Qeshm Free Zone Organization
(QFZO)

Japan International Cooperation Agency
(JICA)

THE PROJECT FOR COMMUNITY-BASED SUSTAINABLE DEVELOPMENT MASTER PLAN OF QESHM ISLAND TOWARD "ECO-ISLAND" IN THE ISLAMIC REPUBLIC OF IRAN

FINAL REPORT

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Abbreviations

ASC	Aquaculture Stewardship Council
BAP	Best Aquaculture Practices
BDS	Business Development Service
BOO	Build Own Operate
BOT	Build Operate Transfer
CAD	Computer Aided Design
CAGR	Compound Average Growth Rate per year
CBD	Convention of Biological Diversity
CBO	Civil-Based Organizations
CDW	Construction and Demolition Waste
CP	Counterpart
DFR	Draft Final Report
DMO	Destination Management Organizations
DoE	Department of Environment
EAF	Ecosystem Approach to Fisheries
ECO	Economic Cooperation Organization
EIA	Environmental Impact Assessment
ERD	Energy Recovery Device
FAM	familiarization
FAO	Food and Agriculture Organization
FDI	Foreign Direct Investment
FIT	Feed-in-Tariff
FR	Final Report
FRWMO	Forests, Range and Watershed Management Organization
FYDP	Five-Year Development Plan
GBO	Global Biodiversity Outlook
GCC	Gulf Corporation Council
GCM	General Circulation Model
GGN	Global Geopark Network
GEF	Global Environment Facility
GEF SGP	Global Environment Facility Small Grants Programme
GHGs	Greenhouse Gases
GIS	Geographic Information System
HACCP	Hazard Analysis and Control Point
HBI	Hot Briquetted Iron
HOV	High Occupancy Vehicle
HRSG	Heat Recovery Steam Generators
HRWWC	Hormozgan Rural Water and Wastewater Company
HUWWC	Hormozgan Urban Water and Wastewater Company
ICCA	Indigenous Communities Conserved Areas
IcR	Inception Report
ICHTO	Iran Cultural Heritage, Handicrafts and Tourism Organization
ICM	Integrated Coastal Management
ICT	Information and Communication Technology
ICZM	Integrated Coastal Zone Management
IEE	Initial Environmental Examination
IRENA	International Renewable Energy Agency
IFO	Iranian Fisheries Organization
IGMC	Iran Grid Management Co.
IMTA	Integrated Multi-Trophic Aquaculture
IPCC	Intergovernmental Panel on Climate Change
IPDC	Iran Power Development Co.
IRR	Iranian Rial
ItR	Interim Report
IUCN	International Union for Conservation of Nature
JCC	Joint Coordination Committee
JICA	Japan International Cooperation Agency
KFZO	Kish Free Zone Organization
LCC	Low Cost Carriers
LNG	Liquefied Natural Gas
NAB	Man and Biosphere Programme
MAPNA	Iran Power Plant Project Management
METI	Ministry of Economy, Trade and Industry, Japan
MICA	Meeting, Incentives, Conferences, and Exhibitions
MoAJ	Ministry of Agriculture Jihad
MP	Master Plan
MPO	Management and Planning Organization
MSY	Maximum Sustainable Yield
MTBE	Methyl Tertiary Butyl Ether
NGO	Non-Governmental Organization
NPO	Non-Profit Organization
OECD	Organization for Economic Co-operation and Development
PCM	Project Cycle Management
PES	Payment for Ecosystems Services
PMO	Port and Maritime Organization
PPP	Public Private Partnership
PR	Public Relation
PrR	Progress Report
QFZO	Qeshm Free Zone Organization
QUC	Qeshm Utilities Company
QUITO	Qeshm Island Tourism Organization
RCM	Regional Climate Model
RCP	Representative Concentration

	Pathway
RD	Record of Discussion
SABA	Iran Energy Efficiency Organization
SDF	Skills Development Fund
SDG	Sustainable Development Goals
SDI	Spatial Data Infrastructure
SEA	Strategic Environmental Assessment
SEZ	Special Economic Zone
SME	Small Medium Enterprise
SNS	Social Networking Service
STP	Sewage Treatment Plant
SUNA	Renewable Energy Organization of Iran
SWOT	Strength, Weakness, Opportunity and Threat
TAC	Total Allowable Catch
TEK	Traditional Ecological Knowledge
TOZI	Qeshm electric power distribution company
TIES	International Ecotourism Society
TSE	Treated Sewage Effluent
TVET	Technical and Vocational Education and Training
UAE	United Arab Emirates
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNWTO	World Tourism Organization
USD	United States Dollar
WDPA	World Database on Protected Areas
WWF	World Wide Fund for Nature
WWTP	Waste Water Treatment Plant

Unit of Measurement

Area

m^2	square meter
km^2	square kilometer
ha	hectare (= 10,000 m^2)

Length

mm	millimeter
cm	centimeter
m	meter
km	kilometer

Weight

µg	micro gram
mg	milligram
kg	kilogram
t	ton (=1,000 kg)
tpa	ton per annual
MTPA	million ton per annual

Volume

l	liter
m^3	cubic meter (= 1,000 liter)
bbl.	barrel (=0.159 m^3)
BCM	billion cubic meter
mmscfd	million standard cubic feet per day
Nm^3	normal cubic meter

Time

sec, s	second
min	minute
h, hr	hour
d	day
y /yr	year

Energy

W	watt
kW	kilowatt
kWh	kilowatt-hour
MW	megawatt
GW	gigawatt
GWh	gigawatt-hour
cal	calorie
kcal	kilocalorie
J	joules (=4.18 cal)
kj	kilo joules

Other

%	percent
$	dollar
Avg	average
degree	degree celsius
dB	decibel
mil.	million
ppm	parts per million

Comparison of Persian Year and Gregorian Calendar

Persian Year	Gregorian Calendar
1369	21 March 1990 – 20 March 1991
1370	21 March 1991 – 20 March 1992
1371	21 March 1992 – 20 March 1993
1372	21 March 1993 – 20 March 1994
1373	21 March 1994 – 20 March 1995
1374	21 March 1995 – 19 March 1996
1375	20 March 1996 – 20 March 1997
1376	21 March 1997 – 20 March 1998
1377	21 March 1998 – 20 March 1999
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1392	21 March 2013 – 20 March 2014
1393	21 March 2014 – 20 March 2015
1394	21 March 2015 – 19 March 2016
1395	20 March 2016 – 20 March 2017
1396	21 March 2017 – 20 March 2018
1397	21 March 2018 – 20 March 2019
1398	21 March 2019 – 19 March 2020
1399	20 March 2020 – 20 March 2021
1400	21 March 2021 – 20 March 2022
1401	21 March 2022 – 20 March 2023
1402	21 March 2023 – 19 March 2024
1403	20 March 2024 – 20 March 2025
1404	21 March 2025 – 20 March 2026
1405	21 March 2026 – 20 March 2027
1406	21 March 2027 – 19 March 2028
1407	20 March 2028 – 19 March 2029
1408	20 March 2029 – 20 March 2030
1409	21 March 2030 – 20 March 2031
1410	21 March 2031 – 19 March 2032
1411	20 March 2032 – 19 March 2033
1412	20 March 2033 – 20 March 2034
1413	21 March 2034 – 20 March 2035
1414	21 March 2035 – 19 March 2036
1415	20 March 2036 – 19 March 2037

CHAPTER 1 INTRODUCTION

1.1 Background

Qeshm is the most populated island in the Farsi Gulf with a population of approximately 111,000 according to the latest census in 2011. The annual population growth rate of Qeshm Island is estimated at 2.62% in the period from 2006 to 2011. This growth rate is about two times higher than 1.29% of the national average. Unlike any other parts of Iran, in Qeshm its rural population (57.0%) is greater than its urban population (43.0%). Qeshm Island is one of the most important economic areas in Iran; Qeshm is designated as one of the seven free zones by the Iranian Government. Thus, Qeshm is expected to play a role in economy taking advantage of its geographical location as a gateway to export and foreign investment.

SWECO, a Swedish consulting company, prepared the Qeshm Free Area Master Plan (hereafter "the SWECO Master Plan") in 1994. KPMG, an Australian company, conducted a tourism market study in 2003. These envisage economic and tourism development in Qeshm utilizing its local resources. Qeshm has tourism resources such as mangrove forests, a geopark, cultural heritages, and rare marine animals (e.g., dolphins and marine turtles). Qeshm also has a natural gas field.

Although the existing master plan and the study results contributed to the island's development to some extent, they have become outdated. Also, they do not emphasize the local communities' involvement enough for sustainable development of the island. For instance, the natural gas development has not led to sufficient improvement in the income of the local residents. Their average monthly income is about US$520 per family. Further, the island's fishery resources have been decreasing in recent years.

Under the conditions described above, sustainable development can only be achieved if the local communities and people themselves strive to manage the natural environment and link the efforts to their livelihood activities. To help realize this, the Japan International Cooperation Agency (JICA) and the Qeshm Free Zone Organization (QFZO) signed a record of discussion (RD) to conduct the Project for Community-based Sustainable Development Master Plan of Qeshm Island toward "Eco-Island" (hereafter "the Project") on June 15, 2015.

1.2 Objectives and Outputs

The objectives of the Project are to realize the sustainable development of Qeshm Island toward an eco-island which must comply with the following directions:

(a) To improve the livelihood of local residents,
(b) To conserve the natural resources of the island, and
(c) To promote development of an environment-friendly island.

The outputs of the Project are as follows:

(a) The existing master plan is reviewed.
(b) A master plan for conservation of community livelihood and natural resources for 2035 (hereafter "the ECO-QESHM Master Plan") is formulated.
(c) Pilot projects for community livelihood improvement and natural resource management are implemented.
(d) An action plan for each priority sector including tourism, fishery, sewage management, and solid wastes management is prepared.
(e) The promotion of investment by the private sector in the island is supported.

The QFZO is updating the SWECO Master Plan. The ECO-QESHM Master Plan will be integrated into a revised master plan for Qeshm Island development (hereafter "the revised Master Plan").

1.3 Project Area and Administrative Setting

The target area of the Project (hereafter "the Project Area") covers Qeshm Island and Hangom Island with a total land area of 1,567.1 km^2. Both islands are located within the administrative area under jurisdiction of Qeshm County. The Project aims to formulate the ECO-QESHM Master Plan for Qeshm Island. Since Hangom Island has close relation with Qeshm Island in socio-economy and ecosystem across the sea, Hangom Island is included in the Project Area. Although Larak Island and Hormuz Island are within the administrative area of Qeshm County, both islands are excluded from the Project Area. Figure 1.3.1 shows the location of the Project Area.

Source: JICA Project Team.

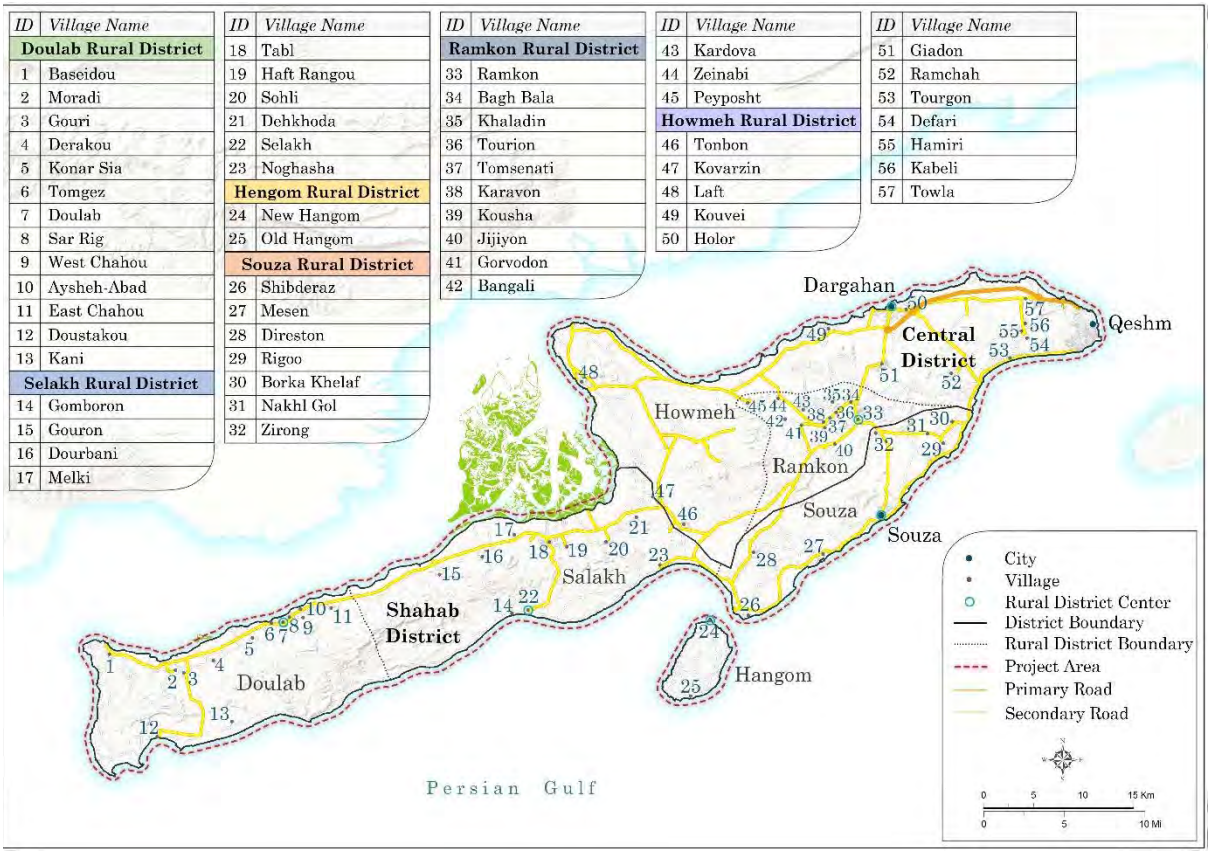
Figure 1.3.1 Location of the Project Area

Hormozgan Province (*ostan*) comprises 21 counties (*shahrestan*) to which Qeshm County belongs. Qeshm has 3 districts (*bakhsh*) of Central, Shahab, and Hormuz. The Project Area includes the Central District and the Shahab District that consist of 3 cities (*shahr*) and 6 rural districts (*dehestan*). Figure 1.3.2 shows the spatial distribution of 57 villages and the administrative boundaries in the Project Area. Table 1.3.1 shows the estimated land area of each administrative unit using GIS.

Table 1.3.1 Land Area by District and Rural District in the Project Area

District	Rural District	Area (ha)	%
Central	Howmeh	55,264	35.3
	Ramkon	12,695	8.1
	Total	67,959	43.4
Shahab	Souza	17,526	11.2
	Selakh	38,921	24.8
	Doulab	28,996	18.5
	Hangom	3,311	2.1
	Total	88,754	56.6
Total		156,713	100.0

Source: JICA Project Team.



Source: JICA Project Team.

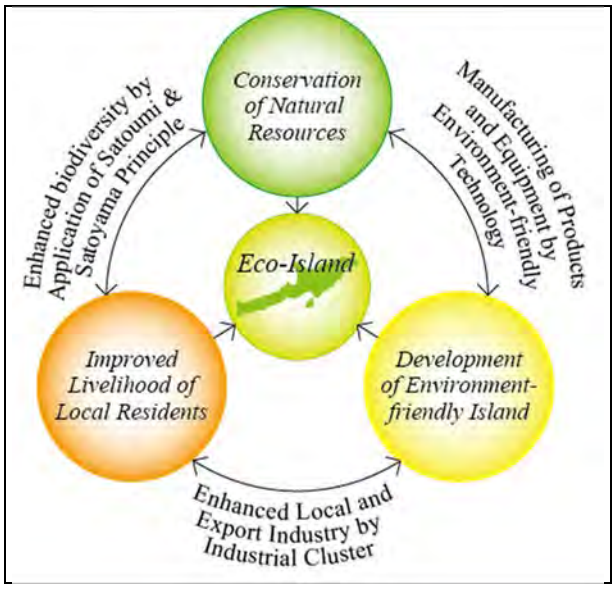
Figure 1.3.2 Cities, Villages, and Administrative Boundaries of the Project Area

1.4 Project Approaches

The Project will take three approaches to realize Qeshm as an eco-island as follows:

(a) Enhancement of biodiversity by application of the *satoumi* and *satoyama* principles,
(b) Enhancement of local and export industries by industrial clustering, and
(c) Manufacturing of products and equipment by environment-friendly technology.

These three approaches seek to link three, mutually complementary directions as depicted in Figure 1.4.1 and described below.



Source: JICA Project Team.

Figure 1.4.1 Directions to Realize Qeshm as Eco-Island

(1) Link between conservation of natural resources and improved livelihood of local residents

The satoumi and satoyama principles have been adopted to attain sustainable local development in Japan. In Japanese, *sato* means a village by simplest definition, *umi* the ocean or sea, and *yama* mountains, forests, or woods. The Japanese Ministry of Environment defines satoumi as "a coastal area where biological productivity and biodiversity has increased through human interaction" (https://www.env.go.jp/water/heisa/satoumi/en/01_e.html). Satoumi represents the close connection between the village and the ocean to which the villagers' lives and livelihoods are tied. Satoyama, on the other hand, means foothills or forests with farmlands, ponds, and grasslands bordering a village, from which the villagers' lives and livelihoods are likewise inseparable.

The satoumi principle dates back to ancient times and its value has been recognized anew recently. Application of the satoumi principle aims at creating an area with enhanced biodiversity by minimizing the use of artificial methods in the development of environment. It is rooted in the Japanese traditional sense of symbiosis between human and nature. This notion is counter to the idea of controlling the environment and resources for economic development. Such conquer-nature approaches have been pursued in most developed countries since the Industrial Revolution and throughout the 20th century. The 20th century development model focuses on economic efficiency through intensive consumption of natural resources. It has often resulted in massive environmental and social problems.

It will be essential to establish a new mechanism for natural resource management by community initiative. The community members are to maintain and use the natural resources for their livelihood. This mechanism will be effective in natural resource conservation as well, and also in line with the satoumi principle.

(2) Link between improved livelihood of local residents and development of environment-friendly island

It may not be self-evident that free trade development contributes to improving community livelihood in Qeshm. In fact, in the past, export-oriented economic activities in special economic zones prompted by foreign direct investment, more often than not, did not lead to vitalization of local economies.

Local industry is the key to linking free zone development and community livelihood improvement. The target industry should utilize the livelihood activities practiced in the communities for export, and it should be developed to be environmentally friendly.

Industrial clustering may be perceived as a highly elaborate economic maneuver such as the ICT industry in Silicon Valley and Bangalore. However, the industrial clustering to be pursued in the Project is simpler and dependent on the local primary goods. It encompasses local livelihood activities, businesses, and the export industry, from the bottom to the top, connecting different types of products;

it is thus vertical in structure. Also, in the industrial cluster, even industrial wastes and byproducts are utilized. In this respect, a vertical industrial cluster is different from a value chain, which typically focuses on only the good or strong attributes of a given economic system.

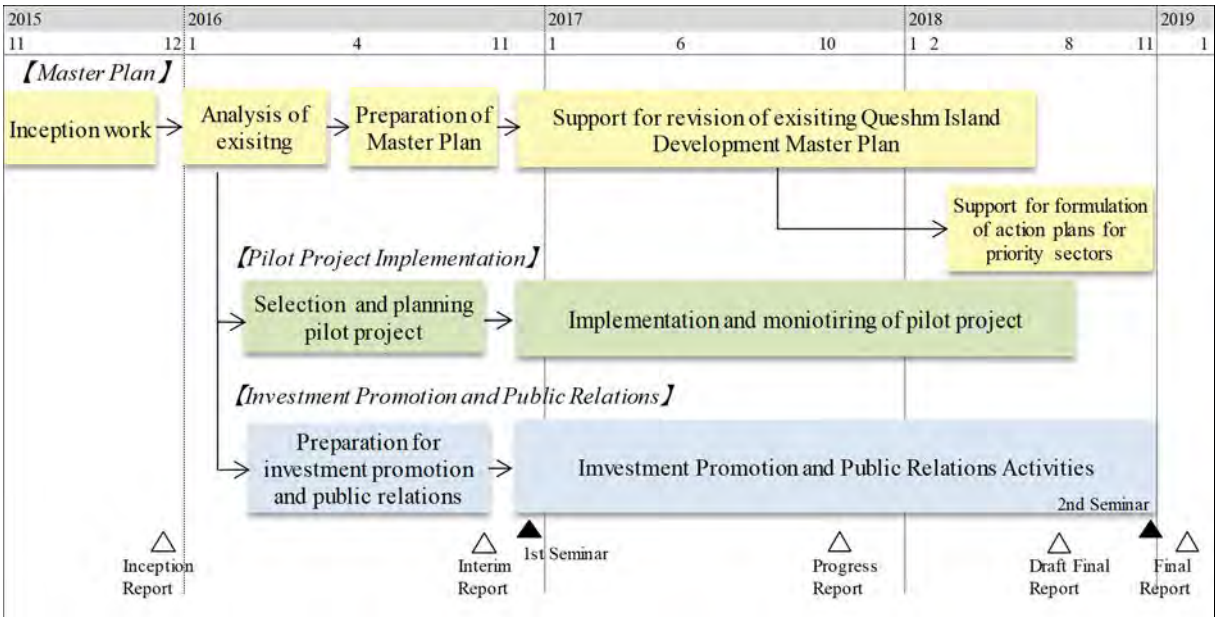
(3) Link between conservation of natural resources and development of environment-friendly island

An eco-island can only be realized by the resource-saving development model. Natural gas should be used in consideration of the living environment of local residents. Desalination may be an example to utilize the natural gas instead of electricity for economic development. The costly water will be recycled by appropriate wastewater treatment technology.

The environment-friendly free zone in the Project is an area that accommodates energy-saving technologies, which cause no environmental impact and help preserve greenery. The promotion of such energy-saving technologies will be important in the Qeshm free zone.

1.5 Project Implementation

The Project activities in Iran started in late November 2015. The Project will continue through January 2019 for 38 months. The ECO-QESHM Master Plan will be drafted in the first year by the end of October 2016. The work flow of the Project is shown in Figure 1.5.1. Pilot projects are to be selected, public relations measures and materials to be prepared, and the Project to be promoted during the same period. The ECO-QESHM Master Plan will be finalized in the third year; meanwhile the selected pilot projects will be implemented and monitored in the second year. In the third year, the pilot projects will continue to be monitored and upon completion will be evaluated.



Source: JICA Project Team.

Figure 1.5.1 Project Work Flow

1.6 Project Organization

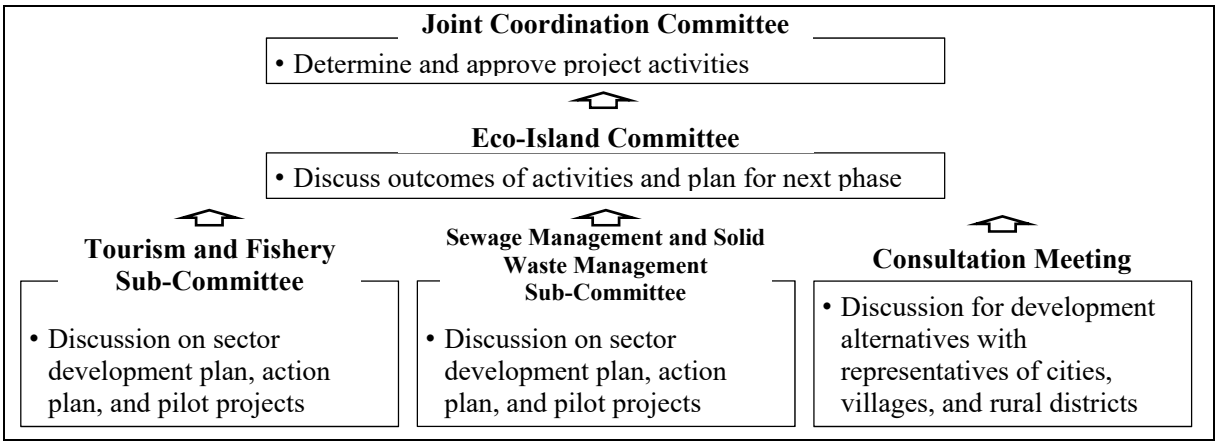
In essence, the ECO-QESHM Master Plan is formulated through coordination among the organizations concerned including the QFZO, local governments, and the private sector. The utmost attention is paid to establishing effective coordination and decision-making mechanism to ensure realization of the ECO-QESHM Master Plan. The JICA Project Team (JPT) works closely with and provides support for the QFZO in establishing necessary implementing arrangements. The RD specifies the implementation arrangements with such entities as Joint Coordination Committee (JCC), Eco-Island Committee, and the JPT. The JCC is the highest entity empowered to determine and

approve the project activities. The Eco-Island Committee is the next, which discusses their outcomes and plans for the next phase.

Sub-committees will be established to formulate development plans, pilot projects, and action plans for the priority sectors. They include the Tourism and Fishery Sub-Committee and the Sewage Management and Solid Waste Management Sub-Committee, both of which have already been established.

Qeshm's development as an eco-island will be achieved by realizing natural resource conservation and community livelihood improvement. This means that the local communities will participate in the management of natural resources to maintain their livelihood, and that their participation in the development is indispensable. For this, a participatory approach will be applied to the Project implementation.

The entities that will interact with each other to implement the Project are illustrated in Figure 1.6.1. They have members and roles as presented in Table 1.6.1. The members and roles as well as the frequency of meetings will change as necessary as the Project proceeds.



Source: JICA Project Team (modified after the IcR and the modification agreed in the first JCC, December 2015).

Figure 1.6.1 Implementing Bodies in the Project

Table 1.6.1 List of Implementing Bodies for the Project

Entity	Members	Roles and Time to Convene
Joint Coordination Committee (JCC)	i) Chair: Chairman and Managing Director of QFZO. ii) Members of Iranian side: [QFZO] - Plan and Program Manager (Project Manager) - Deputy of Cultural, Social and Tourism - Deputy of Economic and Investment - Deputy of Technical and Infrastructure - Qeshm Utilities Company [Hormozgan Province] - Head of Management and Planning Organization - General Manager of Hormozgan Agriculture of Jahad Organization - General Manager of Department of Environmental [Organizations involved] - Governor of Qeshm County - Ministry of Foreign Affairs for Representative Office in Qeshm Island iii) Members of Japanese side: - Chief Representative of JICA Iran Office - Members of JICA Project Team	Will meet as necessary and at least at submission of project reports to i) decide and approve the project activities, ii) facilitate coordination with relevant authorities, iii) review overall progress of the Project activities, and iv) review and exchange views on major issues concerning the Project and recommend measures to solve them.
Eco-Island Committee	i) Chair: Plan and Program Manager of QFZO ii) Members of Iranian side: [QFZO] - Cultural, Arts and Training Affairs Department - Cultural Heritage, Handicrafts and Tourism Department - Health, Sport, Sociality and Youth Department - Geopark and Environment Department - Investment and Marketing Department - Agriculture and Fishery Department - GIS Center - Urbanism and Architecture Department - Urban and Rural Department - Transport and Transit Department - Public Relations and International Affairs Department - Qeshm and Hengam SEZ Department - Dargahan Affairs Department - ICT Department - Cooperatives, Labor and Social Welfare Department - Qeshm Utilities Company [Qeshm County and District] - Qeshm Country - Rural Water and Waste Water Division - Roads and Urbanism Division - Fishery Division - Agriculture Division - Environment Division - Markazi District - Shahab District [Organizations involved] - Society of Qeshm Hotel Owners - Society of Travel & Tourism Agencies - Syndicate of Small and Medium Enterprises - Fisherman's Cooperative - Qeshm Institute of Higher Education - Azad University - Hormozgan University	To be established toward realization of Eco-Island concept by i) facilitating inter-organizational coordination at implementation level, ii) jointly planning and implementing pilot projects. Will meet as necessary at least at submission of project reports.

Source: First Joint Coordination Committee, December 2015.

1.7 Project Reports

The reports to be prepared by the JPT and submitted to the QFZO as part of the Project outputs are as listed in Table 1.7.1. These included the Inception Report and the Interim Report submitted by the JPT in December 2015 and October 2016, respectively. The JPT will submit the Draft Final Report in August 2018 and the Final Report in January 2019.

The Final Report will consist of six volumes:

- Volume 1: Summary
- Volume 2: Main Text
- Volume 3: Main Text
- Volume 4: Review of the Oil and Gas Industry
- Volume 5: Appendices
- Volume 6: GIS Atlas

Table 1.7.1 Project Reports

Report	Contents	Number of Copies	Due
1. Inception Report (IcR)	• Project approaches • Project procedure and methods • Work plan	• English: 5 • Farsi: 15	December 2015
2. Interim Report (ItR)	• Review of the existing master plan • Vision and development objectives • Development frameworks • Draft Master Plan	• English: 5 • Farsi: 15	October 2016
3. Progress Report (PrR)	• Pilot project implementation • Revision work of the existing Master Plan	• English, 5 • Farsi: 15	October 2017
4. Draft Final Report (DFR)	• Finalized Master Plan • Action plans for priority sectors • Evaluation report of pilot projects	• English: 5 • Farsi: 15	August 2018
5. Final Report (FR)	• Revised and updated DFR contents • Project report • Sector reports • Supplemental materials	• English: 5 • Farsi: 15 (main) • Farsi: 20 (summary) • Electronic files (CD-R): 3 (sets)	January 2019

Source: JICA Project Team.

CHAPTER 2 REVIEW OF EXISTING MASTER PLAN

2.1 Planning Concepts and Proposed Goals

An economic free zone was established in Qeshm Island in 1990 to create conditions conducive to foreign and domestic investment. The Qeshm Free Zone Organization (QFZO) entrusted a Swedish consulting company, SWECO, to formulate a comprehensive development master plan for Qeshm Island (the SWECO Master Plan). The SWECO Master Plan was finalized in 1994 and it was the first attempt to specify the overall framework and guidelines for the development of the island to be used by QFZO and all other parties related to the development.

In the master plan, the overall goals for the development of Qeshm Island aimed at the optimal utilization of Qeshm Island's potential and comparative advantages, namely, its natural resources and geographic location. This development, which was to be carried out with consideration for the conservation of social and environmental conditions, was expected to promote economic and social development in not only Qeshm Island but also Iran as a whole. The development-oriented master plan represented by the free zone was in line with the national policy demanding prompt economic reconstruction at that time. It was when the first five-year development plan (FYDP) was approved to boost the economic recovery from the longstanding war in Iran, which ended in 1989.

2.2 Planning Framework and Economic Activities

2.2.1 Population projection

The SWECO Master Plan was prepared for the 27-year period from 1994 to 2021. In the master plan, four development scenarios with different population growth rates were examined to seek the most desirable development for the island (Table 2.2.1). Scenario 1 was the case in which the largest investment would be made and at the most rapid pace. The population was estimated at 395,000 in 2021 according to this scenario. Scenario 4 was the lowest growth scenario with the projected population of 150,000 in 2011. The planning scenario, which was selected as the desired scenario, was based on the assumption that the population would increase at an annual rate of 5.2% until 2011 and the increase would accelerate through 2021. The planned population was set at 400,000 in 2021.

The 2011 census revealed that the population totaled 111,159 in that year. This equated to only 55.6% of the estimated population of 200,000 for 2011 according to the planned scenario. The latest census found that the population increased to 141,696 in 2016, representing less than half of the planned population of 400,000 for 2021.

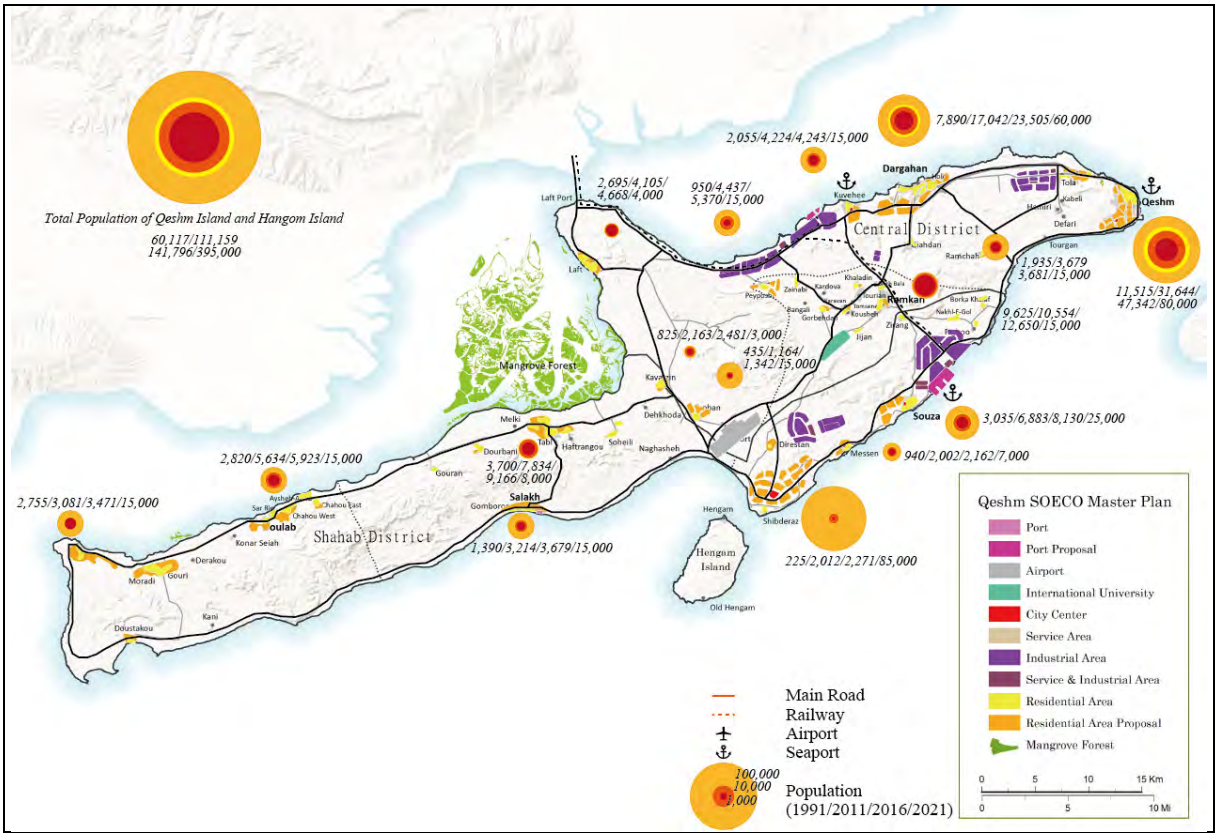
Table 2.2.1 Population Projection by Development Scenario Proposed in SWECO Master Plan

Scenario	1991	2001	2011	2021
1	60,117	175,000	275,000	395,000
Growth rate (%/year)		11.28	4.62	3.69
2	60,117	150,000	225,000	321,000
Growth rate (%/year)		9.57	4.14	3.62
3	60,117	125,000	200,000	264,000
Growth rate (%/year)		7.59	4.81	2.82
4	60,117	90,000	150,000	176,000
Growth rate (%/year)		4.12	5.24	1.61
Planning scenario	60,117	100,000	200,000	400,000
Growth rate (%/year)		5.22	7.18	7.18

Source: SWECO Master Plan.

Figure 2.2.1 shows the estimated population of the cities and the main villages on Qeshm Island in

1991 and 2021 according to the SWECO Master Plan and the population in 2011 and 2016 according to the census. In line with the stagnant population increase on the island as a whole, the village population has not increased as projected. In only two villages was the 2016 population more than the planned population for 2021. Those villages were Laft and Tabl. Kovarzin and Tourion exceeded their population in 2016 by more than 80% of the planned population. Although the SWECO Master Plan proposed a new extensive residential area in Shibderaz and Tonbon, their population in 2016 was less than 10% of the planned population. The SWECO Master Plan also proposed to strengthen the link between the island and the mainland by building the Persian Gulf Bridge and a railway. Such transport developments have yet to be realized. This stagnant development was one of the reasons hindering the population growth.



Sources: SWECO Master Plan for land use and population in 1991 and 2021; 2011 Census for population in 2011; 2016 Census for population in 2016.

Figure 2.2.1 Population Distribution in Qeshm Island in 1991, 2011, 2016, and 2021

2.2.2 Estimated employment

Employment was estimated in the SWECO Master Plan assuming that employment would increase in the manufacturing and service sectors and decrease in the agriculture and construction sectors (Table 2.2.2). By 2021, the service sector was expected to have the largest share at 51.0%, followed by the manufacturing sector at 31.0%.

Table 2.2.2 Employment by Sector in 2011 Census and Scenario 1 of SWECO Master Plan

	2011 Census		Estimated Employment in SWECO Master Plan					
Sector	Employment	%	1991	%	2011	%	2021	%
Agriculture	9,000	29.7	2,800	20.1	5,000	7.7	7,500	6.0
Manufacturing	2,540	8.4	900	6.5	17,000	26.2	38,700	31.0
Service	16,000	52.8	7,700	55.4	33,000	50.8	63,800	51.0
Construction	2,300	7.6	2,300	16.5	7,500	11.5	11,000	8.8
Utilities	440	1.5	200	1.4	2,500	3.8	4,000	3.2
Total	30,280	100.0	13,900	100.0	65,000	100.0	125,000	100.0

Source: SWECO Master Plan and 2011 Census.

In 2011, the actual employment was only 30,280, less than half of the planned employment estimated at 65,000 for the year. Contrary to the assumption, agricultural employment actually increased from 2,800 in 1991 to 9,000 in 2011. In fact, fishery, counted as part of agriculture in statistics, had an influx of farmers who gave up farming due to water scarcity in the preceding years. Likewise, industrial development did not proceed as planned. The unemployment rate has decreased from 14.8% in 1991 to 7.3% in 2011. The unemployment rate, however, have remained at levels that the SWECO Master Plan considered as unacceptable, due to such external factors as the economic sanctions imposed by Western nations.

2.2.3 Agriculture

Because of the limiting natural conditions, particularly the scarcity of water and soil suitable for farming, the agricultural sector in Qeshm Island has not flourished. The SWECO Master Plan predicted that the agricultural sector would be able to absorb twice as much labor force as present in the sector at the time if bottlenecks were removed properly. It also predicted that the yield of the agricultural and animal husbandry sectors would increase by 50%. It seems, however, that these did not happen after two decades. Several objectives in agricultural development were stated in the SWECO Master Plan, and the present situations related to the objectives are described below.

(a) The SWECO Master Plan advised that the existing and potential land for agriculture and animal husbandry be protected from other uses. It is observed that the actual cultivated area has been reduced by more than three quarters since twenty years ago (725 ha in 2016 from 3,064 ha in 1994). The loss is attributed to the decrease in the farmers' motivation to retain their farms. The demand for agricultural land to be converted for industrial and residential uses has sharply increased in the recent years. Also, agricultural (arable) land has been segmented through a succession of changes in property titles.

(b) In spite of the generally unfavorable conditions for agriculture and animal husbandry, the SWECO Master Plan suggested that the existing potential in agriculture be exploited by modern techniques with a view to increasing the yield of the agricultural sector by some 50%. Some statistical data indicate increase in the yield of vegetables; however, the cultivated area has drastically decreased. A few new technologies have been introduced for date palm and horticultural crop cultivation. Technologies for propagation and multiplication have been introduced through veterinary services, including the dissemination of free and appropriate vaccination. As a result, the number of head of livestock has slightly increased.

(c) The SWECO Master Plan indicated that the pasture of the island could be improved to yield more under a well-designed program. Promotion of pasture production still remains important because the number of livestock has actually increased despite the shortage of forage and the absence of manual feeding. Nevertheless, no pasture promotion program has been implemented to date.

(d) The SWECO Master Plan stated that the establishment of the poultry industry in the island would contribute to providing good, inexpensive meat for the islanders. At present, reportedly about 20,000 fowls are raised in the backyard for family consumption in rural areas. There is neither commercial poultry producer nor authorized slaughterhouse in the island.

(e) The SWECO Master Plan strongly recommended that the Agricultural Bank allocate at least 30% of net agricultural income to the agricultural sector each year as credit. There is no official data available on this matter, but some farmers report that the administrative process of loan application is complex and difficult.

According to the Head of Division (county), the Ministry of Agriculture Jihad (MoAJ), there has been no actual, concrete action plan for the development of the agricultural and animal husbandry sector in Qeshm Island.

2.2.4 Fishery

The SWECO Master Plan described the fishery sector in Qeshm Island in the 1980s and the 1990s. It also set objectives and made recommendations for the development of the sector. The present conditions of the fishery sector in the island in view of the SWECO Master Plan are as follows:

(a) The SWECO Master Plan advised that the maximum long-term sustainable yield specified in the master plan be observed for all species. The Iranian Fisheries Organization (IFO) of MOJA has established three committees as the platform to discuss fishery resource management: Fishery Resource Management Committee, Fishing Committee, and Fishermen's Association Committee. IFO has made efforts to maintain sustainable fishing, such as setting closed seasons, restricting the mesh size of nets, limiting outboard engine power, introducing long-line fishing to reduce bycatch, prawn stock enhancement by releasing juveniles, and so on. In addition, IFO and QFZO have been promoting aquaculture development to reduce fishing pressure (i.e., the pressure on fishers to catch fish in the presence of other fishers) on marine stocks.
The Food and Agriculture Organization (FAO) and IFO reports that i) capture production of silver pomfret, prawn, and demersal fish has decreased, ii) illegal fishing is still common, and iii) fleet overcapacity still exists, resulting in too many fishing boats catching limited fish resources. The lack of job opportunities has accelerated the increase in the number of fishers. Consequently, fishing in the island has further intensified. Fishing grounds are becoming farther away, according to the local fishers. Capture production in Qeshm, which was about 56,000 tons in 2014, has far exceeded 35,000 tons, which the SWECO Master Plan indicated to be the maximum sustainable yield (MSY) for fish, crustaceans, and mollusks. Efforts to maintain a sustainable level of fishing still need to be made.

(b) The SWECO Master Plan suggested the promotion of modern fishing methods to increase sardine catches. Small pelagic fishery targeting sardines has made drastic progress through the introduction of purse seine fishing. The small pelagic fishery is now the most important inshore fishery in Qeshm Island and Hangom Island because there is an established distribution network of fishmeal factories. Small pelagic fishery in Qeshm has reached a production level of 44,000 tons a year, which consists of about 70% of small pelagic fish catch and 20% of the total capture production in Hormozgan Province in 2014. On the other hand, the SWECO Master Plan reported that the capture production of small pelagic fish was 840 tons in 1992, and the MSY for small pelagic fishery in Qeshm was 18,000 tons. Therefore, the fishing pressure on the sardine resource has much intensified since then. A clear fishery management plan should be proposed.
Meso-pelagic fishery in the Oman Sea was also recommended as a potential new fishery in the SWECO Master Plan. However, fishing in the Oman Sea is now prohibited for Qeshm fishers.

2.2.5 Manufacturing and industrial development

The main components of industrial development strategy in the SWECO Master Plan are as follows:

(a) Conditions for industrial development: Iran appears to have strong comparative advantages in the first stage processing of its domestic natural resources (upstream manufacturing) as well as in energy-intensive manufacturing. This also applies to Qeshm Island. As compared to the northern and western parts of Iran, Qeshm Island has certain disadvantages of being remote from major domestic markets, lacking some infrastructure, and having less developed support and service industries.

(b) Basic concept for industrial development in Qeshm Island: The concept for industrial development in Qeshm Island should be based on the concept of upstream and midstream processing of abundant, low-cost, domestic natural resources or the utilization of such natural resources in energy-intensive industries. The concept of developing Qeshm Island as a distribution center for the Persian Gulf region has its limitations, but taken as a gateway to the large Iranian market, it could attract considerable direct foreign investment in distribution and manufacturing activities.

(c) Potential for industrial development at sub-sector and project level: The potential and viability of nine manufacturing sub-sectors and individual projects are identified and screened from a viability point of view as presented in Table 2.2.3.

Table 2.2.3 Potential and Viability of Industrial Development by Sub-sector in Qeshm Island in SWECO Master Plan

Sub-sector	Potential and viability
1. Food, beverages, and tobacco	There are not many prospects based on locally grown agricultural products. However, because Iran is a major food importer, agro-fishery production such as soya bean oil refinery, sugar refinery, wheat flour mill, fish cannery, fishmeal and oil factories, and animal feeds production may be promising.
2. Textile, clothing, and leather sector	Labor-intensive midstream and downstream manufacturing does not have much potential due to the high labor cost in Iran. Only upstream activities involving the production of synthetic fiber may be viable.
3. Wood and wooden products	For there is no forest in Qeshm Island, this sector does not provide a major opportunity; however, some small-scale manufacturers of wood doors, window frames, floors are likely to be established for the local construction industry. The existing *dhow* [traditional boat] building industry also has some potential for further development.
4. Paper, cardboard, and related products	Although no major project is foreseen in this sector, small manufacturers of packages, paper and cardboard boxes, and businesses in printing-related services are likely to be established with the general increase in business activities in Qeshm Island.
5. Chemical products	- Several projects have already been proposed for Qeshm Island, including methyl tertiary butyl ether (MTBE) and methanol production, nitrogen fertilizer project, polyolefin complex project, aromatic complex, petroleum refinery, and others. Most of them seem to be competitive or feasible. The production of synthetic soda ash may be an interesting industry for Qeshm Island considering that raw materials, mainly salt and limestone, are available in the island. - A large volume of pharmaceutical imports by Iran will justify targeting international pharmaceutical firms for their establishment in Qeshm Island. - Also, an LNG project has been considered although more profitable alternative uses of natural gas and the priority and timing should be carefully assessed. - Midstream and downstream chemical projects will not have the same competitive advantage as upstream industries in Qeshm Island.
6. Non-metallic minerals	The decision has already been made to construct a small-scale cement plant.
7. Basic metal	The hot briquetted iron (HBI) project demonstrates many attractive features considering the availability of low-cost of natural gas, the competitively priced electricity, and the positive international market outlook. Ferro-alloys present an area of interest to Qeshm Island considering the energy-intensive production of these products. As for aluminum smelter, a sufficiently large regional market may emerge to justify the large-scale aluminum refinery in Qeshm Island.
8. Machinery and metallic equipment	In Qeshm Island, this sector does not have the same comparative advantages as the other products discussed above.
9. Other manufacturing industries	The products in this group of industries include jewelry, musical instruments, toys, etc., which are of little or no interest to Qeshm Island.

