducting monitoring. ☐ 3. Good level of the technical skill for conducting monitoring. ☐ 4. Enough level of the technical skill for conducting monitoring.	

Appendix 15 Questionnaire for capacity assessment

Output	Item	Evaluation Please mark one of the four levels corresponding to **YOUR** situation.	Comments
Output 2: The monitoring method for QEIC to promote sustainable mangrove ecosystem management is developed.	Technical skill on analyzing & reporting monitoring results	☐ 1. Poor technical skill for analyzing and reporting monitoring results. ☐ 2. Certain level of technical skill for analyzing and reporting monitoring results. ☐ 3. Good level of technical skill for analyzing and reporting monitoring results. ☐ 4. Enough level of technical skill for analyzing and reporting monitoring results.	
	Administrative capability	☐ 1. Poor administrative capacity for monitoring the natural and social condition of mangrove ecosystem. ☐ 2. Existence of an idea to achieve monitoring the natural and social condition of mangrove ecosystem, but not implemented yet. ☐ 3. Some efforts have been implemented to achieve monitoring the natural and social condition of mangrove ecosystem. ☐ 4. Smooth administration for monitoring the natural and social condition of mangrove ecosystem.	
Output 3: Methods and techniques for promoting mangrove reforestation are developed.	Sense of understanding and responsibility	☐ 1. Few sense of understanding about necessity of promoting mangrove reforestation. ☐ 2. Understanding the necessity of promoting mangrove reforestation, but few sense of responsibility. ☐ 3. Understanding the necessity of promoting mangrove reforestation, and strong sense of responsibility. ☐ 4. Strong sense of responsibility for promoting mangrove reforestation as highly prioritized issue.	
	Technical knowledge and skill on nursery management (raising seedlings)	☐ 1. Poor technical knowledge and skill for nursery management and raising seedlings. ☐ 2. Certain level of technical knowledge and skill for nursery management and raising seedlings. ☐ 3. Good level of technical knowledge and skill for nursery management and raising seedlings. ☐ 4. Enough level of technical knowledge and skill for nursery management and raising seedlings.	
	Techniques on mangrove reforestation	☐ 1. Poor technical knowledge and skill for mangrove reforestation techniques. ☐ 2. Certain level of technical knowledge and skill for mangrove reforestation techniques. ☐ 3. Good level of technical knowledge and skill for mangrove reforestation techniques. ☐ 4. Enough level of technical knowledge and skill for mangrove reforestation techniques.	
	Technical knowledge and skill on the management of reforested areas	☐ 1. Poor technical knowledge and skill for the management of reforested areas. ☐ 2. Certain level of technical knowledge and skill for the management of reforested areas. ☐ 3. Good level of technical knowledge and skill for the management of reforested areas. ☐ 4. Enough level of technical knowledge and skill for the management of reforested areas.	

Individuals-3

Appendix 15 Questionnaire for capacity assessment

Output	Item	Evaluation Please mark one of the four levels corresponding to **YOUR** situation.	Comments
Output 3: Methods and techniques for promoting mangrove reforestation are developed.	Sense of understanding and responsibility on legal framework and regulations	☐ 1. Poor understanding about legal framework and regulations on mangrove reforestation. ☐ 2. Certain level of understanding about legal framework and regulations on mangrove reforestation, but few sense of responsibility. ☐ 3. Good level of understanding about legal framework and regulations on mangrove reforestation, and strong sense of responsibility. ☐ 4. Strong sense of responsibility for legal framework and regulations on mangrove reforestation as highly prioritized issue.	
Output 4: The capacity of Environmental Education Programme activity for QEIC to promote sustainable mangrove ecosystem management is improved.	Technical knowledge and skill on preparing environmental education programme	☐ 1. Poor technical knowledge and skill for preparing environmental education programme. ☐ 2. Certain level of technical knowledge and skill for preparing environmental education programme. ☐ 3. Good level of technical knowledge and skill for preparing environmental education programme. ☐ 4. Enough technical knowledge and skill for preparing environmental education programme.	
	Technical knowledge and skill on implementing environmental education programme	☐ 1. Poor technical knowledge and skill for implementing environmental education programme. ☐ 2. Certain level of technical knowledge and skill for implementing environmental education programme. ☐ 3. Good level of technical knowledge and skill for implementing environmental education programme. ☐ 4. Enough technical knowledge and skill for implementing environmental education programme.	
	Monitoring and evaluation of environmental education programme	☐ 1. Few opportunity to conduct the monitoring and evaluation. ☐ 2. Existence of opportunity to conduct the monitoring and evaluation, but not actualized. ☐ 3. Existence of opportunity to conduct the monitoring and evaluation and utilized. ☐ 4. Existence of effective opportunity to conduct the monitoring and evaluation and fully utilized.	
	Technical knowledge and skill on preparing materials for environmental education	☐ 1. Poor technical knowledge and skill for preparing the materials. ☐ 2. Certain level of technical knowledge and skill for preparing the materials. ☐ 3. Good level of technical knowledge and skill for preparing the materials. ☐ 4. Enough technical knowledge and skill for preparing the materials.	