Source: SWECO Master Plan, 1994.

(d) Descriptions and assessment of scenarios and infrastructure requirements: The SWECO Master Plan presents four scenarios with assumed potential and viability for industrial development in Qeshm Island. The scenarios cover the period up to 2005. In the Scenario I involving the largest total investment of US$16 billion, direct employment would amount to about 14,000 in 2005 and the total required area may reach some 2,000 ha. Considering energy consumption, a power plant with capacity exceeding 1,000 MW would be required by 2005 to meet the needs of the industrial consumers. The candidate industrial sites are in Kouvei and Souza.
(e) Outline of industrial development strategy: The SWECO Master Plan stresses the need of QFZO for a formally established financial source or fund to instill confidence in potential investors.
(f) Outline of investment promotion strategy: The SWECO Master Plan presents i) the need of QFZO to formulate policy and legal framework, which allow comparison with other countries, ii) guidelines on the targeting of sectors and countries, and (iii) recommendations on investment promotion techniques.

QFZO considers some of the proposals and analysis on industrial development by the SWECO Master Plan for the petro-chemical sector in particular to be still valid. However, most of the proposed projects have not been implemented to date.

2.2.6 Tourism development

The vision of tourism development in the SWECO Master Plan was that tourism would become an integral part of the communities in the island and of the community life. To achieve the vision, the following two objectives were set: 1) to establish facilities (e.g., hotels, restaurants, and recreational areas for sports) and other leisure amenities for visitors, considering the island's scenic beauty and potential attraction by duty-free shopping with a view of developing tourism in Qeshm Island and 2) to make tourism an important source of income and job opportunities, particularly within 20 years from 1994 to 2014.

The formulated tourism spatial development plan indicated tourism attractions, necessary facilities, and zones for tourist resorts. It determined the Hara mangrove protected areas, mountains and areas with scenic views, coastal areas of scenic value, breeding areas of green turtles, and salt dome mountains, which are all part of areas currently known as geosites, as tourism attractions. The zones for tourist resorts were reserved along the southern coast of the Island. To implement the formulated plan, the following three measures were suggested and the degree of achievement for each measure was examined to evaluate the first objective. In summary, some of the facilities, mainly accommodations, have been developed but the others have not.

(a) Facilities development for 1994–2001: It was planned to construct hotels of different classes in Qeshm City, the airport zone, and Dargahan. Guesthouses would be built in 10 villages, namely, Tabl, Doulab, Baseidou, Selakh, Ramchah, Souza, Mesen, Tourion, Peyposht, and Laft. Other tourism facilities such as a visitor center and exhibition hall at the new airport, tourist offices in Qeshm City, Dargahan, and Shibderaz, Hara visitor center in Laft, and the western island visitor center in Doulab would also be constructed. According to the data as of 2011, hotels in Qeshm City and Dargahan were constructed but no hotel in the airport zone. Of those hotels constructed, only 1 was 3-star and the rest 1- or 2-star. Guesthouses are currently located in 7 villages: Tabl, Doulab, Selakh, Souza, Haft Rangou, Borka Khelaf, and Noghasha. None of the other proposed tourism facilities has been properly operated as of 2016.

(b) Promotion and marketing: Promotion and marketing activities were essential in developing tourism in Qeshm Island. Information on tourism products in the island should be compiled and distributed through appropriate channels such as international tourism fairs and the mass media. Some tourism brochures and tools such as maps of Qeshm, geopark brochure, and websites were produced in the past, and some are still available. However, there has been no institutional coordination among the relevant stakeholders. Thus, these promotion and marketing activities have only been implemented on an ad-hoc basis. Consequently, there has been no continuity in promotion and marketing for the island's tourism.
(c) Qeshm Island Tourism Organization: It was suggested to establish an organization called Qeshm Island Tourism Organization (QUITO), which should consist of the public sector and private enterprises, to make intensive efforts to enhance tourism in Qeshm Island. Similar measures were also suggested by KPMG tourism strategy in 2003 to establish a tourism board (Qeshm Tourism Authority). This proposed organization could have taken charge of integrated promotion and marketing. However, the lack of institutional arrangements has resulted in the lack of integrated efforts to promote tourism in the island.

Recently, the number of guesthouses, rental boat operators, and jetty constructions around the Hara mangrove protected area has been increasing. This shows that tourism has become an important source of income and job opportunities in the Island. Given this, the second objective has been achieved to some extent.

2.2.7 Service sector

The SWECO Master Plan recommended that the establishment of professional service institutions in insurance, legal and business consulting, advertising, forwarding, shipping, auto repairs, warehousing, transportation, wholesale, and retail trade be promoted to facilitate the development of Qeshm Island. Additionally, the establishment of offshore banking facilities in the island should be emphasized for Qeshm to become a financial center in the region.

(a) Professional service institutions: No special promotion has been carried out for professional service institutions though the free zone has been promoted. As of 2015, professional services such as insurance, legal and business consulting, and advertising are available but quite limited in Qeshm Island.
(b) Wholesale and retail: Wholesale and retail have become popular in Qeshm City. Many shopping malls have been constructed and some still under construction. The prices of wholesale and retail goods have been lower in Qeshm Island than in the mainland due to the advantage of being tax-exempt. In 2011, about 20% of workers in Qeshm are engaged in wholesale, retail, and auto repairs (including motorcycles).
(c) Offshore banking: The free-zone regulations allow offshore banking operations but not for the special economic zone. The extended economic sanctions made it difficult for foreign banks and insurance companies to operate in Qeshm. As a result, banks in Qeshm Island do not have an offshore banking function although most of Iranian banks and insurance companies have branches in Qeshm.

2.3 Proposed Land Use and Transport System

2.3.1 Land use plan

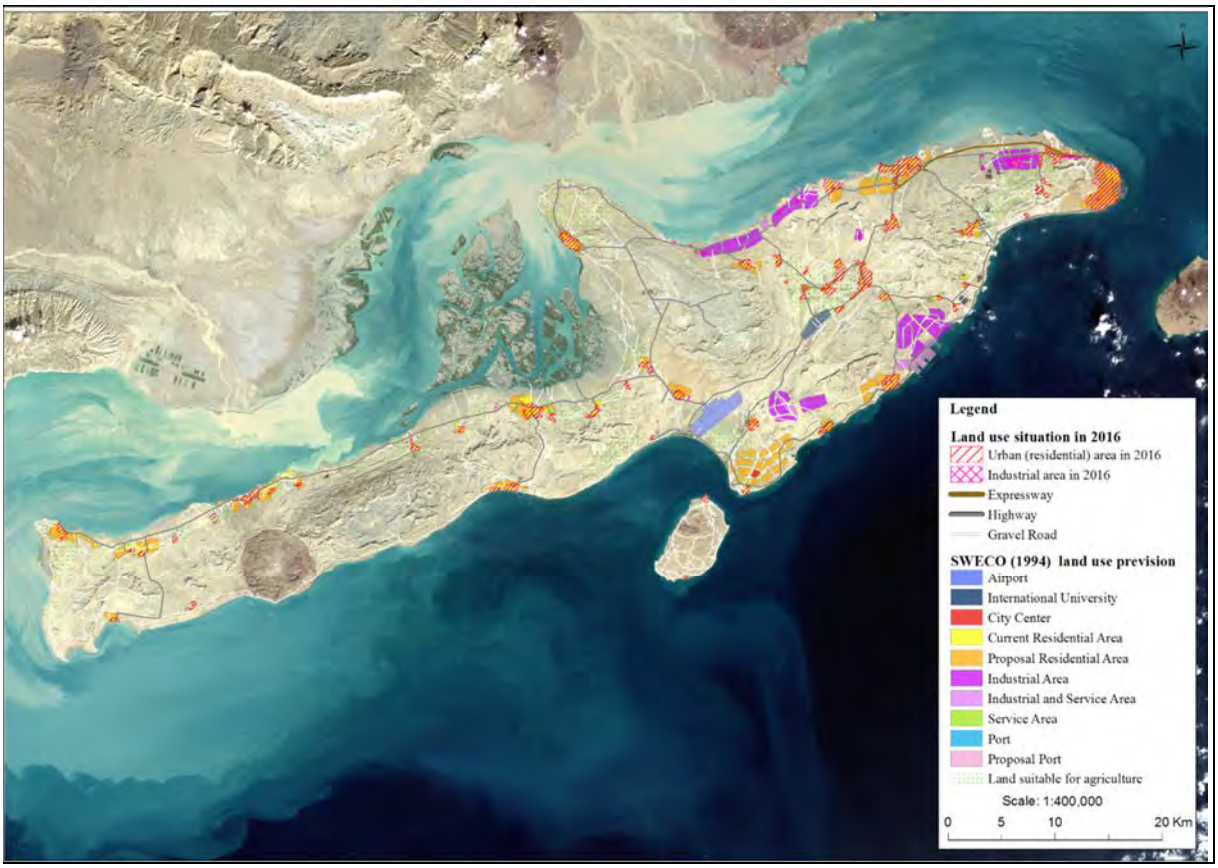
The SWECO Master Plan's projections in 1994 on land planning for residential and other uses have turned out not quite accurate given the situation in 2016. The reason for the difference between the SWECO projections and the reality is that the expected goals for industrial and key infrastructure development have not been met (except for the international airport, the Kouvei port, and the Towla industrial zone). However, there were projects that have not been realized at all due to obvious oversights in the master plan's planning and implementation, such as the Shibderaz New Town, the Souza Industrial Zone, and the International University in Ramkon.

The total residential area in the island as planned by the master plan (3,660 ha for Stage I in 2011) was not far off the actual figure (4,298 ha in 2016). However, it is necessary to look into the details of the different geographical locations. Because the SWECO Master Plan's estimate on the growth of every existing settlement in the island was also less than accurate as shown in Table 2.3.1 and Figure 2.3.1.

Table 2.3.1 Discrepancies between SWECO Master Plan Projections and Current Situation in Land Use and Population

	Current situation		SWECO projections							
			Population				Residential area (ha)			
Village	Popula-tion	Res. area (ha)	Stage I	Gap	Gap (%)	*Stage II*	Stage I	Gap (ha)	Gap (%)	*Stage II*
Qeshm and Towla	31,210	1,122	50,000	18,790	60	*80,000*	550	-572	-104	*800*
Dargahan and Holor	14,255	428	30,000	15,745	110	*60,000*	400	-28	-7	*750*
Shibderaz	456	32	40,000	39,544	8,672	*85,000*	400	368	1,164	*950*
Souza	4,712	177	10,000	5,288	112	*25,000*	200	23	13	*380*
Kouvei	4,224	149	10,000	5,776	137	*15,000*	100	-49	-49	*190*
Tonbon	1,069	61	5,000	3,931	368	*15,000*	100	39	64	*200*
Kovarzin	1,592	58	1,000	-592	-59	*3,000*	80	22	37	*110*
Laft	4,105	175	3,000	-1,105	-37	*4,000*	80	-95	-119	*100*
Peyposht	1,933	65	8,000	6,067	314	*15,000*	140	75	114	*220*
Tourion plain cluster (all villages)	10,983	570	13,000	2,017	18	*15,000*	300	-270	-90	*400*
Ramchah	3,679	97	5,000	1,321	36	*15,000*	300	203	211	*400*
Mesen	2,002	65	1,000	-1,002	-100	*7,000*	40	-25	-62	*100*
Tabl cluster (Tabl, Melki, Haft Rangou)	4,121	222	6,000	1,879	46	*8,000*	100	-122	-122	*200*
Selakh	2,740	74	5,000	2,260	82	*15,000*	120	46	63	*300*
Doulab cluster (Tomgez, Doulab, Sar Rig, Cachou, Aysheh-Abad)	4,875	173	5,000	125	3	*15,000*	300	127	74	*560*
Baseidou cluster (Baseidou, Moradi, Gouri)	3,081	113	5,000	1,919	62	*15,000*	300	187	164	*800*
Others	16,122	719	3,000	-13,122	-437	*8,000*	150	-569	-379	*340*
Total	111,159	4,298	200,000	88,841	80	*400,000*	3,660	-638	-17	*6,800*

Sources: SWECO Master Plan (Volume No. 6); 2011 Census.

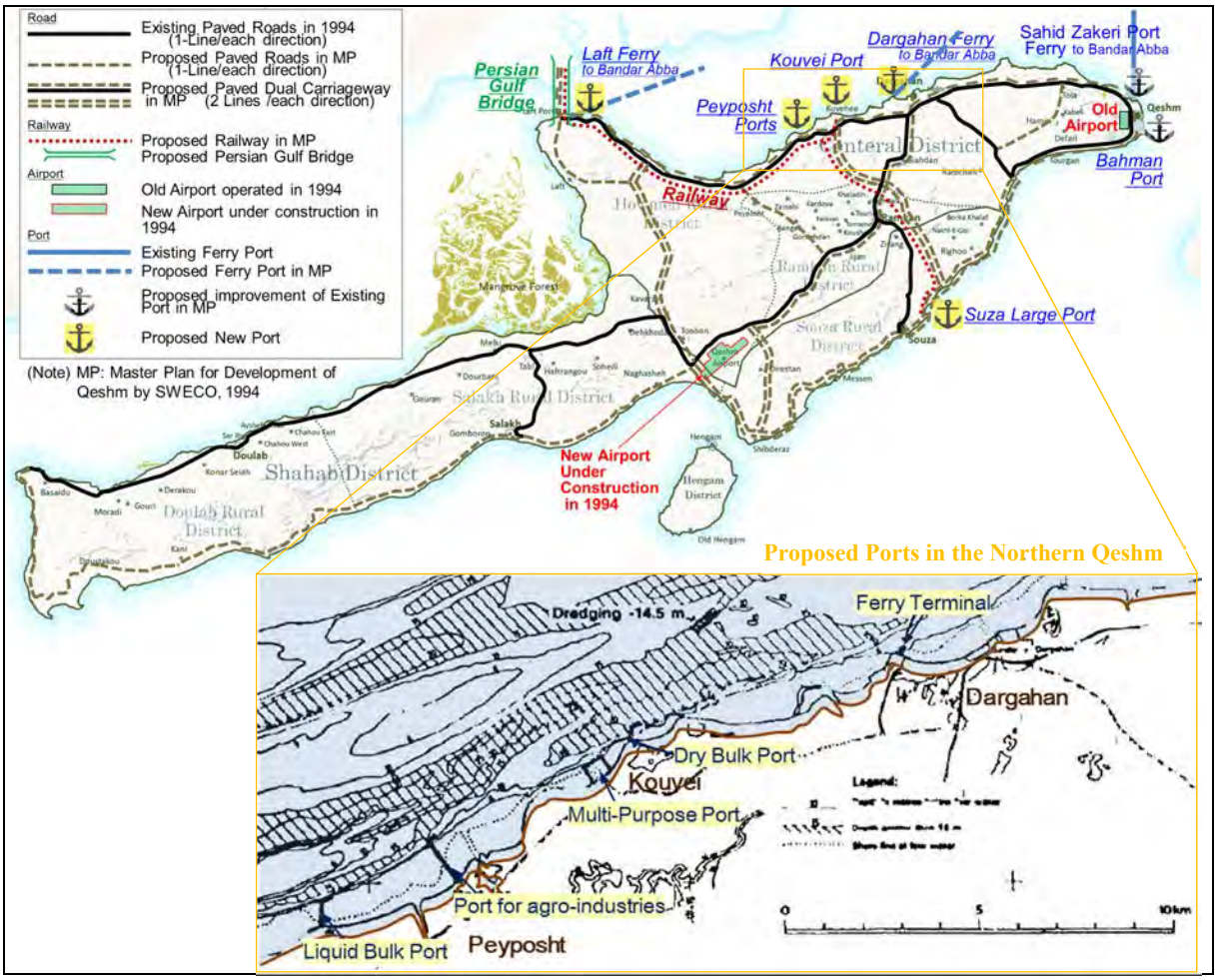


Source: SWECO Master Plan.

Figure 2.3.1 SWECO Master Plan's Land Use Plan Compared to Current Situation

2.3.2 Transport development

The SWECO Master Plan covered transport development including roads, railway, airport, and ports. Figure 2.3.2 shows the locations of the proposed transport development. The road network has been improved, except for the section of Noghasha–Selakh–Kani/Doustakou–Baseidou on the southwest coast. Villages are accessible by the main road and community roads paved with asphalt. The condition of paved roads is mostly good because traffic of heavy vehicles such as trucks and semitrailers is rarely seen in the island. However, the key infrastructure linking the Island with the mainland and other regions outside the country has not been realized, such as the Persian Gulf Bridge and a deep seaport. Construction work of the Persian Gulf Bridge commenced in the 1990s, but it is still underway. The current status of the island's transport development is summarized in Table 2.3.2.



Source: JICA Project Team.

Figure 2.3.2 Proposed Transport Infrastructure in SWECO Master Plan

Table 2.3.2 Proposed Transport Development in SWECO Master Plan and Its Current Status

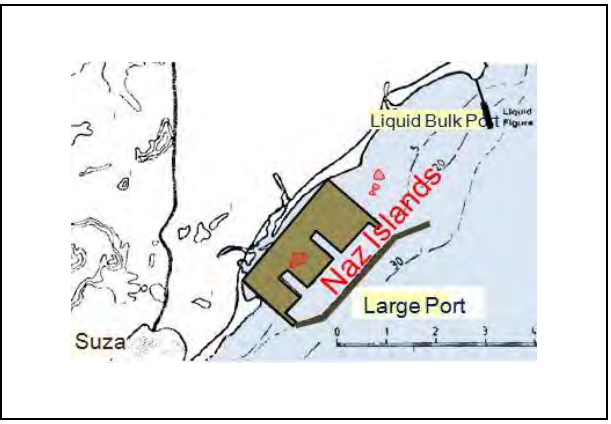
Sub-sector	Proposal in the master plan	Current status
Roads	• Improvement of unpaved sections along the coast in western Qeshm	• Yet to be implemented
	• Development of two new roads connecting the north and south in eastern Qeshm	• Yet to be implemented
	• Upgrading of the existing paved roads to 4-lane (2 lanes/direction) roads in eastern Qeshm	• Implemented
	• Construction of the Persian Gulf Bridge to connect Qeshm to the mainland	• Underway
Railway	• Construction of a new railway from the mainland through the Persian Gulf Bridge to Laft, Kouvei, and Souza	• Yet to be implemented
Airport	• Completion of the new international airport at Direston under construction (in 1994)	• Implemented (the new airport completed in and in operation since 1997)
Ports	Northern Qeshm	
	• Ferry port at Dargahan	• One jetty is under construction, which will accommodate vessels of 3,000–4,000 DWT for passenger transport and shipping of construction material and automobiles.
	• Ferry port at Laft	• One jetty is operated in an area close to the mainland. Various vessels use it to transport construction materials (loaded on trailers, trucks, and pickups), food, and automobiles to the island.
	• Dry bulk port and multi-purpose port at Kouvei	• Kouvei Jetty to accommodate vessels up to 100,000 DWT is under construction, which will allow shipping of 30 million tons of container cargo.
	• Agro-industries port and liquid bulk port at Peyposht	• Yet to be implemented
	Southern Qeshm	
	• Liquid bulk port and large port northeast of Souza	• Yet to be implemented
	• Expansion of the quay of Bahman Port from 160 m to 300 m (Figure 2.3.3) was recommended.	• The breakwater was dredged and widened in 2009 due to the age of the port, lack of dredging works, strong wind conditions, and inability of the eastern breakwater to cope with high waves. Following the works, the eastern breakwater was lengthened by 140 m, and the depth of the berths increased to 8 m (at full tide), with the entrance expanded to 10 m.

Sources: JICA Project Team; Shahidi Rajaee Port Complex website (http://shahidrajaeeport.pmo.ir/en/frmaboutshahidrajaeeport/affiliatedports/qeshmports/introducingtheport)

A deep seaport is planned on the north side of Souza village. This area is suitable for deep-water ports. Naz Islands are a major tourism spot in Qeshm, to which tourists can reach by car. The islands are also part of the geosites constituting Qeshm Geopark. As shown in Figure 2.3.4, the proposed Souza port will need to reclaim the largest island of Naz Islands, and its development will negatively affect tourists and marine sport activities around the islands. Therefore, review is recommended for the size of the new port and liquid bulk port around Naz Islands and for alternative locations of these ports.

Source: SWECO Master Plan.

Figure 2.3.3 Proposed Expansion Plan of Bahman Port



Source: ibid.

Figure 2.3.4 Proposed Port in Southern Qeshm

2.4 Proposed Utility Development

2.4.1 Water supply

The SWECO Master Plan proposed water supply development to meet the water demand for the estimated population and the industrial activities. Table 2.4.1 shows comparison of the proposed water supply system in the master plan for the intermediate year of 2011 and the current situation (2016).

Table 2.4.1 Proposed Water Supply System and Current Situation

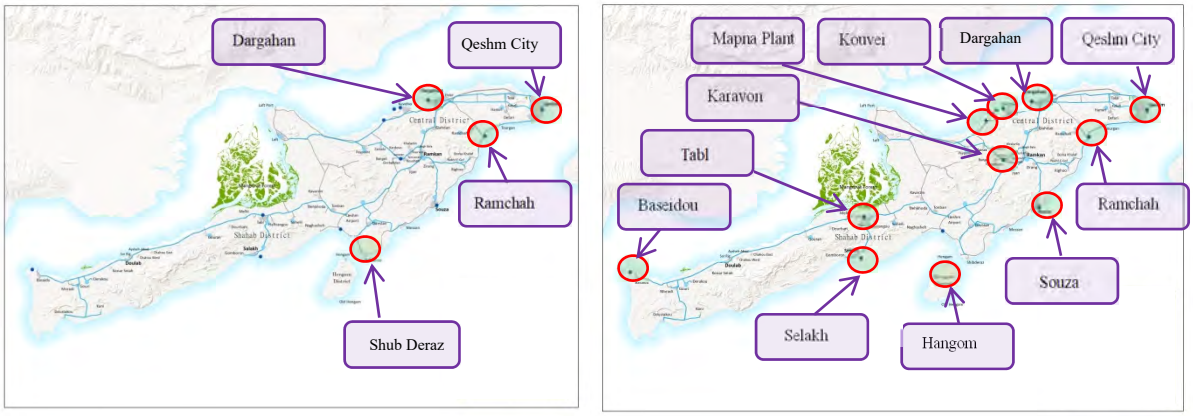
No.	Item	SWECO master plan for 2011	Current situation in 2016
1	Population (person)	273,800	141,696
2	Daily average water demand per capita (liter/person/day)	333	200 (urban) and 150 (rural)
3	Daily average water demand for domestic use (m^3/day)	91,175	24,315
4	Number of desalination plants	4 (Qeshm City, Ramchah, Dargahan, Shibderaz)	11 (Qeshm City, Dargahan, Souza, Ramchah, Kouvei, Karavon, Tabl, Selakh, Baseidou, Hangom, Mapna)
5	Transferred water from mainland (m^3/day)	43,200	0
6	Type of desalination plants	Reverse osmosis (RO) is recommended.	Distillation plants and RO plants have been newly constructed.
7	Locations of desalination plants	Southeast coastal area of the island to use fresh water	Around the entire island

Source: JICA Project Team.

At present, the daily average water demand per capita is estimated at 150 liter/person/day in rural areas and 200 liter/person/day in urban areas. It is much less than the SWECO Master Plan's estimate at 333 liter/person/day. This relatively low water demand should not be increased to maintain the effective use of costly water. Due to the low water demand per capita and the slow population growth, the daily average water demand for domestic use is estimated at 24,315 m^3/day. This is also much smaller than the estimated demand at 91,175 m^3/day in the SWECO Master Plan.

Four desalination plants were proposed in the southeast coastal area of the island because of the availability of clean water. The new desalination plants have been constructed around the entire island. The number of the desalination plants at present is 11. On the other hand, the SWECO Master Plan suggested only 4 as shown in Figure 2.4.1. The master plan recommended reverse osmosis (RO) plants with their reasonable cost as an advantage, and these distillation plants have also been newly built. The

existing desalination plants have treatment capacity sufficient to satisfy the current water demand. Once the water distribution network is established, treated water will be available throughout the island.



Locations of RO Plants in SWECO Master Plan Locations of Existing Desalination Plants in 2016

Figure 2.4.1 Locations of Desalination Plants in SWECO Plan and Current Situation

2.4.2 Wastewater treatment

The key points of sewerage planning in the SWECO Master Plan are summarized below.

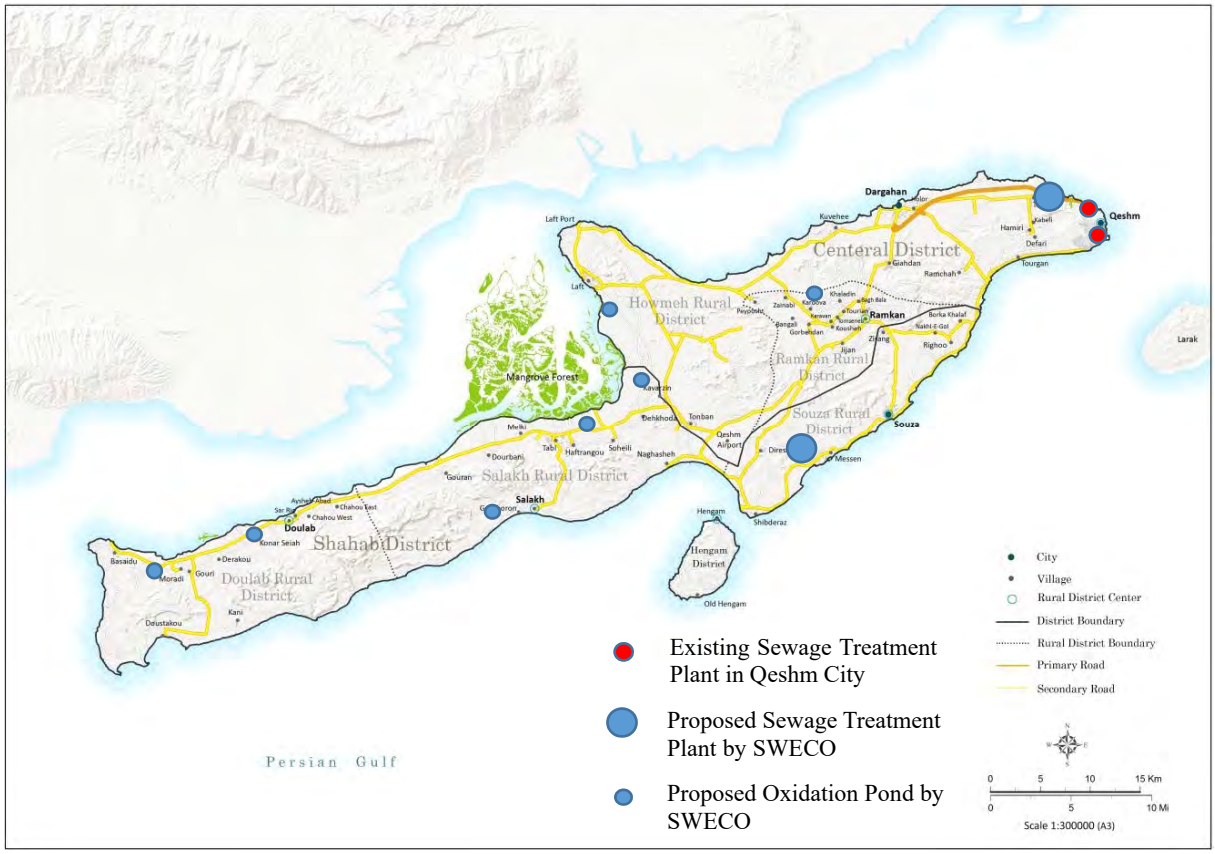
(a) Separate sewer systems are being employed. Drains for storm water are not connected to sanitary sewers. Underground sewer system is used for the densely developed areas in cities and villages. Sanitary toilet systems are to be established in small clusters and scattered settlements as in the current system.
(b) Industrial wastewater may be discharged into the sanitary sewer system on the condition that necessary pre-treatment be performed by the industry concerned. In the most severe cases, the industry is required to treat its entire wastewater for disposal.
(c) Four drainage zones, each with its own treatment plant and outfall, are proposed:
   - ✓ Zone 1: Industrial Zone North, Peyposht, Northern Port, Kouvei and Dargahan;
   - ✓ Zone 2: Industrial Zone East and Qeshm City;
   - ✓ Zone 3: Industrial Zone South, Southern Port, and Souza; and
   - ✓ Zone 4: Industrial Zone West, Mesen, Shibderaz, Direston, Airport, Tonbon, and Kovarzin.

   However, to facilitate the reuse of treated effluent, it may be recommended to combine Zone 1 and Zone 2 into a single drainage area and Zone 3 and Zone 4 into another, thereby reducing the number of treatment plants from four to two. The locations of two treatment plants are proposed in the northern suburb of Qeshm City and the southwest of Mesen. Area required for two treatment plants is estimated at 12 ha, 6 ha (about 200 m by 300 m), respectively. A step-wise construction plan is proposed for improving sewerage treatment facilities:
   - ✓ Pre-treatment facilities (e.g., mechanical screen and grid chamber) and outfall for direct discharge (without treatment) into the ocean,
   - ✓ Additional treatment facilities for intended reuse, and
   - ✓ Allocation of land space for future expansion.
(d) Treated sewage effluent can be used for irrigation, industrial purposes, and watering for public parks and gardens, etc.
(e) Inland and the Hara protection areas are considered for local treatment such as open pond system.

Sewage treatment service was not implemented until 2010 in Qeshm Island. The delay is attributed to

two factors: i) industrial development and population growth did not occur as planned and ii) the SWECO Master Plan was impractical in that its contents too abstract and lacking in specific detail, merely describing the general idea.

The 2 currently existing treatment plants in Qeshm City were developed in 2012 which have a total capacity of 3,000 m^3/day but not in accordance with the proposal in the master plan. The locations of the 2 existing plants and the 9 proposed plants in the SWECO Master Plan are shown in Figure 2.4.2. The sewage treatment area is limited to Qeshm City, and all the treated water is used for watering the green spaces in the city. The local treatment of the open pond system has not been implemented in the rural area where the sanitary facility treats human waste and gray water in a leaching pit.



Source: JICA Project Team.

Figure 2.4.2 Locations of Exiting Sewage Treatment Plants and Those Proposed in SWECO Maser Plan

2.4.3 Solid waste management

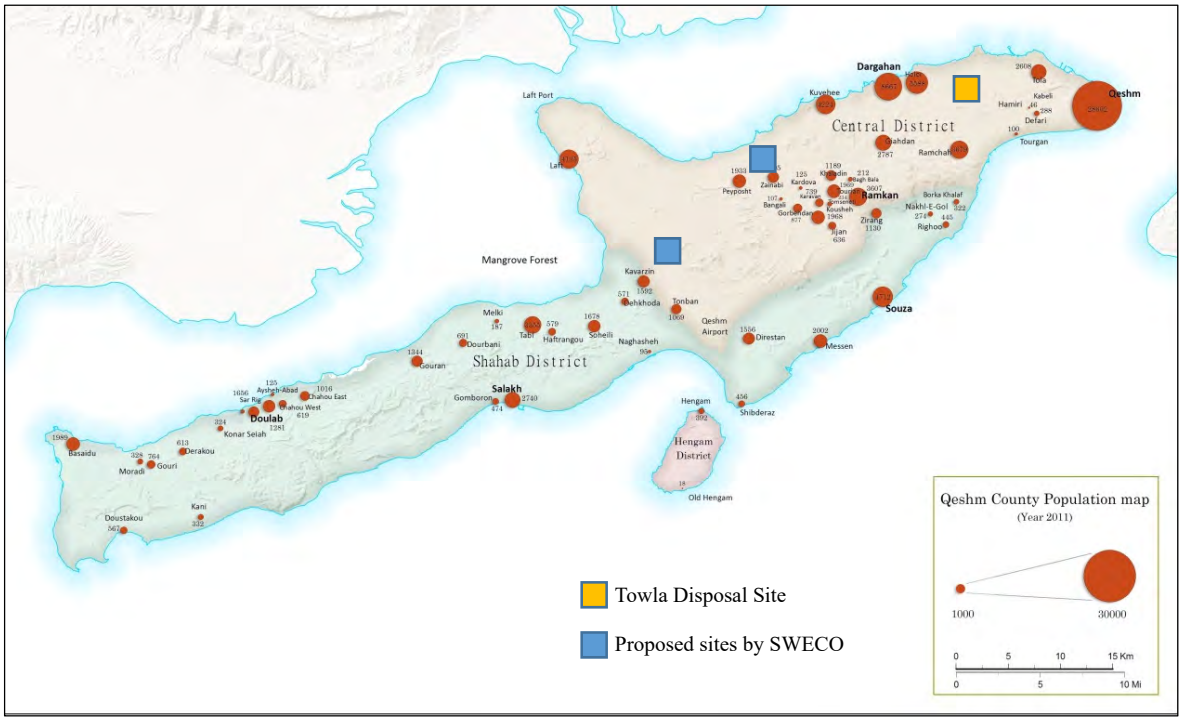
Solid wastes consist of ordinary waste in urban and rural areas, industrial waste, hospital waste, and agricultural and fishery waste. In the Project, the types of solid waste in Qeshm Island have been analyzed to examine gaps between the SWECO Master Plan and the current situation in solid waste management. Annex to this chapter presents the gaps item by item.

(1) Ordinary waste in urban areas

Waste collection equipment is required to clean cities and villages. For Qeshm Island, the SWECO Master Plan recommended introducing 2-plus-1 bins system to encourage recycling of dry, wet, and hazardous waste. This waste separation system has yet to be realized probably due to the abundant land available for waste disposal and the small volume of waste generated. The SWECO Master Plan proposed two landfill sites. Towla where the existing disposal site is located is not included in the sites recommended by the SWECO Master Plan as shown in Figure 2.4.3. Though unsubstantiated, the site appears to be appropriate as a final disposal site. Regardless, waste disposal is still at a rudimentary

level in Qeshm Island.

It should be noted that ordinary waste generation per person seems to be disproportionately large. The SWECO Master Plan estimated the ordinary waste generation in the island at 0.8 kg/person/day. The amount of ordinary waste generated at present is roughly estimated at 1.6 kg/person/day as described in Chapter 6.



Source: ibid.

Figure 2.4.3 Locations of Towla Disposal Site and Proposed Landfill Sites in SWECO Maser Plan

(2) Ordinary waste in rural areas

The SWECO Master Plan did not refer to solid waste management in the rural areas of the island. The amount of ordinary waste generated in the rural areas at present is still small. No serious problem has been seen.

(3) Industrial waste (non-hazardous and hazardous)

Although the SWECO Master Plan recommended disposal of industrial waste separately from ordinary waste, no industrial waste landfill has been constructed yet.

(4) Hospital waste (non-hazardous and hazardous)

The SWECO Master Plan recommended that hazardous hospital wastes be handled separately from ordinary waste and treated in a special incineration plant. Such a treatment plant is yet to be developed. There is a large hospital that separates infectious wastes well; however, that is not the case with small clinics.

(5) Agricultural and fishery waste

The SWECO Master Plan did not present any treatment or disposal plan for agricultural and fishery wastes. No serious problem is currently observed for agricultural wastes.

2.4.4 Power supply

(1) Power demand forecast

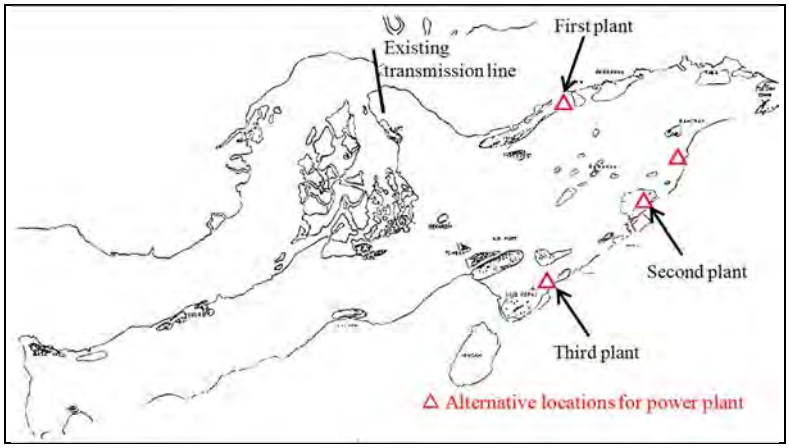
The SWECO Master Plan concluded that the power demand in Qeshm Island would reach 517 MW, 1,673 MW, and 3,035 MW in 2001, 2011, and 2021, respectively, based on the assumptions of key variables including population, the number of households, the size of economically active population (employment), desalinated water production, and industrial development. For the increase in power demand, rapid growth was assumed with an average annual growth rate of 12.5% from 2001 to 2011. Meanwhile, for the following decade up to 2021, the annual growth rate was expected to remain about half the level of the previous decade at 6.1%.

Of the industrial, commercial, and residential sectors, the industrial sector was expected to become the largest power consumer, continuously increasing its demand for electricity up to 2021. Its share was assumed to be about 62 to 63% by 2011. For the final decade of 2011–2021, the share of the residential sector was expected to increase from 17.9% to 23.1%.

(2) Power supply facilities

The SWECO Master Plan proposed phase-wise development for power plants as follows:

(a) The first power plant would be established adjacent to the Industrial Zone North with its final capacity of 1,000 MW at least (Figure 2.4.4) and connected to the mainland grid via its 230 kV interconnection line.
(b) The second power plant site would be established in the Industrial Zone South when an additional 230 kV transmission line is built.
(c) Another, third power plant, which could be located close to the Industrial Zone West and Shibderaz New Town, might become necessary when the total system demand exceeds 2,000 MW.
(d) Surplus power generated would be transmitted to the mainland with the maximum generation capacity of the interconnection line (400 MW) and enough to satisfy the peak power demand in the island.
(e) Some of the industries were assumed to use steam, which could be generated in co-generation units; the units would need to be located close to or within the industries concerned.
(f) The location of a desalination and power plant is largely dependent on the water supply system.
(g) The optimum capacity of a gas turbine power station was considered to be about 1,000 MW.



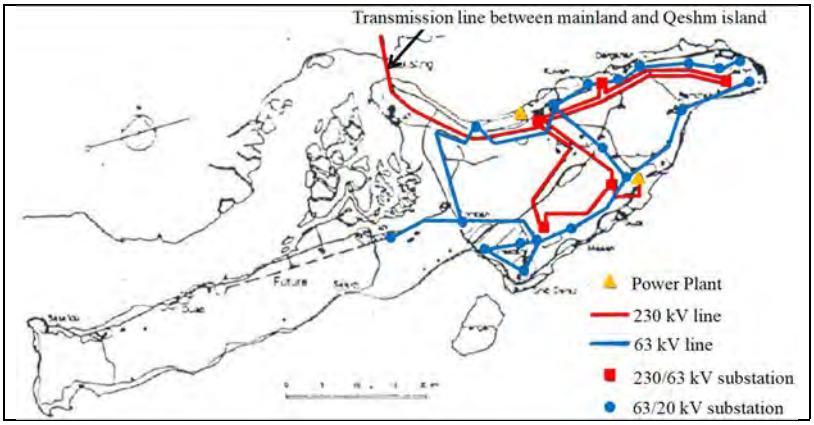
Source: SWECO Master Plan.

Figure 2.4.4 Power Plant Locations

For the development plan of power transmission and distribution system, the following are the key points in the SWECO Master Plan:

(a) Power transmission system consisting of 230 kV and 63 kV lines for the basic electricity requirement.
(b) A 63 kV local looped network for the main industries in the Industrial Zones North and South, a 20 kV network for other industries and large consumers, and a three-phase 400/230 V low voltage system for small consumers.
(c) A loop of 63 kV lines through Laft–Dargahan–Qeshm City–Souza–Shibderaz–Kovarzin–Laft, sufficient to supply power to new industrial facilities in the eastern part of Qeshm Island
(d) An interconnection with the 230 kV mainland system from a 230/63 kV substation to be established by 2001 before power demand reaches 60 MW.
(e) A 230 kV line to the Industrial Zone South required when power demand within the area exceeds 60 MW; another 230 kV line to the Industrial Zone South (via the Industrial Zone West) to be commissioned when the power demand within the area exceeds 400 MW.
(f) A second transmission line from the Industrial Zone North to Qeshm Town to be commissioned when the power demand within the Kouvei–Qeshm Town area exceeds 400MW.
(g) Installation of underground cables of low voltage distribution system to be coordinated with those of other utility systems.

Figure 2.4.5 shows the completed power system development in the island proposed by the SWECO Master Plan. In 2015, the power demand in the island was about 200 MW, of which 70% was used by residential customers. A power plant has been developed with a capacity of 50 MW in the island for water desalination, of which 10% (5MW) is supplied to a distribution network. Power supply relies on imported electricity from the mainland through a 230 kV connection line of the National Grid of Iran.



Source: SWECO Master Plan.

Figure 2.4.5 Power System in Qeshm Island (Ultimate Development)

2.5 Environmental Planning, Cultural Environments and Human Resource Development

2.5.1 Environmental planning

The SWECO Master Plan proposed that environmental protection be achieved through environmental policy-making and creation of an environmental data bank. The present situation in this regard is as follows:

(a) Policy and methodology: The SWECO Master Plan recommended that QFZO be responsible for environmental impact assessment (EIA) in Qeshm Island, as there was no other department pertinent to the task at that time. According to the master plan, i) QFZO should carry out EIA in close cooperation with national environmental authorities; ii) training should be implemented for QFZO staff to compile appropriate environmental information into a database; iii) QFZO should ensure that every economic development project be in line with the overall environmental strategy and that any project with potential to overburden the

regenerative capacity of Qeshm Island environment not be promoted. Seven years later in 2001, the department of environment (DoE) was established in QFZO. Hormozgan Province also has a DoE. Both DoEs are responsible for EIA in the island; however, the two DoE's understanding of their own roles are inconsistent with each other. In fact, urban and infrastructure development has caused negative environmental impact though these DoEs conducted EIA for the development.

(b) Databank: Accumulating environmental information is the first step toward the development of an environmental database of the island, which can be an effective tool for QFZO to implement EIA. Once developed, the database should be updated with new data at regular intervals, and the updated database should be made available to and shared by QFZO staff and various experts in the related fields. At present, the environmental database is yet to be constructed.

2.5.2 Cultural environment

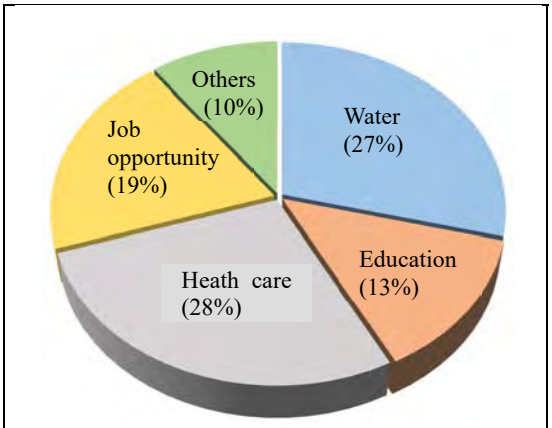
Reflecting the circumstances under which economic development was being pursued at the time when the SWECO Master Plan was formulated, the outcomes of the master plan focused on economic development directed to industrialization and trading rather than improvement of social, cultural, and environmental indicators. Meanwhile, the master plan recommended the island's development to be pursued in social harmony with its population and in a manner that safeguards its cultural heritage. It suggested that freedom of cultural expressions be facilitated to cultivate a social atmosphere for tolerance to the expected mixture of ethnic groups and different nationalities.

2.5.3 Community development

The SWECO Master Plan did not much refer to community development. This implies that it did not give weight to the people's lives in rural areas. However, with the development of Qeshm Island, vitalization of the rural areas has become seen as important due to the increase in the rural population that accounts for a half of the total population. Enhancement of the rural areas will result in alleviating over-concentration in cities and facilitating balanced development of the island.

(1) Social facilities

The SWECO Master Plan demanded that well-equipped hospitals be constructed at suitable locations in the island. According to the socio-economic baseline survey conducted by the JICA Project Tem (JPT) in 2016, the need for health care is ranked high by the local people, compared to other needs such as education (Figure 2.5.1). High-grade hospitals and health centers are important for rural residents especially in remote villages where hospital and medical care is hard to access. Provision of health care should be considered for those villages. At present, the villages do not have enough medical equipment for treatment and doctors. In the island, because of the lack of well-equipped hospitals, patients with serious illnesses must be treated in the mainland, Teheran or Bandar Abbas. On the other hand, educational facilities and services have been sufficiently provided for most of the villages in the rural areas.



Source: JICA Project Team.

Figure 2.5.1 Highest Needs of Local People in 57 Villages

The SWECO Master Plan suggested other facilities including stadiums, swimming pool, cinemas, and theaters to improve the leisure time in villages. However, the villagers' priorities are water supply, health care, and education as found in the baseline survey. Actually, the support for leisure facilities from the government and other organizations may not be sufficient or suitable for the needs of the

local people at present.

(2) Public participation

In the SWECO Master Plan, close cooperation with the local people was suggested to successfully implement the proposed plan. It is a sound suggestion for community development. However, it is not enough: Democratic decision-making system is also required for successful community development. Participatory approaches are effective in ensuring democratic decision making. Since there are various participatory approaches to community development, the islanders and government officials need to learn about them and seek one that is suitable for Qeshm Island.