Appendix 15 Questionnaire for capacity assessment

Output	Item	Evaluation Please mark one of the four levels corresponding to **YOUR** situation.	Comments
	Administrative capability of the exhibition management for environmental education	☐ 1. Poor administrative capacity for the management of exhibition. ☐ 2. Existence of an idea to achieve good management of exhibition, but not realized yet. ☐ 3. Some efforts have been implemented to achieve good management of exhibition. ☐ 4. Smooth administration to achieve good management of exhibition.	
	Technical knowledge and skill as a facilitator of environmental education programme	☐ 1. Poor technical knowledge and skill as a facilitator. ☐ 2. Certain level of technical knowledge and skill as facilitator. ☐ 3. Good level of technical knowledge and skill as a facilitator. ☐ 4. Enough level of technical knowledge and skill as a facilitator.	

Questionnaire (Organizarion)

Appendix 15 Questionnaire for capacity assessment

Capacity Assessment Checklist (Organization)

Output	Item		Evaluation Please mark one of the four levels corresponding to MECA**'s** situation.	Comments
Output1: The capacity of training activity for QEIC to promote sustainable mangrove ecosystem management is developed.	Human Resources	Allocation of Human Resources	☐ 1. Quantity of human resources for conducting training course is totally insufficient. ☐ 2. Quantity of human resources for conducting training course is slightly insufficient. ☐ 3. Quantity of human resources for conducting training course is basically sufficient but improperly allocated. ☐ 4. Human resources for conducting training course are properly allocated.	
		Accumulation of Experience and Knowledge	☐ 1. No accumulations of experience and knowledge for conducting training course within MECA. ☐ 2. Few accumulations of experience and knowledge for conducting training course within MECA. ☐ 3. Some accumulations for conducting training course within MECA but not expanded to next generation. ☐ 4. Full accumulations for conducting training course and well utilized and expanded.	
		Human Resources Development	☐ 1. Few programs of human resources development for MECA's staff to conduct a training course. ☐ 2. Some programs of human resources development for MECA's staff to conduct a training course. ☐ 3. MECA is conducting effective Human Resources Development Programs for related Staff. ☐ 4. Useful applications by the Human Resources Development Programs are already developed.	
	Material Resources	Working Space and IT Property	☐ 1. No usable working space and computer for conducting training course. ☐ 2. Working space and computers are usable in limited condition. ☐ 3. Working space and computers are usable but not necessarily enough for conducting training course. ☐ 4. Enough working space and computer for conducting training course.	
		Training Tools	☐ 1. No training tools are available. ☐ 2. Some training tools area available but limited. ☐ 3. Enough training tools area available but insufficient. ☐ 4. Enough training tools are available and sufficient.	

Appendix 15 Questionnaire for capacity assessment

Output	Item		Evaluation Please mark one of the four levels corresponding to MECA**'s** situation.	Comments
	Intellectual Properties	Capability for Acquiring Necessary Information	☐ 1. No reference and data to conduct training course, such as statistics data and reports, acquired by MECA. ☐ 2. Limited reference and data for conducting training course in MECA. ☐ 3. Some reference and data for conducting training course acquired by MECA but not necessarily enough. ☐ 4. Enough reference and data for conducting MECA acquired by MECA.	
		Framework for the next generation	☐ 1. No framework to hand over the accumulated knowledge to the next generation is established. ☐ 2. Framework to hand over the accumulated knowledge to the next generation is established but insufficient. ☐ 3. Framework to hand over the accumulated knowledge to the next generation is established but isn't utilized. ☐ 4. Framework to hand over the accumulated knowledge to the next generation is established and efficiently utilized.	

Appendix 15 Questionnaire for capacity assessment

Output	Item		Evaluation Please mark one of the four levels corresponding to MECA**'s** situation.	Comments
Output1: The capacity of training activity for QEIC to promote sustainable mangrove ecosystem management is developed.	Organization Roles and Structures of MECA	Structure of Working Group	☐ 1. No working group in MECA for conducting training course. ☐ 2. Existence of working group in MECA for conducting training course but the structure (group member, management/conducting system, etc.) is unsuitable and ineffective. ☐ 3. Proper working group structure in MECA for conducting training course but not necessarily enough. ☐ 4. Enough structure of working group in MECA for conducting training course.	
		Clear Demarcation between Central and Regional Organizations in MECA	☐ 1. No demarcations are clarified between central and regional organizations in MECA for conducting training course. ☐ 2. Existence of demarcations but not appropriate. ☐ 3. Existence of proper demarcations but not understood by related organizations in MECA. ☐ 4. Existence of clear and effective demarcations.	
		Collaboration between MECA and Related Organizations	☐ 1. Few opportunity and availability for MECA to collaborate with related organizations for conducting training course. ☐ 2. Some opportunity and availability for MECA to collaborate with related organizations for conducting training course. ☐ 3. Almost enough opportunity and availability for MECA to collaborate with related organizations for conducting training course. ☐ 4. Enough opportunity and availability for MECA to collaborate with related organizations for conducting training course.	
Output2: The monitoring method for QEIC to promote sustainable mangrove ecosystem management is developed.	Human Resources	Allocation of Human Resources	☐ 1. Quantity of human resources for conducting mangrove monitoring is totally insufficient. ☐ 2. Quantity of human resources for conducting mangrove monitoring is slightly insufficient. ☐ 3. Quantity of human resources for conducting mangrove monitoring is basically sufficient but improperly allocated. ☐ 4. Human resources for conducting mangrove monitoring are properly allocated.	
		Accumulation of Experience and Knowledge	☐ 1. No accumulations of experience and knowledge for conducting mangrove monitoring within MECA. ☐ 2. Few accumulations of experience and knowledge for conducting mangrove monitoring within MECA. ☐ 3. Some accumulations for conducting mangrove monitoring within MECA but not expanded to next generation. ☐ 4. Full accumulations for conducting mangrove monitoring and well utilized and expanded.	

Organization-3

Appendix 15 Questionnaire for capacity assessment

Output	Item		Evaluation Please mark one of the four levels corresponding to MECA**'s** situation.	Comments
Output2: The monitoring method for QEIC to promote sustainable mangrove ecosystem management is developed.	Human Resources	Human Resources Development	☐ 1. Few programs of human resources development for MECA's Staff to conduct mangrove monitoring. ☐ 2. Some programs of human resources development for MECA's Staff to conduct mangrove monitoring. ☐ 3. MECA conducted effective Human Resources Development Programs for related Staff. ☐ 4. Useful applications by the Human Resources Development Programs.	
	Material Resources	Working Space and IT Property	☐ 1. No usable working space and computer for deciding maximum permissible concentrations and levels of PFC. ☐ 2. Working space and computers are usable in limited condition. ☐ 3. Working space and computers are usable but not necessarily enough for deciding maximum permissible concentrations and levels of PFC. ☐ 4. Enough working space and computer for deciding maximum permissible concentrations and levels of PFC.	
	Intellectual Properties	Capability for Acquiring Necessary Information	☐ 1. No reference and data for conducting mangrove monitoring, such as statistics data and reports, acquired by MECA. ☐ 2. Limited reference and data for conducting mangrove monitoring acquired by MECA. ☐ 3. Some reference and data for conduct mangrove monitoring acquired by MECA but not necessarily enough. ☐ 4. Enough reference and data for conduct mangrove monitoring acquired by MECA	
	Organization Roles and Structures of MECA	Structure of Working Group	☐ 1. No working group in MECA for conduct mangrove monitoring. ☐ 2. Existence of working group in MECA for conduct mangrove monitoring but the structure (group member, management/conducting system, etc.) is unsuitable and ineffective. ☐ 3. Proper working group structure in MECA for conduct mangrove monitoring but not necessarily enough. ☐ 4. Enough structure of working group in MECA for conduct mangrove monitoring.	
		Clear Demarcation between Central and Regional Organizations in MECA	☐ 1. No demarcations are clarified between central and regional organizations in MECA for conduct mangrove monitoring. ☐ 2. Existence of demarcations but not appropriate. ☐ 3. Existence of proper demarcations but not understood by related organizations in MECA. ☐ 4. Existence of clear and effective demarcations.	