2.5.4 Human resources development

The SWECO Master Plan set several indicators such as literacy, unemployment rate, and labor market for human resources development. The related conditions at present are as follows:

(a) Literacy: The literacy rate in Iran improved from 74.1% in 1994 to 84.8% in 2011. In Qeshm, it was 86.0% in 2011, slightly higher than the national average.
(b) Educational and training activities to facilitate employment: The SWECO Master Plan assumed that the modern sector had not been established in Qeshm Island. However, the oil and industrial sectors, which are part of the modern sector, had developed to some extent by the time. Some private businesses in the existing modern sector have developed training programs for their employees. The public sector, on the other hand, has not provided such educational activities. There is a demand among the residents for training programs.
(c) Women in the workforce: There is no available data to estimate the percentage of women in the workforce in Qeshm. Traditionally, only a few women worked in the island except for family labor, but the situation has gradually changed. Now there are female workers in some sectors, the service sector in particular, such as restaurants, hotels, and shops in shopping malls. Also, female QFZO and NGO staff are good examples that indicate the increasing female participation in the workforce.
(d) Health, sanitation, and related services: Statistics indicative of the health and sanitation conditions in the island are unavailable. Medical services and a wastewater treatment plant have been developed in Qeshm City but not in the rural areas. Such imbalance needs to be corrected.
(e) Human resources development: Overall the gaps in available human resources between the mainland and Qeshm have narrowed. The SWECO Master Plan promoted education, training, and other labor market-related activities to reduce unemployment. In the island, higher educational institutions have been established, and many students graduate from their schools every year. Also, women have gradually entered the workforce. However, job opportunities are still limited in Qeshm, especially in the modern sector. There still is room for improvement in unemployment.

2.6 Planning Issues to Be Clarified

In the previous sections, the results of analysis on the gaps between the proposals and projections of the SWECO Master Plan and the current situation were discussed. Given the results and considering the changes that have occurred in the island since the SWECO Master Plan's formulation, the planning issues to be considered in the Project are identified and presented below.

2.6.1 Planning framework and economic activities

(1) Planning concept

It has been over 20 years since the SWECO Master Plan was formulated, but the FZ still maintains its role in boosting the national economy by linking it with the global economy. This development-oriented expectation is in line with the national economic development strategy. In the

sixth FYDP, the objectives highlight environmental management, revitalization of history and culture, and enhanced participation by women. These objectives emphasize the environmental and social aspects on which to establish the solid basis of the country. A new master plan must contribute to those contemporary challenges.

(2) Planning framework

Population and employment projections should be updated with the latest statistics. The opening of the Persian Gulf Bridge is an important factor to estimate the scenarios for the population projections. Employment should be planned to contribute to the local people. The rapid and drastic immigration from outside needs to be stopped or controlled to ensure the island's social stability.

(3) Agriculture

Due to the water scarcity and the low soil fertility, the island's agriculture faces difficult competition with agricultural products from outside. It is not practical to promote agriculture focusing on production increase. Different approaches should be sought such as cultivation of herbs for traditional medicine and apiculture. Such new agricultural activities and agro-products can be linked with tourism and medical services. Livestock raising and husbandry are other prospective activities to improve employment in the island to some extent. They can be linked with the local pasture production.

(4) Fishery

The number of workers in the fishery sector has increased because of the influx of ex-farmers seeking another livelihood. Since the fish production in the Qeshm waters has already exceeded their MSY, management of artisanal fishing is one of the most important challenges in fishery resources management in the island. Attempts should be made to manage and control fishery resources and the coastal ecosystem in the inshore areas by fishers' initiatives. Environment-friendly aquaculture should be promoted and its production should be increased. The fishery sector needs diversification. Fish processers are seeking opportunities to develop new products from sardines and other bycatch species as value-added food because most of the sardine and bycatch is utilized only as raw material of fish meal. The value chain of the fishery sector from harvesting (capture and aquaculture) to sales (consumers) should be improved for further development and advance of the sector.

(5) Manufacturing and industrial development

Industrial development has not been realized as planned. The island's advantage in manufacturing is the use of local resources, natural gas and oil in particular. Upstream and midstream processing including energy-intensive industries is the most suitable for the island. Basic metals, chemical products, and textile may be viable. The island has a potential to be the gateway to the Iranian domestic market for distribution and manufacturing.

(6) Tourism development

Eco-tourism has been promoted in the Hara mangrove forest, the dolphin bay, and the Geopark, but the promotion was conducted in an ad-hoc manner without coordination among the organizations concerned. The International Ecotourism Society (TIES) defines ecotourism as "responsible travel to natural areas that conserve the environment, sustains the well-being of the local people, and involves interpretation and education". Other potential benefits of tourism that contributes to socio-cultural prosperity and environmental conservation should be considered under the ECO-QESHM Master Plan. The new objectives of the ECO-QESHM Master Plan should be set for the pursuit of ecotourism development in consideration of economic, socio-cultural, and environmental aspects and toward sustainable development of Qeshm as an eco-island.

2.6.2 Land use plan and utility development

(1) Land use plan

Urbanization has progressed though the new cities have not been established in Souza and Shibderaz, yet. The boundaries of future residential areas should be updated to be consistent with the revised population projection.

(2) Transport system

A trunk road network has been developed. An attempt should be made to strengthen the island's access to the outside by building the Persian Gulf Bridge and the main seaport. The location of the Souza deep seaport needs to be reviewed without causing negative impact on the Naz Islands.

(3) Water supply

The current, low water tariff should be maintained to use costly water effectively. The locations of new desalination plants should be selected, considering access to fresh water and the main water consumption areas.

(4) Wastewater treatment

To update the sewerage development plan, the following debatable issues should be examined:

- Large-scale treatment area: This requires a long pipeline for conveying wastewater to be constructed based on the scale of the ultimate plan, and the construction cost can cause the project's investment efficiency to fall.
- Direct discharge of wastewater into sea without treatment: At the time of reviewing the sewerage development plan, direct discharge of untreated wastewater is not permitted according to the newly established Wastewater Discharge Standards under the Water Pollution Prevention Act.
- Selection of rural sewerage development area: It is necessary to determine criteria and their priority for the selection of sewerage development areas in 57 villages to prevent water contamination from the population increase.
- Beneficial use of treated sewage effluent and sludge: It is necessary to discuss not only the reuse of treated sewage effluent but also the recycling of sewage sludge.

(5) Solid waste management

Waste collection is carried out efficiently and effectively in both urban and rural areas. Treatment at the Towla disposal site and management of construction wastes should be improved.

(6) Power supply

Power plants have not been developed as planned to supply electricity to not only the island but also the mainland as a whole. Effective use of local resources including gas, oil, and renewable energy should be considered. The residents should be given priority in the use of power.

2.6.3 Environmental planning, cultural environment, and human resources development

(1) Environmental planning

Serious environmental problems have not happened, yet. An environmental database should be developed for managing and monitoring the natural environment. The QFZO and county government departments responsible for environment ne to supplement each other's capacity.

(2) Cultural and environmental considerations

Economic development has always been given the highest priority. Due to changes in the global

environment, more attention must be paid to environmental and cultural aspects in development planning. Both aspects are essential in determining the conditions to be established for realizing a sustainable environment.

(3) Community development

Local residents' participation should be emphasized in the preparation and implementation of pilot projects in villages. The village council should be consulted and used as an intermediary in the course of involving the local people.

(4) Human resources development

The gaps in literacy and unemployment between the mainland and Qeshm have narrowed. Higher educational institutions have been established in the island. Women's participation needs to be increased in both social and economic activities.

2.6.4 Evaluation of SWECO Master Plan's objectives

The SWECO Master Plan specified objectives for different sectors in Volume 1 of its main report. The JICA Project Team has evaluated each objective in view of the current situation. Given the changes that occurred in the conditions after 1994, the JICA Project Team has made recommendations to prepare its own master plan for natural resources conservation and livelihood. Table 2.6.1 shows the objectives, evaluation, changes in the conditions, and recommendations.

Table 2.6.1 Review of Objectives of SWECO Master Plan

Field		SWECO Master Plan objectives		Evaluative questions	Evaluation		Changes in conditions (1994–2016)	Recommendations for objectives of Eco-Island Master Plan (including methodological aspects)	
Nº	Field	Nº	Objectives		Note	Comment		Relevance of SWECO objective	Recommendation for new objective
1	Cultural Environment	1.1	Development should be pursued in social harmony with the Qeshmi population and in a manner which safeguards the cultural heritage. In view of the foreseen mixtures of ethnic groups and different nationalities, freedom for different cultural expressions should be facilitated. Breakdown:	(See breakdown)					
		1.1.1	Development in social harmony with the Qeshmi population has been realized	• Have participatory approach development programs been implemented? • Have social conflicts been avoided?	++	• In response to requests by residents, QFZO has implemented the projects to meet their needs. However the residents are not satisfied with result of those projects. The participation of residents in planning, design, implementation, and operation of the projects still needs to be improved for successful result. • The social conflicts have not been happened since 1994, thanks to the peaceful character of Qeshmi people. However departments and villages compete each other for their own objectives without vision agreed among stakeholders.		High	• Participatory approach should be enhanced to involve stakeholders in planning and implementation.
		1.1.2	Development in a manner which safeguards the cultural heritage has been realized	Have cultural heritage been protected? Not destroyed by development?	++	• The cultural heritages remain with the legal support by Cultural Heritages, Handicrafts, and Tourism Organization. QFZO succeeded the legal power of ICHTO in 2006. • Traditional architecture is facing a threat from change of the modern architecture and lifestyle.		High	• The cultural heritages should be identified and protected appropriately in a social and legal system.
		1.1.3	Freedom for different cultural expressions has been facilitated.	Have any action been implemented towards facilitation of various cultural expression?	++	• A village convened an annual festival. Women groups produce handicrafts. QFZO serves the technical training for handicrafts. • Traditional techniques for traditional wooden boats and musical instruments are not protected well.		High	• Culture as well as traditional skills should be identified in each village and conserved by the community and the legal system.
2	Human Resources Development	2.1	The difference in literacy rates between Qeshm and Iran as a whole should be eliminated within a decade.	Has the literacy rate in Qeshm reached the average Iranian level?	+++	• The literacy rate of 5 years old and more reached 86.0% in Qeshm higher than 84.7% of average in Iran.		High	• The literacy rate should be further improved by establishing schools in accordance with the planning standard.
		2.2	Education, training and other labor market-related activities should be geared, towards the objective of facilitating employment and participation of the Qeshmi population in the modern sector of the economy, thereby minimizing unemployment and underemployment.	Have educational or training activities implemented towards facilitating employment and participation of the Qeshmi population in the modern sector of the economy been implemented?	-	• A training program for the modern technology was not carried out. The residents are demanding to attend to such training program.		High	• The training program should be developed to meet the requirement so of the modern technology. The target sector includes tourism, marine environment, agriculture in dry weather, and petrochemical.
		2.3	Unemployment should be reduced to less than half from the present level and of about 10% within five years	Has unemployment been reduced of 50%?	+++	• Unemployment was reduced to 7.3% in 2011. This rate was less than half of unemployment rate at 14.8% in 1991.		High	• Employment opportunity should be created to meet the demand caused by increase of economically active population.
		2.4	Labor market activities should aim at an increase in the female participation rate in the labor force to the same level as for Iran as a whole within a decade.	Has the female participation rate in labor force in Qeshm reached the average Iranian level?	NA	• The statistics have not been available to represent the female participation rate. Good example is observed the women works for the governor of the county, a chairperson of non-governmental organization, and governments.		High	• Participation of women should be enhanced for social diversify.
		2.5	Health, sanitation and related services for the majority of the Qeshmi population should reach the same level as the average for the whole of Iran within a decade.	Has the health, sanitation and related services for the majority of the Qeshmi population reached the average Iranian level?	++	• The statistics of have not been available to represent the health and sanitation conditions. Medial services and wastewater treatment plant have been developed in Qeshm city, and the rural areas still need improvement.		High	• Health and sanitation services should be established to cover the entire island including villages in west and the city of Dargahan.
3	Natural Re-	3.1	The rate of exploitation of non-renewable	Has the rate of exploitation of non-re-	++	• Non-renewable natural resources have been		Intermedi-	• The non-renewable natural resources should

Field		SWECO Master Plan objectives		Evaluative questions	Evaluation		Changes in conditions (1994–2016)	Recommendations for objectives of Eco-Island Master Plan (including methodological aspects)	
Nº	Field	Nº	Objectives		Note	Comment		Relevance of SWECO objective	Recommendation for new objective
	sources Development		natural resources should be compatible with Iran's long term policies for exploitation of such resources.	newable natural resources reached a level of compatibility with Iran's long term policies for exploitation of such resources? (search for national policies)		developed for natural gas in Siri and Kovarzin. The development of Hangom oil field is under construction. The Iranian government seeks further development in Farouz B gas field.		ate	be developed for the purpose of national economy and benefit of the island without causing environmental impact.
		3.2	Exploitation of renewable natural resources should be based on the principle of indefinite long-term sustainable yield.	Has the exploitation of renewable natural resources been based on the principle of indefinite long-term sustainable yield?	-	• The exploitation of renewable natural resources has not been taken in place yet.	• Green economy should be pursued as stated by the Supreme Leader in line with realization of the sustainable development.	High	• Exploitation of renewable natural resources should be pursued in the island.
		3.3	To maximize the value added from utilizing non-renewable natural resources, the selection between applications and approval of projects should be guided by netback price calculations.	• Has the value added from utilizing non-renewable natural resources been maximized? • Has the approval of projects been guided by netback price calculations?	+	• The value added has not been realized from use of natural gas yet as the natural gas is supplied to the mainland.		High	• The non-renewable natural resources should be developed for the purpose of national economy and benefit of the island without causing environmental impact.
		3.4	Considering the huge reserves of natural gas, the pricing of natural gas should reflect the long-term marginal cost of supply based on a realistic exchange rate. For other non-renewable natural resources such as oil, salt, limestone, etc., pricing should also allow for adequate depletion premiums.	• Has the pricing of natural gas reflected the long-term marginal cost of supply based on a realistic exchange rate? • Has the pricing of other non-renewable natural resources such as oil, salt, limestone, etc. allowed for adequate depletion premiums?	+	• The natural gas is supplied to fulfill the domestic demand at the rate of tariff established by the government. Use of the natural gas has not brought the benefit yet.		High	• The non-renewable natural resources should be developed for the purpose of national economy and benefit of the island without causing environmental impact.
4	Economic development	4.1	Long-term economic growth compatible with acceptable levels of inflation and unemployment should be the prime economic objective.	Has long-term economic growth been planned in manners to be compatible with acceptable levels of inflation and unemployment?	+++	• The unemployment rate was improved to 7.3% in 2011 slightly better than the rate at 7.4% proposed in the SWECO Master Plan.		High	• The development model should pursue to create sufficient employment opportunity for increase of economically active population. In the island.
		4.2	Major complementary economic objectives include the creation of value added to domestic natural resources and the generation of foreign exchange by non-oil exports.	• Has the creation of value added to domestic natural resources been realized? • Has the generation of foreign exchange by non-oil exports been realized?	-	• Non-oil exports and value added industry using domestic resources have not been realized yet.		Intermediate	• Non-oil exports and value added industry using domestic resources should be pursed.
		4.3	A reasonably equitable and fair distribution of income should be sought to avoid a dual economy consisting of a backward, low-income traditional sector on the one hand and an advanced, high-income modern sector on the other.	• Has a reasonably equitable and fair distribution of income system been promoted • Has the gap between backward, low-income traditional sector (including informal sector) and an advanced, high-income modern sector been filled?	-	• Due to the scarce water resource, the farmers are in severe conditions to continue farming. Villagers started the fishery and are looking for livelihood.		High	• The development model should pursue to create sufficient employment opportunity for increase of economically active population. In the island.
		4.4	The place of economic development and the choice of industrial and infrastructure projects should follow sound economic and financial principles.	Has the place of economic development and the choice of industrial and infrastructure projects followed sound economic and financial principles?	-	• The Souza petrochemical complex has threats to deteriorate the Naz Islands of tourisms spot and environmental areas.		Low	• The large scale development of seaport and industrial sites should be review in the strategic environmental assessment.
5	Agriculture and Husbandry	5.1	Existing and potential land for agriculture and animal husbandry should be protected from other uses.	Has the existing and potential land for agriculture and animal husbandry been protected from other uses?	-	• Actual cultivated area has been reduced due to decrease in farmer's motivation to retain their farmlands.	• Demand of the industrial and residential use has been sharply increased recent years. • Agricultural (arable) land has been segmented by succession of property.	High	• In the context of natural land conservation of eco-island, this still takes significance. • Protection from other usage of agricultural land in the context of natural land and vegetation conservation of eco-island is important.
		5.2	In spite of general unfavorable preconditions for agriculture (crop production & horticulture), the existing potential should be exploited to the extent possible by the introduction of modern techniques including improved seeds, fertilizers and pesticides, processes for disinfection and packaging of dates, etc. all with a view to increasing the yield from the sectors by some fifty per cent.	• Has the yield in the agricultural and animal husbandry sectors increased by 50%? • Have modern techniques including improved seeds, fertilizers and pesticides, processes for disinfection and packaging of dates, etc. been introduced?	+	• Data showed some increment in the yield per unit area of vegetables; however the cultivated area was drastically decreased. • Few new technologies were introduced/ implemented in date-palm and vegetable cultivations. Farmers generally learned new technologies through trial and error by themselves.	• As the logistics and productivity have been improved in the mainland, the cost- benefit performance on the crop production by using expensive desalinated water in the island become less competitive with the products from mainland. The degree of importance in increasing productivity is decreased recent days if it targets only on the amount of yield. • Promotion of pasture production still remains importance, because despite shortage of forage and ab-	Intermediate	• Value of the agriculture and husbandry should be measured not only from the economical outputs but also cultural aspects including landscapes and ecotourism. Objectives for the agriculture development should be pursed for traditional and cultural aspects in the island.
		5.3	• In spite of general unfavorable preconditions for animal husbandry, the existing potential should be exploited to the extent possible by the breeding of local and native livestock, artificial insemination, veterinary	• Has the yield in the agricultural and animal husbandry sectors increased by 50%? • Have modern techniques including artificial insemination, breeding local	+	• Number of heads has slightly increased. • Technologies regarding breeding/ propagation system are introduced and applied through veterinary services. • Veterinary services including vaccination have			

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			services, and etc. all with a view to increasing the yield from the sectors by some fifty per cent. • Pasture of the island can be improved to yield more under a well-designed program.	and native livestock, veterinary services, etc. been introduced? • Has any program to improve the yield of pasture of the island?		been appropriately provided. • The pasture promotion programs do not seem to have been implemented.	sence of manual feeding, the number of livestock has slightly increased in reality.		
		5.4	Agro-industries adding value to the output from agriculture and husbandry such as chicken farms should be established.	Has agro-industries adding value to the output from agriculture and husbandry such as chicken farms been promoted?	+	• About 20,000 fowls are raised/fed at the backyard gardens for self-consumption; however no commercial poultry producer is in the island.	• With consideration of the cost-benefit performance and the comparison with products from mainland, the degree of importance is decreased nowadays.		
		5.5	The Agricultural Bank should allocate each year at least an amount equal to 30 % of net income of the agriculture, to this sector as credit.	Has Agricultural Bank allocated each year at least an amount equal to 30 % of net income of the agriculture, to this sector as credit?	-	• Complex and difficult administrative process exist on the application for a loan.		Low	• The practical means for financial support shall be studied in the revised Master Plan. • Relaxation of the application requirement and loan condition (Not realistic), and/ or education to farmers for the application is required
6	Fishery	6.1	• Efforts should be made to maintain an adequate sustainable level of fishing of all species which should not exceed the maximum sustainable yield in the long term. • Measures should be taken with a view to maximizing the returns to the Qeshmi population from existing fishing activities.	• Have efforts of maintaining an adequate sustainable level of fishing of all species been implemented? Results of these efforts? • Have measures of maximizing the returns to the Qeshmi population from existing fishing activities been taken?	+	• Iranian Fisheries Organization (IFO) established three committees; Fishery Resource Management Committee, Fishing Committee, and Fishermen's Association Committee. • IFO made several efforts to maintain sustainable fishing, such as setting closed season, restriction in mesh size of nets, limiting outboard engine power, introduction of long-line fishing to reduce bycatch, stock enhancement by releasing juveniles of prawn, and so on. • IFO and QFZO promote aquaculture development in order to reduce fishing pressures on marine stocks. • Capture production of silver pomfret, prawn and demersal fish decreased, illegal fishing is still found common, and overcapacity in fishing fleet/boats still exists. Lack of job opportunities is accelerating increase in the number of fishermen, consequently, intensifying fishing efforts more. Fishing grounds are getting farther. • Capture production of Qeshm, which was about 56,000 tons in 2014, has exceeded the maximum sustainable yield of fish, crustaceans and mollusks from Qeshmi waters, i.e. 35,000 tons, which was shown in the SWECO Master Plan. • Judging from the above-mentioned facts, efforts to maintain a sustainable level of fishing are still needed.	• Fishermen's active and initiative participation in wise use of resource is now internationally recognized as a key to sustainable fisheries development. • Ecosystem-based approach for fishery resource management and biodiversity conservation is now adopted worldwide. • Aquaculture development by local fishermen can reduce the fishing pressure on fishery resources. IFO has intended to promote aquaculture based on its fishery promotion plan "Fishery Potential. Hormozgan Province 2014-2015"	High	• Management of fishery resource and coastal ecosystem in the inshore areas is strengthened by fishers' initiative actions. • Aquaculture production increases in an environmentally friendly manner.
		6.2	Increased catches of sardines should be aimed at by the promotion of more modern fishing methods.	Have the increased catches of sardines been realized by the promotion of more modern fishing methods?	++	• Small pelagic fishery targeting sardines made a huge progress through the introduction of purse seine fishing. The small pelagic fishery is now the most important fisheries in the inshore areas of Qeshm Island and Hangom Island because there is a firm distribution channel through fish meal factories. • Small pelagic fishery in Qeshm has reached a production level of 44,000 tons a year greater than 18,000 tons of the maximum sustainable yield specified in the SWECO Master Plan.	• Fish processers are seeking opportunities to develop new products from sardines and other bycatch species as value-added food because most of sardine resource and bycatch is utilized only as raw material of fish meal.	High	• Fishermen's income becomes stable through diversification of livelihoods • Value chain of the fishery sector from harvesting (capture & aquaculture) through sales (reaching consumers) should be improved, by which fishery sector is developed and advanced as a whole.
		6.3	The establishment of a fishing fleet based at Qeshm Island should be promoted for exploiting of the large potential of mesopelagic in the Sea of Oman.	Has the establishment of a fishing fleet based at Qeshm Island been promoted for exploiting of the large potential of mesopelagic in the Sea of Oman?	-	• Fishing in Oman Sea by Qeshmi fishermen is now prohibited.		Low	• Due to prohibition of fishing in the Oman Sea, this objective is not suitable to be succeeded.
7	Industry	7.1	Industrial development should focus on the	• Has industrial development focused on	+	• The limited number of factories in the		Intermedi-	• The industrial development model should be

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			upstream and midstream processing of abundant, low cost, domestic natural resources or the utilization of such natural resources in energy intensive industries.	the upstream and midstream processing of abundant, low cost, domestic natural resources? • Has industrial development focused on the utilization of natural resources in energy intensive industries?		industrial parks started operation. The industrial development has not progresses as expected.		ate	reviewed to meet the conditions of the island which has disadvantage in small scale of population size.
		7.2	Industries which benefit from the strategic geographical location of Qeshm Island as a gateway to Iran, the Persian Gulf and the states of the former USSR should be promoted. *(breakdown needed)*	Have industries which benefit from the strategic geographical location of Qeshm Island as a gateway to Iran, the Persian Gulf and the states of the former USSR been promoted?	+	• The limited number of factories in the industrial parks started operation. The industrial development has not progresses as expected. • Development of the Persian Gulf Bridge has not been completed. The island does not fully use the potential of the strategic location.		Intermediate	Same as above
		7.3	Industries with strong backward linkages with mainland Iran should be promoted. Export-oriented industries should be promoted. Industries which may lead to the acquisition of foreign technology and access to an international marketing network should be promoted. *(breakdown needed)*	• Have industries with strong backward linkages with mainland Iran been promoted? • Have export-oriented industries been sufficiently promoted? • Have industries which may lead to the acquisition of foreign technology and access to an international marketing network been promoted?	+	• The limited number of factories in the industrial parks started operation. The industrial development has not progresses as expected. • Development of the Persian Gulf Bridge has not been completed. The island does not fully use the potential of the strategic location.		Intermediate	Same as above
		7.4	The industries to be established should be deemed to be financially and economically feasible.	Have the industries established been deemed to be financially and economically feasible?	+	• The limited number of factories in the industrial parks started operation. The industrial development has not progresses as expected.		Intermediate	Same as above
8	Investment promotion	8.1	The Free Trade Area concept should be applied so as to provide investors with incentives competitive to those provided by other free trade or export processing zones in the world.	Has the Free Trade Area concept been applied so as to provide investors with incentives competitive to those provided by other free trade or export processing zones in the world?	++	• The incentives have been given to the free zone competitive to the other export processing zones. Due to restriction of overseas remittance, the investment is discouraged.		High	• The incentives should be reviewed to be competitive to the other free zones.
		8.2	A market-oriented business environment should be established in order to attract potential foreign investors, thereby also functioning as a pilot case to demonstrate that Iran as a whole, with its new economic policies, may be an attractive country to host foreign direct investment. Preference should be given to private sector investment.	Has a market-oriented business environment been properly established in order to attract potential foreign investors? Has the preference been given to private sector investment in Qeshm?	++	• Although attempts have been made to create the preferable environments with incentives, the economic sanction and diplomatic policy affected the investment in Iran.		High	• The incentives should be reviewed to be competitive to the other free zones.
		8.3	Foreign direct investment, preferably in joint venture with Iranian partners, should be encouraged.	Has foreign direct investment, preferably in joint venture with Iranian partners, been encouraged?	+	• The incentives allowed the investor to establish the company with 100% capital of foreign company.		Intermediate	• The incentives should be reviewed to be competitive to the other free zones.
		8.4	The diffusion of technology from Qeshm Island to mainland Iran shall be promoted by the encouragement of joint ventures, procurement of raw materials from mainland Iran and the utilization of Iranian know-how in industrial planning.	Has the diffusion of technology from Qeshm Island to mainland Iran been promoted by the encouragement of joint ventures, procurement of raw materials from mainland Iran and the utilization of Iranian know-how in industrial planning?	-	• The limited number of factories in the industrial parks started operation. The industrial development has not progresses as expected.		Intermediate	• The industrial development model should be reviewed to meet the conditions of the island which has disadvantage in small scale of population size.
		8.5	Private investors shall be encouraged to participate in infrastructure development and operation.	Have private investors been encouraged to participate in infrastructure development and operation?	-	• EU companies joined to implement the Persian Gulf Bridge.		High	• Private investors should be allowed to participate in the infrastructure development.
9	Service sector	9.1	The establishment of professional service institutions in fields such as insurance, legal matters, advertising, consulting services, forwarding, shipping, repairs, warehousing, transportation, wholesale and retail trade etc. should be promoted so as to facilitate the development of Qeshm Free Area. *(breakdown needed)*	Has the establishment of professional service institutions in fields such as insurance, legal matters, advertising, consulting services, forwarding, shipping, repairs, warehousing, transportation, wholesale and retail trade etc. been promoted?	+	• No special promotion has not been carried out for the professional service institution, though the promotion of free zone has been taken in place.		High	• Non-labor-intensive industry without environmental impact should be introduced in the island. The professional service institution of knowledge based industry and logistics meet the conditions of the island.
		9.2	The establishment of offshore banking facilities on Qeshm Island should be given particular emphasis with a view to establishing the	Has the establishment of offshore banking facilities on Qeshm Island been given particular emphasis?	+	• The regulation for free zone allows the offshore banking, though the special economic zone is not allowed for this offshore banking.		High	• Non-labor-intensive industry without environmental impact should be introduced in the island. Offshore banking meets this

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			island as a financial center in the region.						requirement.
10	Tourism development	10.1	Considering the scenic beauty of parts of Qeshm Island and the potential attraction provided by the possibility of duty-free shopping, facilities such as hotels, restaurants, sports areas and other leisure amenities, should be established with a view to developing tourism on Qeshm Island.	Has facilities such as hotels, restaurants, sports areas and other leisure amenities, been established with a view to developing tourism on Qeshm Island?	++	• Hotels and guesthouses have been constructed to some degree, but not as planned. For instance, there are no hotels around the airport. Guesthouses were planned to be established in 10 villages, but were established only in 7 villages. Regarding other tourism facilities such as visitor center and tourism offices, none of them have been operated properly as of 2016. • Other measures such as promotion and marketing as well as Qeshm Island Tourism Organization were proposed, but, these have not been implemented.	• Tourism attractions have been diversified. The Naz Islands has become one of the most popular tourism attractions which is easily accessible from the Qeshm town. Since the development of Industrial Zone South deteriorates the value of the Islands as a tourist site, it should be reconsidered in the context of current tourism trends. • The territory of newly applied Geopark is expanded to the entire island, including the Hangom Island with 25 geosites. Since a Geopark is considered as a protected area, the revised Master Plan should conform to its concept.	Intermediate	• The two objectives of tourism development in the SWECO Master Plan focused on economic benefit from tourism. However, it has caused challenges. The new objectives of Eco-Island Master Plan should be set to satisfy the 3 pillars of ecotourism, economic, socio-cultural and environmental aspects with the catalyst of interpretation and education toward sustainable development in Qeshm as an Eco-Island. • The current biggest trend of domestic tourists whose purpose is shopping, limits the benefits to the local economy. It is necessary for local communities to understand tourism not only from the aspects of economic benefit, but also to foster the sense of environmental conservation and traditional cultural value. • A new vision for tourism, "Eco-island for lively villagers and rich biodiversity toward sustainable development in Qeshm" should be pursed in the Master Plan.
		10.2	Particularly in the short and medium term, tourism could become an important source of income and job opportunity on the island.	Has tourism become an important source of income and job opportunity on the island?	+++	• Observed from the current increase of guesthouses and boatmen around the Hara mangrove protected areas and the Hangom Island, the tourism become the important source.	Same as above	Intermediate	Same as above
11	Infrastructure development	11.1	The development of infrastructure shall be undertaken so as to provide high quality service to industry and to households, at comparable levels in old and new areas.	• Has the development of infrastructure been undertaken so as to provide high quality service to industry and to households? • Has the development of infrastructure been undertaken so as to provide comparable levels in old and new areas? (How evolved regional disparities in infrastructure supply?)	Water supply +	• Treatment capacity of desalination plants has been increased to meet the demand for drinking water. New desalination plants were located in different placed in the entire island, on contrary to the recommendation by the SWECO Master Plan that specified four locations in south of the island. • Due to insufficient preparedness of water distribution network, there is shortage of drinking water in rural area. There are still regional disparities regarding water supply.	Same as above	Low	• Water distribution system including pipe, pump, and reservoir should be constructed in rural area. • The water supply development plan should be reviewed in conformity to the updated socio-economic framework. • Capacity of HRWWC should be strengthened to achieve the water distribution system in the rural area. • Desalination plant with high energy-saving technology should be installed, when a new plant is constructed.
					Wastewater +	• Sewage treatment plants have been developed in Qeshm city in 2011 and 2012. The treatment capacity is under the study to be ready for the population increase. Effluent of treated sewage is used for watering street trees. • A new sewage treatment plant in Dargahan is under the study. • The wastewater treatment plan in the SWECO Master Plan was unpractical due to its abstract analysis.	Same as above	Intermediate	• The national minimum based on basic human needs should be achieved by development of a sewerage system. • Wastewater treatment should be carried out to conserve water environment of the island. • Possible reuse of treated sewage should be studied.
					Solid waste +	• Towns and villages are generally kept clean by means of procurement of necessary waste collection equipment. Meanwhile, waste disposal is still at a primitive level. • The SWECO Master Plan did not mention about solid waste management in rural areas. Waste amount generated there is still small. No serious problem has been seen. • Waste separation was recommended in The SWECO Master Plan. However, it has not been realized. This seems to be due to abundant land areas for disposing of waste and	Same as above	Intermediate	• Recommendations made by SWECO, such as waste separation, final disposal, etc. are well relevant to the current objectives. The recommendations should be updated as items of the Action Plan to be prepared.

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						small waste generation amount. • Towla Disposal Site is located at the place different from recommended ones in the SWECO Master Plan. Reason is unknown, but the site seems to be appropriate as a final disposal site.			
					Power supply +	• All the electric power is currently imported from the mainland via 230 kV transmission line of National Grid. New power plants of the SWECO Master Plan have not been implemented at three locations yet. • The current peak demand was approximately 200MW much smaller than 2,250 MW estimated in the SWECO Master Plan in 2016. • The electrification rate reached 100%.	• Same as above • The Ministry of Energy specified the target rate at 5% using renewable sources.	Low	• The power demand should be reviewed in conform to the updated socio-economic framework. • Introduction of renewable energy and energy saving technologies should be proposed in the master plan.
		11.2	Implementation of infrastructure investment shall be undertaken with a view to optimizing the use of facilities, avoiding costly overcapacity, and providing services with competitive pricing based on full cost recovery.	Has the implementation of infrastructure investment been undertaken with a view to optimizing the use of facilities, avoiding costly overcapacity, and providing services with competitive pricing based on full cost recovery?	Water supply +	• Desalination plants have been built to meet the current water demand. • Full cost recovery policy is not applied for water supply. Financial resources are water tariff, general taxes, etc. • Private sector investment was attempted by means of BOT (build-operate-transfer) and BOO (build-own-operate).	• It is not unknown why full cost recovery policy is not applied. Maybe, to subsidize public services is a basic policy of this resource abundant county.	Intermediate	• Water supply system with higher efficiency should be studied to secure the optimal use of financial resources. • It is disputable if application of full cost recovery is appropriate in Iran. Financial resources should be considered in the sector development plan.
					Wastewater -	• Investment has been made appropriately for wastewater treatment. • Full cost recovery policy is not applied for wastewater treatment services. Financial resources are water tariff, general taxes, etc.	Same as above	Intermediate	Same as above
					Solid waste ++	• Investment has been made appropriately for waste collection, but not for final disposal. • Full cost recovery policy is not applied for solid waste services. Financial resources are general taxes, business permission fees, etc.	Same as above	Intermediate	Same as above
					Power supply ++	• Investment has been made appropriately for power supply. • Full cost recovery policy is not applied for power supply. Financial resources are electricity tariff, general taxes, etc.	Same as above	Intermediate	Same as above
12	Transport infrastructure development	12.1	As regards transportation facilities, adequate investments and good services should be aimed at. Regular air traffic is required in order to provide long distance services. Ferry transport for goods and passengers should be improved. Public transport should be arranged within the island. Implementation of the Persian Gulf Bridge project should be promoted when deemed financially and economically viable.	• Has adequate investments and good services of transportation been realized? • Has the implementation of the Persian Gulf Bridge project been promoted?	Roads & railway ++	• Total length of paved road increased from 250 km in 1995 to 500 km in 2014. The target in Stage II has been almost completed, except for Noghasha–Selakh–Kani/Doustakou–Baseidou on the southwest coast. • The Persian Gulf Bridge of road and railway is under construction.	The followings are common changes in the conditions: • The population growth and industrial development have not been realized as planned in the SWECO Master Plan. • Geosites have been identified in and around the project sites of the transport development.	Intermediate	• Improvement of Noghasha–Selakh–Kani/Doustakou–Baseidou on the southwest coast should be studied carefully on the harmonization with environmental protection considering the tourism aspects. • Improvement of road-side services should be studied for visitor centers, kiosks, toilets, etc. • Railway routes in Qeshm Island should be reviewed in accordance with not only the industrial development objectives, but also environmental protection.
				Has regular air traffic required in order to provide long distance services been implemented?	Airport ++	• The new Qeshm International Airport has been operating since 1997.		High	• Expansion of the existing airport to meet the updated air traffic forecast should be reviewed.
				Has ferry transport for goods and passengers been improved?	Ports +	• Ferry services at Shahid Zakeri and Laft have been improved. • Port facilities at Bahman and Kouvei have been under improvement. • The other ports including Souza deep sea port are still under consideration.		Intermediate	• The proposed port development plans for Peyposht, Dargahan, and Souza should be reviewed in accordance with not only the industrial development objectives, but also environmental protection.
				Has public transport been arranged within the island?	Public transport -	• Taxi services have been improved. There are no public bus services yet, because it has not been feasible for new public transport services		High	• Public transport should be studied to find feasible ways.

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						to be introduced under the economic sanctions.			
13	Community Development	13.1	Existing communities and neighborhood structures should be respected in the development planned for Qeshm Island.	Have existing communities and neighborhood structures been respected in the development of Qeshm Island?	++	• QFZO and county government implemented projects to meet the needs of residents. As a result, the people's lives improved as indicated by the socio-economic baseline survey (62% of the respondents answered their lives have improved.) • They, however, are not entirely satisfied with the efforts by QFZO and Qeshm County due to lack of communication. A participatory approach was not carried out to formulate the SWECO Master Plan and the Qeshm County master plan.	• Following the legislation of Environmental Impact Assessment Decree 138 in 1994, related standards and regulations have been established. The introduction of Strategic Environmental Assessment (SEA) into the 6th 5-year development plan (2016–2020) is under discussion by DoE and ministries. An important element of SEA is community participation.	Intermediate	• A participatory approach should be adopted in formulating development plans and implementing projects.
		13.2	Construction of housing should be promoted so as to avoid housing shortages on the island.	Has construction of housing been promoted so as to avoid housing shortages on the island?	+++	• Housing has been adequately supplied more than housing demand in urban areas. There are a lot of vacant apartments in the Qeshm City. • Excessive supply of housing, however, potentially has a risk of aging due to lack of maintenance. • Those village people facing no housing problem accounts for 63% according to the socio-economic baseline survey. • The remaining 37% still have a housing problem, especially high in Selakh Rural District where the proportion is as high as 76%.	• The population growth and industrial development have not been realized as planned in the SWECO Master Plan.	Intermediate	• Expansion of residential areas should be planned to meet the housing demand based on the updated socio-economic framework. • Those villages with the housing problem should be supported through planning and financial measures.
		13.3	Community development should be undertaken with a view to creating integration of the most of the island and a common use of facilities, while at the same time respecting established community structures. In development staging, existing areas should enjoy benefits comparable with new areas.	Has community development been undertaken with a view to creating integration of the most of the island and a common use of facilities, while at the same time respecting established community structures? Have existing areas enjoyed benefits comparable with new areas?	-	• Those people living in villages with a sense of being left behind in development accounts for 59% according to the socio-economic-baseline survey. • Village people feel their highest needs are water supply, health service and job opportunities.	• The population growth and industrial development have not been realized as planned in the SWECO Master Plan.	Low	• Tradition, culture and nature should be conserved and properly utilized for upgrading the livelihood of village people. • Social services should be provided for the entire island in a well-balanced manner. • Linkage should be strengthened between large scale development and community-based livelihood development.
		13.4	For expatriate residents, arrangements should be made to provide requisite community and educational facilities. This may also include neighborhoods in the vicinity of an international school etc.	Have arrangements been made to provide requisite community and educational facilities to expatriate residents?	-	• Requisite community and educational facilities have not been provided for expatriate residents, since such expatriate has not lived in the island.	• Foreign direct investment has not realized yet, as planned in the SWECO Master Plan.	Low	• Residential areas should be planned to meet the housing demand on harmonization with the existing communities in cities and villages.
14	Land Use	14.1	The use of land for community and industrial development should be undertaken with a view of preserving and enhancing natural and manmade features, and so as not to encroach on land suitable for agriculture.	Has the use of land for community and industrial development been undertaken with a view of preserving and enhancing natural and manmade features, and so as not to encroach on land suitable for agriculture?	+	• Based on the analysis of land use change and especially urban encroachment of cultivated areas (from the comparison of 1991 aerial image and 2016 satellite image), it can be said that community development has been undertaken relatively in adequacy with the natural and cultural heritage. Only 21% of the cultivated areas in urban context (inside city or village boundaries) have been encroached during the past 25 years.	• Long-term drought causing the drop of profitability of agricultural sector, and general decrease of job opportunities in rural areas during the past decades might put the pressure on land owner to sell their cultivated fields or open them to urban development. Thus, more urban encroachment of cultivated area is forecasted in near future. • The emergence in recent years of a new paradigm of promotion of large-scale industrialization and switch from classical industry to petrochemical heavy industry is a concern for the conservation of ecological balance in the future.	High	• Masterplan shall identify the most valuable and the most threatened cultivated areas, and especially the ones that are in direct proximity of human dwellings, situated inside village boundaries. • Various levels of administration shall promote the perseveration and enhancement of cultivated areas in urban context and support the farmers who participate in maintaining this "common good". • Village planning tools shall from now integrate the preservation and enhancement of cultivated areas in urban context as a key objective to be set-up through the participation of all stakeholders including land owners.
					+	• Until now, under the prescription of SWECO Master Plan, industrial development has been undergone with a relative success, away from human settlements and environmentally sensitive areas.			
		14.2	Development, in particular community development, should be undertaken in a scale, materials, colors and characters harmonizing with the nature and manmade features.	Has development, in particular community development, been undertaken in a scale, materials, colors and characters harmonizing with the nature and manmade features?	Existing +	• Thanks to the willingness and the efforts of the residents, the dwellings continue to be build-up and rebuilt in the traditional scale, materials and colors in most of historical villages.	• With the accentuation of rural exodus in recent years, more and more buildings in villages are abandoned and destroyed. This favors the disconnection of communities with their local history and the growing lack of interest	Intermediate	• Various levels of administration shall promote the preservation of traditional urban and architectural characteristics of villages and support technically and financially the adaptation to modern life of the oldest parts of villages. • Village planning tools shall reinforce their
					Extension -	• Consecutively in particular to the partial destruction of villages in the central part of the			

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						island by earthquakes occurred in the 2000's, some urban extensions have been constructed in urgency, and not planned properly with the existing part of the village and the surroundings. A total of 16/57 villages (28%) have been developed through those ex-nihilo extensions in the past decades.	towards vernacular architecture. Taking this into account, more abonnement and destruction of traditional houses is forecasted in near future.		consideration of traditional architecture and urban landscape, in order to end up with recommendations in terms of preservation and adaptation to modern life of traditional dwellings.
		14.3	In the case of larger communities and industrial zones, development should be undertaken so that the perceived scale is moderate and in harmony with the character of the environment.	Has development of larger communities and industrial zones been undertaken so that the perceived scale is moderate and in harmony with the character of the environment?	- -	• The cities of Qeshm and at a lesser extend Dargahan have been developed in a fast and extensive way, ignoring or even contradicting its cultural and natural environment. The construction of numerous over-scaled shopping malls using the sand of natural sandy beaches of the island is one of the expression of the lack of consideration for the environmental carrying capacity of the island.	• Except a few noteworthy initiatives of new housing projects developed under a new typology reinterpreting the wind catchers in Dargahan, most of the developments in Qeshm in recent years have been undergone under the same model of high-rise anonymous mansions.	High	• Starting from the analysis of the environmental carrying capacity of the island, the Masterplan shall guide the development of all cities, including Ramkon to be promoted as city in the near future, towards a more sustainable type of urban development.
		14.4	The existing village structure should be retained and reinforced, although for different reasons some villages may be planned to grow faster than others.	Has the existing village structure been retained and reinforced?	+	• Even though the population distribution planned by SWECO revealed globally incorrect, most of the villages have been reinforced in their structures except for few villages such as Old Hangom which has been almost abandoned.	• With the decrease of job opportunities in rural areas and the accentuation of rural exodus, the structure of each village will be more and more difficult to retain.	High	• The distribution of population at the horizon of the Masterplan shall be undergone in a realistic way by taking into account different growth patterns according to the geographic entities and also the own growing path of the city or village.
		14.5	The provision of service facilities in full coordination with housing development should be aimed at, enabling all villages and towns to become well equipped and thereby attractive for residence.	Has the provision of service facilities in full coordination with housing development been realized? Have all villages and towns become well equipped and thereby attractive for residence?	-	• According to the *centrality index* developed by Qeshm County Masterplan (2012), taking into consideration educational, health, administrative, religious and cultural services, but also infrastructure and production units, a large majority of the villages in Qeshm Island are still under-equipped.	• Even though public administration make efforts to strengthen the services in rural areas, the smallest and most landlocked villages still need basic infrastructure and service.	Intermediate	• Getting inspired from the recommendations of Qeshm County Masterplan, the Masterplan, based on an innovative regional structure plan, shall provide a clear roadmap for the improvement of all types of social services towards a more balanced social development throughout the island.
15	Environmental protection	15.1	Rational development of industry and infrastructure in harmony with sustainable development and management of natural resources should be aimed at to promote the economic improvement and well-being of the residents of Qeshm Island and the nation as a whole.	Has rational development of industry and infrastructure in harmony with sustainable development and management of natural resources been promoted?	++	• Following the recommendations in the SWECO Master Plan, Department of Environment was established in QFZO in 2001. Hormozgan Province has Department of Environment too. Both DoEs are responsible for EIA, their comprehension of their own roles are inconsistent each other. • In reality, urban development and infrastructure development caused environmental impact, although EIA has conducted for those developments. • In order to evaluate operation of EIA, the number of permitted and rejected projects in EIA procedure as well as the EIA report should be disclosed.	• Environmental Impact Assessment (EIA) Decree 138 was legislated to mandate the submission of EIA in 1994. Following the legislation, DoE Tehran has made efforts to establish necessary standards and regulations for EIA. • The fifth five-year development plan (2011~2015) emphasized needs of environmental conservation to apply strategic environmental assessment, environmental impact assessment, and environmental education as well as enhanced biodiversity	Intermediate	• The sustainable development should be achieved for socio-economic improvement and environmental conservation. Enhanced biodiversity is the basis of the socio-economy. • EIA should be carried out by related organizations including QFZO, Country, and Province in a transparent way among the stakeholders.
				Has the development of industry and infrastructure led to the promotion of the economic improvement and well-being of the residents of Qeshm Island?	++	• Industry and infrastructure development has improved the economic conditions in the island. Unemployment was reduced from 14.8% in 1991 to 7.3% in 2011.		Intermediate	• A new development model should be pursued to achieve large employment opportunity and environmental conservation. A green economy is a tool to meet those objectives.
		15.2	Economic development should not exceed the regenerative capacities of the environment. In cases where an encroachment by considered development on the natural environment is unavoidable, economic and social benefits should be carefully weighed against such negative impact on the environment.	• Has economic development not exceed the regenerative capacities of the environment of Qeshm Island? • In cases of unavoidable encroachment by considered development on the natural environment, has economic and social benefits been carefully weighed against such negative impact on the environment?	+	• EIA has been carried out under the management by QFZO and DoE of Hormozgan. The urban development and infrastructure development however caused the environmental impact. • The Souza deep seaport development was proposed in the SWECO Master Plan. Its implementation will cause the serious environmental impact such as deterioration of Naz Islands. • Since disclosure of the EIA reports is not obligatory in the current system, there is no legal system to review the environmental consideration taken in EIA by stakeholders and resi-		Intermediate.	• The strategic environmental assessment should be carried out in formulating the master plan of Qeshm Island. • EIA should be carried out in transparency to make consensus building among stakeholders and to ensure the application of suitable assessment methods.