Organization-4

Appendix 15 Questionnaire for capacity assessment

Output	Item		Evaluation Please mark one of the four levels corresponding to MECA**'s** situation.	Comments
		Management System for monitoring	☐ 1. No management system for monitoring in MECA. ☐ 2. Existence of management system for monitoring in MECA, but not operated. ☐ 3. Operating the management system for monitoring in MECA, but not necessarily effective. ☐ 4. Effective management system for monitoring in MECA.	
		Collaboration between MECA and Related Organizations	☐ 1. Few opportunity and availability for MECA to collaborate with related organizations for conduct mangrove monitoring. ☐ 2. Some opportunity and availability for MECA to collaborate with related organizations for conduct mangrove monitoring. ☐ 3. Almost enough opportunity and availability for MECA to collaborate with related organizations for conduct mangrove monitoring. ☐ 4. Enough opportunity and availability for MECA to collaborate with related organizations for conduct mangrove monitoring.	
Output3: Methods and techniques for promoting mangrove reforestation are developed.	Human Resources	Allocation of Human Resources	☐ 1. Quantity of human resources for execution of reforestation program is totally insufficient. ☐ 2. Quantity of human resources for execution of reforestation program is slightly insufficient. ☐ 3. Quantity of human resources for execution of reforestation program is basically sufficient but improperly allocated. ☐ 4. Human resources for execution of reforestation program are properly allocated.	
		Accumulation of Experience and Knowledge	☐ 1. No accumulations of experience and knowledge within MECA for execution of reforestation program. ☐ 2. Few accumulations of experience and knowledge within MECA for execution of reforestation program. ☐ 3. Some accumulations within MECA for execution of reforestation program but not expanded to next generation. ☐ 4. Full accumulations for execution of reforestation program and well utilized and expanded.	
		Human Resources Development	☐ 1. Few programs of human resources development for MECA's Staff to execute reforestation program. ☐ 2. Some programs of human resources development for MECA's Staff to execute reforestation program. ☐ 3. MECA conducted effective Human Resources Development Programs for related Staff. ☐ 4. Useful applications by the Human Resources Development Programs.	

Appendix 15 Questionnaire for capacity assessment

Output	Item		Evaluation Please mark one of the four levels corresponding to MECA**'s** situation.	Comments
		Framework for the next generation	☐ 1. No framework to hand over the accumulated knowledge to the next generation is established. ☐ 2. Framework to hand over the accumulated knowledge to the next generation is established but insufficient. ☐ 3. Framework to hand over the accumulated knowledge to the next generation is established but isn't utilized. ☐ 4. Framework to hand over the accumulated knowledge to the next generation is established and efficiently utilized.	
Output3: Methods and techniques for promoting mangrove reforestation are developed.	Material Resources	Facility, equipment	☐ 1. Facility and equipment for execution of mangrove reforestation program is completely insufficient ☐ 2. Some facility and equipment execution of mangrove reforestation program is insufficient. ☐ 3. Facility and equipment execution of mangrove reforestation program is sufficient ☐ 4. Facility and equipment execution of mangrove reforestation program is completely sufficient.	
		Supply of consumables	☐ 1. Supply of consumables is completely insufficient for the maintenance of monitoring equipment. ☐ 2. Supply of consumables is sometimes insufficient for the maintenance of monitoring equipment.. ☐ 3. Supply of consumables is almost sufficient for the maintenance of monitoring equipment.. ☐ 4. Supply of consumables is completely sufficient for the maintenance of monitoring equipment.	
	Intellectual Properties	References and Manuals	☐ 1. No references and manuals for execution of mangrove reforestation program are available in MECA. ☐ 2. Limited references and manuals in MECA for execution of mangrove reforestation program. ☐ 3. Some reference and data in MECA for execution of mangrove reforestation program, but not necessarily enough. ☐ 4. Enough reference and data in MECA for execution of mangrove reforestation program.	
	Organization Roles and Structures of MECA	Structure of Working Group	☐ 1. No working group in MECA for mangrove reforestation program. ☐ 2. Existence of working group in MECA for mangrove reforestation program, but the structure (group member, management/conducting system, etc.) is unsuitable and ineffective. ☐ 3. Proper working group structure in MECA for mangrove reforestation program, but not necessarily enough. ☐ 4. Enough structure of working group in MECA for mangrove reforestation program.	