Field		SWECO Master Plan objectives		Evaluative questions	Evaluation		Changes in conditions (1994–2016)	Recommendations for objectives of Eco-Island Master Plan (including methodological aspects)	
Nº	Field	Nº	Objectives		Note	Comment		Relevance of SWECO objective	Recommendation for new objective
						dents.			

Source: JICA Project Team.

Annex to Chapter 2

Solid Waste Management Proposed in SWECO Master Plan and in Current Situation

Item	SWECO Master Plan in 2011	Current Situation in 2016
Urban		
Generation	• Generation amount is 0.8 kg/person/day (300 kg/person/year)	• 1.6 kg/person/day; Towla landfill receives approximately 80 ton/day. Waste is brought from Qeshm, Dargahan and Towla. The total population is estimated at approximately 50,000.
Source separation	• 2 + 1 bins (wet, dry and hazardous) system is applied. • Publications, campaigns, etc. for raising citizens' awareness are carried out.	• Source separation is not carried out.
Collection	• Compactor truck is used. • Containers for separate collection were placed at curbside. • Waste is collected every other day, but every day in hot season.	• Compactor trucks are used. • Containers are placed but for mixed collection. • Waste is collected every day. • People are asked to discharge waste at 9:00 pm.
Street sweeping	• Mechanical sweeping is applied.	• Mechanical sweeper is used in Qeshm. • Waste collection is carried out along the south coastal road from Qeshm to the airport, the road from the airport to Laft, and the north coastal road from Laft to Qeshm.
Transport	• Landfill is located within 40 km and no transfer transport is applied.	• Waste is directly transported to Towla disposal site which is located at approximately 15 km from Qeshm town.
Treatment	• Windrow composting is carried out, and product is used as soil conditioner. • Material recovery is carried out. • Landfilled waste after decomposition is excavated and used as soil conditioner.	• Waste pickers (informal sector) collect recyclable materials from containers on the streets. • Recyclable materials such as PET and cardboard are recovered at Towla disposal site.
Landfill	• Two alternatives are set: Zeinabi and Kovarzin • Zeinabi is constructed first. - The following are applied: daily soil cover and incineration of landfill gas • No serious consideration about leachate treatment was made in the M/P. • Required area is 30 ha in 2011.	• Towla disposal site is operated. • The current operation manner does not suit to disposing of 80 tons waste per day. • Uncontrolled burning of waste on the site often happens. • Waste is scattered all over the area, approximately 300ha.
Institution	• Operation is carried out mainly by the private sector and partially by the public sector.	• Department of Public Service and Urban Planning and Power and Water Utility Company QFZO share responsibility of the ordinary solid waste service. • Two companies for waste collection and one company for waste disposal are working under contracts with Dept. Public Service and Urban Planning.
Finance	(not described)	• No service fee is applied. • Urban tax is financial source.
Rural		
Characteristic of waste	(not described)	• Waste contains considerable amount of plastics, cardboards and papers.
Collection	(not described)	• Basically village administrations manage the waste collection by themselves. • QFZO supports some villages in terms of equipment and finance.
Disposal	(not described)	• Usually dumping sites are located next to villages. • Waste is disposed of in excavated ditches, natural ditches, etc. • Department of Environment QFZO gives advices in locating dumping sites.
Others	(not described)	• There is a village (Ramkon) where a NGO is working for collecting recyclable materials and money earned is given to poor people.
Industrial		
Control	• Authority concerned supervises and guides waste generators so that they conduct proper management. • Anyone who generates and/or deals with industrial waste should be obliged to	• Department of Industry QFZO is reported from factories about types and amount of their waste, and makes site investigation periodically. • Environmental Division Qeshm covers smaller industries (category 1–3).

Item	SWECO Master Plan in 2011	Current Situation in 2016
	provide the authority concerned with information on its composition and hazardousness. • Industries shall present flow charts on consumption of materials, internal recycling and discharge of residues. • Authority concerned advises on modification of the processes to achieve a higher degree of recirculation of materials to minimize the amount of residues. • Regulations covering the above are issued and updated.	• Department of Environment Province covers larger industries (category 4–7).
Collection and Transport	• Waste generators have to find/establish means of collection and transport of their waste.	• No information available.
Treatment	• Waste generators have to treat their waste appropriately.	Ditto.
Recycling	• Construction waste is used as filling materials. • Combustible waste is utilized as fuel.	• Clandestine dumping of construction waste is a serious problem. • Waste tire is also a problem.
Landfill	• Industrial waste is separately disposed of from municipal waste.	• There is no industrial landfill in the island.
Other		
Hospital	• All hazardous hospital waste is separately handled and treated by a special incineration plant.	• In Payambar Azam Hospital, waste is very well managed: the infectious and the non-infectious are well separated. The infectious is treated by an autoclave. However, the treated infectious is discharged with the non-infectious. • In other small clinics, the infectious is discharged with the non-infectious without treatment.
Agriculture	(not described)	• No serious problem is found.
Fisheries (coastal)	(not described)	• There are abandoned boats on the coast. • Plastic waste is found on the coast. • Waste is scattered in tourist sites.

Source: JICA Project Team.

CHAPTER 3 EXISTING CONDITIONS AND PLANNING ISSUES

3.1 Socioeconomy

3.1.1 Population and Population Distribution

(1) Population trend on Qeshm Island

A census was conducted in Iran in 1996, 2006, 2011 and 2016. The table below shows the population trend in Iran and on Qeshm Island. While the population growth rate is assumed to be on a downward trend in Iran (1.62% in 2006, 1.29% in 2011 and 1.24% in 2016), due to several factors, the population growth rate on Qeshm also decreased from 2.96% in 2006 to 2.62% in 2011. However, the rate for Qeshm jumped to 4.99% in 2016 and has been much higher than for Iran overall. The increase in immigrants from other areas could be one of the main reasons why there is a relatively higher annual population growth rate on Qeshm compared to the rest of Iran. According to the interviews with the QFZO, many immigrants came to seek job opportunities in the construction sector from 2011 to 2013. There are no available data about fertility rates on Qeshm, although the overall rate for Iran has tended to decrease and is expected to decrease further in the long run.

Table 3.1.1 Population Changes in Iran and on Qeshm Island

Year	Iran		Qeshm	
	Population (person)	Annual growth rate (%)	Population (person)	Annual growth rate (%)
1996	60,055,488		72,981	-
2006	70,495,782	1.62	97,685	2.96
2011	75,149,669	1.29	111,159	2.62
2016	79,926,270	1.24	141,796	4.99

Source: National Population and Housing Census for 1996, 2006, 2011 and 2016

(2) Place of birth

Around one third of the population in urban areas have moved from other areas, although there is no clear indication if this occurred from other parts of the island or from off the island (Table 3.1.2). In contrast, 85.5% of the population were born and live in rural areas. Just 14.5% of the population in rural areas come from other areas. This indicator shows that urban areas have received more immigrants than rural areas. The total number is different from the population shown in Table 3.1.1 because some persons answered more than once.

Table 3.1.2 Place of Birth

Place of birth	Number			%		
	Total	Urban	Rural	Total	Urban	Rural
Present place	89,795	30,030	59,765	76.2	62.8	85.5
Another place	22,961	15,303	7,658	19.5	32.0	11.0
City	*17,066*	*13,054*	*4,012*	*74.3*	*85.3*	*52.4*
Small village	*4,078*	*1,528*	*2,550*	*17.8*	*10.0*	*33.3*
Foreign country	*1,817*	*721*	*1,096*	*7.9*	*4.7*	*14.3*
Unknown	5,018	2,515	2,503	4.3	5.2	3.5
Total	117,774	47,848	69,926	100.0	100.0	100.0

Source: National Population and Housing Census for 2011

(3) Population distribution

Regarding population distribution, data are available from the 2011 and 2016 censuses. Qeshm, Dargahan and Souza are defined as cities and other areas are defined as villages. Significant differences in the proportion of urban and rural populations in 2011 and 2016 were observed. The population in urban areas increased from 37.8% (or 41,981 persons) in 2011 to 43.0% (or 60,910 persons) in 2016. The urban population increased by 1.45 times between 2011 and 2016. In contrast to the proportion in urban areas, the proportion of rural areas dropped from 62.2% in 2011 to 57.0% in 2016. The rural population still maintained an increasing tendency. When comparing the village and city populations, the most populated area has been Qeshm City, which accounted for 28.7% in 2016. With several city functions, such as administrative agencies and commercial and service facilities, it has been the biggest city on the island. The other cities, Dargahan City (10.3%) and Souza (4.0%), are relatively aggregated on the island. In particular, the population in Dargahan drastically increased to 14,525, which was equivalent to 10.3% of the total population. Overall, the population tends to live on the eastern or central part. On the other hand, the western area is less populated. Table 3.1.3 below shows the population distribution in 2011 and 2016.

Table 3.1.3 Population Distribution in 2011 and 2016

Name	2011		2016	
	Person	%	Person	%
Qeshm	28,602	25.7	40,678	28.7
Dargahan	8,667	7.8	14,525	10.3
Souza	4,712	4.2	5,707	4.0
Baseidou	1,989	1.8	2,228	1.6
Derakou	613	0.6	639	0.5
Doustakou	567	0.5	645	0.5
Kani	332	0.3	337	0.2
Konar Sia	324	0.3	363	0.3
Gouri	764	0.7	872	0.6
Moradi	328	0.3	371	0.3
Tomgez	178	0.2	215	0.2
West Chahou	619	0.6	599	0.4
East Chahou	1,016	0.9	1,053	0.7
Doulab	1,281	1.2	1,453	1.0
Sar Rig	1,656	1.5	1,702	1.2
Aysheh-Abad	125	0.1	114	0.1
Hangom	392	0.4	496	0.4
Old Hangom	18	0.0	19	0.0
Ramchah	3,679	3.3	3,681	2.6
Tourgon	100	0.1	100	0.1
Kouvei	4,224	3.8	4,243	3.0
Giadon	2,787	2.5	3,152	2.2
Tonbon	1,069	1.0	1,199	0.8
Kovarzin	1,592	1.4	1,822	1.3
Laft	4,105	3.7	4,668	3.3
Holor	5,588	5.0	5,828	4.1
Hamiri	46	0.0	93	0.1
Defari	288	0.3	544	0.4
Towla	2,608	2.3	5,874	4.1
Kabeli	0	0.0	53	0.0

Name	2011		2016	
	Person	%	Person	%
Bangali	107	0.1	112	0.1
Jijiyon	636	0.6	727	0.5
Gorvodon	877	0.8	1,100	0.8
Peyposht	1,933	1.7	2,423	1.7
Khaladin	1,189	1.1	1,396	1.0
Zainab	1,395	1.3	1,572	1.1
Karavon	739	0.7	952	0.7
Kousha	1,968	1.8	2,193	1.5
Kardova	125	0.1	163	0.1
Bagh Bala	212	0.2	283	0.2
Tomsenati	234	0.2	287	0.2
Tourion	1,969	1.8	2,339	1.6
Ramkon	3,607	3.2	4,473	3.2
Dehkhoda	571	0.5	659	0.5
Sohil	1,678	1.5	1,899	1.3
Haft Rangou	579	0.5	699	0.5
Dourbani	691	0.6	739	0.5
Gomboron	474	0.4	570	0.4
Gouron	1,344	1.2	1,526	1.1
Melki	187	0.2	234	0.2
Tabl	3,355	3.0	4,069	2.9
Selakh	2,740	2.5	3,109	2.2
Noghasha	95	0.1	143	0.1
Shibderaz	456	0.4	507	0.4
Mesen	2,002	1.8	2,162	1.5
Borka Khelaf	322	0.3	343	0.2
Rigoo	445	0.4	465	0.3
Zirong	1,130	1.0	1,320	0.9
Nakhl-E-Gol	274	0.2	295	0.2
Direston	1,556	1.4	1,764	1.2
Urban	41.981	37.8	60.910	43.0
Rural	69.178	62.2	80.886	57.0
Total	111,159	100.0	141,796	100.0

Source: National Population and Housing Census for 2011 and 2016

3.1.2 Employment

(1) Working age population and labor force

The table below shows the size of the total population, the working age population (aged 15-64 years) and the labor force in 2011. The working age population equated to 67.1% of the total population in 2011. Among those of working age, 30,282 people (40.6%) constitute the labor force.

Table 3.1.4 Working Age Population and Labor Force in 2011

Item	No. of persons	%
Total population	111,159	
Working age population	74,604	67.1
Labor force	30,282	40.6

Source: National Population and Housing Census for 2011

(2) Employment by sector

The employment situation by sector is shown in Table 3.1.5 below. The sector definitions are in line with the International Standard Industrial Classification system. The definition of each sector can be found in the footnotes.[1]

Primary sector

The primary sector, which includes agriculture, forestry and fishing, used to be one of the main economic activities on Qeshm Island. The primary sector has created some job opportunities, which accounted for 21.3% of the total and 28.5% in rural areas in 2011. Most of the workers involved in agriculture are engaged in animal husbandry, rather than agriculture *per se*. Farmers cannot help but stop farming due to significant decreases in precipitation. Therefore, most of the workers for the primary sector are assumed to be engaged in fishing and animal husbandry.

Secondary sector

As a whole, the secondary sector has the lowest number of employees involved in economic activities on Qeshm Island, which indicates that the industry sector has still not properly developed. The labor force for industrial manufacturing and construction are dominant in the secondary sector. Mining extraction is counted as a part of the primary sector and the number of employment is limited to 138 persons. Even though Qeshm has abundant natural resources, such as oil and gas, these do not contribute to the mainstream economy on the island at present.

Tertiary sector

The tertiary sector creates the most job opportunities in both urban and rural settings on Qeshm Island. Traditional service sectors, such as wholesale, retail and repairing activities, represent the most prominent areas of activity in the tertiary sector. The size of the labor force engaged in modern service sectors, such as information and communication, financial and insurance, and scientific and technical activities, is still very limited. The relatively high proportion of the tertiary sector in rural areas stands at 43.7%, which indicates that Qeshm Island is more dependent on service activities than on primary production activities compared with other areas.

[1] Primary sector: agriculture, forestry and fishing.
Secondary sector: industrial manufacturing, agroprocessing, electricity supply/gas/steam/air conditioning, water supply/solid waste management/sewerage treatment, construction and mining extraction.
Tertiary sector: wholesale/retail/repairing vehicles and motorcycles, transportation and warehousing, land-lending services, information and communication, financial activities and insurance, real estate activities, scientific and technical activities, administrative/auxiliary services, public affairs, defense and social services, education, human health and social workers, arts and leisure, household activities as employer, goods production, activities by organizations and committees from abroad, and other services activities.

Table 3.1.5 Employment Situation in 2011

Activities	Total		Urban		Rural	
	No. of persons	%	No. of persons	%	No. of persons	%
Agriculture/forestry/fishing	6,443	21.3	1,560	11.9	4,883	28.5
Mining extraction	138	0.5	67	0.5	71	0.4
Industrial manufacturing	2,402	7.9	853	6.5	1,549	9.0
Agroprocessing	24	0.1	7	0.1	17	0.1
Electricity supply/gas/steam/air conditioning	257	0.8	141	1.1	116	0.7
Water supply/solid waste management/sewerage	186	0.6	91	0.7	95	0.6
Construction	2,347	7.8	1,022	7.8	1,325	7.7
Wholesale/retail/repairing vehicles and motorcycles	5,787	19.1	3,152	24.0	2,635	15.4
Transportation and warehousing	3,802	12.6	1,147	8.7	2,655	15.5
Land-lending services	441	1.5	274	2.1	167	1.0
Information and communication	174	0.6	120	0.9	54	0.3
Financial activities and insurance	352	1.2	311	2.4	41	0.2
Real estate activities	118	0.4	101	0.8	17	0.1
Scientific and technical activities	697	2.3	574	4.4	123	0.7
Administrative/supporting services	216	0.7	95	0.7	121	0.7
Public affairs, defense and social services	1,691	5.6	1,286	9.8	405	2.4
Education	1,456	4.8	667	5.1	789	4.6
Human health and social workers	401	1.3	248	1.9	153	0.9
Arts and leisure	257	0.8	174	1.3	83	0.5
Other services activities	570	1.9	321	2.4	249	1.5
Household activities as employer, goods production	15	0.0	7	0.1	8	0.0
Activities by organizations and committees from abroad	0	0.0	0	0.0	0	0.0
Unknown	2,508	8.2	901	6.8	1,607	9.2
Total	30,282	100.0	13,119	100.0	17,163	100.0
Total by sector						
Primary	*6,581*	*21.8*	*1,627*	*12.4*	*4,954*	*28.9*
Secondary	*5,216*	*17.2*	*2,114*	*16.2*	*3,102*	*18.1*
Tertiary	*15,977*	*52.8*	*8,477*	*64.6*	*7,500*	*43.8*
Unknown	*2,508*	*8.2*	*901*	*6.8*	*1,607*	*9.2*
Total	*30,282*	*100.0*	*13,119*	*100.0*	*17,163*	*100.0*

Source: National Population and Housing Census for 2011

(3) Unemployment

In 2011, the unemployment rate was 7.3%. The number of unemployed people was 2,390. The breakdown of unemployed people is as follows: 969 in urban areas and 1,421 in rural areas. In proportional terms, 40.5% of unemployed people are in urban areas and 59.5% are in rural areas.

Table 3.1.6 Labor Force and Unemployment Rate

Item	Unit	Number
Total size of the labor force	Persons	30,282
Total number of unemployed people	Persons	2,390
Labor force population	Persons	32,672
Unemployment rate	%	7.3

Source: National Population and Housing Census for 2011

3.2 Natural Conditions

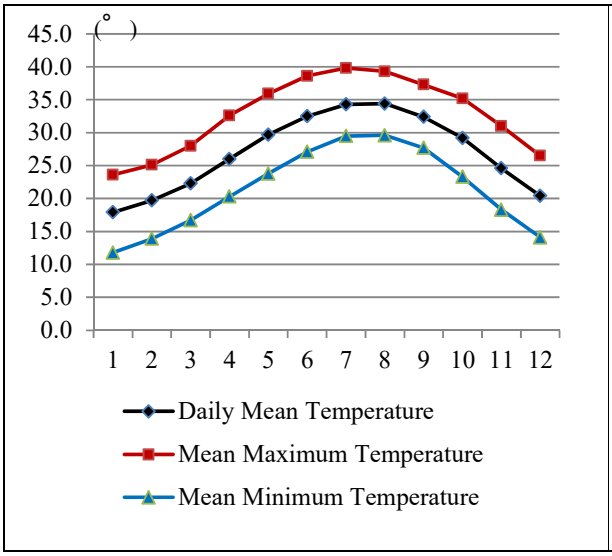
(1) Climate

The Meteorological Organization of Iran has measured the meteorological data at Qeshm Airport for 20 years from 1994 to 2015. Figure 3.2.1 and Figure 3.2.2 show the estimated mean temperature, rainfall and relative humidity. Table 3.2.1 shows the mean duration of daylight and the mean wind speed.

The climate of the island represents hot and dry weather with two typical seasons of summer and winter. The summer starts from April and lasts until October. The mean daily temperature exceeds 25°C throughout the summer, while the mean maximum temperature is more than 30°C and rises to 39.8°C in July. In winter, from November to March, the mean daily temperature is within the range of 17.9°C to 24.6°C. The mean minimum temperature is below 20°C, which is considered as comfortable weather.

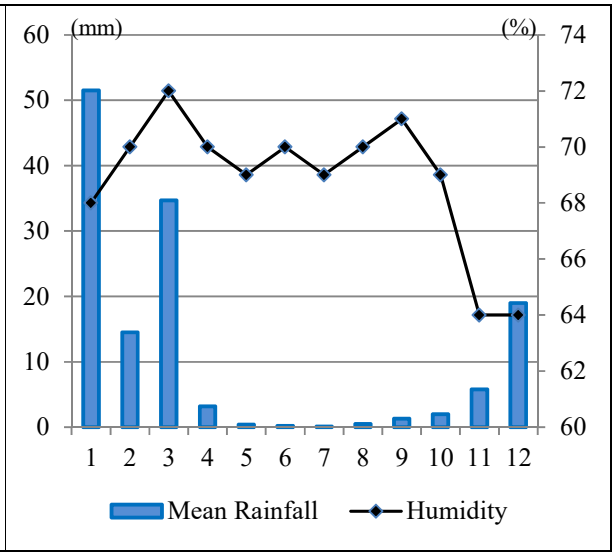
Relative humidity, which is present throughout more than 60% of the year, can rise to approximately 70% in summer. This rise in humidity increases feelings of discomfort. The amount of mean annual rainfall is limited to 133 mm. Approximately 90% of the annual rainfall is concentrated in four months from December to March.

The mean duration of daylight is around 300 h from May to October. The minimum mean duration is 222 h in February. Wind speed varies due to the location and topography. The mean wind speed is estimated in ranges of 4.3~6.5 m/s inland and 9.3~12.0 m/s in coastal areas.



Source: Meteorological Organization of Iran

Figure 3.2.1 Mean Temperature on Qeshm Island



Source: Meteorological Organization of Iran

Figure 3.2.2 Mean Rainfall and Relative Humidity on Qeshm Island

Table 3.2.1 Mean Hours of Daylight and Wind Speed from 1994 to 2015

Month	1	2	3	4	5	6	7	8	9	10	11	12
Mean hours of daylight	236	222	245	279	323	313	292	300	283	288	253	237
Mean wind speed (inland station, m/s)	4.3	6.2	6.5	6.5	6.1	6.1	5.7	5.1	5.8	5.5	5.0	43.0
Mean wind speed at (naval station, m/s)	11.8	12.0	11.7	11.5	11.5	9.9	10.0	9.5	9.3	9.4	10.1	11.0

Source: Meteorological Organization of Iran

(2) Topography and geology

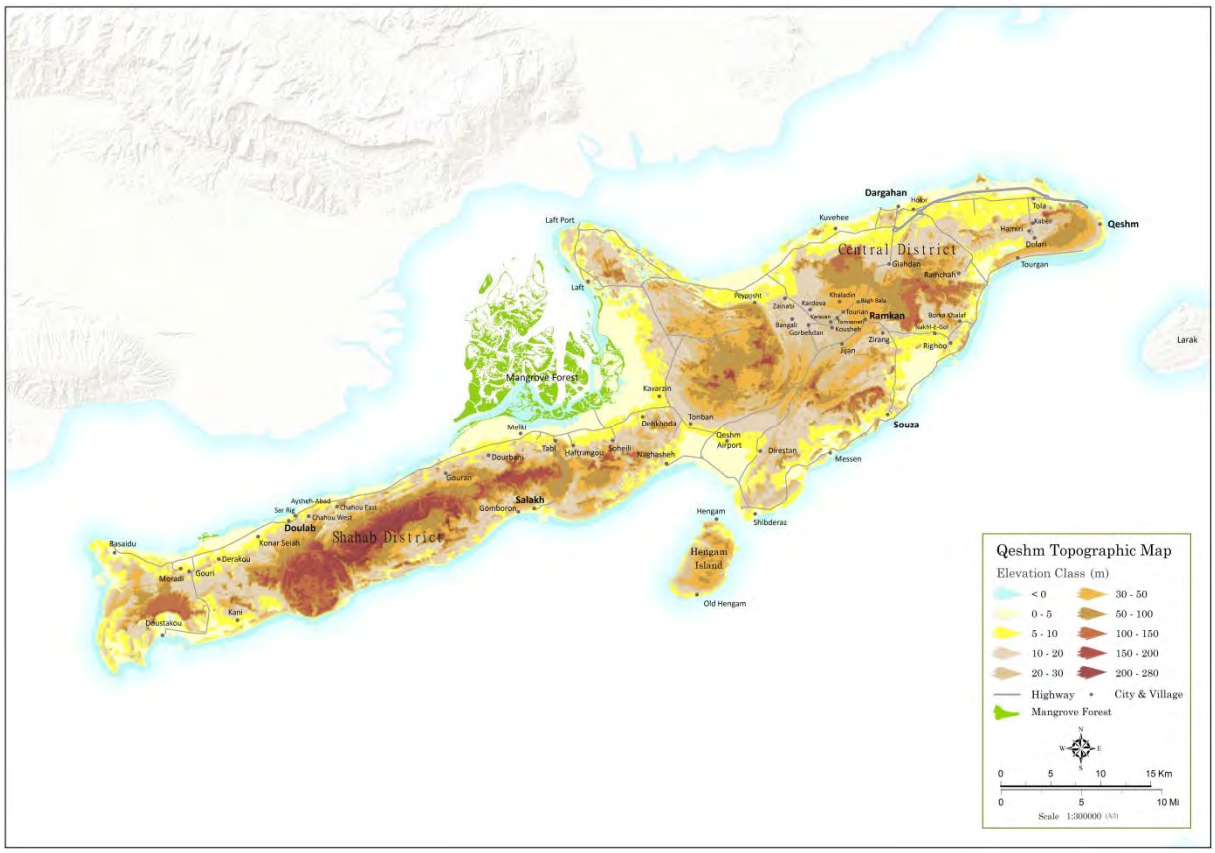
A low-lying area of plain land with a hill range describes the topographic feature of the island (Figure 3.2.3). This low-lying land, which is less than 20 m above sea level, occupies 41.0% of the island,

while the upland, which is higher than 100 m, is limited to 11.9%. The appearance is different between the eastern and western parts of the island. In the east, the low-lying lands, which are less than 20 m, extend from the coastal areas to inland areas. A range of hills is located in areas surrounding Qeshm, Dargahan, Souza, Rigoo, Kovarzin and Laft. In the west, a range of hills extends in an east-west direction to form backbone of the west of the island. The elevation at the highest point reaches 397 m to the east of Namakdan Mountain. The low-lying lands extend inland to some extent in the north, while they are limited in the south. Seasonal rivers flow into the island, but a permanent river does not exist (Figure 3.2.4). Water areas, such as ponds, can be found to a limited extent because the flat topography in the plain lands makes it difficult for water to flow.

A salt dome forms the oldest part of the island. It was formed in the Paleozoic Era. Qeshm Island is formed by alluvial sediments from the Quaternary Era of which the origin is the sedimentary rock from the Zagros Mountains on the mainland. The diastrophism uplifted the seabed. The fossils of clams and marine life prove that the island was below the sea in ancient times. Sediments consist of carbonate rocks, including limestone, dolomite, sand, silt, marl, shale and conglomerate. Rainwater and waves have eroded the surface and created the unique topography on the island. Limestone of high durability, which remains at the ground surface, is resistant to the erosion, but the soft layer of marl has been eroded.

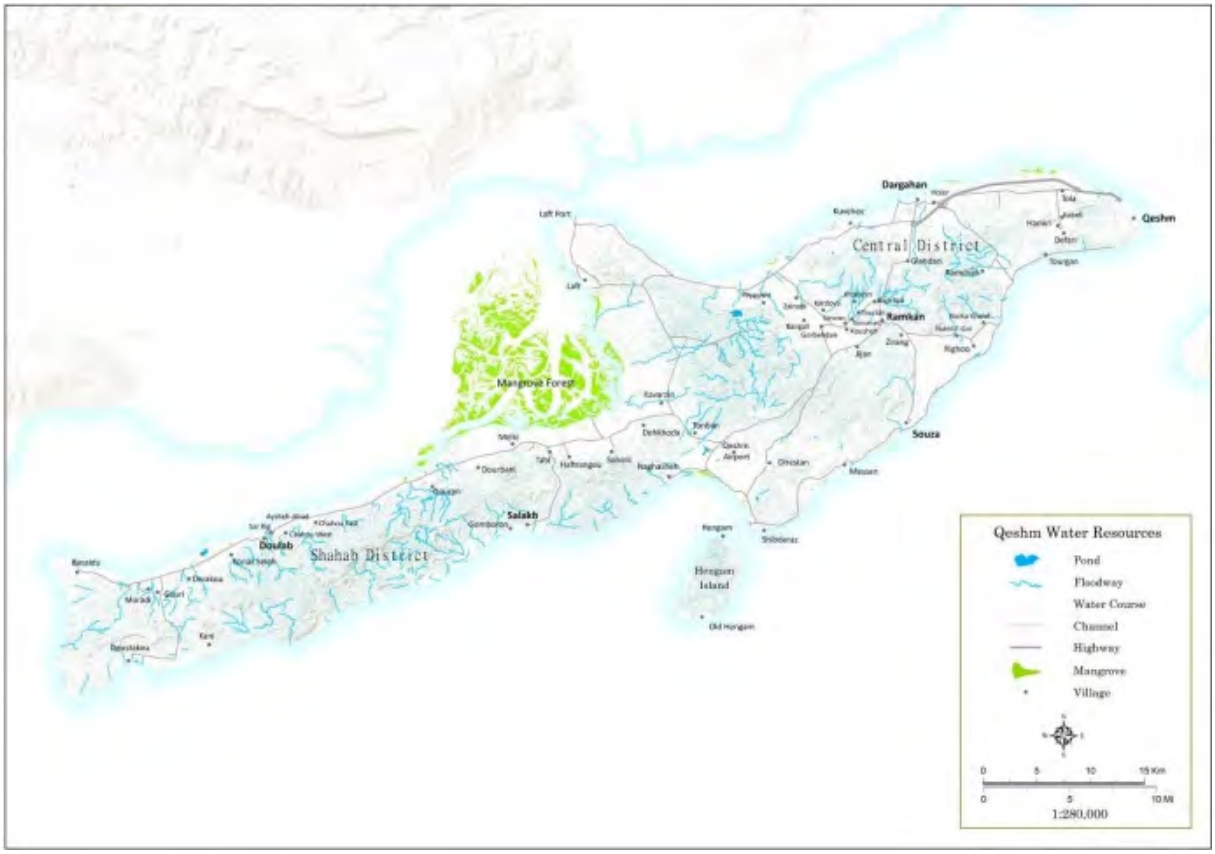
The island is located in the Alpine-Himalayan orogenic belt, which is an active seismic belt. Eighteen significant faults have been found on the island. Destructive earthquakes occurred in 1360, 1884 and 1897. The last one completely destroyed the city and caused 750 casualties. After 1900, an earthquake larger than magnitude 7 occurred in 1966 and 1977, while the latest earthquake, of less than magnitude 4, occurred in 1994.

The shallow marine area is less than 10 m in depth and extends to the north of the island. The water depth is deeper from east to west in the south of the island, as the water depth is less than 8 m in the west as far as Shibderaz, then becomes 50 m in depth towards Qeshm City.



Source: Qeshm Free Zone Organization

Figure 3.2.3 Topography of Qeshm Island

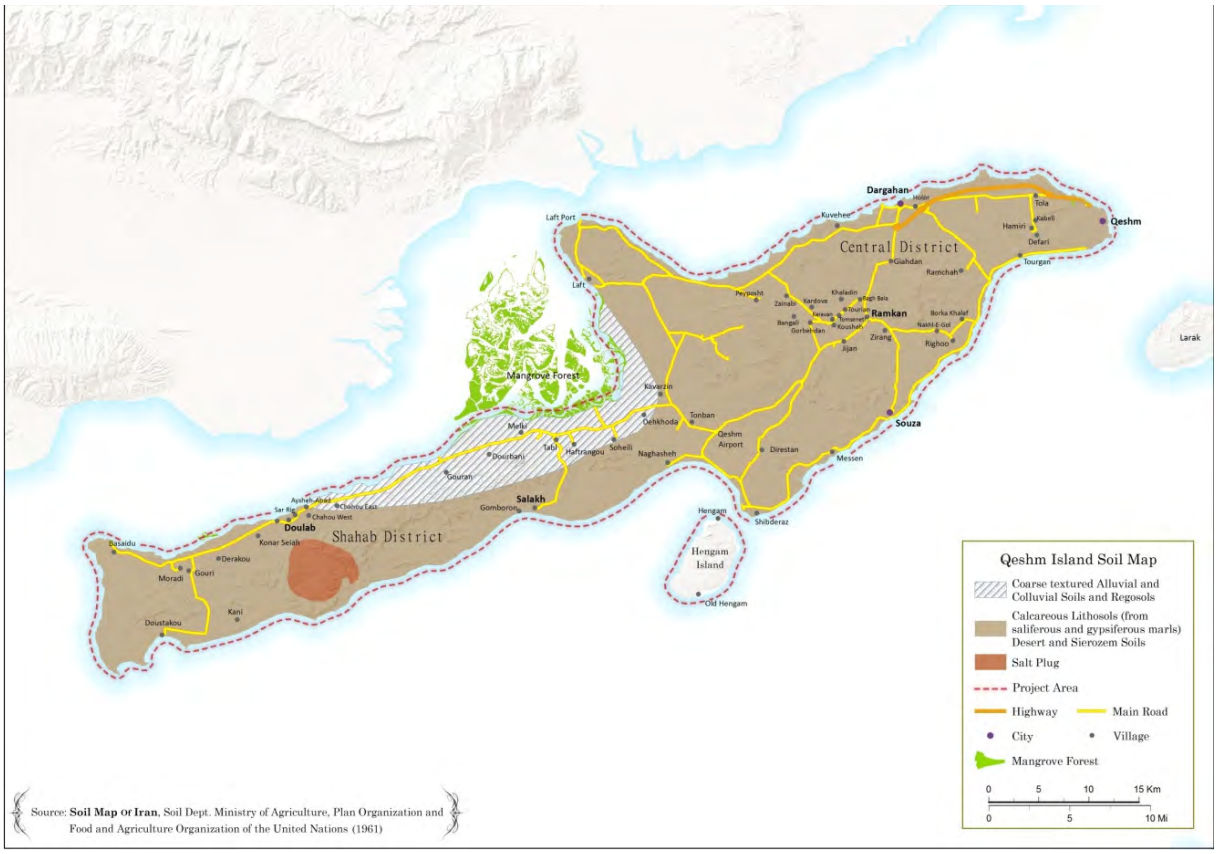


Source: Qeshm Free Zone Organization

Figure 3.2.4 Water Bodies of Qeshm Island

(3) Soil conditions

The surface soil of Qeshm Island consists largely of Calcareous lithosols derived from saliferous and gypsiferous marls. Gypsiferous soils contain sufficient quantities of calcium sulphate, which interfere with plant growth. Most gypsiferous soils are located in arid and semi-arid areas; they do not usually occur in wet climates. They are well represented in dry areas where sources of calcium sulfate exist. In most cases, gypsum is associated with other salts of calcium, sodium and magnesium.



Source: Qeshm Free Zone Organization

Figure 3.2.5 Soil Classification of Qeshm Island

In general, ample nitrogen fertilizer is required for crops grown in gypsiferous soils, especially under irrigated agriculture. The need for phosphorus applications in gypsiferous soils is higher than in non-gypsiferous soils because there are more calcium ions in the soil solution. The application of potassium and micronutrients has been shown to be beneficial in Middle Eastern countries.

Most natural gypsiferous soils are saline, so leaching is necessary to keep the salt content in the soil to a low level. An effective drainage system is required to maintain a relatively low water table and keep salinity under control. In the presence of a cemented gypsic layer, the application of excess irrigation water could lead to the formation of a perched water table and gypsum accumulation in the surface layer of the soil profile. Where there is insufficient irrigation water available for the leaching of salts, there is a possibility of surface crust formation. Soils with a cemented gypsic layer disturb the installation of drainage systems. The effects of solution channels can cause displacement of tiles and consequent breakdown of the drainage systems. Similar difficulties can also occur in open drains because of the lateral solution of the gypsum beds and the slumping of overlying material. Drainage systems are installed well above any cemented or impervious gypsic layer. Thus, a soil with a gypsic layer at a depth of less than 1.5 m is not very suitable for drainage installation (FAO 1990).

(4) Land cover and vegetation

1) Existing land cover and vegetation on Qeshm Island

As explained in the previous section, the important presence of mountain ranges, salty features, harsh climatic conditions and bad soil quality make the majority of lands on Qeshm Island unsuitable for agriculture and human expansion. Indeed, except for the Tourion Plain around Ramkon, the coastal low lands of the Baseidou-Doulab region and the plain area in the vicinity of Direston Village, most of the lands (90.26%) on the island are barren, uncultivated or untouched by human activity.

In addition, as explained in detail in Section 6.1, it is likely that, due to the long-term drought, the area

of agricultural land use has been reduced drastically in the past 20 years. This severe climatic phenomenon also affects the natural local vegetation in the first place, which is decreasing in its area and variety.

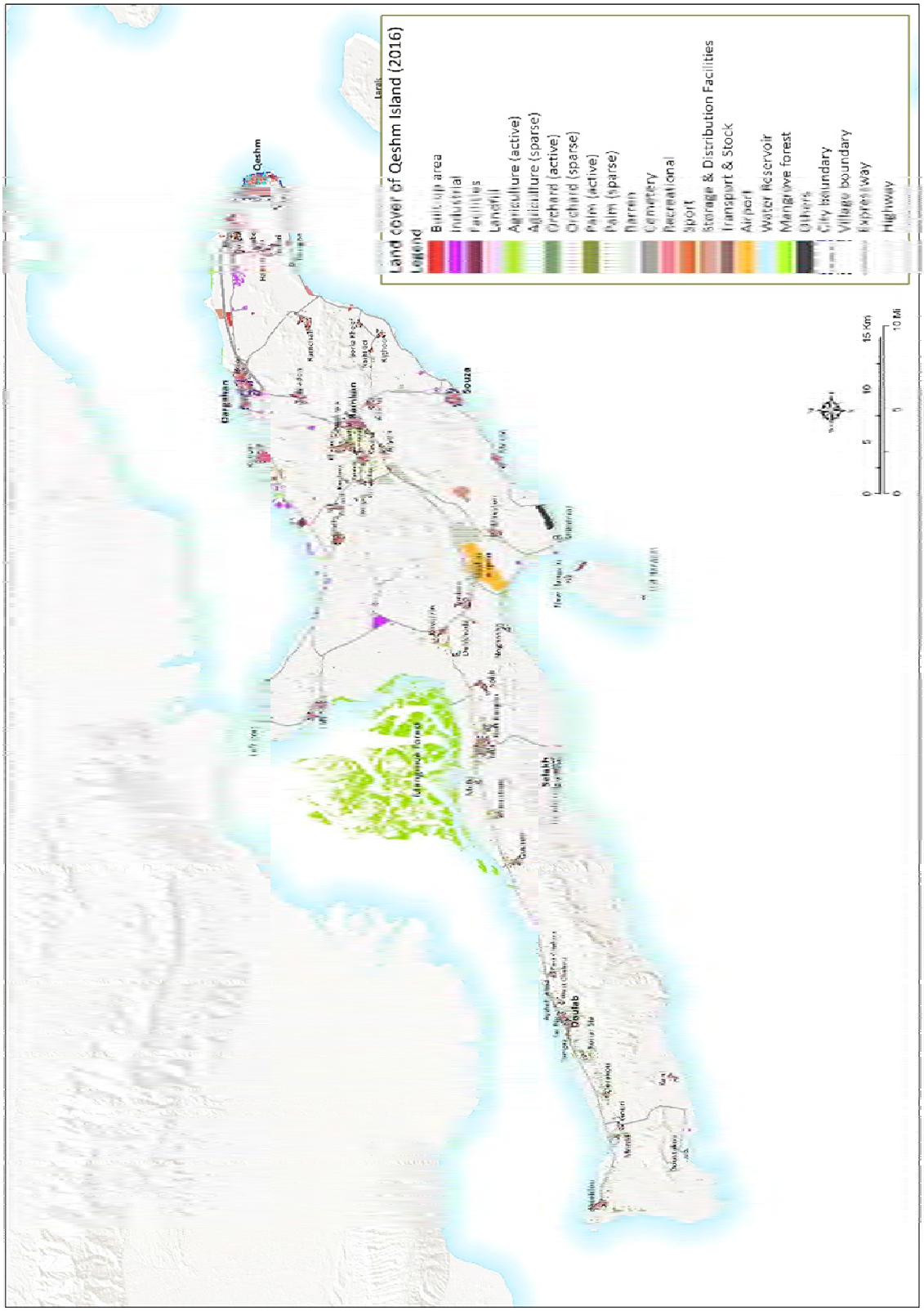
Based on this rapidly changing situation, and due to the absence of a recent land cover map, produced, for example, using remote sensing analysis of a satellite image, it is extremely difficult to have a clear picture of the land cover situation on Qeshm Island for 2016. It is almost impossible to evaluate what currently remains among the large natural vegetation communities and the vast cultivated areas identified previously. However, the observation of the numerous aerial photos taken at different periods allow for the identification of more or less sparse or abandoned agricultural land uses.

The surface and the geographic distribution of major existing land uses on Qeshm Island in 2016 are presented in Table 3.2.2 and Figure 3.2.6, respectively. These figures are based on the most up-to-date GIS data, namely, the spatial data infrastructure (SDI) dated from 2007. The SDI was created by the QFZO.

Table 3.2.2 Land Use Distribution on Qeshm Island (2016)

Land use class	Area (ha)	%
Built-up area (total)	1,992.62	1.29
Administrative	59.44	0.04
Commercial	63.24	0.04
Cultural	5.01	0.00
Educational	110.69	0.07
Public health	15.04	0.01
Religious	27.27	0.02
Residential	1,711.94	1.11
Industrial	551.51	0.36
Facilities	97.00	0.06
Cultivated: active (total)	854.56	0.55
Agricultural (active)	313.82	0.20
Orchard (active)	166.57	0.11
Palm (active)	374.17	0.24
Cultivated: sparse (total)	4,156.27	2.70
Agricultural (sparse)	679.21	0.44
Orchard (sparse)	2,867.70	1.86
Palm (sparse)	609.36	0.40
Recreational	47.37	0.03
Sport	75.56	0.05
Storage and distribution	299.60	0.19
Transport and stock	34.63	0.02
Airport	829.75	0.54
Mangrove forest	5,892.35	3.82
Others	174.14	0.11
Barren (rest of the island)	141,707.63	90.42
TOTAL	**156,713.00**	**100.00**

Source: Qeshm Free Zone Organization, National Geographic Center, JICA Project Team



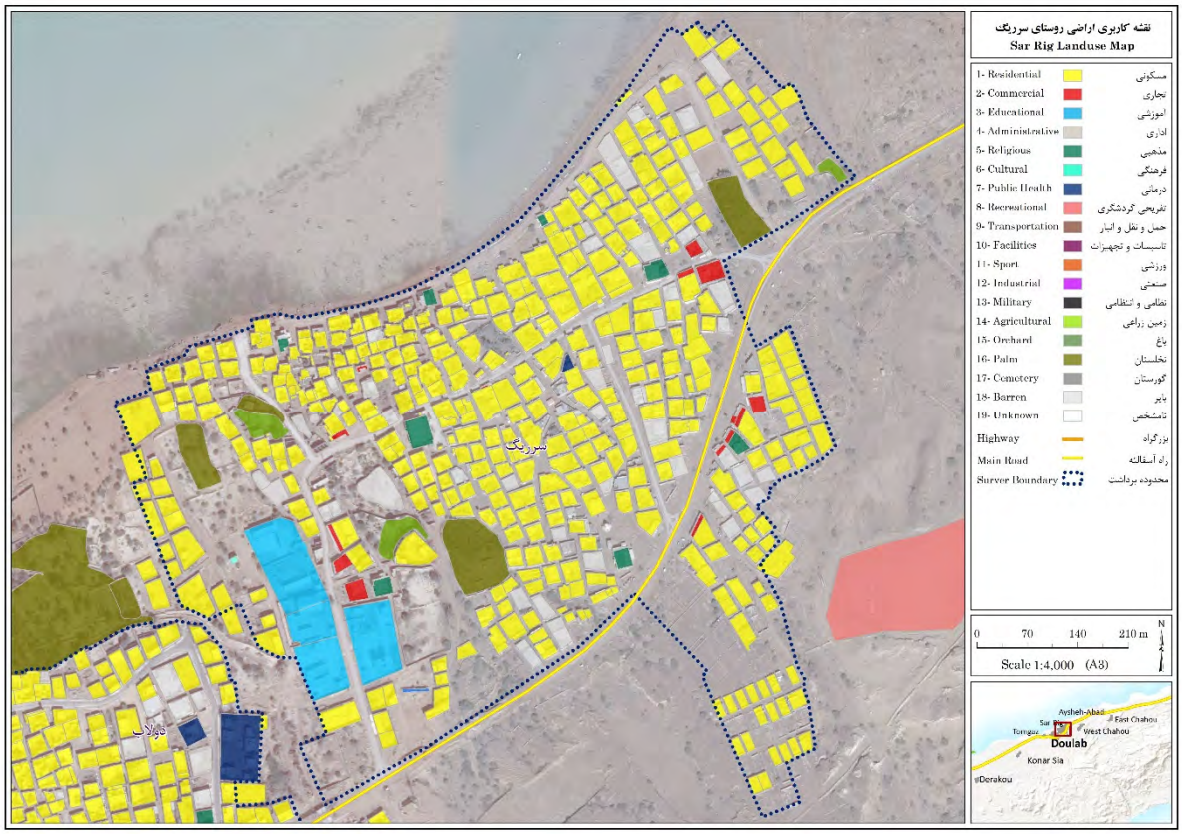
Source: Qeshm Free Zone Organization, National Geographic Center, JICA Project Team

Figure 3.2.6 Land Cover on Qeshm Island (2016)

2) Existing land use of cities and villages on Qeshm Island

Inversely from the imprecise state of the natural and agricultural land cover on Qeshm Island as a whole, the human land use inside the boundaries of the cities and villages could be perfectly documented. Furthermore, it is likely that the data elaborated reflect, with a high degree of accuracy, the reality of the land use in 2016. This work of data construction has been possible thanks to the quality of the baseline data provided by the QFZO, the SDI created in 2007, the digitalization of the latest spatial features (buildings etc.) from 2016 satellite images, the support from the socioeconomic baseline surveys conducted in every village and numerous final cross-checks (see Appendix for details).

Figure 3.2.7 shows, using the example of Sar Rig Village, the degree of accuracy (at the scale of the parcel) achieved to describe the land use of all the cities and villages on Qeshm Island. Table 3.2.3 shows the surface and distribution of existing main land uses in each city and village on Qeshm Island in 2016.



Source: Qeshm Free Zone Organization, revision and update by JICA Project Team, Google Earth

Figure 3.2.7 Example of Land Use Map of Qeshm Cities and Villages (Sar Rig)

Table 3.2.3 Existing Land Use of Cities and Villages on Qeshm Island (2016)

Cities and villages	Administrative boundary area	Built-up area							**TOTAL Built-up area**	Cultivated - active			**TOTAL Cultivated**	Industrial	Sports fields
		Residential	Administrative	Commercial	Cultural	Educational	Public health	Religious		Agriculture	Palm	Orchards			
Qeshm	980.19	188.37	23.73	40.38	4.07	13.01	1.71	9.49	**280.77**	0.00	0.54	0.27	**0.81**	0.58	5.38
Dargahan	293.85	117.54	3.85	6.71	0.00	2.30	0.67	0.43	**131.50**	0.00	3.78	0.09	**3.87**	0.06	0.00
Souza	176.83	57.89	2.21	0.63	0.00	2.63	0.54	1.74	**65.63**	0.00	2.38	0.43	**2.80**	0.32	4.00
Ramkon	281.47	84.39	0.00	0.00	0.00	2.21	0.00	0.74	**87.34**	11.97	2.48	0.29	**14.74**	0.00	3.39
Baseidou	71.53	27.90	0.00	0.00	0.00	0.76	0.00	0.11	**28.77**	0.00	4.95	8.78	**13.73**	0.00	0.00
Derakou	18.05	7.71	0.00	0.00	0.00	0.00	0.00	0.09	**7.80**	0.00	0.00	0.62	**0.62**	0.00	0.35
Doustakou	19.62	6.61	0.00	0.00	0.00	0.33	0.02	0.11	**7.07**	0.00	0.00	0.00	**0.00**	0.00	2.39
Kani	19.52	4.27	0.01	0.00	0.00	0.10	0.00	0.11	**4.48**	0.00	0.10	0.02	**0.12**	0.00	1.86
Konar Sia	15.06	4.57	0.00	0.00	0.00	0.43	0.00	0.09	**5.09**	0.00	0.06	0.34	**0.40**	0.00	0.00
Gouri	28.24	11.19	0.00	0.07	0.00	0.46	0.05	0.25	**12.02**	0.00	0.12	0.05	**0.17**	0.00	0.00
Moradi	13.71	5.13	0.03	0.00	0.00	0.00	0.00	0.12	**5.27**	0.00	0.00	0.00	**0.00**	0.00	0.00
Tomgez	11.59	3.50	0.00	0.59	0.00	0.00	0.00	0.05	**4.15**	0.00	0.00	0.00	**0.00**	0.00	1.73
West Chahou	23.15	9.62	0.00	0.03	0.00	0.35	0.00	0.16	**10.16**	0.00	0.11	0.00	**0.11**	0.08	0.00
East Chahou	19.00	8.58	0.02	0.15	0.00	0.28	0.01	0.05	**9.09**	0.00	0.09	0.00	**0.09**	0.00	0.02
Doulab	54.89	20.25	0.03	0.04	0.00	0.00	0.59	0.31	**21.22**	0.00	5.02	0.21	**5.23**	0.00	0.37
Sar Rig	59.40	22.72	0.00	0.42	0.01	2.30	0.03	0.44	**25.92**	0.00	2.32	0.86	**3.18**	0.00	0.00
Aysheh-Abad	4.79	1.21	0.00	0.05	0.00	0.00	0.00	0.02	**1.28**	0.00	0.00	0.00	**0.00**	0.00	0.00
Shibderaz	31.64	11.56	0.00	0.00	0.07	0.00	0.00	0.21	**11.84**	0.00	2.39	0.27	**2.66**	0.00	0.00
Mesen	68.94	31.06	0.00	0.00	0.00	1.15	0.04	0.44	**32.70**	0.00	1.51	0.00	**1.51**	0.00	0.19
Borka Khelaf	16.98	5.23	0.00	0.00	0.00	1.23	0.07	0.08	**6.61**	0.00	0.19	0.13	**0.32**	0.00	0.00
Rigoo	28.15	9.05	0.00	0.00	0.00	0.35	0.00	0.11	**9.50**	0.17	2.20	0.00	**2.37**	0.00	0.00
Zirong	49.47	22.04	0.00	0.00	0.00	1.53	0.00	0.13	**23.71**	0.00	0.52	0.00	**0.52**	0.00	1.06
Nakhl Gol	13.84	6.90	0.00	0.03	0.00	0.00	0.00	0.23	**7.15**	0.00	0.00	0.00	**0.00**	0.00	0.00
Direston	75.00	31.91	0.00	0.00	0.00	1.07	0.00	0.52	**33.49**	0.00	0.36	0.00	**0.36**	0.00	0.00
Dehkhoda	20.75	8.89	0.00	0.00	0.02	0.65	0.10	0.15	**9.80**	0.00	0.36	0.00	**0.36**	0.00	0.00
Sohli	54.40	27.23	0.09	0.00	0.00	1.58	0.02	0.44	**29.35**	0.00	0.00	0.00	**0.00**	0.00	0.00
Haft Rangou	30.37	10.33	0.10	0.00	0.00	0.32	0.04	0.13	**10.92**	0.00	1.29	0.00	**1.29**	0.00	0.00
Dourbani	22.07	9.88	0.01	0.00	0.00	0.59	0.00	0.00	**10.48**	0.00	1.66	0.00	**1.66**	0.00	0.16
Gomboron	23.42	6.79	0.09	0.83	0.00	0.31	0.07	0.04	**8.14**	0.00	1.40	1.28	**2.68**	0.00	0.00
Gouron	40.78	16.89	0.48	0.02	0.00	0.00	0.00	0.21	**17.60**	0.00	2.79	0.00	**2.79**	0.00	0.00
Melki	13.13	2.96	0.12	0.00	0.00	0.27	0.00	0.00	**3.35**	0.43	0.00	0.00	**0.43**	0.00	0.12
Tabl	178.79	56.71	0.11	0.00	0.08	2.29	0.89	0.46	**60.54**	0.72	21.29	0.46	**22.47**	0.00	0.00
Selakh	73.61	30.56	2.98	0.00	0.60	0.25	0.07	0.96	**35.43**	0.30	0.69	0.61	**1.60**	0.04	0.00
Noghasha	14.74	3.24	0.00	0.00	0.00	0.22	0.00	0.05	**3.51**	0.00	0.00	0.00	**0.00**	0.00	0.00
New Hangom	29.25	8.62	0.00	0.00	0.00	0.00	0.00	0.12	**8.73**	0.00	0.00	0.00	**0.00**	0.00	0.00
Old Hangom	9.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00	0.00	**0.00**	0.00	0.00
Ramchah	96.53	38.91	0.00	0.00	0.00	0.00	0.00	0.21	**39.12**	0.00	4.06	0.11	**4.16**	0.00	1.26
Tourgon	16.48	4.91	0.00	0.00	0.00	0.00	0.00	0.30	**5.21**	0.00	0.00	0.00	**0.00**	0.00	0.00
Kouvei	148.56	77.87	0.42	0.00	0.00	1.37	0.00	0.18	**79.84**	0.26	0.15	0.92	**1.32**	0.21	0.77
Giadon	102.40	47.76	0.00	0.00	0.00	0.59	0.00	0.29	**48.64**	0.00	3.29	0.17	**3.46**	0.00	0.00
Tonbon	61.08	30.86	0.05	0.00	0.00	0.21	0.11	0.31	**31.54**	0.00	0.00	0.00	**0.00**	0.00	0.00
Kovarzin	58.22	30.49	0.00	0.00	0.00	0.21	0.00	0.43	**31.13**	0.65	0.74	0.13	**1.52**	0.00	0.00
Laft	174.82	61.53	0.30	0.00	0.00	1.53	0.69	0.41	**64.46**	0.30	0.00	1.15	**1.45**	0.00	1.89
Holor	133.96	62.57	0.12	0.88	0.00	1.12	0.09	0.64	**65.42**	0.00	3.82	0.00	**3.82**	0.31	0.00
Hamiri	38.47	10.87	0.00	0.00	0.00	0.31	0.00	0.05	**11.23**	0.00	3.33	0.94	**4.27**	0.00	0.00
Defari	18.32	6.83	0.00	0.00	0.00	0.13	0.00	0.03	**6.99**	0.00	1.48	1.36	**2.84**	0.00	0.00
Towla	141.72	47.81	0.00	0.00	0.00	1.66	0.00	0.36	**49.83**	1.35	4.02	0.00	**5.36**	2.31	0.00
Kabeli	25.39	6.60	0.00	0.00	0.00	0.00	0.00	0.00	**6.60**	0.00	5.17	2.67	**7.83**	0.00	0.00
Bangali	6.03	1.48	0.00	0.00	0.00	0.32	0.00	0.01	**1.82**	0.00	0.00	0.00	**0.00**	0.00	0.00
Jijiyon	28.50	12.16	0.17	0.00	0.00	0.23	0.00	0.00	**12.56**	0.00	0.13	0.00	**0.13**	0.00	0.00
Gorvodon	49.36	17.61	0.00	0.00	0.00	0.29	0.00	0.14	**18.04**	1.23	0.47	0.00	**1.71**	0.00	0.00
Peyposht	71.36	33.78	0.00	0.00	0.00	0.97	0.08	1.34	**36.17**	1.15	2.18	0.25	**3.57**	0.00	0.00
Khaladin	39.66	18.69	0.00	0.00	0.00	0.66	0.00	0.40	**19.74**	0.00	0.05	0.00	**0.05**	0.00	0.06
Zeinabi	55.07	22.18	0.24	0.00	0.11	0.59	0.07	0.39	**23.59**	0.29	0.99	0.93	**2.21**	0.00	1.54
Karavon	28.53	12.08	0.20	0.36	0.05	0.59	0.00	0.42	**13.70**	1.12	1.70	0.22	**3.04**	0.00	0.00
Kousha	53.09	24.51	0.00	0.00	0.00	0.82	0.00	0.35	**25.67**	0.78	1.24	0.00	**2.01**	0.00	0.00
Kardova	14.90	4.85	0.00	0.00	0.00	0.36	0.00	0.13	**5.35**	0.00	0.00	0.00	**0.00**	0.00	0.00
Bagh Bala	12.77	3.24	0.00	0.13	0.00	0.68	0.00	0.16	**4.21**	0.00	0.00	0.00	**0.00**	0.00	0.00
Tomsenati	5.57	2.71	0.00	0.00	0.00	0.00	0.00	0.05	**2.76**	0.00	0.58	0.04	**0.62**	0.00	0.00
Tourion	84.06	36.93	0.00	0.00	0.00	1.62	0.16	0.50	**39.20**	4.79	0.05	1.14	**5.98**	0.00	7.33
Subtotal	**4,350.90**	**1,498.57**	**35.35**	**51.31**	**5.01**	**51.22**	**6.11**	**25.69**	**1,673.26**	**25.50**	**92.02**	**24.73**	**142.25**	**3.90**	**33.89**
Outside admin. boundaries		213.37	24.09	11.93	0.00	59.47	8.92	1.58	**319.36**	288.32	282.15	141.85	712.31	547.61	41.68
TOTAL	**4,350.90**	**1,711.94**	**59.44**	**63.24**	**5.01**	**110.69**	**15.04**	**27.27**	**1,992.62**	**313.82**	**374.17**	**166.57**	**854.56**	**551.51**	**75.56**

Note: Only land use categories relevant at the inner city/inner village level are represented
Source: JICA Project Team

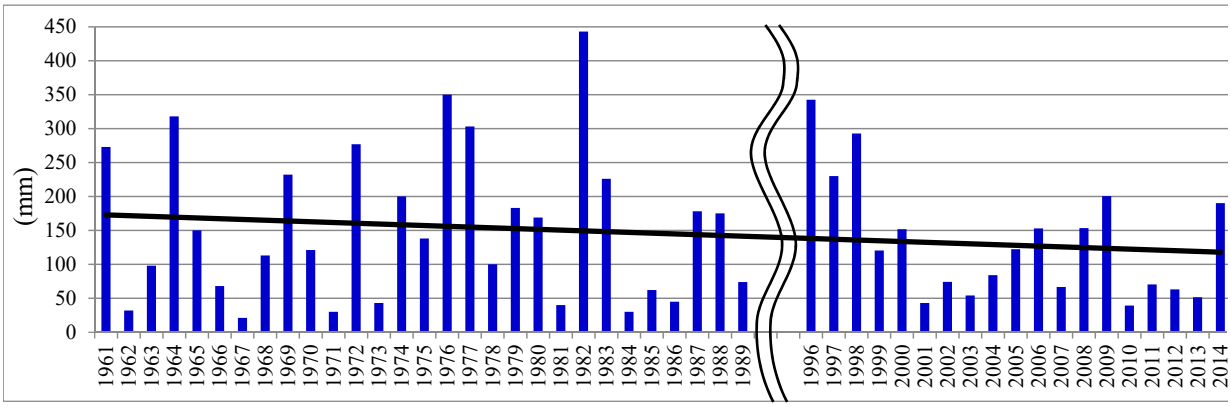
(5) Climate change

1) Temperature after 1982

As mentioned in the SWECO Master Plan, previous data for Qeshm Island show that the mean temperature was around 26°C for the six years between 1982 and 1987. More recent annual temperature data for the island can be obtained from the website of the Meteorological Organization of Iran (http://irimo.ir/far/). Since August 2016, the temperature data from 1996 to 2014 have been available through the website. According to the obtained data, the mean annual temperature was 26.99°C from 1998 to 2003, 26.8°C from 2009 to 2014, and 26.67°C from 2004 to 2009. Thus, it is clear that the temperature has been rising from around 0.67°C to 0.99°C since the 1980's.

2) Annual rainfall after 1961

The annual rainfall data for Qeshm Island were obtained from the SWECO master plan (from 1961 to 1989) and the website of the Meteorological Organization of Iran (1996 to 2014), as shown in the following figure. The annual rainfall fluctuates between 30 mm and 450 mm; however, in general, it has also been experiencing a declining trend in the past 50 years, with the decrement over 50 mm.



Source: SWECO master plan, Meteorological Organization of Iran (http://irimo.ir/far/)

Figure 3.2.8 Annual Rainfall on Qeshm Island from 1961 to 2014

The average, standard deviation and coefficient variation results regarding annual rainfall for nine- to 10-year periods were calculated as per the following table, based on the data mentioned above. Annual rainfall has gradually decreased over a 50-year period, with the largest drop observed in the period from 2006 to 2014.

Table 3.2.4 Annual Rainfall in Nine- to 10-year Periods

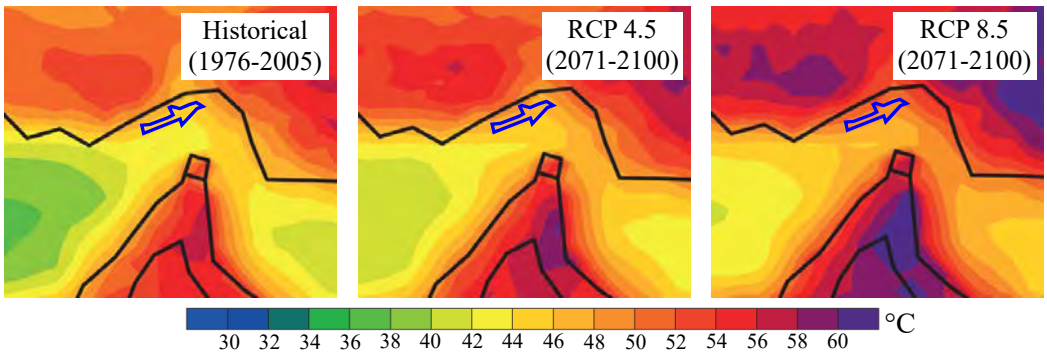
Year	Average (mm/year)	Standard deviation	Coefficient variation
1961-1970	142.6	95.8	0.67
1971-1980	179.3	101.7	0.57
1981-1989	141.4	126.2	0.89
1996-2005	151.5	98.0	0.65
2006-2014	109.7	60.0	0.55

Source: Iran Meteorological Organization (http://irimo.ir/far/), JICA Project Team

3) Prediction of temperature

A regional climate model (RCM) was applied to a 25 km grid for a regional forecast by the Intergovernmental Panel on Climate Change (IPCC). RCM simulations were carried out using the data for a historical period from 1975 to 2005. The IPCC defines different scenarios for the concentration of greenhouse gases (GHGs) to estimate the impacts of climate changes for the period from 2071 to 2100. In the stabilization scenario (or representative concentration pathway (RCP) 4.5), the 30-year maximum temperatures are predicted as having risen by 2°C compared to the historical period. In the

scenarios with relatively larger amounts of GHG emissions (RCP 8.5), the temperature rise is estimated at 4°C around Qeshm Island, as shown in Figure 3.2.9. This figure indicates the average of the 30-year maximum temperatures over a six-hour period.

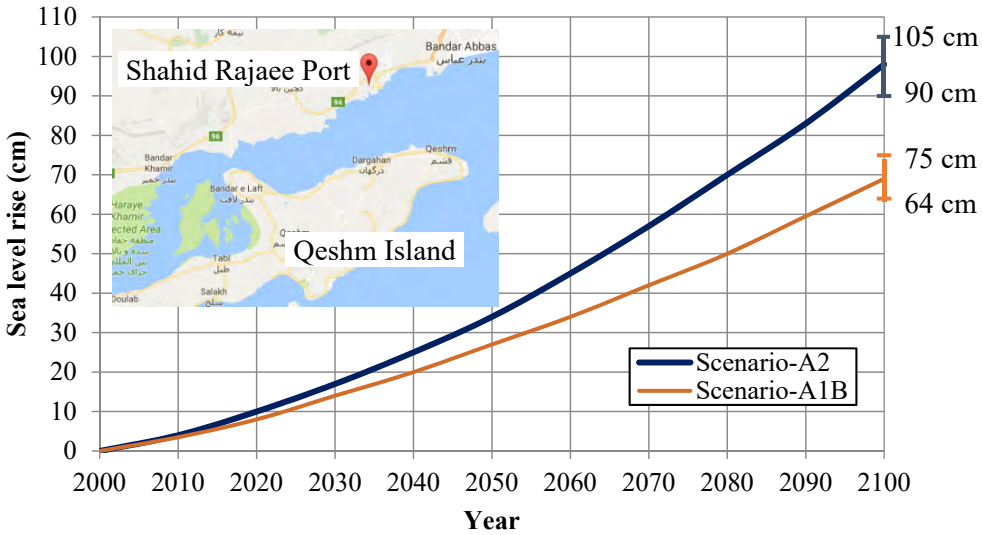


RCP 4.5 is a stabilization scenario in which total radiative forcing is stabilized as 4.5W/m^2 shortly after 2100, without overshooting the long-run radiative forcing target level.
RCP 8.5 is characterized by increasing greenhouse gas emissions over time, representative of scenarios in the literature that lead to high GHG concentration levels. Total radiative forcing will exceed 8.5W/m^2 in 2100 and reach to 12 W/m^2 in 2300.
Source: "Future temperature in southwest Asia projected to exceed a threshold for human adaptability", Jeremy S. Pal and Elfatih A. B. Eltahir (2015), edited partially by the JICA Project Team

Figure 3.2.9 Spatial Distributions of Extreme Temperature Around the Strait of Hormuz

4) Predation of sea level

Climate changes cause the effects of increasing the water level in the Strait of Hormuz. The probable changes in sea level should be investigated in order to employ adaptation strategies. The climatic output data of a general circulation model under a climate change scenario of A1B and A2 were used. A1B represents the conditions of very rapid economic growth. A2 shows relatively slow economic development. One of the models (discrete wavelet artificial neural network) was developed to explore the relationship between climatic variables and sea level changes. The results showed that, in the Shahid Rajaee Port Station, the sea level rise is around 64 cm to 75 cm for scenario A1B and around 90 cm to 105 cm for the A2 scenario.



Scenario A1 describes a future world of very rapid economic growth, in which the global population peaks in the mid-century and declines thereafter, alongside the rapid introduction of new and more efficient technologies. The major underlying themes are convergence among regions, capacity building and increased cultural and social interactions, with a substantial reduction in regional differences in per capita income. A1B is characterized by its technological emphasis; a balance across all sources (A1B).
Scenario A2 is characterized by heterogeneity, with self-reliance and local identities emphasized, and population continuously increasing. Economic development is relatively slow.
Source: Hamid Goharnejad and Amir Hossein Eghbali, 2015, Forecasting the sea level change in the Strait of Hormuz

Figure 3.2.10 Average Changes in Sea Level for Two Scenarios at Shahid Rajaee Port

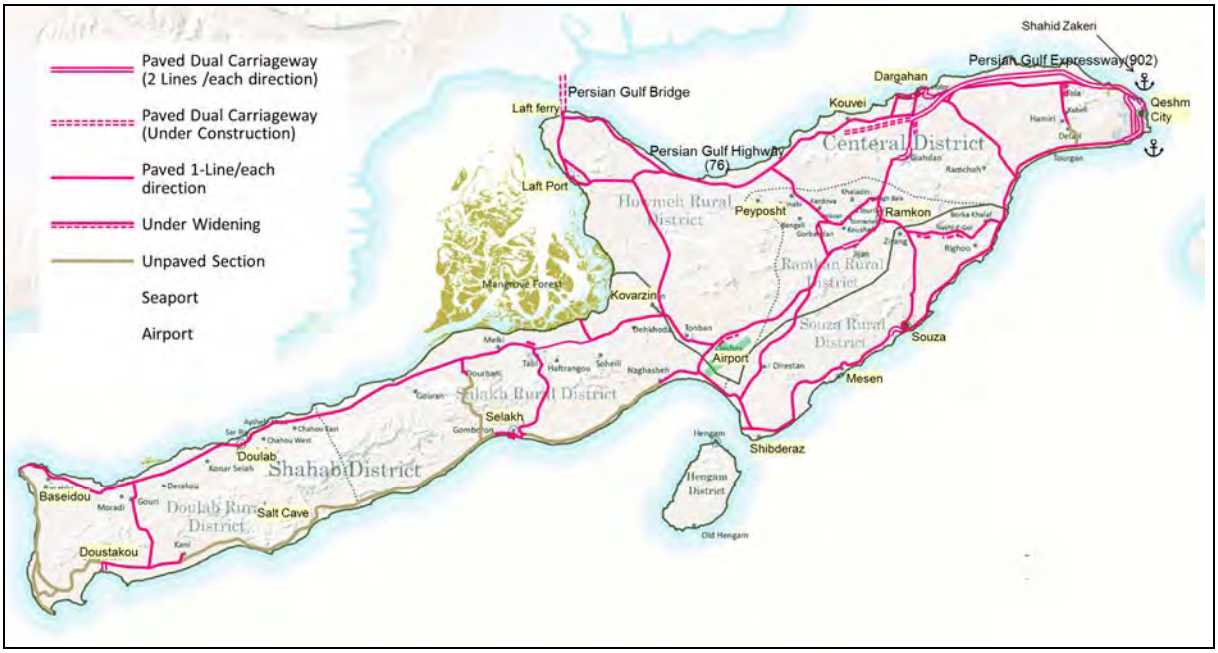
3.3 Existing Transport System and Industrial Development

3.3.1 Transport facilities

The current road network is well developed in terms of linking current cities and villages with paved roads on the entire island (Figure 3.3.1). Road widening is ongoing, section by section, in the east of Qeshm, with some sections being constructed as dual carriageways. The highest priority for transport development is to strengthen the link to the mainland. Currently, passengers' access to the mainland relies on marine transport from three ports: Bahman and Shahid Zakeri on the east of the island, and Laft on the north of the island. The number of arriving and departing passengers, excluding at Bahman Port, was more than seven million in 2015/16. The Persian Gulf Bridge was proposed in the SWECO master plan to overcome this issue by linking Laft and Bandar Pol on the mainland. The bridge comprises car transport and railway routes. Construction started in the late 1990s, although progress has been stagnant due to financial limitations. The section between Qeshm and Laft is being extended as a new route of the Persian Gulf Expressway. The new route will be connected to the Persian Gulf Bridge.

The other form of access to the mainland and other countries is Qeshm International Airport. The airport has been in operation in the center of the island since 1997, while the old airport in Qeshm City is now closed. Table 3.3.1 shows the outline of the international airport.

The ports of Bahman and Shahid Zakeri play a main role in terms of commodity. Kouvei Port is under construction to enhance the container-handling capacity, while Souza Port is planned to be a new deep seaport on the north of the island linking up with the international waterways in the Persian Gulf.



Source: JICA Project Team

Figure 3.3.1 Current Road Network, Seaports and Airport on Qeshm

Table 3.3.1 Outline of Qeshm International Airport

Owner	Qeshm Free Zone Organization
Operator	Qeshm International Airport Co. (private sector)
Land area	2,050 ha
Operation hours	24 h
Runways	Length: 4,225 m Width: 45 m
Public/private transport services to/from the airport	Airport taxis (private) only
Annual air passenger, air cargo and aircraft	No. of air passengers 396,799

movements.	Air cargo	5,952 tons
	Aircraft movements	2,610

Note: Aircraft movement means an aircraft take-off or landing at an airport. For airport traffic purposes one arrival and one departure is counted as two movements.
Source: Qeshm Free Zone Organization, http://qeshmairport.ir/main/en/page,1493

3.3.2 Free Zone and Special Economic Zone

The Islamic Consultative Assembly approved the first five-year development plan (FYDP) for 1989 to 1993. It was the first step towards economic reconstruction. Article 18 of the first FYDP specified the development of free trade-industrial zones (FZs) in a maximum of three sites, aimed at establishing a backdoor to the global economy. The FZs were expected to be a focal point for attracting foreign direct investment, introducing modern technology and encouraging the export industry to boost the national economy. In 1991 three FZs were designated in Kish, Qeshm and Chabahar alongside the international waterways in the Persian Gulf. The Law on the Administration of Free Trade-Industrial Zones was legislated to define the administrative settings and function of the FZs in 1993. In line with the law, the QFZO was established as an autonomous authority to develop, promote and manage the Qeshm FZ in 1994. The Iranian Cabinet ordered the formation of the Coordination Council of Free Trade-Industrial and Special Economic Zones in 1997, bringing together the relevant ministers. The Coordination Council was originally led by the President and is currently led by President's Chief of Staff. As time has passed, the number of FZs has been increased to seven with the additional designation of FZs in Aras, Anzali, Arvand and Maku. These FZs face towards inland countries, with the exception of Arvand, located on the border with Iraq. The Qeshm FZ was established as part of the first generation of FZs in order to contribute to Iran's national economic strategy.

The origin of the special economic zones (SEZs) was the protected custom area specified in the first FYDP. The protected custom area aimed to improve the distribution network for industrial materials and intermediate materials in the country. In contrast to the FZs established within the national economic context, the SEZs' objectives focus on economic vitalization in the regions. The first SEZ was designated in Sirajan in 1991. At present, Iran has 64 SEZs, of which 27 are operational. The Qeshm SEZ became the fourth SEZ in 1996 and covers the parts of the island outside the FZ.

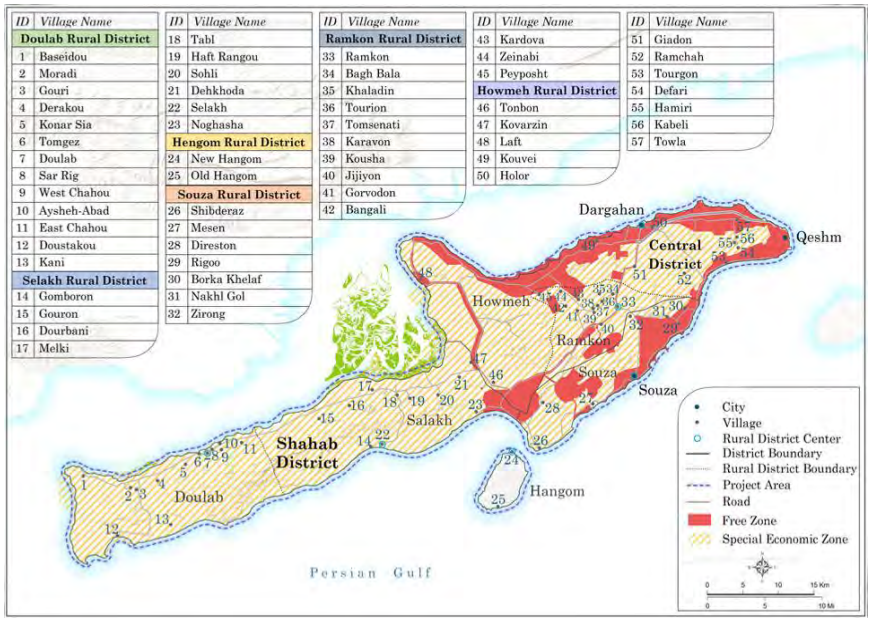
FZs and SEZs are given incentives to attract foreign direct investment and excluded from the legal system on the mainland. FZs have better incentives for attracting prospective investors; for instance, the FZs have a tax holiday lasting 20 years, compared to that of seven years for SEZs. FZs are considering whether to extend the duration of the tax holiday to 30 years, although the government has not approved the proposed extension as yet. Table 3.3.2 shows the incentives offered by FZs and SEZs. In practice, some SEZs are given over to a specific industry, such as petrochemicals and shipping, while FZs are allowed to cover comprehensively different economic sectors.

Table 3.3.2 Incentives Offered by FZs and SEZs

No.	Item	FZ	SEZ
1	Visa and immigration	Not required	Apply to visa
2	Employment of foreigners	Labor permit is necessary	Labor permit is necessary
3	Investment application	FZ's regulations apply	Mainland's regulations apply
4	Registration of company	FZ's authority applies	SEZ's authority applies
5	Tax incentive	Tax holiday of 20 years	Tax holiday of seven years
6	Custom duty	Free	Free
7	Export of imported product	Tax is exempted	Tax is exempted
8	Storage period of products	No limitation	No limitation
9	Partial custom clearance	Acceptable	Acceptable
10	Export to mainland and import from mainland	Mainland's regulations for export apply	Mainland's regulations for export apply
11	Re-export imported goods to mainland	Mainland's export and import regulations apply	Mainland's export and import regulations apply
12	Export to mainland	To be added to the value on product	To be added to the value on product
13	Transit of products	No tax but storage charged	No tax but storage charged
14	Usage of land or natural resources	Only land leasing for foreigners	Only land leasing for foreigners
15	Certificate of origin	Certificate issued by the FZ Authority	Certificate issued by the SEZ Authority
16	Sales	Possible in FZ	Only allowed for foreigners to bring out to overseas
17	Banking business	Possible in FZ including offshore bank dealing	Limited to domestic banking through states' banks
18	Insurance business	FZ's regulations apply	Mainland's regulations apply
19	Protection of investment	Guarantee	Guarantee
20	Guarantee of foreign investment (non-nationalized)	Guarantee	Guarantee
21	Social insurance	Mainland's laws apply	Mainland's regulations apply
22	Labor law	FZ's regulations apply	SEZ's regulations apply
23	Employment of foreigners	Maximum 10% of total employees	Maximum 10% of total employees

Note: Shaded item is the only difference between FZs and SEZs
Source: Iran Investment Organization

The Qeshm FZ encompasses an area of approximately 300 km^2, while the rest of the island is designated as an SEZ. Figure 3.3.2 shows the boundaries of the FZ. The QFZO promotes industrial development as well as provides biotechnology research, higher education, a medical center, tourism, and banking.



Source: Qeshm Free Zone Organization

Figure 3.3.2 FZ and SEZ on Qeshm Island

3.3.3 Industrial and manufacturing

(1) Overview of the manufacturing sector in Iran, Hormozgan Province and Qeshm Island

According to the Iran Statistical Yearbook for 2013/14, the number of manufacturing establishments with 10 workers or more amounted to 14,784 in Iran and 149 in Hormozgan Province, as shown in Table 3.3.3. The share for Hormozgan Province represents only 1% of that for all of Iran, although the 2011 census showed that it had 2.1% of the population.

On the other hand, in 2012/13, Qeshm County had 23 manufacturers with 10 workers or more, which equates to 12.7% of the total number of manufacturers in the province, even though it is home to 8.2% of the entire population, according to the 2011 census.

As for employment, the number of employees of manufacturing establishments amounted to 1,204,699 in Iran and 14,691 in Hormozgan Province, as shown in Table 3.3.4. The share for Hormozgan Province is 1.2% of that for all of Iran. In Qeshm County, there were 1,492 workers in 2012/13, while 11.3% of the total number of employees in the province were involved in manufacturing.

Based on the data above, the larger shares regarding the number of establishments and the number of employees of manufacturers with 10 workers or more in Qeshm County, as part of Hormozgan Province, compared to that of the overall population, show a relatively large accumulation of industries on Qeshm Island.

In terms of value added in 2013/14, manufacturing establishments with 10 workers or more generated IRR 846,007bn and IRR 24,477bn in Hormozgan Province, as shown in Table 3.3.5. The share for Hormozgan Province is 2.9% of that for all of Iran, which contrasts with the fact that it is home to 2.1% of the population as of the 2011 census. The value-added amount in Qeshm County was not shown in the respective Hormozgan Provincial Statistical Yearbook.

Table 3.3.3 Number of Manufacturing Establishments with 10 Workers or More

(a) 1392* (2013/14)

Province (Ostan)	Total	10-49 workers	50-99 workers	100 or more workers
Iran	14,784	10,355	2,200	2,230
Hormozgan	**149**	**118**	**9**	**22**
Iran	100.0	100.0	100.0	100.0
Share (%) for Hormozgan in relation to all of Iran	**1.01**	**1.14**	**0.41**	**0.99**

(b) 1391* (2012/13)

Province (Ostan)	Total	10-49 workers	50-99 workers	100 or more workers
Iran	14,962	10,481	2,138	2,343
Hormozgan	**180**	**145**	**11**	**24**
Iran	100.0	100.0	100.0	100.0
Share (%) for Hormozgan in relation to all of Iran	**1.20**	**1.38**	**0.51**	**1.02**
Qeshm County	**23**	**17**	**1**	**5**
Share (%) for Qeshm County in relation to the whole province	**12.7**	**11.7**	**9.1**	**20.8**

* Year according to the Iranian calendar

Sources: Iran Statistical Yearbook for 2013/14, Hormozgan Provincial Statistical Yearbook for 2012/13

Table 3.3.4 Number of Employees of Manufacturing Establishments with 10 Workers or More

(a) 1392* (2013/14)

Province (Ostan)	Total	10-49 workers	50-99 workers	100 or more workers
Iran	1,204,699	237,675	150,594	816,430
Hormozgan	14,691	6,000	2,445	6,246
Iran	100.0	100.0	100.0	100.0
Share (%) for Hormozgan in relation to all of Iran	1.22	2.52	1.62	0.77

(b) 1391* (2012/13)

Province (Ostan)	Total	10-49 workers	50-99 workers	100 or more workers
Iran	1,242,983	235,239	145,771	861,973
Hormozgan	13,240	2,914	759	9,567
Iran	100.0	100.0	100.0	100.0
Share (%) for Hormozgan in relation to all of Iran	1.07	1.24	0.52	1.11
Qeshm County	1,492	397	86	1,009
Share (%) for Qeshm County in relation to the whole province	11.3	13.6	11.3	10.5

* Year according to the Iranian calendar
Sources: Iran Statistical Yearbook for 2013/14, Hormozgan Provincial Statistical Yearbook for 2012/13

Table 3.3.5 Value Added for Manufacturing Establishments with 10 Workers or More

(a) 1392* (2013/14) (in IRR million)

Province (Ostan)	Total	10-49 workers	50-99 workers	100 or more workers
Iran	846,007,912	74,783,184	51,662,087	719,562,641
Hormozgan	24,477,183	912,280	1,506,696	22,058,207
Iran	100.0	100.0	100.0	100.0
Share (%) for Hormozgan in relation to all of Iran	2.89	1.22	2.92	3.07

(b) 1391* (2012/13) (in IRR million)

Province (Ostan)	Total	10-49 workers	50-99 workers	100 or more workers
Iran	624,332,432	54,479,644	37,721,573	532,131,216
Hormozgan	12,260,834	1,588,941	1,516,817	9,155,076
Iran	100.0	100.0	100.0	100.0
Share (%) for Hormozgan in relation to all of Iran	1.96	2.92	4.02	1.72

* Year according to the Iranian calendar
Sources: Iran Statistical Yearbook for 2013/14, Hormozgan Provincial Statistical Yearbook for 2012/13

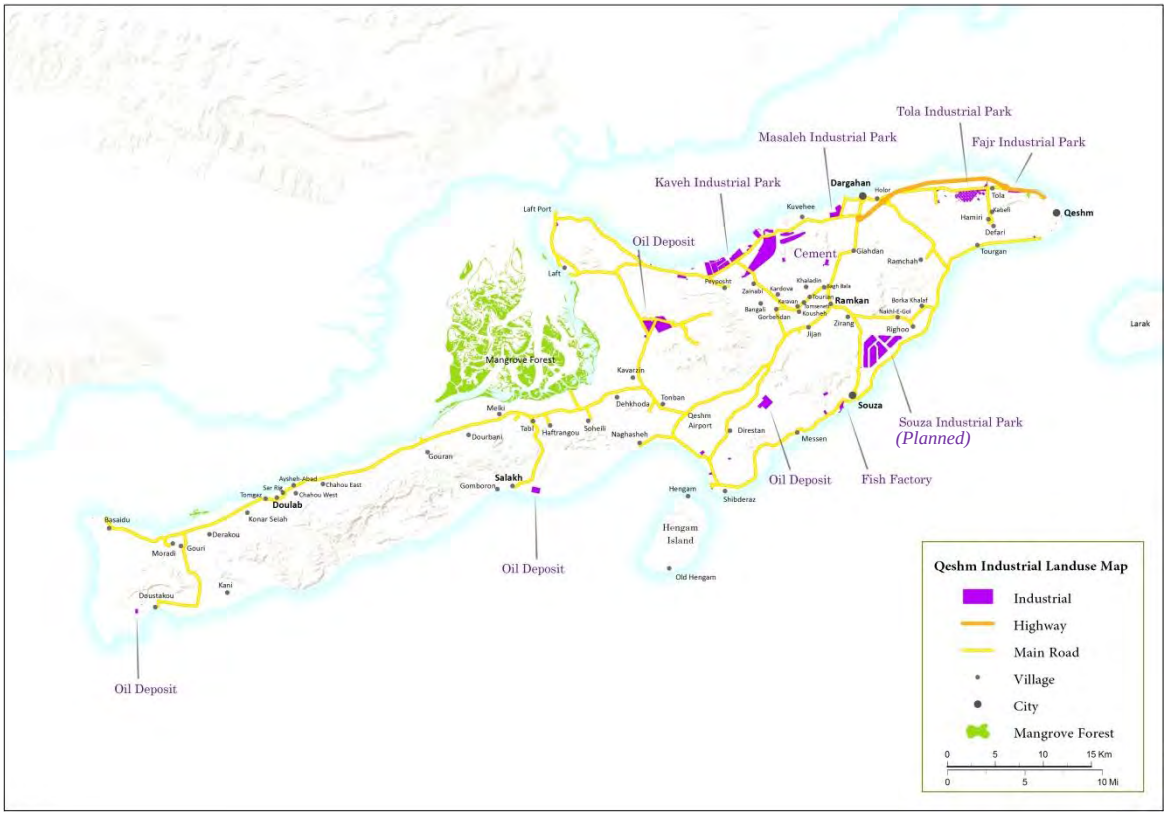
(2) Industrial zones and their characteristics on Qeshm Island

Seven industrial parks are expected to be the major driving force of the economy on Qeshm Island (Table 3.3.6 and Figure 3.3.3). The total land area, including planned areas, exceeds 5,700 ha. Currently, slightly fewer than 90 companies are operating. The major industrial subsectors are nonmetallic mineral industries (construction materials), wood products, storage of petrochemicals and fish processing. Although some industrial parks have already been developed, further development is required in relation to on-site infrastructure. Several industrial zones are still vacant and still need to be introduced to investors or tenants.

Table 3.3.6 Industrial Parks on Qeshm Island

Name of industrial park	Area size (ha)	Location; starting year of operation (or planned starting year of operation)	Current situation; number of active industries as of April 2016	Targeted industries; majority or dominant types of industrial subsectors	Names of major companies active in each zone
1. Fajr Industrial Park	35	4 km from Qeshm City; in operation since 1995/96	Most of the area is occupied; 29 factories are operating	Small industries; various workshops, wood products (doors, windows, cabinets etc.), PVC, food	
2. Towla Industrial Park	1,300	Near to Towla village; in operation since 1995/96	27 factories are operating	Small and medium industries; multilayer polymer tubes, chemical industries (engine oil), power and electricity industries, textile clothing and leather industries, nonmetallic mineral industries, mixed industries, food, recycled PET	Superpipe International Co. Ltd., Castrol (engine oil) and Qeshm Tobacco Company
3. Kouvei Industrial Park	1,400	35km west of Qeshm City; in operation since 1995/96	Five factories are operating	Light and heavy industries; storage of metals and nonmetallic minerals, storages of marine industries, storage of petrochemicals, launch making (construction of traditional type of vessels), storage of downstream petrochemicals	Zinc Smelting Co. (zinc and lead ingots manufacturer), located in the western part of Kouvei Industrial Zone
4. Souza Industrial Park	3,000	Next to Souza Seaport; much of the area is vacant	10 factories are operating	Petrochemical complex; oil storage	
5. Alvand Industrial Park	-	East of the airport; not currently operational	Mentioned in SWECO master plan; still not operational	High-tech industry	
6. Fishery Industrial Park	13	East of Souza; planning started in 2010, work started in 2011	12 factories are operating	Fish processing; fish processing industry	
7. Masaaleh Industrial Park	50	Next to Dargahan; in operation since 1995/96	Five factories are operating	Construction materials; construction materials, concrete, block and bricks	
Total	5,748		88 factories are operating		

Note: Some factories are located in the villages of Ramkon, Gordian and Tourion, as well as Dargahan City
Source: JICA Project Team based on information from the Qeshm Free Zone Organization



Source: Qeshm Free Zone Organization

Figure 3.3.3 Existing and Planned Industrial Parks/Zones on Qeshm Island

3.4 Existing Development Plan in a Regional Context

3.4.1 Fifth Five-Year Development Plan

The Government of Iran deliberated on a fifth FYDP, which comprehensively encompassed many targets relating to socioeconomic, cultural, security, technological and environmental areas. The planning period of the fifth FYDP was from 1390 to 1394 in the Iranian calendar (equates to 2011/12 to 2015/16). The quantitative targets envisaged that the annual growth of gross domestic product (GDP) would be 8.0% per year, while economic growth had to simultaneously reduce the dependency on oil revenues. The economic growth was planned to create new employment opportunities of 2.5 million and reduce the unemployment rate to 7.0%. Improvements in social welfare and social disparity were other main issues, with the view that the Gini coefficient should be less than 0.35. It was demanded that foreign direct investment should be 3.0% of GDP. The fifth FYDP specified the conservation of natural environments by the formulation of a land use plan to achieve the sustainable use of natural resources. In line with environmental protection, the application of a strategic environmental assessment (SEA) of national-, regional-, and sector-level projects, as well as an environmental impact assessment (EIA), were introduced.

Taking those expectations from the fifth FYDP into account, despite the absence of any definite recommendation related to Qeshm in the articles, the roles of Qeshm Island are considered as follows:

(a) To promote foreign direct investment in the FZ, which is one of the seven designated FZs in Iran,
(b) To encourage the economy in Iran and surrounding areas of the island,
(c) To improve social disparity by increasing household income and employment opportunities on the island, particularly in villages,
(d) To conserve the natural environment upon which people of the island base their livelihood,

(e) To efficiently use limited natural resources,
(f) To promote bunkering, as the fifth FYDP suggested, through the enabling bunkering in the area along the Persian Gulf, and
(g) To develop a successful model in sector-level activities.

The Islamic Consultative Assembly decided to extend the validity period for another fiscal year until the end of March 2017. The Government of Iran periodically renewed the FYDP and deliberated on a sixth iteration, which comprehensively encompassed many targets relating to socioeconomic, cultural, security, technological and environmental areas. The planning period of the sixth FYDP is from 1396 to 1340 in the Iranian calendar (equates to 2017/2018 to 2021/2022). The quantitative targets envisaged that the annual growth of gross domestic product would be 8.0% per year. Quantitative goals have been defined. The following are major components of the plan, which the government is obliged to pay attention to in full:

(a) Gini coefficient of 0.34 at the end of the five-year period (target year)
(b) Strategic plans of water management and environment management
(c) Revitalization of old urban fabric, historical fabric and rural areas
(d) Economy of mines and mineral industries, agriculture, tourism, transit and rail transport, ad advanced technology
(e) Enhancement of business environment, reduction in economic inequality, empowerment of the poor with priority for women who are family caregivers,
(f) At least 2.8% of the target 8% economic growth rate must be realized through improving the efficacy of the entire production chain (the assumed investment growth rate will be 21.4% annually)
(g) Supply of 30 billion USD from foreign financing in forms of direct investment and joint ventures
(h) Establishment of international banks and financial institutes will be facilitated in Iran
(i) Enhancement of job creation policies, training and vocational programs and small household businesses (the annual rate of at least 0.8% reduction in unemployment must be achieved)

The sixth FYDP envisages high economic growth under conditions where priority will be given to environmental management, social equality as well as the revitalization of the historical fabric to create a firm foundation for sustainable development.