Organization-6

Appendix 15 Questionnaire for capacity assessment

Output	Item		Evaluation Please mark one of the four levels corresponding to MECA**'s** situation.	Comments
		Clear Demarcation between Central and Regional Organizations in MECA	☐ 1. No demarcations are clarified between central and regional organizations in MECA for mangrove reforestation program. ☐ 2. Existence of demarcations but not appropriate. ☐ 3. Existence of proper demarcations but not understood by related organizations in MECA. ☐ 4. Existence of clear and effective demarcations.	
		Collaboration between MECA and Related Organizations	☐ 1. Few opportunity and availability for MECA to collaborate with related organizations for mangrove reforestation program. ☐ 2. Some opportunity and availability for MECA to collaborate with related organizations for mangrove reforestation program. ☐ 3. Almost enough opportunity and availability for MECA to collaborate with related organizations for mangrove reforestation program. ☐ 4. Enough opportunity and availability for MECA to collaborate with related organizations for mangrove reforestation program.	
Output4: The capacity of environmental education programme activity for QEIC to promote sustainable mangrove ecosystem management is improved.	Human Resources	Allocation of Human Resources	☐ 1. Quantity of human resources for execution of environmental education program is totally insufficient. ☐ 2. Quantity of human resources for execution of environmental education program is slightly insufficient. ☐ 3. Quantity of human resources for execution of environmental education program is basically sufficient but improperly allocated. ☐ 4. Human resources for execution of environmental education program are properly allocated.	
		Accumulation of Experience and Knowledge	☐ 1. No accumulations of experience and knowledge within MECA for execution of environmental education program. ☐ 2. Few accumulations of experience and knowledge within MECA for execution of environmental education program. ☐ 3. Some accumulations within MECA for execution of environmental education program but not expanded to next generation. ☐ 4. Full accumulations for execution of environmental education program and well utilized and expanded.	
		Human Resources Development	☐ 1. Few programs of human resources development for MECA's Staff to execute environmental education. program ☐ 2. Some programs of human resources development for MECA's Staff to execute environmental education program. ☐ 3. MECA conducted effective Human Resources Development Programs for related Staff. ☐ 4. Useful applications by the Human Resources Development Programs.	

Appendix 15 Questionnaire for capacity assessment

Output	Item		Evaluation Please mark one of the four levels corresponding to MECA**'s** situation.	Comments
		Framework for the next generation	☐ 1. No framework to hand over the accumulated knowledge to the next generation is established. ☐ 2. Framework to hand over the accumulated knowledge to the next generation is established but insufficient. ☐ 3. Framework to hand over the accumulated knowledge to the next generation is established but isn't utilized. ☐ 4. Framework to hand over the accumulated knowledge to the next generation is established and efficiently utilized.	
Output4: The capacity of environmental education programme activity for QEIC to promote sustainable mangrove ecosystem management is improved.	Material Resources	Facility, equipment	☐ 1. Facility and equipment for execution of environmental education program is completely insufficient ☐ 2. Some facility and equipment execution of environmental education program is insufficient. ☐ 3. Facility and equipment execution of environmental education program is sufficient ☐ 4. Facility and equipment execution of environmental education program is completely sufficient.	
	Intellectual Properties	References and Manuals	☐ 1. No references and manuals for execution of mangrove reforestation program are available in MECA. ☐ 2. Limited references and manuals in MECA for execution of mangrove reforestation program. ☐ 3. Some reference and data in MECA for execution of mangrove reforestation program, but not necessarily enough. ☐ 4. Enough reference and data in MECA for execution of mangrove reforestation program.	
	Organization Roles and Structures of MECA	Structure of Working Group	☐ 1. No working group in MECA for environmental education program. ☐ 2. Existence of working group in MECA for environmental education program, but the structure (group member, management/conducting system, etc.) is unsuitable and ineffective. ☐ 3. Proper working group structure in MECA for environmental education program, but not necessarily enough. ☐ 4. Enough structure of working group in MECA for environmental education program.	
		Clear Demarcation between Central and Regional Organizations in MECA	☐ 1. No demarcations are clarified between central and regional organizations in MECA for environmental education. ☐ 2. Existence of demarcations but not appropriate. ☐ 3. Existence of proper demarcations but not understood by related organizations in MECA. ☐ 4. Existence of clear and effective demarcations.	

Organization-8

Appendix 15 Questionnaire for capacity assessment

Output	Item		Evaluation Please mark one of the four levels corresponding to MECA**'s** situation.	Comments
		Collaboration between MECA and Related Organizations	☐ 1. Few opportunity and availability for MECA to collaborate with related organizations for environmental education. ☐ 2. Some opportunity and availability for MECA to collaborate with related organizations for environmental education. ☐ 3. Almost enough opportunity and availability for MECA to collaborate with related organizations for environmental education program. ☐ 4. Enough opportunity and availability for MECA to collaborate with related organizations for environmental education program.	