3.4.2 Transportation and logistics development plan

Iran has flourished as a strategic region of the Silk Road since ancient times. This context exists as the country comprises one of the countries of the Asian Highway, which links Asian and European countries via the Eurasian Continent. Iran is an original member of the Economic Cooperation Organization (ECO), which was established in 1985. The ECO now includes 10 Middle Eastern and Asian countries. It envisions an interregional transit network of trunk roads and railways as shown in Figure 3.4.1 and Figure 3.4.2. In line with this, Iran has the potential to be a gateway to the inland member countries of the ECO. Particularly, Bandar Abbas and Chabatar have the potential, as well as the main seaports, to service logistics in Iran. For instance, Bandar Abbas is the largest container port in Iran and linked to Tehran by highways and railways, as well as to Turkey and Azerbaijan. The existing Chabatar Port has not been developed well, but is linked to Mashhad and the inland countries of Turkmenistan, Uzbekistan, Kazakhstan, Tajikistan and Kyrgyz. Chabatar Port also complements Bandar Abbas Port. The Iranian Government has made the effort to realize these opportunities as described below:

(a) A container port will be expanded in Bandar Abbas,
(b) A new deep seaport will be developed in Chabatar, and
(c) A new railway network will be put into operation from Chabatar Port to Mashhad and onto neighboring countries.

Source: Economic Cooperation Organization

Figure 3.4.1 Transit Roads in ECO Member Countries

Source: Economic Cooperation Organization

Figure 3.4.2 Transit Railway in ECO Member Countries

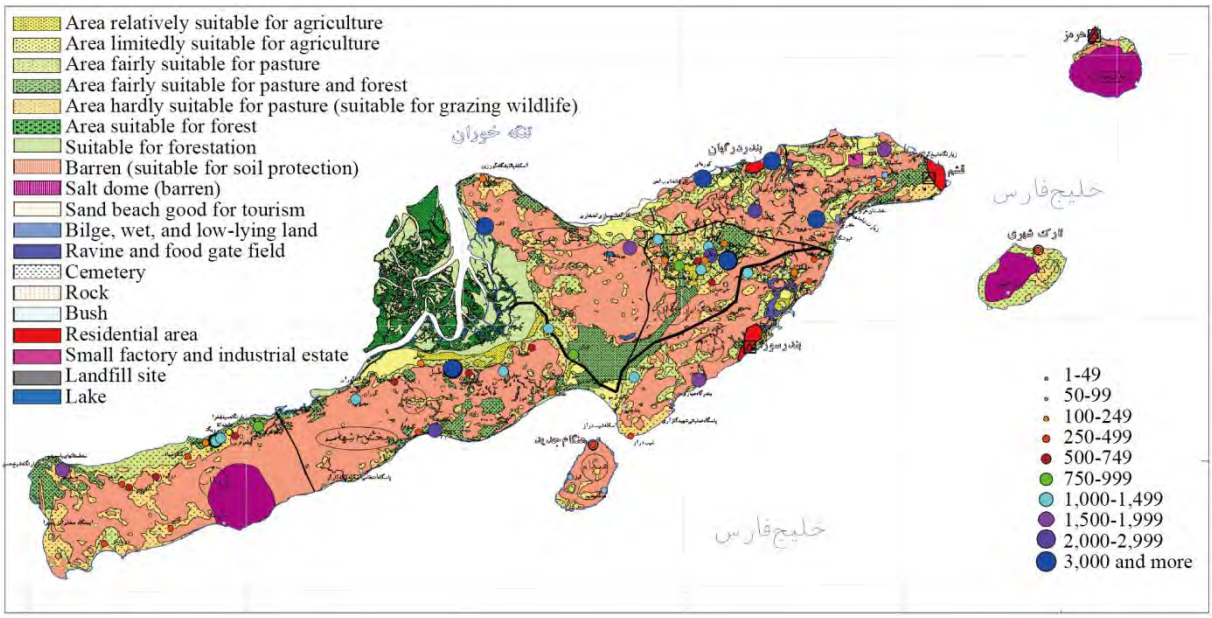
3.4.3 Qeshm Country Master Plan

The Department of Housing and Urban Development of Hormozgan Province formulated a master plan for Qeshm County under the jurisdiction of the Ministry of Housing and Urban Development in 2012. The county master plan envisions comprehensive developmental progress on Qeshm Island including those relating to economic, social, environmental, cultural, spatial and physical aspects. The goals are expected to achieve leading economic growth with an increase in the export of non-oil products. The goals include the balanced development of urban and rural communities, as well as the participation of women and youth in economic and social development. In terms of economic development, priority is given to eight economic activities, which are considered to be important to the island in the following order: i) transit of goods, ii) manufacturing, iii) tourism, iv) higher education, v) fishing, vi) service and maritime support, vii) business, and viii) industry and mining.

An outline of the county master plan is given below.

(a) Planning framework: The country master plan outlines the planning framework, which includes a population projection of 203,000 persons, of which 97,440 would live in urban areas and 105,560 would live in rural areas by 2026. The rural population will equate to more than half of the total population. The annual population growth is 2.42% per year for the period from 2011 to 2026. Employment opportunities are estimated to total 40,300 by 2026.

(b) Land use plan: The future spatial composition is expected to meet the requirements for the conservation of the natural environment and urbanization (Figure 3.4.3). The proposed land use plan delineates areas suitable for the use of agriculture, pasture and forestation with regard to the level of adaptability.



Source: Qeshm County master plan

Figure 3.4.3 Proposed Land Use Plan in Qeshm County Master Plan

(c) City and village hierarchy: Qeshm City will be the city with the largest population. Dargahan, Souza and Hormuz will be the secondary cities. Regional poles (main villages) will be promoted at 16 locations to provide service for villages in their surrounding areas (the so-called "associated areas" in the master plan) (Figure 3.4.4). Among 16 regional poles, Laft and Selakh will be new cities after the opening of the Persian Gulf Bridge. Laft, Baseidou and Hangom will be valuable cultural and natural heritage sites, which are competent for tourism.

Source: Qeshm County master plan

Figure 3.4.4 Proposed Spatial Structure in Qeshm County Master Plan

(d) Infrastructure development to support the proposed city and village hierarchy: The proposed infrastructure development includes new desalination plants and a water supply from the mainland. The sewage system should be developed in all cities and important villages. Independent power stations are recommended, with overproduction possibly transmitted to the national grid. Improvements are needed in the fishing ports located in Selakh, Souza and Baseidou. Links between cities and villages should be strengthened by upgrading a road network in the following sections: Qeshm-Dargahan-Laft; Qeshm-airport, Qeshm-Souza-Shibderaz; Laft-Kovarzin-Shibderaz.

(e) Social service development: The Ministry of Urban and Road Development specifies the planning standards for education and health facilities. The social service improvement was planned to comply with the planning standard.

The county master plan contains proposals that were inherited from the recommendations in the SWECO Master Plan and have subsequently become outdated. For instance, the case for a water supply from the mainland is no longer relevant nowadays, since the desalination plant has already been developed to satisfy the water demand on the island. However, the county master plan comprises valuable deliverables, such as the land use plan, along with the land suitability analysis, the envisaged city and village hierarchy and the social service improvement plan.

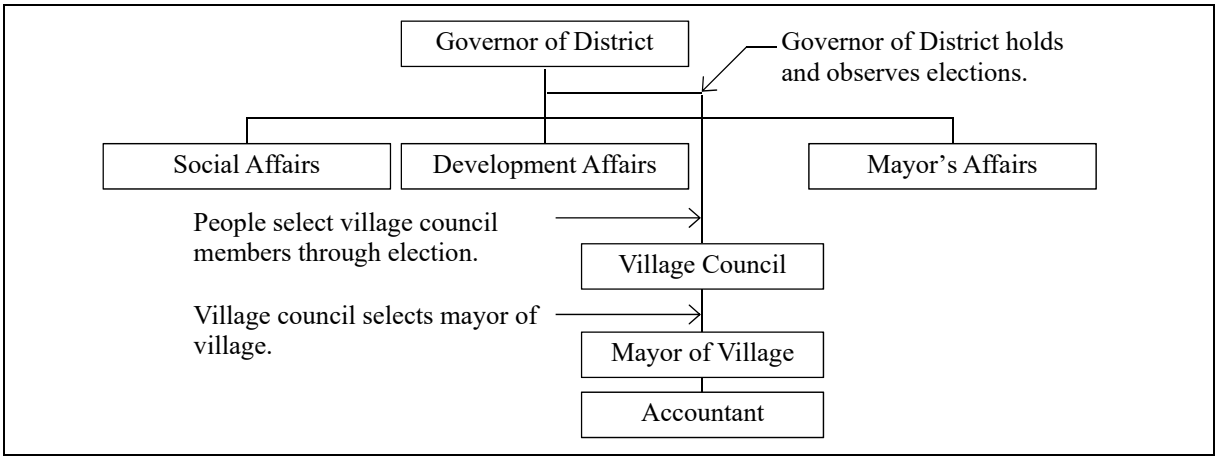
3.5 People's Lives

3.5.1 Organizational structure of community and cultural conservation

A village council plays an important role for community development. Its main responsibilities are to 1) select the mayor of the village from the villagers; 2) identify the social, cultural, educational, health, and economic needs of the villagers and find solutions; 3) follow directives from the mayor; 4) cooperate with the public sector; and 5) motivate the villagers to participate in educational, cultural, and social events. The district governor may instruct the village council on its activities of. The mayor selected by the council is responsible for implementing the directives given by the village council.

The village council is also responsible for managing the direction of the village's development. Participatory bottom-up approaches are considered to be required for the development of rural areas. Thus, small projects such as infrastructure, education, health, and livelihood activities should be promoted by such approaches with the participation of women's and youth groups and local NGOs. Application of participatory approaches will contribute to meeting the immediate needs of the local residents. By initiating and participating in consensus-building, the residents and other stakeholders will become involved in the implementation and management of development projects in their hometowns. In this way, participatory planning will contribute to strengthening the foundation of community development.

NGOs are an effective way to solicit collaboration from local people, but there is no local NGO that actively supports residents' activities in the island at present. Social organizations such as women's groups, youth groups, and elderly groups will be instrumental in negotiating, motivating, and organizing the communities.



Source: JICA Project Team

Figure 3.5.1 Organizational Structure of Village Council

At present, the island's cultural assets are identified and registered as national heritage. The Deputy of Cultural, Social and Tourism initiated activities to renovate traditional architecture, conserve the local culture, and raise public awareness about the island's identity by publishing books on the local history and beliefs. UNESCO registered the traditional skill to build and sail *Lenji* boats as an intangible cultural heritage. The people of Qeshm insist on following their tradition. Their custom was established in the long history of wars and disasters due to the geographical location of the island. The islanders inherit their tradition in clothes, weddings, worships, funerals, architecture, and handicraft. However, according to Imam of the island, divorces and narcotic smuggling have drastically increased in their number due to the extensive immigration to the island in 2016. To prevent the island's tradition and custom from vanishing, QFZO initiated the establishment of a cultural council in 2011. The council comprises members from the Ministry of Islamic Culture, Cultural and Tourism Heritage Organization, Islamic Promotion Organization, Imams, etc. This new council aimed at making policies

and plans through collaboration among those organizations overcoming administrative complexity. However the council has not been convened yet.

3.5.2 Individual interview survey among villagers

A socioeconomic baseline survey was conducted by the JICA Project Team in cooperation with Hormozgan University from April to May 2016 in order to collect information on various aspects of people's lives on Qeshm Island. The survey took the form of an interview survey among selected individual villagers and key informants from each village. Table 3.5.1 presents the results of the interview survey among individual villagers by rural district. The village-specific tables are shown in the Appendix of this interim report. The findings are summarized as follows:

- The average number of household members is 4.6 in Qeshm, ranging between 4.1 and 5.1.
- The average number of bread earners in a household is 1.2. Those in Hangom and Doulab are high at 1.8 and 1.4 respectively.
- In terms of the main source of income, being employed in an office is the highest at 36% followed by fishing at 22%. The proportion of fishing is high in Hangom, Selakh and Souza (33%, 35% and 33%). Farm labor is 12%, while farming is at 1%, indicating that working on another person's farm results in more income than farming on one's own land.
- The strongest relation with nature is groundwater at 54%, followed by trees, shrubs and mangroves at 38%, with fishing at 25%. Dependence on groundwater is especially high in Doulab, Hangom and Selakh. The Hangom people have a strong relation with nature through all these three elements.
- In terms of property, those owing houses rate highly, with an average of 82%; there are small variations among the rural districts. Motorcycles are owned by 66%, but with wider variations: the lowest is in Howe at 33% and the highest is in Ramkon at 86%. Cars are owned by 39% with some variations: the lowest is in Hangom at 0% and the highest is in Doulab at 47%
- The two major sources of drinking water are water trucks (desalinated water) at 46% and rainwater at 34%. Tap water is partly available, but only in Howe, Ramkon and Souza, while other rural districts have no or almost no access to tap water.
- All the households interviewed use an absorbing well (technically, a leaching pit) for wastewater storage.
- Most of the garbage is collected by solid waste collection services (88%).
- There is almost a 100% access to a power supply.
- The level of satisfaction with education is high at 89% (satisfied and almost satisfied combined). The level of dissatisfaction is high in Souza at 37%. The problems that people see in education include the lack of adequate learning materials at 43%, the distance to school being too far at 30% and lack of capability among teachers at 18%.
- Those with experience of seeking paid jobs accounted for 58% on average, although the ratio was especially high in Ramkon, Selakh and Souza (75%, 68% and 74%, respectively). Most of those who were successful in getting paid jobs work in Qeshm (81%). The reasons that people cite for not being able to get paid jobs include lack of job opportunities (39%), lack of capability due to limited education (20%) and a lack of any special connections (20%).
- The information on annual income indicates that a huge disparity exists in terms of income levels on Qeshm Island. The proportion of the highest income level to the lowest income level was the largest in Howe at 750, followed by Ramkon at 617 and Doulab at 329. The disparities in other rural districts were smaller.
- The people who think their income level is sufficient accounted for 68% (sufficient and almost sufficient combined). However, there are more people in Selakh who think their incomes are not sufficient (68%).
- In terms of the marketing of products produced in villages, about two thirds of the people depend on themselves (67%), while, in Selakh, they depend more on traders (66%). The nearby town or village rates the highest as the place for selling one's products (67%).

- Self-sufficiency regarding food is generally high in Qeshm at 76%. In Selakh, however, the proportion of people who think that food is not sufficient accounted for 54%.
- The level of participation in civil-based organizations' (CBOs') activities and decision-making opportunities are low at 14% and 8%, respectively. The ratio for Ramkon was higher at 29% and 19%, respectively.
- There is a great difference in the perception toward disaster. While those people in Doulab, Hangom, Howe and Souza think that there is no or almost no risk of disaster, those who think that there is a risk accounted for 90% and 98% in Ramkon and Selakh, respectively. Earthquakes are cited as the main risk.
- There is a big difference in the perception toward the environment as well. The proportions of those who think that there is an environmental problem range between 0% and 99%. Air pollution is regarded as the main problem (45%), followed by water pollution (33%) and offensive odor (21%).
- In terms of the need for development, the highest need was in relation to the water supply at 28%, followed by healthcare at 27% and job opportunities at 19%. Almost all the other responses related to higher income. Economic issues, therefore, represent the largest concern for people given that job opportunities and other responses combined give the highest ratio at 39%.
- Those with the intention of changing job accounted for 43%. Those in Selakh and Souza were especially high at 67% and 62%, respectively. The dominant reason was low income (76%). The kinds of job that people expect to get in the future include working in construction (26%), tourism (21%), marine products (17%) and energy (9%). 27% answered with other responses, which included a higher income job, some kind of self-employed job (business, shop etc.), employment in a company or government, or simply any job other than the present one.
- Those who think that their lives have improved over the last 20 years accounted for 62% (this ratio combined improved significantly at 11% and improved a little at 51%). Those people who think that their lives have deteriorated accounted for 30%, although the ratio was especially high in Souza (42%), Selakh (40%) and Howe (34%).
- The ratio of those whose lives were disrupted by development was low at 5%; in Ramkon, however, it was higher at 12%.
- Those with housing problems accounted for 37%. Selakh was the highest at 76%. Those who think that their housing conditions have improved was 42%, with the highest in Ramkon at 57%.
- Those who think that they have been left behind, compared to other areas that have experienced development, accounted for 59%. The ratio was especially high in Souza at 75%, Selakh at 73% and Doulab at 71%.
- The level of satisfaction with one's life was generally high at 69%.
- Nearly two thirds of the population are interested in the environment (64%), with the exception of the population of Hangom, where the ratio was 20%.
- Those who plan to move to other areas accounted for 12%. The ratios were higher in Souza (29%) and Selakh (21%).

Table 3.5.1 Condition of Villages by Rural District Clarified by the Socioeconomic Baseline Survey

Item			Name of rural district						Qeshm
			Doulab	Hangom	Howe	Ramkon	Selakh	Souza	
1. Number of samples collected			133	10	132	145	102	73	595
2. Information on household	2.1 Number of members per household		4.1	4.3	4.3	5.1	4.7	5.1	4.6
	2.2.1 Number of breadwinners per household		1.4	1.8	1.1	1.1	1.1	1.1	1.2
	2.2.2 Main source of income (%)	(1) Farming	1	0	1	2	2	0	1
		(2) Livestock raising	6	17	9	8	9	23	10
		(3) Fishing	25	33	14	7	35	33	22
		(4) Hunting	5	8	9	5	7	2	6
		(5) Trading	6	0	0	1	0	0	2
		(6) Farm labor	8	0	14	17	7	14	12
		(7) Other labor work	1	17	1	1	2	1	2
		(8) Handicraft	0	0	0	1	3	1	1
		(9) Collecting forest products	12	0	11	14	7	2	10
		(10) Employed at an office	37	25	40	44	29	23	36
		(11) Other	0	0	0	0	0	0	0
		Total	100	100	100	100	100	100	100
3. Type of natural resources used (% to the number of samples)	(1) Groundwater		78	100	29	41	81	38	54
	(2) Tree, shrubs, mangrove etc.		61	80	8	44	58	4	38
	(3) Wild animals		1	0	1	2	0	0	1
	(4) Fishing		44	80	4	16	51	1	25
	(5) Farming		2	0	4	0	0	0	1
	(6) Reforestation		0	0	3	0	0	0	1
	(7) Domesticated animals		0	0	0	0	0	0	0
	(8) Other biological resources		0	0	0	0	0	0	0
4. Property owned (% to the number of samples)	(1) House		73	80	80	88	87	79	82
	(2) Barn		5	0	4	5	3	0	4
	(3) Shop building		17	10	8	12	12	5	11
	(4) Boat		16	50	9	5	22	12	13
	(5) Car		47	0	36	46	36	29	39
	(6) Motorcycle		71	80	33	86	63	63	66
	(7) Computer		0	0	0	0	0	0	0
	(8) Other		1	0	0	14	1	0	4
5. Source of drinking water (%)	(1) Dug well		1	0	1	0	5	0	2
	(2) Dug well with desalination		1	0	0	0	14	0	4
	(3) Rain Water		40	44	24	39	38	13	34
	(4) Tap water (desalinated and supplied)		0	0	17	12	1	26	8
	(5) Tap water (other)		13	0	3	3	3	0	6
	(6) Water truck(desalinated water)		41	56	56	46	39	61	46
	(7) Other		3	0	0	0	0	0	1
	Total		100	100	100	100	100	100	100
6. Type of latrine (%)	(1) Absorbing well (pit latrine)		100	100	100	100	100	100	100
	(2) Septic		0	0	0	0	0	0	0
	(3) Sewer		0	0	0	0	0	0	0
	(4) Other		0	0	0	0	0	0	0
	Total		100	100	100	100	100	100	100
7. Solid waste (%)	(1) Dump in the open field near our house		0	0	21	19	11	11	12
	(2) Dump in our garden		0	0	0	0	0	1	0
	(3) Collected by solid waste collection service		100	100	78	81	83	88	86
	(4) Segregate and sell valuable waste		0	0	0	0	0	0	0
	(5) Other		0	0	1	0	6	0	1
	Total		100	100	100	100	100	100	100
8. Access to power supply			99	100	100	100	100	100	100
9. Education	9.1 Level of satisfaction with education (%)	(1) Yes, satisfied	18	75	59	60	37	47	45
		(2) Almost satisfied	78	13	28	33	57	16	44
		(3) Not satisfied	4	13	14	6	6	37	11
		Total	100	100	100	100	100	100	100
	9.2 Problems with school (%)	(1) School is too far	25	0	40	38	11	50	30
		(2) The level of education is low due to lack of capability among the teachers	26	67	21	23	4	4	18
		(3) There are too many pupils/students in a class	3	0	0	14	11	0	6
		(4) There are no adequate learning materials	46	33	36	20	70	46	43
		(5) Other	0	0	2	6	4	0	3
		Total	100	100	100	100	100	100	100

Item			Name of rural district						Qeshm
			Doulab	Hangom	Howe	Ramkon	Selakh	Souza	
10. Paid Job	10.1 Those with experience of trying to get a paid job (%)		38	20	47	75	68	74	58
	10.2 Those who succeeded in getting a paid job (%)		34	50	34	75	16	28	42
	10.3 (1) (if successful): place of work (%)	(1) Tehran	0	0	0	0	0	0	0
		(2) Other cities outside Qeshm	0	100	32	1	36	100	19
		(3) In Qeshm	100	0	68	99	64	0	81
		Total	100	100	100	100	100	100	100
	10.3 (2) (if not successful): reasons (%)	(1) There are no job opportunities	3	0	73	52	9	86	39
		(2) His/her capability level is too low due to limited educational background	74	0	15	14	14	2	20
		(3) His/her capability level is too low due to limited opportunities for skilled training	6	100	5	10	10	5	8
		(4) His/her work experience is limited	3	0	3	12	23	2	12
		(5) He/she had no special connections	10	0	5	5	43	5	20
		(6) Other	3	0	0	7	1	0	2
		Total	100	100	100	100	100	100	100
11. Household income (IRR in millions/year)	11.1 Annual income (IRR in millions/year)	Average	314.3	167.0	228.5	242.9	157.2	128.7	236.4
		Maximum	2,760.0	250.0	3,600.0	3,700.0	1,315.0	600.0	3,700.0
		Minimum	8.4	100.0	4.8	6.0	18.2	36.0	4.8
		Maximum/minimum	329	3	750	617	72	17	771
	11.2 Sufficiency of income (%)	(1) Sufficient	31	40	31	26	10	14	24
		(2) Almost sufficient	62	60	47	38	22	44	44
		(3) Not sufficient	7	0	22	36	68	42	32
		Total	100	100	100	100	100	100	100
12. Marketing products produced by villagers	12.1 Method of selling (%)	(1) By ourselves	79	75	80	98	32	55	67
		(2) Through trader	21	25	16	2	66	45	32
		(3) Other	0	0	4	0	2	0	1
		Total	100	100	100	100	100	100	100
	12.2 Place of selling (%)	(1) Market in nearby town/village	89	88	51	57	65	70	67
		(2) Market in a big town in Qeshm	4	13	39	9	19	9	16
		(3) Outside Qeshm	4	0	5	4	0	0	3
		(4) Abroad	0	0	0	2	12	0	3
		(5) Other	2	0	5	28	4	22	11
		Total	100	100	100	100	100	100	100
13. Sufficiency of food	Sufficient		98	100	75	80	45	68	76
	Not sufficient		2	0	23	20	54	32	24
	Total		100	100	100	100	100	100	100
14. Participation in CBOs	14.1 Those participating in any CBO activities (%)		15	0	9	29	9	4	14
	14.2 Opportunity to participate in discussions about village's development (%)		2	0	4	19	9	3	8
15. Land ownership	15.1 Those owing land (%)		62	60	21	86	88	21	58
16. Disaster and environment	16.1 Those who think disaster risks exist (%)		7	0	7	90	98	1	42
	16.2 Kind of disaster risk (%)	(1) Flood/inundation	0	-	0	6	3	0	4
		(2) High tide	89	-	0	1	0	0	4
		(3) Wind	0	-	0	0	2	0	1
		(4) Earthquake	11	-	100	92	95	100	91
		(5) Landslide	0	-	0	0	0	0	0
		(6) Other	0	-	0	1	0	0	0
		Total	100	-	100	100	100	100	100
	16.3 Those who think environmental problems exist (%)		1	0	27	41	99	18	35
	16.4 Kind of environmental problem (%)	(1) Offensive Odor	0	-	27	44	9	54	21
		(2) Air pollution	0	-	24	50	50	0	45
		(3) Water pollution	100	-	39	4	41	38	33
		(4) Noise	0	-	0	0	0	0	0
		(5) Other	0	-	9	1	0	8	2
		Total	100	-	100	100	100	100	100

Item			Name of rural district						Qeshm
			Doulab	Hangom	Howe	Ramkon	Selakh	Souza	
17. Needs for development	Issues with highest priority (%)	(1) Water supply	13	10	44	11	42	47	28
		(2) Education	11	10	13	21	13	3	13
		(3) Healthcare	35	10	31	28	21	18	27
		(4) Agriculture	3	0	1	0	1	3	1
		(5) Livestock raising	0	0	0	0	2	0	0
		(6) Job opportunity	36	70	11	14	4	29	19
		(7) Road	1	0	0	0	1	0	0
		(8) Other	2	0	0	26	16	1	10
		Total	100	100	100	100	100	100	100
18. Future job	18.1 Intention to change the job (%)		20	10	30	50	67	62	43
	18.2 Reason for changing job (%)	(1) Income is too low	42	0	97	57	80	93	76
		(2) Poor living condition in the village	32	100	3	36	10	7	17
		(3) To follow family or relatives	5	0	0	0	2	0	1
		(4) Other	21	0	0	8	7	0	6
		Total	100	100	100	100	100	100	100
	18.3 Kind of job expectation for the future (%)	(1) Tourism-related job	21	0	5	13	43	0	21
		(2) Marine products-related job	58	0	24	5	10	31	17
		(3) Energy-related job	0	0	0	17	7	0	9
		(4) Construction-related job	4	0	38	39	10	46	26
		(5) Other	17	100	33	25	31	23	27
		Total	100	100	100	100	100	100	100
19. About life	19.1 Improvement in life in the last 20 years (%)	(1) Improved significantly	4	0	2	26	18	1	11
		(2) Improved a little.	69	100	50	50	43	24	51
		(3) Same as 20 years ago.	0	0	14	6	0	32	8
		(4) Deteriorated	27	0	34	18	40	42	30
		Total	100	100	100	100	100	100	100
	19.2 Any disruption due to development		0	0	3	12	4	7	5
	19.3 Housing	19.3.1 Those suffering from housing problems (%)	11	20	32	42	76	33	37
		19.3.2 Those whose housing condition has improved in last 20 years (%)	31	0	46	57	30	48	42
	19.4 Development compared with other areas	Those who think they are left behind in relation to other areas experiencing development (%)	71	0	56	35	73	75	59
	19.5 Satisfaction with life	Those who are satisfied with their lives (%)	57	80	73	68	80	71	69
	19.6 Interest in the environment	Those interested in environmental issues (%)	56	20	53	74	79	67	64
	19.7 Plan for moving	Those who plan to move to another place in the future (%)	8	10	5	8	21	29	12

Source: JICA Project Team

3.5.3 Results of key informants survey

(1) Howmeh Rural District

In the past, the district was covered with fertile soil suitable for agricultural production and animal husbandry. In recent years, however, most agricultural production, besides palm cultivation, has declined due to lack of water. The recovery and rebuilding following the earthquake in 2004 has been delayed in central villages such as Tonbon and Kovarzin. Life in these villages has improved recently, but the people are hopeful of greater income and employment opportunities.

(2) Souza Rural District

In the past, agricultural production had been prosperous by utilizing fertile soil effectively, but the recent lack of water has caused almost all of the agricultural industry, except palm production, to decline. Since the village is located within an FZ area, there are severe restrictions on building height,

which prevents these villages from being developed. In the villages of Direston and Shibderaz, the focus is on the tourism sector, such as dolphin watching and sightseeing cruises to Hangom Island. On the other hand, migration to other villages and a decrease in the population are also occurring due to a lack of employment opportunities.

(3) Ramkon Rural District

The reasons for development in this district include the abundance of water for agriculture and fertile soil. Local people have become increasingly dissatisfied with the lack of employment and low income levels recently. They also expect further improvements in their living standards.

(4) Hangom Rural District

When Hangom was under Arab rule, the district functioned as a significant location from the point of view of controlling smugglers. In the immediate post-Arab era, it became a defensive location against attacks by Arab countries. The island was then left deserted for a period until the recent population increase due to the development of the tourism sector. Tourist attractions include handmade crafts, such as shell work, dolphin watching and silver beaches.

(5) Selakh Rural District

In the past, agriculture and fisheries flourished by taking geographical advantage of the coastal area and fertile soil in this district. However, these industries deteriorated due to a severe lack of water. The tourism sector, utilizing natural resources such as the mangrove forests, has developed in Sohli, Tabl and Noghasha. In Selakh, the local people are trying to facilitate an aquaculture in order to generate new employment opportunities.

(6) Doulab Rural District

In the past, the district was considered as a summer resort on Qeshm as it took advantage of the coastal area and the crest of the hill as a cool spot. In addition, an abundant water supply had promoted agriculture due to fertile soil. However, a subsequent lack of water and salt damage have mostly turned the fertile soil into barren soil. On the other hand, there are many palm trees around the district, which are the source of the main agricultural products in the district. The palm trees, however, together with the hilly nature of the surrounding area, are restricting the extent of the residential area. Local people are engaged in husbandry with camels and goats.

Table 3.5.2 Major Rural District Issues

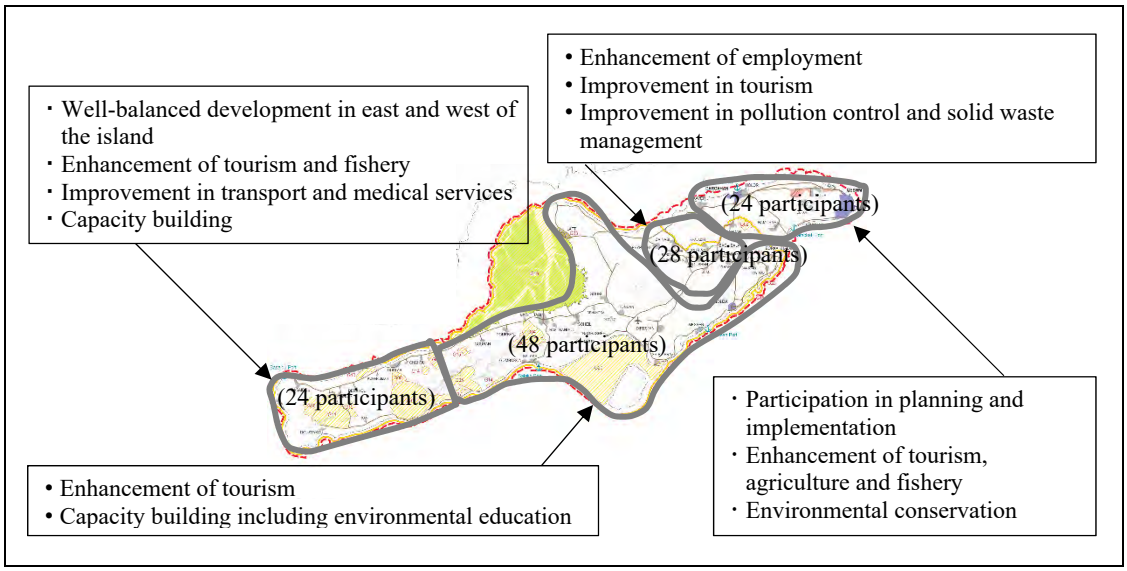
	Infrastructure	Education	Health
Howmeh	• There are problems with unpaved roads, lack of water pipes and gas pipes	• Since there is no high school in most of the villages, the students have to go to Tabl or Holor to attend high school	• Most of the villagers need to go to Laft or Qeshm for medical treatment due to low-quality medical facilities in their village
Souza	• Low-quality paved roads	• Low-quality educational facilities and ineffective teachers due to lack of public funds	• Since there are only a few clinics where the patients can receive sufficient medical treatment, they need to go to Qeshm or other villages • Poor quality of drinking water
Ramkon	• Low quality paved roads • Weak communications infrastructure (such as the Internet and telephone calls) • Poor electricity supply capability • Gas pipeline has not been installed yet	• Poor quality of teachers • Absolute shortage in the number of teachers and classrooms in comparison to the number of students • Female students quit attending school due to the lack of schools for girls	• Since there are many villages which do not even have medical clinics, the local people need to go to Qeshm or other villages for medical treatment • Problems associated with stray dogs, drug addiction and illegal dumping • There are also some villages that are negative impacted, to a severe extent, by air pollution, which is caused by soot and smoke from cement factories
Hangom	• Lack of drinking water and means of telecommunications	• Low-quality educational facilities	• Local people need to go to Qeshm to receive high-quality medical treatment because Hangom only has local clinics.
Selakh	• Low-quality paved roads • Lack of gas pipelines, floods during rainfall due to no drainage and side ditches	• Low-quality educational facilities and ineffective teachers • Parents and their children not interested in education • Need to travel to a different village in order to attend a higher-level educational facility	• Infectious diseases due to poor quality of drinking water • Some young people have a drug dependence High level of maternal mortality due to a lack of clinics and the low quality of existing clinics • In urgent cases, local people need to go to Qeshm or Tabl to receive high-quality medical treatment
Doulab	• Low-quality paved roads • Limited service area for the Internet and telecommunications	• Low-quality educational facilities and ineffective teachers • Need for local students at most of the villages to travel to Doulab to attend high school	• In urgent cases, local people need to go to Doulab or Qeshm due to the lack of medical treatment facilities

Source: JICA Project Team

3.5.4 Development needs expressed by villagers' representatives in the workshops

The QFZO and the JPT convened the workshop for the representatives of the villages to identify their needs in December 2015. The Project Area was divided into four regions. The workshop was held in each region and 124 representatives participated.

Figure 3.5.2 sets out major needs expressed by the participants in each region. Those were primarily to improve job opportunities in tourism, fishery and agriculture, which are the main livelihood sources for villagers. They pointed out the lack of environmental management including environmental education, solid waste management and pollution control. They requested improved participation by villagers in planning and implementation. Participants in the western region expressed a high demand for balanced development between eastern and western regions, especially in terms of transport and medical services.



Source: JICA Project Team.

Figure 3.5.2 Needs Identified by Villagers' Representatives in Workshop

3.5.5 Planning issues from the public's perspective

The socioeconomic baseline survey clarified both the positive and negative aspects of people's lives in Qeshm. On the positive side, many people think that their lives have somewhat improved in the last 20 years (62%) and that they are satisfied with the present states of their lives (69%). The fact that most people in Qeshm (91%) live in places from where they originally came, while those who plan to move to other places only account for 12%, despite some difficulties in the rural way of life, indicates the attachment that many people have to their villages. On the negative side, many think that they have been left behind compared to other areas that have experienced development (59%) and express the need for development in some public services and the economy.

The important issues to be addressed for upgrading the villagers' lives are: (i) the creation of job opportunities in rural areas, (ii) an improvement in some public services, (iii) an improvement in environmental conditions and (iv) a mechanism for participation.

(a) Creation of jobs in rural areas: The creation of job opportunities and raising income levels represent is the highest need among those surveyed. A number of factors, such as a decrease in agricultural activities due to lack of water and urban-centered economic development, has resulted in a disparity in income levels and created a sense of being left behind, compared to other areas, among villagers. Creating jobs in villages is important, especially considering villagers' strong attachment to their villages. The large-scale development planned on Qeshm in the energy and transportation sectors, such as in the form of the Persian Gulf Bridge, should be viewed as an opportunity to provide more jobs for villagers. Linking this large-scale development and community livelihood development would be key in this sense.

(b) Public services: In terms of the need for public services, water and healthcare services are the most important when it comes to related issues. An expansion of the water supply system to replace water trucks and rainfall as water sources are necessary. Access to and upgrading the service level of healthcare services is an important issue for villagers, as well as the whole of Qeshm. Electricity is not a problem since access to electricity is almost at 100%. Education is not an urgent issue, either. While sanitation was not cited as a problem by the people, it may become an important issue in the future with an increase in the population in areas with limited capacity.

(c) Environment: People are conscious about the environment on Qeshm, as indicated by the finding of the socioeconomic survey that 64% were interested in the environment. The environmental problems pointed out by those surveyed included air pollution, water pollution and odor. The opinions collected from villagers during the initial stage of the pilot project formulation process indicate that issues such as *Prosopis juliflora* elimination and recovery of farmlands are of a high degree of interest to them. Proper environmental management would be needed, not only from the macroscopic view, but also from people's ground-level perspective.

(d) Mechanism for participation: Election of city and village council members took place in the island and Iran in 2008. The election has contributed to social activities in both cities and villages to some extent. Apart from the election, there is no mechanism for local community members to participate in planning and implementing development projects in their hometowns. The proportions of those participating in CBO activities in the villages and decision-making processes concerning village development were only 14% and 8%, respectively. People's perception toward the QFZO is not necessarily favorable. To guide development activities in the coming years, in such a way as to create linkage between large-scale development and livelihood development among the people, a stronger consultation and coordination mechanism should be established.

3.6 Problem Structure Analysis

(1) Analytical procedure

The existing conditions on Qeshm Island have been analyzed by sector, while an environmental baseline survey has been undertaken as part of the JICA Study. Various problems facing Qeshm Island have been identified in different sectors and localities. Many of these problems are interrelated, such that they lead to the undesirable phenomena as observed at present. A problem structure analysis is a method to clarify these interrelationships in a macroscopic way. The analysis, usually undertaken during the initial stage of development planning, would allow for a broad perspective, without getting into details, to enable the identification of more essential factors and major problems, which can be alleviated through planned development efforts. The analysis is used to define development objectives and a basic strategy for development on Qeshm Island.

(2) Problem enumeration

As the first step of the problem structure analysis, problems facing Qeshm Island are enumerated. Early results from the fieldwork, which included consultations with stakeholders and field surveys, were utilized to enumerate as many problems as were perceived by the stakeholders and observed by the JPT. A few problems were added by the JPT from a macroscopic point of view. All the problems that were enumerated are listed below.

Some of these problems have been combined to define a broader problem expressed in generic way. For example, poor access to medical facilities and lack of equipment at clinics in the health sector have been combined to define a broader problem of limited access to quality medical services. In the education sector, lack of schools for girls and insufficient teachers of good quality have been combined to define a broader problem expressed as shortages in education staff and facilities. Some relatively minor problems are excluded from the analysis. All the problems defined for the purposes of the problem structure analysis are listed in Table 3.6.1.

Table 3.6.1 Major Problems Facing Qeshm Island Identified by Consultation with Stakeholders and Field Surveys

Category	Major problems
Economic problems	1. Lack of proper training opportunities
	2. Lack of technical education institutes
	3. Insufficient tourism facilities
	4. Poor quality of local handicrafts
	5. Insufficient markets, cold storage and ice plants for fisheries
	6. Illegal trade of gasoline, electric appliances etc.
	7. Decline of agriculture
	8. Lack of viable SMEs
	9. Limited processing of fishery and other primary products
	10. Weak economic links between the east and the west
Institutional problems	11. Weak capacity regarding developmental and environmental management
	12. Lack of a comprehensive and strategic development plan
	13. Weak enforcement of environmental regulations
	14. Uncontrolled inward migration from the mainland
	15. Lack of collaboration between villagers and the government
Social problems	16. Insufficient employment opportunities
	17. Limited access to quality medical services
	18. Shortage of education staff and facilities
	19. Insufficient sporting and recreation facilities
	20. Underutilization of traditional skills and wisdom
	21. Diminishing active traditional society

Category	Major problems
Infrastructure problems	22. High water prices
	23. Unreliable and unstable power supply
	24. Lack of interdistrict public transport
	25. Inadequate road conditions in rural areas
	26. Inadequate coastal area development: jetties, ports, roads etc.
Environmental problems	27. Drawdown of groundwater tables
	28. Degrading environmental quality
	29. Inadequate sewage treatment
	30. Beach destruction by sand collection
	31. Lack of sizable greenery
	32. Degrading wind towers
	33. Inadequate solid waste management
	34. Proliferation of harmful exotic plant species
	35. Degradation of mangrove forests
	36. Degradation of native plant species
	37. Inadequate fishing practices
	38. Degrading marine resources
	39. Water pollution by industries and desalination plants
	40. Discharge of diesel by smugglers
	41. Limestone extraction
	42. Increasing threat to floods in urban areas
Inherent problems	43. Extremely limited local water resources
	44. Climatic changes

Source: JICA Project Team

(3) Problem structure

Having identified all the major problems, a problem structure has been constructed as shown in Figure 3.6.1. In the figure, more important problem factors and phenomena are shown, expressed in generic terms to imply many detailed or sector-specific problems. The figure also shows causal relationships between the identified problems, focusing only on the main interrelationships. The problem factors, which are at the root of many interrelated problems and the observed problem phenomena, are described below.

Problem factors

Two inherent problems at the root of many problems are climatic changes and extremely limited local water resources. The climatic changes cause the drawdown of groundwater tables. These problem factors result in many undesirable problems in environmental and economic terms, including a lack of sizeable greenery, the proliferation of harmful exotic plant species, such as *Prosopis juriflora*, which can extract deep groundwater to aggravate water availability, and the decline of agriculture, as shown in Figure 3.6.1.

Another fundamental problem factor is the weak capacity regarding developmental and environmental

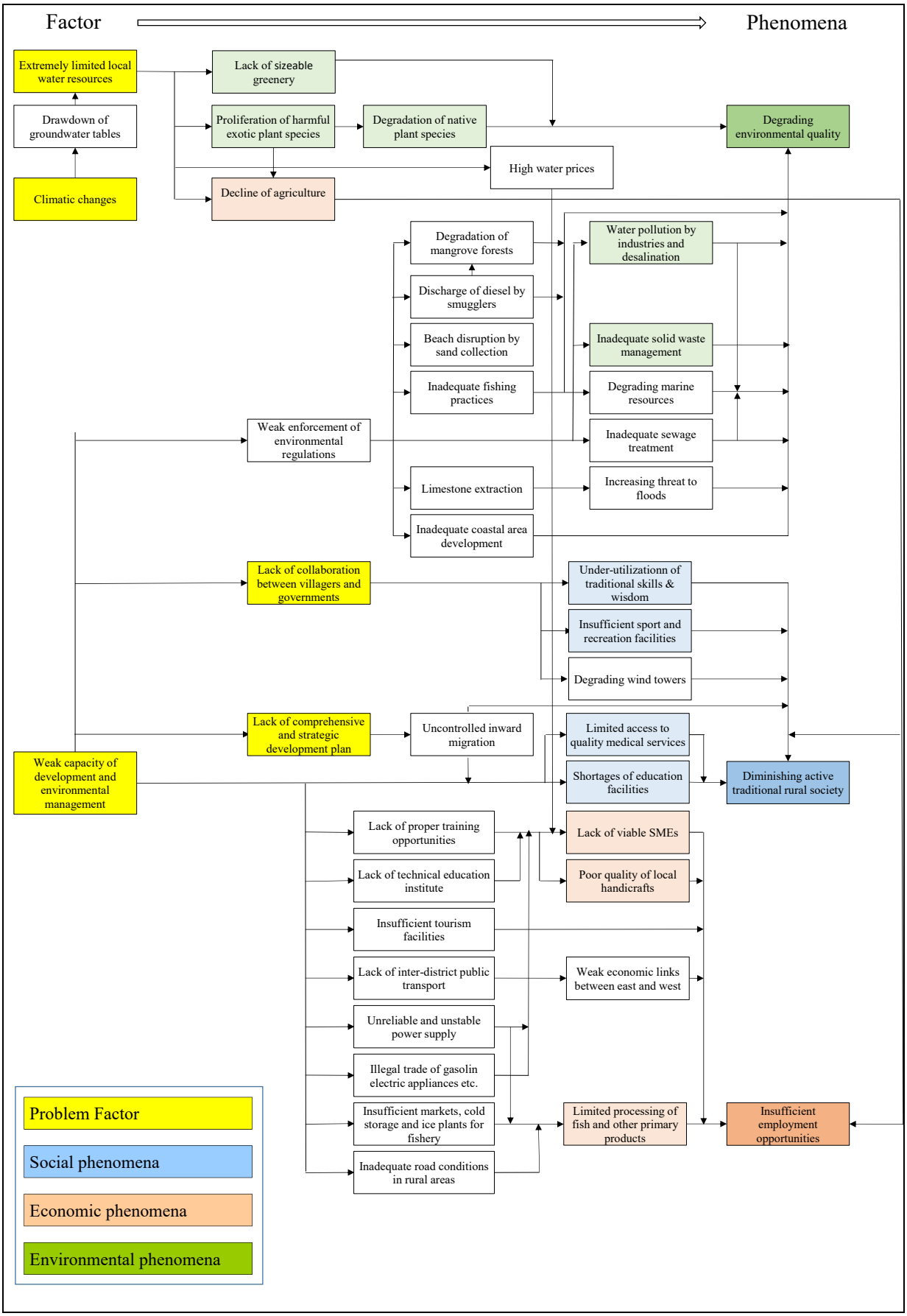
management, which reflects the lack of collaboration between villagers and governments, as well as the lack of a comprehensive and strategic development plan. Another related problem is the weak enforcement of environmental regulations, which causes a wide range of undesirable practices, as shown in Figure 3.6.1.

Problem phenomena

Three broad problems may be identified, which should be alleviated through planned development efforts: namely, economic, social and environmental problems. Economic problems are represented by insufficient employment opportunities, the lack of viable SMEs, the poor quality of local handicrafts, and the limited processing of fish and other primary products. The first problem will become increasingly more important as the population on Qeshm is expected to continue increasing rapidly due to inward migration from the mainland.

Social problems are represented by a diminishing traditional rural society, which is caused, among others, by the underutilization of traditional skills and wisdom, insufficient sport and recreation facilities, limited access to quality medical services, and shortages in education facilities. These problems will also become more serious with the increasing levels of inward migration.

Environmental problems are expressed in terms of degrading environmental quality, which has several aspects: namely, the lack of sizeable greenery, the degradation of native plant species, water pollution by industries and desalination, and inadequate solid waste management as shown in Figure 3.6.1.



Source: JICA Project Team

Figure 3.6.1 Problem Structure for the Development of Qeshm Island

3.7 Planning Issues

A master plan for the conservation of community livelihood and natural resources for 2035 (the ECO-QESHM Master Plan) should be formulated to meet the planning issues listed below. They are derived from the findings from discussions, technical analyses and surveys.

(1) Environment

(a) Preparation of a comprehensive development plan – The QFZO will revise the SWECO master plan in order to achieve the sustainable development of the island through effective use of the natural environment, as well as human resources in social and cultural terms. The ECO-QESHM Master Plan will be the milestone to pursue the best development alternatives in a well-balanced management of environmental, economic, social and human resources.
(b) Effective use of limited resources – The island has deposits of natural gas and oil in inland areas and in the surrounding waters. As these fossil fuels are not limitless resources, they should be used wisely on the island in the long term, rather than consuming them for economic reasons in the short term.
(c) Enhancement of the green area – The green area of dates and fruit trees was emblematic of the island in the old days. Exotic species have caused the deterioration of the original plants. Efforts should be made to eliminate exotic species, while expanding the green area.
(d) Application of an EIA – An EIA should be carried out in advance of making decisions concerning project implementation. The mitigation measures and monitoring should be studied. The environmental impact should at least aim to fulfill the related environmental standards, although a higher standard is recommended with the use of modern technology, which will be put into practical use in the near future.
(e) Environmental management – Wastewater and solid waste should be treated properly without causing any negative environmental impacts.

(2) Economy

(f) Creation of employment opportunities for residents – As the population is to grow in the coming years, employment opportunities must be created to support the livelihood of residents. The fishery and service sectors are currently the main industries with a large number of workers. The sustainable use of marine resources and terrestrial resources, as well as improvements in related processing and handicrafts, is fundamental to resolve this issue. Small and medium enterprises, along with local industry, should be encouraged to support the livelihoods of local people too.
(g) Pioneer of the green economy – The reformation of production patterns and consumption patterns is to be achieved to deliver a lower environmental impact and low-carbon industries. Industry should be encouraged to effectively use local resources, such as human, cultural, traditional and natural resources. This will be create a step in the right direction towards a resilient economy.

(3) Social

(h) Participation of women and youth – The Iranian Government is encouraging residents to proactively consider and take action under their own initiative. The participation of stakeholders, including women and youth, is essential in order to formulate practical plans and projects. Participation in the process of carrying out an EIA and a SEA is one approach, while dissemination information about these assessments is another approach.

(i) Conservation of culture and tradition – Each village has a local culture and tradition, as represented by clothes, architecture and handicrafts. These forms of traditional knowledge, skills and lifestyles should be conserved. For the establishment of the free zone, the use of resources such as budget, time, and workforce has been concentrated on infrastructure development and public services. Cultural issues have not been taken as a primary subject because speed is the most vital factor in the development of the free zone. The priority of projects is determined by the managers to comply with their roles within their limited assignment periods. Cultural aspects are left out as an unurgent issue. Cultural surveys are rarely conducted in large-scale projects. For instance, only one has been observed in the Persian Gulf Bridge construction project. Be that as it may, considering cultural aspects in large-scale development projects is still a relatively new idea.

(j) Balanced development of the island – People's lifestyle changed as urbanization spread from the east to the west in the island. With the urbanization, more and better public facilities have been provided for the east than for the west. This gap needs to be filled by improving the public facilities in the west. However, attention should be paid to the conservation of the culture and tradition in the course of the development.

(4) Human resources

(k) Human resources development – Communication with the mainland, neighboring counties, and the global economy is key to revitalizing the island. Human resources should be developed in order to compete with the global economy in the form of higher education and training on modern technology.

(l) Promotion of research and development –The island is rich in natural biodiversity, culture and society, and mineral resources. These are its unique characteristics. Research and development should be carried out to identify the most innovative technology for the local industry and environmental management.

CHAPTER 4 STRATEGIC ENVIRONMENTAL ASSESSMENT

4.1 Application of Strategic Environmental Assessment

4.1.1 Aims of strategic environmental assessment

(1) SEAs as a new approach to development interventions

A SEA is a new approach to development interventions, which has been adopted in an increasing number of countries. A SEA is applied at higher levels of any development intervention, such as policy and program levels, compared to project-specific environmental assessments, such as initial environmental examinations and EIAs. Naturally, a SEA is applied at an early stage in a development intervention typically for the purpose of policy formulation and master planning.

A SEA assesses a wider range of possible impacts, both temporal and spatial, while project-specific environmental assessments mainly focus on marginal effects. That is, a SEA assesses the long-term, as well as the short- and medium-term, effects, along with effects on a larger geographic scale. A SEA is also applied to a wider scope of works, covering all different sectors and aspects that may be affected by any development intervention. In addition, an SEA assesses cumulative and complex effects.

In sum, a SEA represents the phase of effective planning for environmental development, where the environment is considered in its broadest sense. This is in sharp contrast to other economy-oriented developments, where environmental and social concerns are put on the sidelines at best. A SEA, on the other hand, puts environmental and social concerns in the foreground of development.

To satisfy all these conditions effectively, an SEA should be conducted by involving a wide range of stakeholders at an early stage in any development intervention. This is effected through (1) stakeholder meetings and (2) disclosure and sharing of relevant information.

(2) A SEA in an Iranian context

The Islamic Consultative Assembly formulated the fifth FYDP for the period from 2011 to 2015. The plan introduced a SEA with the aim of ensuring the reflection of the environmental aspects in the formulation of policy, planning and programming at national and regional levels, as well as by sector. The concept of the SEA is still new and its contents are not well defined. Meanwhile, in Iran, no regulation and technical standards have been officially established yet, even though the Department of Environment (DoE) has already finished draft SEA guidelines following the advice of the High Council of Environmental Protection. The fifth FYDP, however, demands an assessment of the environmental impact, which is predicted as a consequence of the implementation of development plans and projects, as well as monitoring of the impact.

The application of the SEA to the ECO-QESHM Master Plan is a prominent issue in the country. The long-term development of Qeshm Island should pursue a development path that reflects the sociocultural heritage that is unique to the island, as well as its natural environmental conditions. The SEA will be critical to the planning for long-term development. Due to its pioneering nature in Iran, the SEA for the ECO-QESHM Master Plan has a major didactic role to play. Therefore, the concepts and the methodology of implementing the SEA should be robust and clear enough to be understood, interpreted and eventually reproduced, in order to be of full benefit to the formalization and institutionalization of this planning tool in Iran.

4.1.2 Planning principle for the Eco-island

(1) Application of *satoyama* and *satoumi* principles

The objective of the Project is to formulate a master plan aimed at realizing the eco-island in a way that will satisfy three aspects: namely, the livelihood improvement of local residents, the conservation of natural resources and the development of an environmentally friendly island. While these three aspects complement each other, knowing how to materialize the best relationships between them is a challenge when it comes to formulating the ECO-QESHM Master Plan.

The *satoyama*[1] and *satoumi*[2] principles are applied to link these three aspects. *Satoyama* is an area where biodiversity is realized through human-nature interactions and encompasses a village and forests, farmland, ponds and grassland in its surrounding area. The biodiversity of *satoyama* has been enhanced and maintained through the efforts of villagers over a long period of time to minimize the use of artificial methods in the development of the environment, while establishing a livelihood based on agriculture, forestry and fishing. The *satoyama* initiatives were adopted at the 10th meeting of the Conference of the Parties to the Convention on Biological Diversity in 2010 in order to conserve the biodiversity and to use it in a sustainable manner.

A concept of integrated coastal zone management (ICZM) was adopted at the 1992 Earth Summit in Rio de Janeiro. ICZM aims to manage the entire material circulation from the territorial area to the marine area for conserving affluent and stable marine biodiversity by an integrated approach involving stakeholders, such as associations, the private sector and the general public along coastal areas. In line with ICZM, *satoumi* is a coastal area where biological productivity and biodiversity have increased through human-nature interactions.

(2) Application of an alternative socioeconomic development model

The *satoyama* and *satoumi* principles are counter to the idea of controlling the environment and resources for economic development. The latter approach has been pursued in most developed countries since the Industrial Revolution and throughout the 20th century. The 20th century development model focuses on economic efficiency through intensive consumption of natural resources, represented by the extraction and use of fossil fuel resources and mass production. It has often resulted in massive environmental and social problems, such as various types of pollution and social problems, epitomized by the degradation of rural societies and the alienation of urban residents.

The trends of economic globalization and free trade are recognized as inevitable for economic development. Economic globalization means the pursuit of economic efficiency on a worldwide scale and is therefore considered to be a necessary condition for the efficient use of limited resources. When economic globalization is pursued without consideration to the distribution of economic benefits and wealth, social problems, such as income disparities, will exacerbate.

It is now essential to pursue an alternative socioeconomic model, rather than continue to apply the 20th century development model. The new development model has recently been gaining increased recognition as a possible replacement for the 20th century development model. Attempts to apply this alternative model have been made in recent years in both developed and developing countries. The two development models are compared in Table 4.1.1.

[1] *Sato* means the area where people live, while *yama* means foothills or forests.
[2] *Sato* means the area where people live, while *umi* means the ocean.

Table 4.1.1 Comparison of Two Development Models

Index	20th century development model	Alternative socioeconomic model
Goal	Largest economic gains	Largest employment opportunities
History	Pursued by most developed countries since the Industrial Revolution	Sporadic attempts started recently in developing and developed countries
Resources	Abuse of natural resources to obtain more economic gains	Conservation of natural resources as capital for a sustainable society
Criterion	Economic efficiency	Social and environmental considerations
Technology	Advanced technology	Appropriate and intermediate technology*

* **Intermediate technology** is a term pioneered by Ernst F. Schumacher, describing something much more effective than "primitive" technology, but much less expensive and on a smaller scale than the technology used in mass production (source: Appropedia www.appropedia.org/Intermediate_technology).
Appropriate technology is technology that is designed to be "appropriate" to the context of its use. The most appropriate technologies are sustainable, small and appropriate to environmental, ethical, cultural, social, political and economic contexts (source: Appropedia, www.appropedia.org/Appropriate_technology).

Source: JICA Project Team

(3) Localization vs. globalization

In the globalizing economy, the localization model of development based on indigenous resources and local markets cannot work effectively on its own. In fact, such self-contained closed societies cannot exist under globalization for the following reasons.

When better products come in from outside and sold in the region at lower prices, no one can say that local products of low quality at higher prices should be bought instead. Another reason is that local products have to compete against products from other regions or countries that are still pursuing the 20th century development model. At least in the short term, local products would lose against such imported products produced in a more efficient way with more resources used and more waste generated.

Generally, four strategic alternatives are conceived for regional development by combining resources and markets as shown below.

		Market	
		Local	Export
Resources	Local	1	2
	Import	3	4

Alternative:
1: Import substitution
2: Export promotion
3: Import processing
4: Export processing

Alternative 1 corresponds to the localization model based on local consumption of local products, which may be applicable only to limited products. This alternative opposes current economic globalization. Alternative 3 is applicable when a local market is significantly large. Alternative 4 represents typical export processing, which does not automatically ensure the promotion of indigenous industries. For self-reliant regional development, Alternative 2 is the most valid. The key to success under this alternative is to create specialty products, which have export competitiveness.

The use of imported equipment and materials from neighboring countries is important in order to supplement the limited local resources on Qeshm. The market will not be limited to the island itself, but will also include the mainland and foreign countries. A possible alternative should effectively utilize Alternatives 1, 2, and 3 in proper combination.

4.1.3 Methodology of the strategic environmental assessment

Due to the absence of a national legal and institutional framework for SEAs in Iran, an original methodology, which is comprehensive and adapted to the context, had to be defined for the SEA of the ECO-QESHM Master Plan. This experimental methodology has been introduced to the QFZO and its implementation will allow for improvements to some operational and conceptual details related to environmental management.

(1) Methodological guideline sources

The following guidelines have been taken into account for the purpose of elaborating the methodology of the SEA.

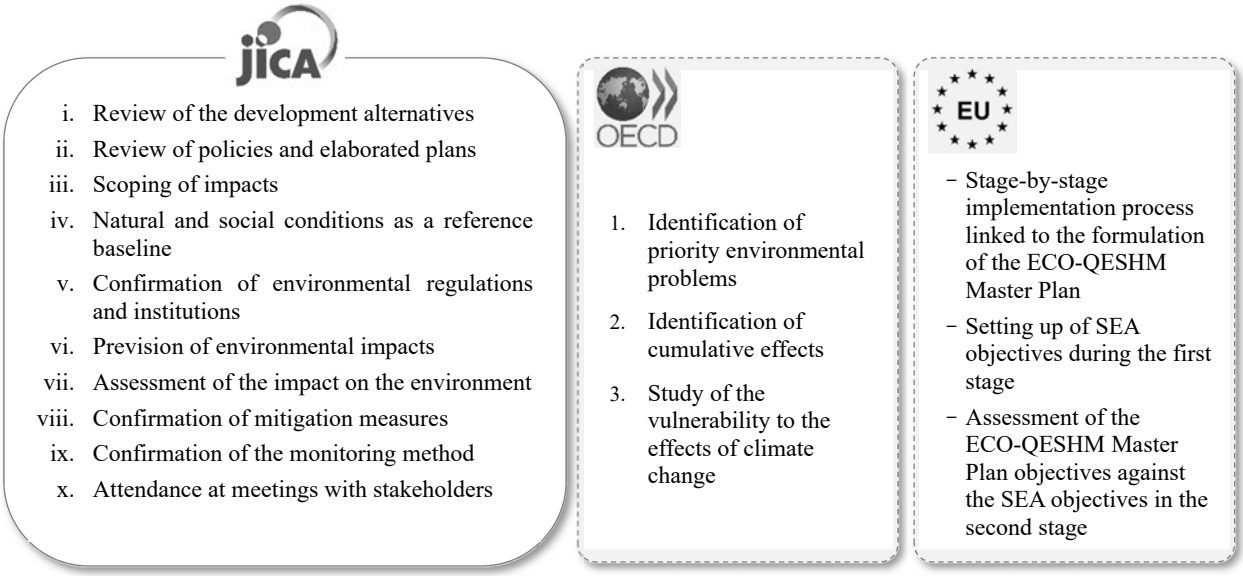
(a) The JICA Guidelines for Confirmation of Environmental and Social Considerations (hereinafter referred to as "the JICA guidelines") dated 2010. The 10 following components required by the JICA guidelines will be implemented in the SEA:
   i) Review of alternatives to achieve the objectives of the project
   ii) Review of the content of policies and elaborated plans
   iii) Implementation of scoping
   iv) Confirmation of natural and social conditions as a reference baseline
   v) Confirmation of environmental regulations and institutions
   vi) Prevision of environmental impacts
   vii) Assessment of the impact on the environment and review of the alternatives
   viii) Confirmation of mitigation measures
   ix) Confirmation of the monitoring method
   x) Attendance at meetings with stakeholders

(b) Guidelines of the Strategic Environmental Assessment of the OECD (hereinafter referred to as "the OECD guidelines") dated 2006, as a major reference for the establishment of an SEA legal framework in various countries. For regional development projects, the OECD guidelines indicate that any "SEA applied to spatial/regional plans or programmes provides an important recommendation to integrate sustainable development approaches within the decision-making process", as well as advocate in this framework the recognition of the following fundamental questions:
   i) What are the priority environmental problems in the area in question? Is there a danger that these problems could be exacerbated by the proposed programs/plans?
   ii) Have any relevant cumulative issues been taken into account?
   iii) Are the proposed developments likely to be vulnerable to the impacts of climate change?

(c) Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on "the assessment of the effects of certain plans and programmes on the environment" (hereinafter referred to as "the European SEA directive") and its explanatory guidelines, as a proven international reference and a major knowledge source regarding various aspects of strategic assessment. The implementation process, through different clear stages, the setting of SEA objectives and other aspects recommended in this directive, will be implemented in the SEA.

(2) Methodological framework

The methodological framework for the SEA, which takes into account the 10 components required by the JICA guidelines, the three principles outlined in the OECD guidelines described above and some structural aspects recommended by the European SEA directive, is presented in Figure 4.1.1.

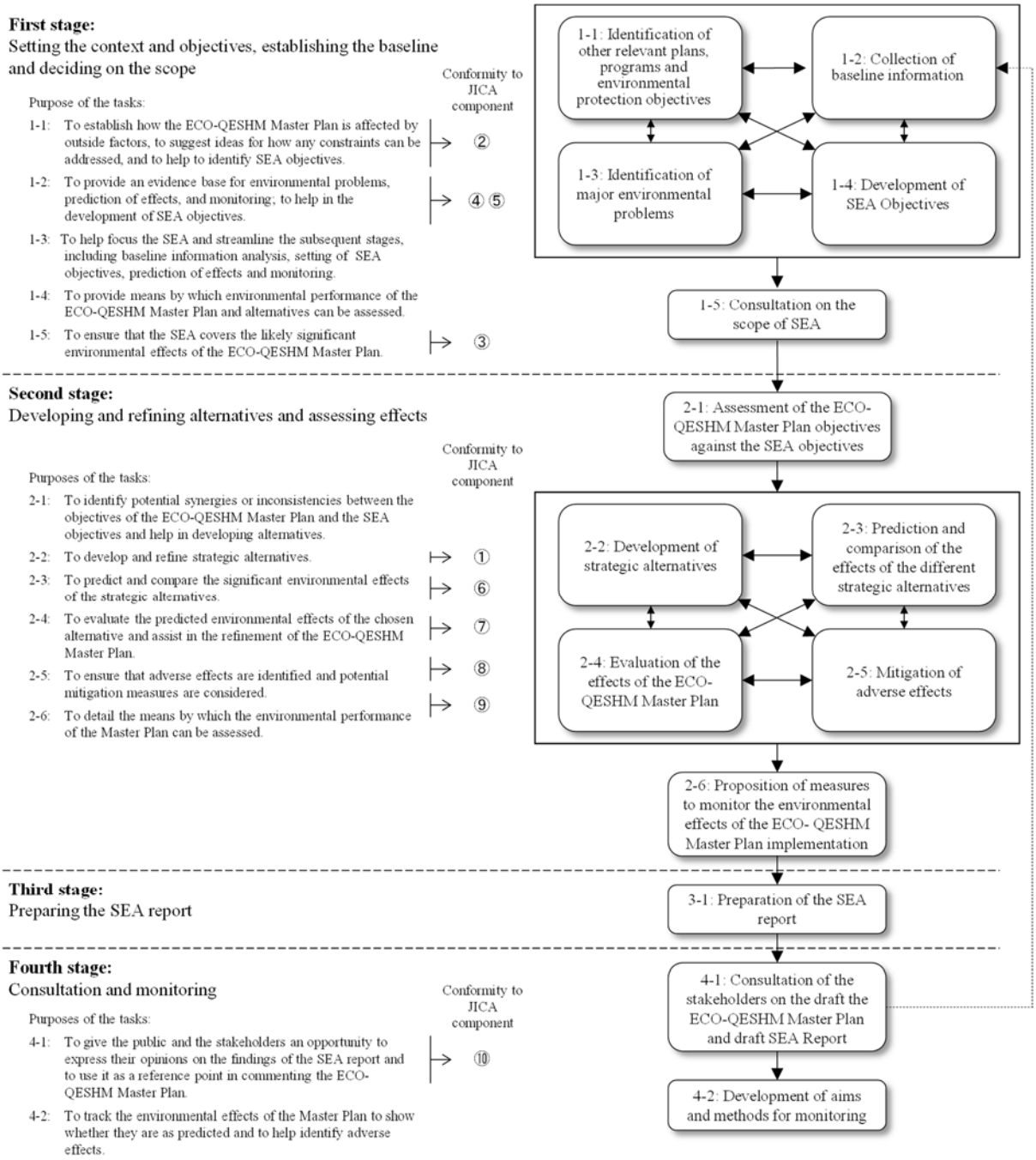


Source: JICA Project Team

Figure 4.1.1 Methodological Framework of the SEA

(3) SEA implementation process

Based on the European SEA directive guidelines, a stage-by-stage process is adopted for the implementation of the SEA. Figure 4.1.2 below summarizes the main stages in the SEA process, the purpose of each of the tasks, their relationships to each other and the conformity to JICA requirements.



Source: JICA Project Team, based on the European SEA directive

Figure 4.1.2 Strategic Environmental Assessment Implementation Process

With regard to the current progress status of the project, the drafting of the ECO-QESHM Master Plan, the SEA has been implemented to cover the period until the beginning of the second stage, namely, Task 2-3. Therefore, the current Interim Report will reflect the results of the SEA during the first stage (in Section 4.2) and the second stage until the start of Task 2-3 (in Section 4.3).

(4) Consultation with Stakeholders

A variety of technical meetings with relevant environmental agencies (e.g., DoE) and consultations with a large number of stakeholders have been planned and implemented with regard to the framework of the SEA. Tables 4.1.2 to 4.1.4 below respectively summarize the outlines of the first, second and third stakeholder consultation meetings implemented.

Table 4.1.2 Outline of First Stakeholder Consultation Meetings

First consultation meeting (first round in Doulab)	
Date	December 19, 2015 14:00-16:30
Venue	Meeting room of Qeshm International Incubator (Building No. 2)
Chairman	Saeed Baniamerian (Planning and Budget Manager, QFZO)
Participants	Eight representatives from villages including Baseidou, East Chahou, Derakou, Doulab, Doustakou, Gouri, Kani and Konar Sia
Major objective of the consultation	General presentation of the project, explanation of the procedure to select pilot projects and discussion about the vision of the eco-island for Qeshm Island
Major expectations and opinions	1. Expectation regarding the economy and quality of living conditions rather than conservation of natural resources 2. Expectation regarding tourism and fisheries to develop the economy 3. Wishes for well-balanced development on the east and west of the island 4. Need to improve quality of living conditions such as transport and medical service 5. Capacity building to realize these expectations and needs

First consultation meeting (second round in Dargahan)	
Date	December 20, 2015 14:00-16:30
Venue	Primary school
Chairman	Saeed Baniamerian (Planning and Budget Manager, QFZO)
Participants	Nine representatives from the cities of Qeshm and Dargahan and villages including Defari, Gouri, Hamiri, Holor, Kabeli, Kouvei, Ramchah and Tourgon
Major objective of the consultation	General presentation of the project, explanation of the procedure to select pilot projects and discussion about the vision of the eco-island for Qeshm Island
Major expectations and opinions	1. Willingness to participate in planning and implementation 2. Second highest interest in economic activities, such as tourism and agriculture, followed by fishery 3. Fourth highest interest in environmental conservation and water supply

First consultation meeting (third round in Tabl)	
Date	December 21, 2015 14:00-16:30
Venue	Tabl Community Center
Chairman	Saeed Baniamerian (Planning and Budget Manager, QFZO)
Participants	22 representatives of villages including Hangom, Laft, Tonbon, Dehkhoda, Dourbani, Gomboron, Gouron, Gouri, Haft Rangou, Melki, Noghasha, Selakh, Sohli, Tabl, Direston and Shibderaz
Major objective of the consultation	General presentation of the project, explanation of the procedure to select pilot projects and discussion about the vision of the eco-island for Qeshm Island.
Major expectations and opinions	1. Highest interest in tourism development 2. Willingness towards participation and employment of local people 3. Third highest interest in environmental education, capacity building and water supply

First consultation meeting (fourth round in Ramkon)	
Date	December 22, 2015 14:00-16:30
Venue	Ramkon Community Center
Chairman	Saeed Baniamerian (Planning and Budget Manager, QFZO)
Participants	12 representatives from the city of Souza and villages including Giadon, Peyposht, Bagh Bala, Bangali, Gorvodon, Jijiyon, Kardova, Khaladin, Kousha, Ramkon, Tourion, Zeinabi, Borka Khelaf, Mesen, Nakhl Gol, Rigoo and Zirong
Major objective of the consultation	General presentation of the project, explanation of the procedure to select Pilot Projects and discussion about the vision of the eco-island for Qeshm Island
Major expectations and opinions	1. Highest interest in participation of local people, especially employment 2. Second highest interest in hygiene (solid waste management) and tourism 3. Third highest interest in environmental conservation, as well as the removal of pollution and violation in society

Table 4.1.3 Outline of Second Stakeholder Consultation Meetings

Second consultation meeting (first round in Qeshm City)	
Date and time	March 14, 2016 10:00-11:50
Venue	Meeting room of Qeshm Incubator Center in Qeshm City
Chairman	Saeed Baniamerian (Planning and Budget Manager, QFZO)
Participants	14 representatives from villages including Doustakou, Dourbani, Moradi, Konar Sia, Shibderaz, Dehkhoda, Direston, Hangom, Laft, Holor, Defari, Gouri and Tomgez; two QFZO agents
Major objective of the consultation	Presentation of the outcomes of the first consultation meeting and the draft alternatives for a vision and spatial structure
Themes of discussion	1. Importance of economic activities 2. Insufficiency of job opportunities 3. Problem of water pollution due to wastewater 4. Decrease in agricultural and fishery activities 5. Environmental conservation

Second consultation meeting (second round in Sohli)	
Date and time	April 16, 2016 10:40-13:45
Venue	Branch building of the Sohli Geopark
Chairman	Saeed Baniamerian (Planning and Budget Manager, QFZO)
Participants	12 representatives from villages, including Kovarzin, Holor, Gouron, Gomboron, Ramchah, West Chahou, Dehkhoda, Aysheh-Abad, Laft, Rigoo, Zeinabi and Melki; eight QFZO agents.
Major objective of the consultation	Presentation of the outcomes of the first consultation meeting and the draft alternatives for a vision and spatial structure.
Themes of discussion	1. Tourism and traditional culture 2. Livelihood opportunities 3. Participation and cooperation 4. Fishery 5. Agriculture 6. Environmental problems 7. Balanced development

Table 4.1.4 Outline of Third Stakeholder Consultation Meetings

Second consultation meeting (first round in Qeshm City)	
Date and time	August 27, 2018 10:30-12:30
Venue	Branch building of the Sohli Geopark
Chairman	Zahra Mokhtari (Planning and Budget Department, QFZO)
Participants	Approximately 20 villagers from villages in western and central parts of the island
Major objective of the consultation	Presentation of the ECO-QESHM Master Plan
Themes of discussion	1. People's lives and needs 2. Economic activities for Qeshm Island 3. Development alternatives 4. Envisaged spatial structure and Vision 5. Proposed sector plans

4.2 First Stage of the Strategic Environmental Assessment: Setting the Context and Objectives

4.2.1 Identification of other relevant plans, programs and environmental protection objectives

This task will confirm the influence of other existing plans or programs, or external environmental protection objectives, such as those laid down in policies or legislation, on the ECO-QESHM Master Plan. These relationships enable the ECO-QESHM Master Plan to take advantage of potential synergies with previous studies and to deal with constraints and resolve any inconsistencies. Table 4.2.1 below summarizes the identification of other relevant plans, programs and environmental protection objectives. Given the specificity of Qeshm as an FZ, and due to the fact that one of the purposes of the future ECO-QESHM Master Plan is to review and correct the existing master plan, the focus here will be on the review of the specific propositions made by the SWECO Master Plan for Qeshm Island, rather than studying Iranian domestic laws and policies. In addition, according to the proposition of the High Council of Environmental Protection for Qeshm Island, the Sustainable Development Goals (SDGs), elaborated in 2015 by the United Nations and validated by the Iranian Department of Environment in 2016, will be taken into account as a main guiding framework for sustainable development.

Table 4.2.1 Other Relevant Plans, Programs and Environmental Protection Objectives

Other plan/ program	Environmental protection objective or requirement of another plan or program	How the objective or requirement shall be integrated in the SEA
SDGs (2015)	- Goal 1: end poverty in all its forms everywhere	- Integrate in SEA objectives (Task 1-4) the reduction of poverty (EMP-01)
	- Goal 2: end hunger, achieve food security, improve nutrition and promote sustainable agriculture	- Integrate in SEA objectives (Task 1-4) the promotion of sustainable agriculture (LOC-01)
	- Goal 3: ensure healthy lives and promote well-being for all at all ages	- Integrate in SEA objectives (Task 1-4) the protection of human health and healthy living (PHH-01)
	- Goal 4: ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	- Integrate in SEA objectives (Task 1-4) equal access to quality educational services (DIS-01)
	- Goal 5: achieve gender equality and empower all women and girls	- Integrate in SEA objectives (Task 1-4) equality and empowerment of women (GEN-01 and 02)
	- Goal 6: ensure availability and sustainable management of water and sanitation for all	- Integrate in SEA objectives (Task 1-4) equal access to water and sanitation (DIS-02 and 03)
	- Goal 7: ensure access to affordable, reliable, sustainable and modern energy for all	- Integrate in SEA objectives (Task 1-4) equal access to modern energy (DIS-04)
	- Goal 8: promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	- Integrate in SEA objectives (Task 1-4) sustainable economic growth (LOC-02), productive employment (EMP-02), sustainable tourism (LOC-04) and decent working conditions (EMP-03)
	- Goal 9: build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	- Integrate in SEA objectives (Task 1-4) equal promotion of sustainable industrialization (LOC-03)
	- Goal 10: reduce inequality within and among countries	- Integrate in SEA objectives (Task 1-4) the reduction of inequality (SOC-01)
	- Goal 11: make cities and human settlements inclusive, safe, resilient and sustainable	- Integrate in SEA objectives (Task 1-4) equal access to affordable transport systems (DIS-05) and housing (DIS-06)
	- Goal 12: ensure sustainable consumption and production patterns	- Integrate in SEA objectives (Task 1-4) the promotion of sustainable consumption and production patterns (WPR-03)
	- Goal 13: take urgent action to combat climate change and its impacts	- Integrate in SEA objectives (Task 1-4) action to combat climate change (CLI-01 and 02)
	- Goal 14: conserve and sustainably use the oceans, seas and marine resources for sustainable development	- Integrate in SEA objectives (Task 1-4) the protection of marine fishery resources (BIO-FF-01), marine water quality (POL-02) and the different coastal and marine ecosystems (BIO-ME series)
	- Goal 15: protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	- Integrate in SEA objectives (Task 1-4) the protection and the sustainable use of terrestrial ecosystems (BIO-TE-01)
	- Goal 16: promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective and inclusive institutions at all levels	- Integrate in SEA objectives (Task 1-4) the promotion of a peaceful society (SOC-05)
	- Goal 17: revitalize the Global Partnership for Sustainable Development	- Not applicable
SWECO Master Plan (1994) "Golden Rules of Environmental Considerations" (Volume No. 4, Section 1.2)	- Emphasize the need for prudence when assessing environmental effects, especially when they are irreversible	- Identify environmental trends before irreversible damage is caused (Task 1-2) - Insist on the avoidance of irreversible impact as a leading principle of the SEA (Task 1-4)
	- Recognize that the marine environment surrounding Qeshm Island represents a sustainable source of food, as well as a habitat of rich biodiversity	- Ensure that issues related to fishery resource and marine biodiversity are well studied (Task 1-2) and integrated in SEA objectives (Task 1-4) (BIO-FF-01)
	- Acknowledge that prevention is preferable and	- Insist on the avoidance of irreversible impact

	generally less costly than remedial actions, which may not always be possible	as a leading principle of the SEA (Task 1-4) - Promote prevention, reduction and offset of adverse effects at the stage of effect prediction and comparison of alternatives (Task 2-3)
	- Endeavour to ensure that projects with unavoidable adverse consequences for the environment are sited in areas where environmental damage is minimized, even at somewhat greater costs	- Integrate in SEA objectives (task 1-4) the prohibition of large-scale projects with unavoidable impacts on protected areas - Promote the use of various analyses (cost-benefit analysis, GIS suitability analysis) based on environmental values in the development of strategic alternatives (Task 2-2)
	- Require that the projects with unavoidable adverse effects on the environment should contain an adequate compensatory component	- Consider various and adequate ways of mitigating and compensating adverse effects (Task 2-5)
	- The QFZO will not accept projects that would cause severe or irreversible environmental deterioration without mitigation measures acceptable to the QFZO	- Insist on the avoidance of irreversible impact as a leading principle of the SEA (Task 1-4) - Consider acceptable mitigation measures for adverse effects (Task 2-5)
	- The QFZO will not accept projects that unduly compromise general public health and safety, for instance, the handling of certain chemical products using labor-intensive methods	- Introduce the consideration of human health and safety under the SEA topic "Population and Human Health" and integrate its preservation as an SEA objective (Task 1-4)
	- The QFZO will not accept projects that displace people or seriously disadvantage certain vulnerable groups, unless mitigation measures acceptable to the QFZO are undertaken;	- Introduce the consideration of population resettlement under the SEA topic "Population Resettlement" and integrate its avoidance as an SEA objective (Task 1-4)
	- The QFZO will not accept projects that contravene any international environmental agreement to which Iran is a contracting party, e.g., the Ramsar Convention on Wetlands	- Identify existing international environmental agreements signed by Iran, which are concerned with Qeshm Island (Task 1-2) - Introduce the consideration of a protected area under the SEA topic "Protected Area" and confirm its legitimacy in SEA objectives (Task 1-4)
	- The QFZO will not accept projects that significantly harm the environment of a neighboring country without the consent of that country	- Introduce the consideration of a large-scale transboundary environment under the SEA topic "Transboundary Environmental Issues" and integrate its preservation as an SEA objective (Task 1-4)
Geopark Master Plan (2009)	- Conserve geological heritage	- Introduce the consideration of geosites under the SEA topic "Protected Area" and promote its conservation in SEA objectives (Task 1-4)
Qeshm County Master Plan (2012)	- No specific environmental objective or requirement in this plan	- Not applicable

Source: JICA Project Team

4.2.2 Collection of baseline information

Baseline information provides the basis for predicting and monitoring environmental effects and helps to identify environmental problems and alternative ways of dealing with them. Both qualitative and quantitative information can be used for this purpose.

A baseline survey regarding natural conditions and socioeconomics has been undertaken (refer to Appendix) in order to collect baseline information, although the final report has not been submitted at the time of writing. The draft report needs to be improved in terms of quantitative information necessary to set up indicators and targets for SEA objectives. Discussions have been engaged with the consultant in charge of this survey and there is hope that the final report will offer more accurate information, which can be more beneficial to the SEA.

4.2.3 Identification of environmental problems

Identifying environmental problems is an opportunity to define key issues and improve SEA objectives. The identification of environmental problems should be based as much as possible on evidence related to baseline information, as well as on consultations with relevant agencies and stakeholders.

The identification of environmental problems was the subject of a special working session held with the relevant environmental authority, namely, the DoE, on January 27, 2016, although some comments for revision were received afterwards on February 13, 2016.

In order for the identification of the environmental problems to fully benefit the formulation of SEA objectives, several key strategic questions, as shown in Table 4.2.2 below, need to be answered.

Table 4.2.2 Strategic Themes and Questions for the Identification of Environmental Problems

Strategic theme	Strategic question
Intensity	How good or bad is the current situation in comparison with other environmental issues and other locations regarding the target area?
Trend	Do trends show that it is getting better or worse?
Sensibility	Are particularly sensitive or important elements of the respective environment affected, e.g., vulnerable social groups, non-renewable resources, endangered species and rare habitats?
Reversibility	Are the problems reversible or irreversible, permanent or temporary? How far off is the situation regarding irreversible impact?
Remedy	How difficult would it be to offset or remedy any damage?
Cumulative/indirect effects	Have there been significant cumulative or synergistic effects over time? Are any such effects expected in the future?
Indicators	How can environmental problems be measured? How far off is the current situation from any established thresholds or targets?

Source: JICA Project Team, based on the European SEA directive

Identified environmental problems are described in Table 4.2.3 below and shown geographically on the map in Figure 4.2.1, on which only the problems that have a strong geographical presence are displayed. On the map, the problems are grouped in four different categories in order to facilitate intelligibility.

Table 4.2.3 Description of Environmental Problems

Environmental problems	Intensity	Trend	Sensibility	Reversibility	Remedy	Cumulative/indirect effect	Possible indicator for monitoring the problem
Problems regarding the marine and coastal ecosystem							
Problems regarding the mangrove habitats							
- Urbanization threatening the integrity of the mangrove forest's ecosystem	Average (Dargahan); low (elsewhere)	Growing slightly	Low (transplanted mangrove only is threatened)	Irreversible (land use change)	Impossible to remedy due to land use change (urbanization)	Mangroves threatened by urbanization also affected by domestic waste discharge.	Area (ha) of land use change from mangrove to urban (from satellite image interpretation)
- Mangrove tree cutting by local communities in protected area	Average	Growing moderately	Average	Reversible/ temporary	Easy to remedy (replant)	Cumulative effects on Hara protected area might increase in the near future especially due to human presence recently facilitated.	Area (m^2) of mangrove cut yearly in Hara Protected Area
- Camel eating mangrove seedlings	High (Tabl); low (elsewhere)	Stable	Low	Irreversible	Hard to remedy (tree do not grow)		Area (m^2) of mangrove seedlings eaten by camel in Hara Protected Area
- Construction of access roads and jetties for tourism purposes in the Hara Protected Area	High (southern part of Hara Forest)	Growing strongly	High (allowing more human presence)	Reversible (rehabilitation)	Rehabilitation needs a lot of effort		Number of roads and jetties constructed in Hara Protected Area
- Discharge of diesel by smugglers affecting the roots of mangrove trees and shellfish, as well as fish eaten by birds	High (northern part of Hara Forest)	Decreasing slightly	Average	Reversible/ temporary	Hard to remedy (depollution of soil)		Number of observed diesel discharges in Hara Protected Area
Problems regarding the tidal flat habitats							
- Illegal sand extraction threatening the integrity of sandy beaches	Very high (all sandy beaches)	Decreasing slightly	Very high (non-renew. resource)	Irreversible	Impossible to remedy	-	Volume (m^3) of natural sand extracted illegally
Problems regarding coral reef habitats							
- Anchors of boats physically damaging the coral reefs	Low (all coral reefs)	Stable	Very high (unique habitat)	Irreversible	Impossible (physical damage)	-	Area (m^2) of coral reefs damaged by boat anchors
- Red tide phenomenon (algal bloom) causing coral bleaching	High (all coral reefs)	Growing slightly	Very high (unique habitat)	Reversible to irreversible	Hard to remedy (remove dead part)	Coral bleaching is caused by the cumulative effect of red tide and global warming.	Area (m^2) of coral reefs affected by red tide
- Global warming altering sea chemistry, causing coral bleaching	Average (all coral reefs)	Growing slightly	Very high (unique habitat)	Reversible to irreversible	Hard to remedy (remove dead part)		Area (m^2) of coral reefs affected by coral bleaching
Problems regarding terrestrial ecosystem							
- Camel eating acacia seedlings	Low (all island)	Stable	Low	Irreversible	Hard to remedy (tree do not grow)	Associated with drought, local species are threatened cumulatively by invasive plant *(Prosopis juliflora)* and seedling eating by camel.	Area (m^2) of acacia seedlings eaten by camel
- Invasive plant *(Prosopis juliflora)* threatening local vegetation and cultivated areas	High (eastern part); average (western part)	Growing moderately	High (rare local flora species are threatened)	Reversible (except in case of extinction of local species)	Hard to remedy (needs large-scale coordination of efforts)		Area (m^2) of acacia seedlings eaten by camel
- Agriculture for dates and other fruits vanishing because of drought	High (all island)	Stable	Average	Reversible/ temporary	Impossible (climate phenomenon)	-	Area (ha) of yearly abandoned cultivated fields

Table 4.2.3 Description of Environmental Problems (Continued)

Environmental problems	Intensity	Trend	Sensibility	Reversibility	Remedy	Cumulative/indirect effect	Possible indicator for monitoring the problem
Problems regarding fauna and flora							
- Intensive/destructive fishing practices (dragging nets) affecting the integrity of the fishery resource for future generations	High (south-eastern coast); average (elsewhere)	Growing moderately	High (most important livelihood threatened)	Reversible (except in the case of the extinction of fish species)	Hard to remedy (population control)	Fishery resource is under pressure from and foreign (Chinese) catches	Yearly observation and interview (of fishermen) about the state of the fishery resource
- Important hunting and capture threatening gazelle integrity	High (Hangom and west part)	Growing slightly	High (endangered species)	Reversible (except in the case of extinction)	Hard to remedy (population control)	-	Gazelle population
- Visual pollution from Kovarzin plant (flare) affecting wildlife during the night	Low (Hara mangrove area)	Stable	Low	Reversible/ temporary	Hard to remedy (no countermeasure)	-	Annual time (hours) of flaring at night time
- Breeding habitat of egret species threatened by invasion of black rats	High (Hara mangrove area)	Growing moderately	High (largest breeding colonies in Iran)	Reversible (except in the case of extinction)	Easy to remedy (rat eradication)	-	Daily survival rate (DSR) of nests of egret and heron species/black rat population
Problems regarding pollution/risk to human health							
- Industrial pollution (air pollution, waste discharge etc.)	High (vicinity of industries in Towla region)	Growing slightly	Average	Reversible/ temporary	Hard to remedy (depollution)	Industrial pollution in Towla might be worsened by incursion in groundwater	Various indicators of air, marine, soil pollution etc.
- Brine discharge of desalination plants increasing global salinity of the marine environment	Low (northern shore); potential (Hara mangrove area)	Growing strongly	Low (northern shore of Qeshm)	Reversible/ temporary	Hard to remedy (no countermeasure)	As the majority of desalination is located on the northern shores, this area might be prone to cumulative effects	Number and specificities of desalination plants to be constructed
- Gas pipeline threatening surrounding dwellings (risk of explosion)	Very high (alongside pipeline)	Stable	Very high (human villages)	Irreversible in the case of accidents	Hard to remedy (change route of the pipeline)	-	Setback distance (m) of existing and new constructions from gas pipeline
- Fish-processing industry affecting local population with offensive odors	Low (vicinity of industries in Souza region)	Stable	Very high (human villages)	Reversible/ temporary	Easy to remedy (countermeasure)	-	Number of people affected by offensive odors
- Discharge of diesel into the sea by smuggler boats	Low (all shores)	Decreasing slightly	High (coastal area)	Reversible/ temporary	Hard to remedy (open sea)	-	-
Problems regarding geological and hydrological erosion							
- Construction of jetties and ports causing modification of the coastal line and sedimentation	Very high (southeastern shore); high (elsewhere)	Growing strongly	High (coastal area)	Irreversible (change of morphology)	Impossible to remedy	-	Number of jetties and ports constructed without proper validation by an EIA
- Limestone extraction affecting the solidity of geological structure and causing runoffs and floods during heavy rains	High (Dargahan); potential (elsewhere)	Stable	Very high (human cities and villages)	Irreversible (geological erosion)	Impossible to remedy		Percentage regarding the occurrence of runoff and floods in the vicinity of extraction site on rainy days

Source: JICA Project Team

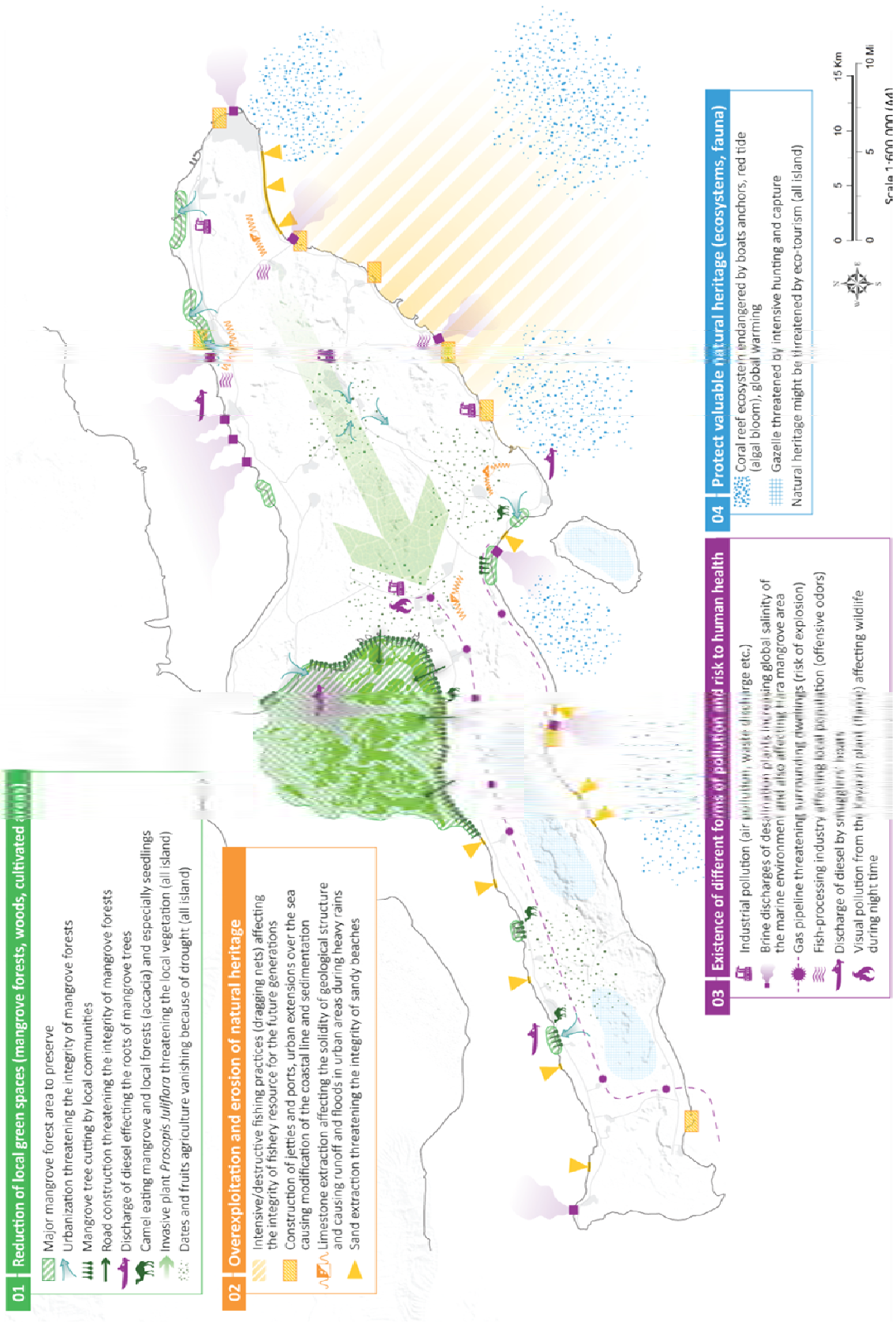


Figure 4.2.1 Summary Map of Identified Environmental Problems

Source: JICA Project Team

4.2.4 Development of strategic environmental objectives

An SEA objective is a statement of what is intended with regard to a conceived development intervention, in which a desired direction of change is specified. SEA objectives represent a guiding path, which allows for an effective comparison to be made of the effects of alternatives (Task 2-3) and an assessment of the environmental effects of the ECO-QESHM Master Plan (Task 2-4).

The achievement of SEA objectives is measured by using indicators and quantified targets. SEA objectives, indicators and targets might be revised at the point at which the collection of baseline information is finalized and as new environmental problems are identified.

In addition, the development of SEA objectives was the subject of a special working session held with the relevant environmental authority, namely, the DoE, on July 19, 2016.

The SEA objectives will be categorized into SEA topics in order to match the scope of the ECO-QESHM Master Plan as much as possible. SEA topics should cover all the environmental and social assessment components required by the JICA guidelines, but some arrangements and a simplification will be carried out in order to increase conformity with the current SEA, as shown in Table 4.2.4 below.

Table 4.2.4 Reorganization and Simplification of the Assessment Components into Strategic Environmental Assessment Topics

#	Assessment components from JICA guidelines		#	New SEA topic
01	Anti-pollution	Air quality	01	Pollution (air, water and soil) (POL)
02		Water quality		
03		Soil pollution		
04		Waste management	02	Waste production (WPR)
05		Noise and vibration	03	Population and human health (PHH)
06		Offensive odors		
07	Natural env.	Fauna, flora and ecosystem	04	Biodiversity (ecosystems, fauna and flora) (BIO)
08		Geology, topography and soil erosion	05	Geological and hydrological erosion (ERO)
09		Hydrology and hydric erosion		
10		Protected areas	06	Protected areas (incl. geosites) (PRAs)
11		Water resources use	07	Natural resource (incl. water) depletion (RES)
12	Social environment	Involuntary resettlement	08	Population resettlement (PRS)
13		Local employment	09	Employment, poverty and working conditions (EMP)
14		Poverty		
15		Working conditions		
16		Children rights		
17		Local livelihood and resources	10	Local and sustainable livelihood (LOC)
18		Social institutions	11	Social and community cohesion (SOC)
19		Indigenous or ethnic minorities		
20		Poor distribution of benefits and damages	12	Equal distribution of benefits and damages (DIS)
21		Local conflicts of interest		
22		Gender	13	Gender (GEN)
23		Cultural heritage	14	CHL – Cultural heritage and landscape
24		Landscape		
25		Infectious disease and HIV	Not applicable	
		Addition from Task 1-1	15	Transboundary environmental issues (TEI)
		Addition from the OECD guidelines	16	Climate factors (CLI)

Source: JICA Project Team

SEA objectives, indicators and targets are described in Table 4.2.5 below.

Table 4.2.5 Strategic Environmental Assessment Objectives, Indicators and Targets

SEA topics	SEA objectives	SEA indicators	*Possible targets*
POL	- POL-01: limit air pollution to levels that do not damage natural systems, in particular, by reducing the need for travel	- Mean urban air pollution of particulate matter (PM10 and PM2.5) - Levels of key air pollutants/by sector and per capita - Distances travelled per person per year by mode of transport	→ *Achievement of less than 50% of national average of mean urban air pollution of particulate matter by 2036* → *Achievement of less than 50% of national average of key air pollutants levels by sector and per capita by 2036* → *Based on the 2016 figure, distances travelled per person per year decrease by 20% for car and bike modes, increase of 20% in use of public transport by 2036*
	- POL-02: limit water and marine pollution, including diesel discharge from smugglers' boats, to levels that do not damage natural systems	- Quality (biology and chemistry) of rivers, groundwater and seawater	→ *Achievement of more than 50% of national average of rivers, groundwater and water quality figures by 2036*
	- POL-03: reduce contamination and safeguard soil quality and quantity	- Area of contaminated land	→ *Based on the 2016 figure, contaminated land not to increase by more than 5% by 2026 and 10% by 2036*
WPR	- WPR-01: minimize waste generation	- Waste production per capita	→ *Target to be confirmed*
	- WPR-02: promote waste re-use and recover through recycling, composting or energy recovery	- Amount of recycled waste, compost and energy recovery	→ *Target to be confirmed* → *Target to be confirmed* → *Target to be confirmed*
	- WPR-03: promote sustainable production and consumption patterns	- Food losses along production and supply chains - Per capita global food waste at the retail and customer levels	→ *Reduction of food losses and of per capita global food waste of not less than 50% by 2036 (SDG 12 target)*
PHH	- PHH-01: protect and enhance human health and healthy living for all at all ages	- Infant mortality rate - Premature mortality by non-communicable disease - Premature mortality by traffic accident	→ *Reduction in mortality rate of children under five years of age to at least as low as 25% (SDG target)* → *Based on the 2016 figure of annual deaths from non-communicable disease, reduction by at least 33% of 2036 (SDG target)* → *Based on the 2016 figure of annual deaths and injuries from road traffic accident, reduction by at least 50% by 2026 (SDG target)*
	- PHH-02: reduce the risk of industrial disaster (explosion etc.)	- Number of constructions containing human presence being exposed (inside minimum setback distance) to the risk of explosion of an industrial unit of an oil or gas pipeline	→ *Nil construction containing human presence exposed (inside minimum setback distance) to the risk of explosion of an industrial unit of an oil or gas pipeline by 2026 and 2036*

	- PHH-03: create the conditions to improve health and reduce health inequalities	- Share of population with access to primary healthcare facilities (within 10km) - Density of nursing and midwifery personnel (for every 1,000 people in the population);	→ *Increase to 80% by 2026 and 100% by 2036* → *Based on the 2005 national figure of 1.41‰, increase to 2% by 2026 and 3% by 2036*
	- PHH-04: reduce offensive odors, noises and vibrations	- Number of people affected by ambient noise, offensive odors and vibrations - Proportion of tranquil areas	→ *Based on the 2016 figures, number of people affected by ambient noise, offensive odors and vibrations not to increase by more than 2% by 2026 and 5% by 2036*
BIO	**BIO-ME: Marine and coastal ecosystem**		
	BIO-ME-m: Mangrove habitats		
	- BIO-ME-m-01: limit the construction of access roads and jetties for tourism purposes in Hara Protected Area	- Number of new access roads and jetties constructed in any zone of Hara Protected Area	→ *Based on the 2016, nil new access road or jetty constructed by 2026 and 2036*
	- BIO-ME-m-02: restore the full range of mangrove habitats and species to viable levels in Hara Protected Area	- Number of access roads and jetties dismantled and the restoration of the site to its original natural state in Hara Protected Area	→ *One access road and jetty dismantled and site restored by 2026 and three by 2036*
	- BIO-ME-m-03: reduce mangrove tree cutting for industrial purposes	- Area (m^2) of mangroves cut yearly in Hara Protected Area	→ *Based on the 2016, figure of annual mangrove tree cut area to drop to 60% by 2026 and 20% by 2036*
	- BIO-ME-m-04: decrease mangrove seedling eating by camel	- Area (m^2) of mangrove seedlings eaten yearly by camel in Hara Protected Area	→ *Based on the 2016 figure of annual mangrove seedling eating area, drop to 60% by 2026 and 20% by 2036*
	- BIO-ME-m-05: limit urbanization of mangrove lands all over the island.	- Area (m^2) of urbanized mangrove land	→ *Based on the 2016 figures, 0 m^2 of mangrove land to be urbanized by 2026 and 2036*
	BIO-ME-s: Seagrass bed habitats		
	- BIO-ME-s-01: preserve the integrity of seagrass beds for their various ecosystem services	- Area (ha) of vanished seagrass beds - Amount of fish catches (individuals or kg/year) in the area	→ *Based on the 2016 figure, no more than 2% of seagrass beds to have vanished by 2026a and 5% by 2036* → *Based on the 2016 figure of annual catches in the surrounding area of seagrass beds, a decrease by 2% by 2026 and 5% by 2036.*
	BIO-ME-t: Tidal flat habitats		
	- BIO-ME-t-01: preserve the integrity of mud flats for their various ecosystem services	- Area (ha) of vanished mud flats - Number of birds feeding on mud flats area (individuals/year)	→ *Based on the 2016 figure, no more than 2% of mud flats to vanish by 2026 and 5% by 2036;* → *Based on the 2016 figure, a decrease in birds feeding in mud flats area by 2% by 2026 and 5% by 2036*

	- BIO-ME-t-02: preserve the integrity of sandy beaches, especially from sand extraction, for their various ecosystem services	- Area (ha) of vanished sandy beach - Volume (m^3) of natural sand extracted illegally from sandy beaches - Number of cars (individuals/day) accessing sandy beaches	→ *Based on the 2016 figure, no more than 2% of sandy beaches to vanish by 2026 and 5% by 2036* → *0 m^3 of natural sand extracted illegally from sandy beaches by 2026* → *Based on the 2016 figure, reduction in cars accessing sandy beaches by 30 % by 2026 and 80% by 2036;*
	- BIO-ME-t-03: Preserve sandy beaches and especially sea turtle nesting sites from any light pollution	- Number of sea turtles (individuals/year) coming to lay eggs - Number of juvenile turtle (individuals/night) moving in the wrong direction.	→ *Based on the 2016 figure, an increase of 10% in sea turtles laying eggs by 2026 and 20% by 2036* → *Based on the 2016 figure, a decrease of 5% by 2026 and 15% by 2036.*
	BIO-ME-c: Coral reef habitats		
	- BIO-ME-c-01: preserve the integrity of coral reefs for their various ecosystem services	- Area (ha) of coral reef - Percentage (%) of live coral cover	→ *Based on the 2016 figure, decrease of not more than 2% in coral reef ecosystems area and percentage of live coral cover by 2026 and 5% by 2036*
	BIO-TE: Terrestrial ecosystem		
	- BIO-TE-01: preserve the integrity of terrestrial ecosystems and their services, particularly regarding forests, wetlands, and mountains	- Area (ha) of annual land use change in native woodlands (acacia, jujube, konar etc.).	→ *Based on the 2016 figure, decrease of not more than 5% of native woodland cover by 2026 and 5% by 2036*
	- **BIO-FF: Fauna and flora**		
	- BIO-FF-01: effectively regulate harvesting, illegal, unreported and unregulated fishing and destructive fishing practices	- Indicator to be confirmed	→ *Target to be confirmed*
	- BIO-FF-02: reduce the impact of invasive alien species on land and water ecosystems, and control or eradicate the priority species	- DSR of nests of egret and heron species in Hara mangrove threatened by invasive black rats - Black rat population - Distribution of *Prosopis juliflora*	→ *Based on the 2008-2009 figure of a mean DSR of 0.9896, a decrease of no more than 5% by 2026 and 10% by 2036* → *Decrease in black rat population of 50% by 2016 and 100% by 2036 (eradication)*
	- BIO-FF-03: put an end to hunting, capturing and trafficking of protected species of flora and fauna	- Gazelle population	→ *Based on the 2016 figure, a decrease of no more than 5% of the gazelle population by 2036*
ERO	- ERO-01: reduce geological erosion especially by controlling mining extraction	- Percentage of occurrence of runoff and floods in the vicinity of extraction site on rainy days	→ *Based on the 2016 figure, increase in the occurrence of runoff and floods in the vicinity of extraction site on rainy days of no more than 5% by 2026 and 2036*
	- ERO-02: reduce hydrological erosion especially by controlling the construction of jetties and ports	- Number of jetties and ports constructed without a proper validation by ab EIA	→ *Nil construction of new jetties and port without a proper validation by EIA by 2026 and 2036*

PRA	- PRA-01: ensure that no large-scale development is implemented in protected areas including geosites	- Number of large-scale developments implemented in protected areas including geosites.	→ *Nil new large-scale developments implemented in protected areas including geosites by 2026 and 2036*
RES	- RES-01: maintain equivalent use of water	- Daily water consumption per capita in urban and rural areas	→ *Maintain the water consumption less than 300 l / capita by 2036*
	- RES-02: promote recycling of wastewater	- Share of recycled water	→ *Target to be confirmed*
	- RES-03: increase water use efficiency and reduce losses and leaks	- Share of produced drinkable water over raw sea water	→ *Increase produced drinkable water from around 40% in 2016 to 60% in 2036*
		- Share of lost water in the supply network	→ *Decrease lost water in the supply network from around 30% in 2016 to around 10% by 2036*
PRS	- PRS-01: avoid any involuntary population resettlement	- Annual involuntary displaced population	→ *Less than 100 in the population to be involuntary displaced annually by 2026 and less than 10 by 2036*
EMP	- EMP-01: reduce poverty in all forms	- Proportion of men, women and children living under the poverty line	→ *Less than 10% each of men, women and children among the population living on less than USD 1.25 a day by 2026 and 0% by 2036 (SDG 1 target)*
	- EMP-02: achieve productive and sustainable employment for all	- Unemployment rate	→ *Decrease the unemployment rate to less than 6% by 2026 and to less than 5% by 2036*
	- EMP-03: ensure decent working conditions for all	- Indicators of decent work, such as the percentage of children not in school	→ *Target to be confirmed*
LOC	- LOC-01: promote sustainable agriculture and fisheries	- Crop and livestock yield gap (actual yield as % of attainable yield)	→ *Achieve 70% of crop and livestock productivity (yield per unit area) in the Hormozgan Province by 2026 and 100% (similar productivity) by 2036*
		- Working population and annual income in agricultural sector	→ *Decrease in the working population in the agricultural sector by no more than 5% by 2036, plus an 50% increase in the annual income by 2016 and 100% by 2036 (SDG 2 target)*
		- Percentage of cultivated land area by utilizing water-saving irrigation systems (e.g., drip irrigation systems)	→ *10% increase in the coverage of water-saving irrigation systems in cultivated areas by 2026 and 30% by 2036*
	- LOC-02: achieve a high level of economic productivity through diversification, technological upgrading and innovation	- Growth of gross regional domestic product (GRDP) per capita in urban and rural areas	→ *Based on the 2016 figure, increase in GRDP per capita of more than 5% by 2036*
	- LOC-03: promote inclusive and sustainable industrialization	- Manufacturing value added as a percentage of GRDP	→ *To be confirmed*
	- LOC-04: promote sustainable tourism, which creates jobs and promotes local culture and products	- Share of jobs in sustainable tourism sector	→ *Based on the 2016 figure, an increase in the share of sustainable tourism jobs by more than 15% of the labor*

			force by 2036
SOC	- SOC-01: maintain and enhance social cohesion and equality (avoid social inequality)	- Gini index - Income growth of the most deprived part of the population	→ *To be confirmed* → *Achieve income growth among the lowest 40% of the population at a rate higher than the national average by 2036 (SDG target)*
	- SOC-02: maintain and enhance spatial cohesion and equality (avoid spatial discrimination);	- Difference in the income of people living in the same part of a city/village	→ *To be confirmed*
	- SOC-03: maintain and enhance cultural cohesion and equality (avoid cultural segregation)	- Share of non-Muslim immigrants settled on the island	→ *No more than 5% of non-Muslim immigrants to settle on the island by 2026 and 15% by 2036*
	- SOC-04: promote access to safe, inclusive and accessible green and public spaces	- Area (m^2) of green and public spaces per capita	→ *Based on the 2016 figure, increase the average area of green and public spaces per capita by 25% by 2026 and 50% by 2036*
	- SOC-05: maintain a peaceful and inclusive society and reduce all forms of violence	- Number of violent injuries and deaths per 100,000 of the population	→ *Based on the 2016 figure, reduce the number of violent injuries and deaths by 25% by 2026 and 50% by 2036*
DIS	- DIS-01: ensure equal access to quality educational services for all	- Share of boys and girls completing primary and secondary education	→ *100% of boys and girls to complete primary and secondary education by 2036 (SDG target)*
	- DIS-02: ensure equal access to safe and affordable drinking water for all	- Share of people having access to safe and affordable drinking water	→ *100% of people to have access to safe and affordable drinking water by 2036 (SDG target)*
	- DIS-03: ensure equal access to adequate sanitation and hygiene for all	- Share of people having access to adequate sanitation and hygiene	→ *100% of people to have access to safe and affordable drinking water by 2036 (SDG target)*
	- DIS-04: ensure equal access to modern and sustainable energy for all	- Share of people having access to affordable, reliable and modern energy services - Share of renewable energy in the global energy mix	→ *100% of people to have access to affordable and modern energy services by 2036 (SDG target)* → *Share of renewable energy to increase by more than 23% by 2026 and 28% by 2036*
	- DIS-05: ensure equal access to a safe, affordable and sustainable transport system for all	- Percentage of the population within 0.5 km of public transit running at least every 20 min in urban areas and every 120 min in rural areas	→ *10% increase in the percentage of the population within 0.5km of public transit running at least every 20 minutes in urban areas and every 120 minutes in rural areas by 2026 and 30% by 2036*
	- DIS-06: ensure equal access to adequate, safe and affordable housing for all, in both urban and rural contexts, in all parts of the island.	- Percentage of the eligible population covered by national social protection programs	→ *Target to be confirmed*
GEN	- GEN-01: promote sustainable and decent job opportunities for women	- Female unemployment rate	→ *Decrease the female unemployment rate by more than 25% by 2026 and 50% by 2036*

	- GEN-02: promote public security for women	- Number of public or green spaces certified open and secure for all female visitors	→ *Target to be confirmed*
CHL	- CHL-01: preserve the integrity of remarkable natural landscapes and viewpoints	- Area (ha) of annual land use change of remarkable natural landscapes and viewpoints	→ *0 ha of land use change regarding remarkable natural landscapes and viewpoints by 2026 and 2036*
	- CHL-02: preserve remarkable historic buildings and other culturally important human heritage	- Scale (numeric) of land use changes or destruction of registered heritage	→ *Zero use change or destruction of registered heritage by 2026 and 2036*
	- CHL-03: preserve and enhance the traditional urban fabric of old parts of villages	- Scale (numeric) of destruction or displacement of registered heritage	→ *Nil destruction or displacement of registered heritage by 2026 and 2036*
TEI	- TEI-01: ensure that the development on Qeshm is adequate to the needs of the island and does not aggravate water quality on a large and transboundary scale (red tide, salinization)	- Number of additional shrimp farms constructed - Number of additional desalination plants constructed over local water consumption self-sufficiency thresholds	→ *Fewer than five additional shrimp farms to be constructed by 2026 and 2036* → *Nil desalination plants to be constructed over local water consumption self-sufficiency thresholds by 2026 and 2036*
CLI	- CLI-01: reduce GHG emissions	- CO_2 emission rate per capita - Travel needs in terms of distances travelled per person per year by specific mode of transport	→ *Target to be confirmed* → *Target to be confirmed*
	- CLI-02: reduce vulnerability to the effects of climate change (floods, heat island phenomenon, disruption of travel by extreme weather), especially through the integration of climate change measures in policies and planning	- Number of approved urban planning master plans integrating the study and proposition regarding adaptation to climate change	→ *Approved urban master plans and rural plans integrating the study and proposition regarding adaptation to climate change for at least two cities and five villages by 2026 and a total of four cities and 20 villages by 2036*

Note: targets are awaiting confirmation and subject to change
Source: JICA Project Team

4.3 Second Stage of the Strategic Environment Assessment: Developing and Refining Alternatives and Assessing Effects

4.3.1 Development of strategic alternatives

(1) General definition

A total of four strategic alternatives has been elaborated, effectively representing the full spectrum of development possibilities for the island. Each of the four alternatives represents reasonable, realistic and relevant development patterns, but their distinct differences enable meaningful comparison, especially regarding their environmental implications. Table 4.3.1 below introduces a general definition for each of the four strategic alternatives elaborated.

It should be noted that Alternative A represents the most likely evolution trend in the absence of the implementation of the project.

Table 4.3.1 General Definition of the Four Strategic Alternatives

ID	Alternative name	General definition
A	Economic growth-oriented alternative	Maximum use of natural resources and massive exports, aimed at strong growth and stability for the local economy
B	Social diversity enhancement alternative	Enhancing the competitiveness and creation of a solid local market enabled by boosted regional exposure
C	Minimum environmental impact alternative	Maximum preservation of the natural and cultural environment of the island and resistance towards external and exotic influence
D	Eco-island in pursuit of resilience alternative	Conscious development aimed at defining new paradigms of balanced and sustainable growth through participation and wise use of local resources

Source: JICA Project Team

(2) Strategic planning themes

All alternatives are elaborated on the basis of the regional development models to be pursued, as well as several strategic planning themes, which affect the extent of the preparation for the ECO-QESHM Master Plan to varying degrees. Some of the strategic planning themes include the following aspects:

- Balance of power between public administration and the private sector (for example, Alternative A suggests an economic liberalism where the private sector is able to invest without limit; conversely, Alternative C is the symbol of a strong public intervention, which regulates all private activities for the preservation of the environment)
- Leverage over urban and rural planning (for example, Alternative A suggests that urban development is conceded to real estate private companies, which build up freely without coordination; conversely, Alternative D proposes a strong intervention in the city planning public authority regarding the regulation of city development and the extent to which the general public are implicated in planning decisions through the development of the participatory approach.
- Immigration structure depending on the economic model pursued.

(3) Summary of the main differences between alternatives

Table 4.3.2 summarizes the main differences between the four strategic alternatives elaborated.

Table 4.3.2 Summary of the Main Differences Between Alternatives

Item	Alternatives			
	A	B	C	D
Economic model	• Export processing economy	• Import substitution economy	• Self-sufficiency economy	• Eco-resilient economy
Important means	• Upgrading economic infrastructure and utilities • Promoting massive private investments in FZ	• Improving social services delivery • Collaboration between villagers and governments	• Strengthening environmental management for coastal and marine resources • Controlling solid wastes and wastewater	• Develop linkages between indigenous and export industries • Promote high-grade settlements and social services in urban and rural areas
Key infrastructure development	• Deep seaport • Airport • Industrial estates • Water supply expansion • Electricity • Artery roads and bridge • Solid waste management • Wastewater treatment with recycling	• Social and cultural facilities • Rural roads • Rural water supply • Rural electrification • On-site treatment of solid wastes and wastewater	• Tourism facilities • Cultural and heritage facilities • Access roads • Electricity • Solid waste management • Wastewater treatment with recycling	• Shipping facilities • Tourism facilities • Cultural and heritage facilities • Artery roads and bridge • Electricity • Solid waste management • Wastewater treatment with recycling
Development management	• Promotion and incentive measures for private investments	• Collaboration between villages and governments	• Environmental management for coastal and marine resources	• Promotion of participatory planning for a resilient eco-island

Source: JICA Project Team

(4) Detailed presentation of the alternatives

Figures 4.3.1 to 4.3.4 depict detailed presentations of all the four strategic alternatives. Each of the alternatives is described through the characterization of its spatial and socioeconomic frameworks, sectoral development and environmental management strategies, as shown in Table 4.3.3 below.

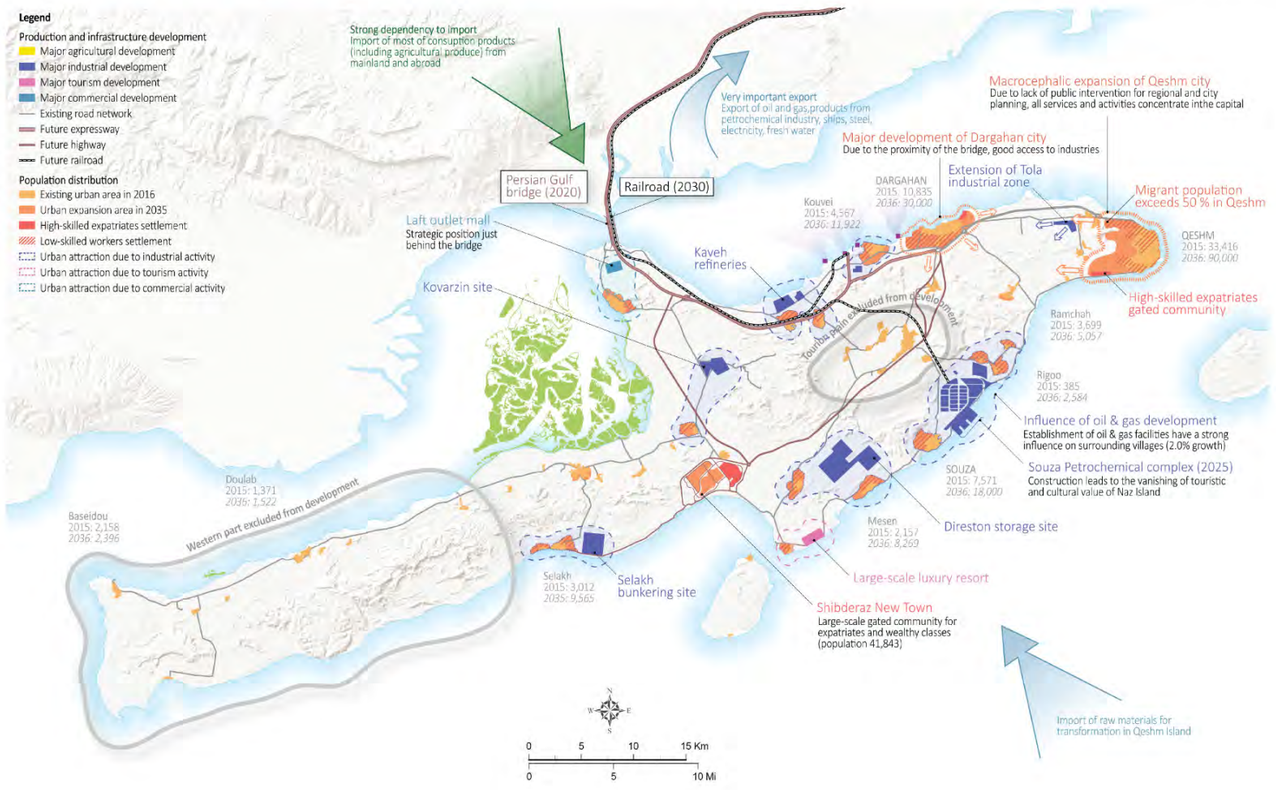
Table 4.3.3 Components of Detailed Presentation of the Alternatives

Presentation category	Presentation components	Description	Support
Spatial framework	- Regional integration	Economic and functional role and relationships on Qeshm Island in the large-scale regional and transboundary context	Map (approx. scale 1:2500,000 in A3)
	- Spatial structure	Internal spatial organization of the island and major functions and roles of the different poles and zones	Illustration and text
	- Main map	General spatial distribution of sectoral, urban development and cross-cutting issues	Map (approx. scale 1:500,000 in A3)
	- Housing and community	Explanation of major spatial planning strategies in terms of urban planning, housing, urban transport, livability, community interactions etc.	Text
	- Site suitability of deep seaport/petrochemical complex*	Result of GIS analysis for site suitability of deep-seaport/petrochemical complex originally planned by SWECO in Souza	Maps and text
Socioeconomic framework	- Economic model	Orientation of the economy towards either localization or globalization, depending on the use of resources and markets (refer to 4.1.2 (3))	Chart (four-axis scatter)
	- Economic resilience	Evaluation of the socioeconomic impacts according to the five principles of a "resilient economy" stated by the Supreme Leader of Iran	Chart (pentagon radar)
	- Population and immigration	Projected total population and immigration, reasons for attraction and share of high-skilled expatriates and low-skilled workers	Chart (column histogram)
	- Population distribution	Share of urban and rural population, distribution of population in cities and rural districts.	Chart (pie)
	- Socioeconomic framework	Tables of labor force by sector, Gross Regional Domestic Product (GRDP) and population projections for the horizons 2026 and 2036.	Tables
Sectoral development	- Agriculture	Explanation of development strategies and possible trends of agricultural sector	Text
	- Fishery	Explanation of development strategies and possible trends of fisheries sector	Text
	- Industry	Explanation of development strategies and possible trends of industrial sector	Text and main map
	- Tourism	Explanation of development strategies and possible trends of tourism sector	Text and main map
Environmental management	- Environmental protection	Explanation of environmental protection strategies	Text and main map

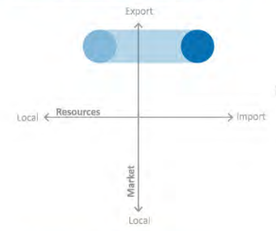
Note: * only for alternative D
Source: JICA Project Team

alternative **A** Economic growth-oriented alternative

Alternative of maximum use of natural resources and massive exports aiming at strong growth and stability of local economy.



Economic model: Export processing economy

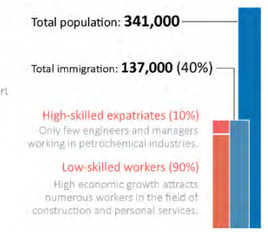


Economic resilience

(based on the five principles of the Supreme Leader)

Population and immigration

Immigration model: Dubai



Socioeconomic framework

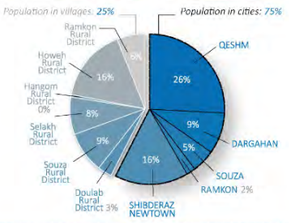
Labor force by sector

		2011		2026		2036	
		Person	%	Person	%	Person	%
Total population		111,159	-	211,400	-	341,100	-
Working age population		74,600	-	148,800	-	231,900	-
Labor force	Total	30,280	100	81,400	100	127,500	100
	Agriculture	2,500	8.3	2,850	3.5	3,190	2.5
	Fishery	6,500	21.5	8,100	10.0	6,400	5.0
	Manufacturing	2,400	7.9	23,600	29.0	43,400	34.0
	Construction	2,300	7.6	11,600	14.2	16,400	12.9
	Utilities	440	1.5	2,400	3.0	4,500	3.5
	Mining	140	0.5	4,100	5.0	5,100	4.0
	Service	16,000	52.8	28,700	35.3	48,600	38.1

Gross Regional Domestic Product (GRDP)

		Unit	2011	2026	2036
GRDP (price at 2011)	Total	IRR Billion	12,589	44,051	98,816
	Primary	IRR Billion	1,448	2,257	2,372
	Secondary	IRR Billion	4,691	18,299	43,321
	Tertiary	IRR Billion	6,450	23,495	53,123
Annual growth rate	Total	%/year		8.7	8.4
	Primary	%/year		3.0	0.5
	Secondary	%/year		9.5	9.0
	Tertiary	%/year		9.0	8.5
GRDP per capita (real)		USD	5,663	10,419	14,485
Annual growth rate		%	-	4.15	3.35

Population distribution



Population projections

	Unit	2015	2026	2036
Total population	Person	129,078	211,400	341,100
Growth rate	%		4.54	4.88
Immigration total	Person		50,000	137,000
% of immigration	%		23.7	40.2
Assumed natural growth rate	%		2.1	1.8

Source: Statistical Center of Iran and JICA Project Team

Fishery

- The development of intensive fishing practices leads to high profits of the fishery sector on short term, but from the middle term, overexploitation accelerates the depletion of fishery resources at the large scale of the Persian Gulf, and consequently end up to put out of business the majority of local fishermen.
- Major investments in fish farming sector lead to the increase of intensive aquaculture production which generates various adverse effects on local marine environment (transfer of diseases, contamination of bottom and benthic flora and fauna).
- Expatriates from richest economies and local wealthy social class might expect the production of exotic species in aquaculture for high economic return, which would lead to ecological disturbance.

Industry

- Targeting important export to mainland and to foreign countries, large-scale and wide-scope of oil and natural gas development is achieved through the rapid conclusion of numerous investment agreements with foreign companies, which operate transfer of high-technology and of operating engineers. Concomitant to the development of oil and gas activities, affiliated downstream industry will develop through Souza petrochemical complex.
- Oil and natural gas development increases the risk to heavily deteriorate natural resources in long term, due to an unpredicted accident.
- In addition, export processing based industries such as iron production and shipbuilding will settle in Qeshm Island as a transformation pole of raw materials to final products to be exported. All kinds of industries including fiber/sewing, fishery, recreation, sightseeing, storehouse, or logistics will be promoted mainly by foreign investment.

Tourism

- Large-scale and luxury resorts, residential and commercial condominium, especially targeting expatriates and wealthy classes of Iranian from mainland, are constructed along the shoreline without any proper control.
- Since large-scale resorts and commercial malls requires abundant labor force, employment opportunities grows, but are limited to low-skilled jobs coveted by immigrants while management jobs are limited.
- This form of tourism attracts middle-income domestic tourists. The revenue of tourism increases within mid-term period. After that, due to the severe price competition, the revenue of tourism gradually decreases. International tourists do not increase much, since Qeshm cannot differentiate existing competitors such as Dubai and Kish.
- Tourism activities by local communities are limited and the lack of interaction between local communities and visitors results in poor benefit to local economy from tourism. The situation may cause crimes whith attach visitors due to the disparity between visitors and local communities.

Agriculture

- Taking advantage of the revenues of oil and gas development, plant factory is introduced and high-quality fruits and vegetables are produced by hydroponics.
- However, the sector faces several difficulties/challenges in the domestic market due to the inadequacy of cold chain and the international markets due to the competition with the preceding countries such as UAE and Qatar.
- The expansion of the production volume increases water scarcity and salt concentration in the well-water and coastal seawater.

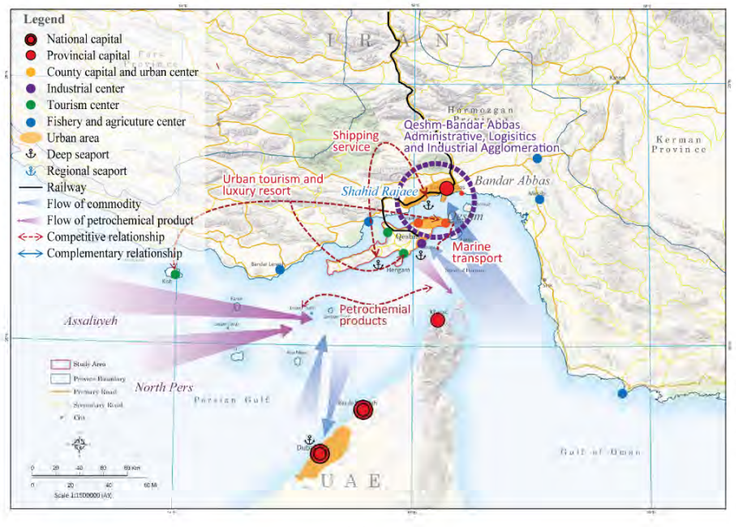
Environmental protection

- The project is implemented in any economically feasible areas aiming at the economic development and livelihood improvement, even though the project areas would be located in environmentally sensitive areas such as protected areas and coastal areas.
- EIA is conducted to authorize indulgence for project implementation, if the proposed project contributes to the sufficient economic benefit.
- The intensive development increases the amount of brine from desalination and pollutant from manufacturing. Those loads negatively influence the mangrove forests and marine environment.

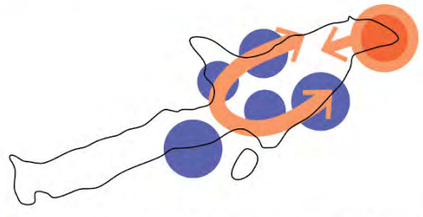
Housing and community

- Due to the establishment of foreign companies especially in the field of oil and natural gas development including petrochemical industry, an important afflux of high-skilled expatriates is forecasted.
- Consequently to the high economic growth and the new needs in terms of infrastructure and housing, a second category of foreign workers, less-skilled, is predicted to work mainly in the fields of construction and personal services. It is likely that those jobs will be held by Afghans, Iraqis or Pakistanis.
- Without any strong guidance from the public administration, the residential strategies of the two foreign population opposed in two phenomenon:
- On the one hand, a logic of *isolation* of the wealthy high-skilled expatriates into gated communities, separated from the local population, in exclusive suburbs especially located on the coastal area. In search for high standard of educational, health and recreational services, the expatriate population will chose to live in priority in Shibderaz New Town or in the best endowed cities of Qeshm and Dargahan.
- On the other hand, a logic of *dependency* of the lower-skilled proletarian classes to their working place. Not being able to afford the rents of the biggest cities, this population is likely to gather by community in the outskirts of industrial towns.

Regional integration



Spatial structure



- Macrocephalic development of Qeshm city which receives the majority of the demographic burden
- The rest of the population, attracted by industrial poles, is distributed along a half circle from Dargahan to Souza
- Over-scaled oil and gas developments having the ambition to prevail over the whole Persian Gulf are a potential time bomb for the environmentally sensible island of Qeshm

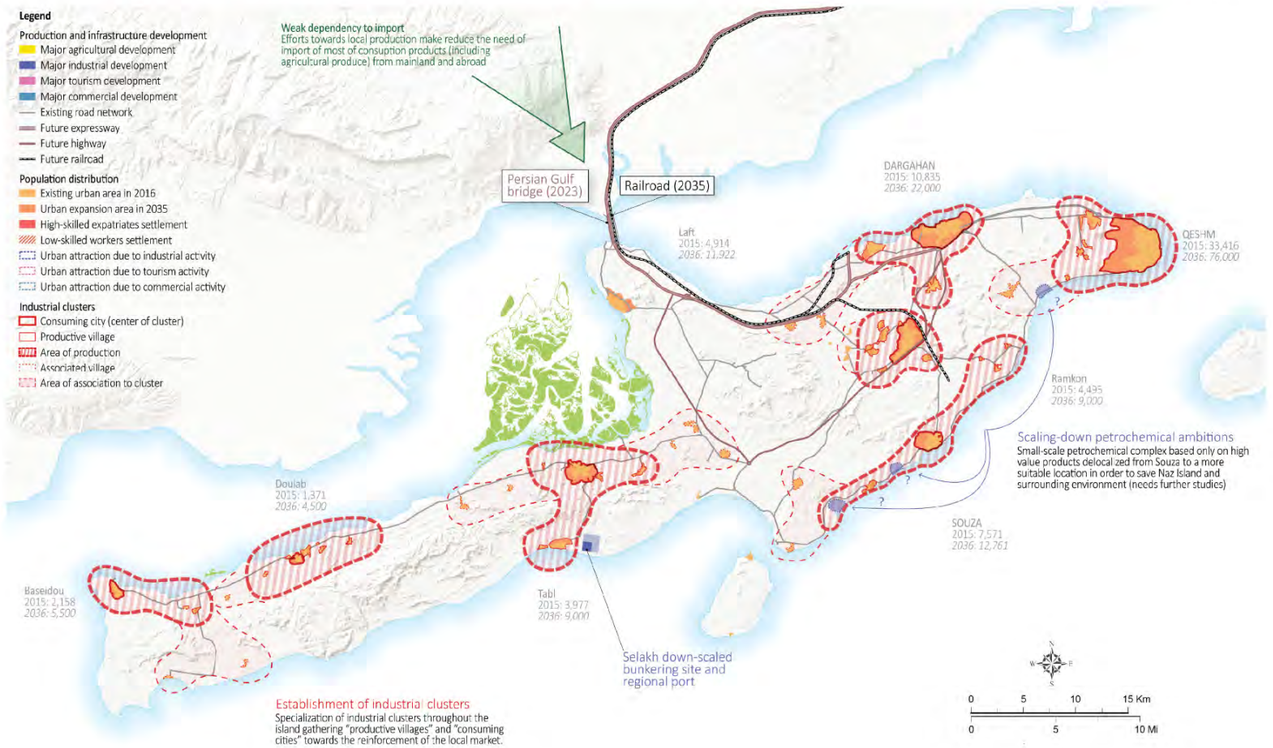
- The large investment is installed to develop the island as an export-processing and logistic hub. The deep seaport and petrochemical complex are expected to lead the regional and national economy.
- The deep seaport faces the severe competition with Jebel Ali seaport for international marine transit and Shahid Rajaee seaport for logistics to Iran. The petrochemical complex has to compete the natural gas industrial development in Asaluyeh and Ras Laffan. Since the deep seaport and petrochemical complex do not differentiate from the similar development enough, the large investment results in encouraging the hard competition.

Source: JICA Project Team

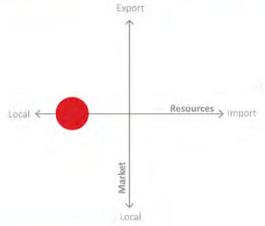
Figure 4.3.1 Detailed Presentation of Alternative A: Economic Growth Oriented Alternative

alternative **B** Social diversity enhancement alternative

Alternative of enhancement of the competitiveness and creation of a solid local market enabled by boosted regional exposure.

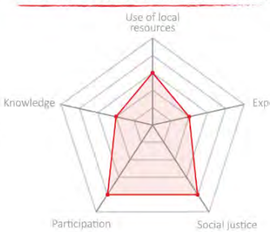


Economic model: Import substitution economy

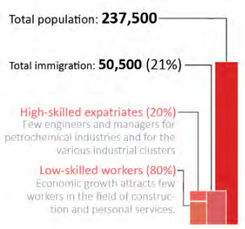


Economic resilience

(based on the five principles of the Supreme Leader)



Population and immigration



Socioeconomic framework

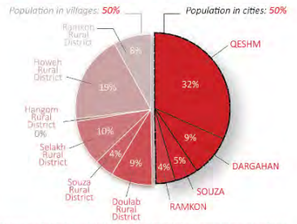
Labor force by sector

		2011		2026		2036	
		Person	%	Person	%	Person	%
Total population		111,159	-	180,800	-	237,500	-
Working age population		74,600	-	126,560	-	161,500	-
Labor force	Total	30,280	100	63,280	100	88,800	100
	Agriculture	2,500	8.3	2,400	3.8	2,130	2.4
	Fishery	6,500	21.5	8,200	13.0	8,900	10.0
	Manufacturing	2,400	7.9	10,700	16.9	18,600	21.0
	Construction	2,300	7.6	4,700	7.5	9,700	10.9
	Utilities	440	1.5	1,270	2.0	2,700	3.0
	Mining	140	0.5	2,500	4.0	3,600	4.0
	Service	16,000	52.8	33,400	52.8	43,200	48.7

Gross Regional Domestic Product (GRDP)

		Unit	2011	2026	2036
GRDP (price at 2011)	Total	IRR Billion	12,589	33,165	60,961
	Primary	IRR Billion	1,448	2,427	3,261
	Secondary	IRR Billion	4,691	12,941	24,293
	Tertiary	IRR Billion	6,450	17,797	33,407
Annual growth rate	Total	%/year		6.7	6.3
	Primary	%/year		3.5	3.0
	Secondary	%/year		7.0	6.5
	Tertiary	%/year		7.0	6.5
GRDP per capita (real)		USD	5,663	9,172	12,834
Annual growth rate		%	-	3.27	3.42

Population distribution



Population projections

	Unit	2015	2026	2036
Total population	Person	129,078	180,800	237,500
Growth rate	%		3.07	2.77
Immigration total	Person		23,500	50,500
% of immigration	%		13.0	21.3
Assumed natural growth rate	%		2.1	1.8

Source: Statistical Center of Iran and JICA Project Team

Fishery

- Resource management framework and sustainable fishing practices are established by the local communities through Satoumi concept contribute to the stabilization of the fishery resource and the improvement of value chain.
- Aquaculture is carried out in the environmental-friendly manner for sustainable use of marine environment.
- Each village promotes special product using catch fishes. The fish products are sold to the cities in the island. The successful fish products are sold in the mainland and neighboring countries.
- Diversification of coastal-related livelihood, in link with tourism (diving, fishing tourism, promotion of local gastronomy) will benefit to the fishery sector.

Environmental protection

- Public awareness of culture, tradition, and environment is raised among communities and tourists.
- The communities make efforts to achieve two objectives of conservation of natural environment and their livelihood improvement.
- The environmental sensitive areas including the protected areas, coastal areas, and geopark are conserved well.
- The discharge of brine and pollutant is placed at the areas without causing the considerable environmental impact.

Tourism

- Ecotourism based on the unique tourism resources of Qeshm such as Geopark and cultural heritages is enhanced. Selakh port can be utilized for new tourism activities.
- Local communities are encouraged to be involved in SMEs related to tourism business such as professional guides, guesthouse owners, launch boat operators, boat operators, scuba diving, marine activities and traditional handicrafts souvenir shops.
- Number of entrepreneurs and employment increase due to newly developed tourism services.
- Ecotourism attracts international tourists who are relatively well educated and well consumers from the higher socio economic groups. Therefore, tourism expenditure spent by tourist increases.
- Once the Persian Gulf Bridge is connected, the number of domestic tourists also increases. In order to achieve a resistant and strong local market, shopping tourism is in strengthened in parallel of ecotourism in particular with the branding of Qeshm products manufactured in the industrial clusters. Families who are interested in learning unique culture and environment increase.
- Economic and cultural value exchange between tourists and local communities is enhanced. Tourism becomes one of the important sources of income of local communities. It will also contribute to conserve local traditional culture.

Agriculture

- Associated with eco-tourism industries, the production of traditional herbal plants (and their processed products) and high value-added agro-products (such as mangrove honey) as local-specialty products contributes to domestic employment creation and the growth of working population of the sector.
- Agricultural produce, including staple food grains and forage are mainly supplied from the mainland of Iran in the same way for the last two decades.
- Fresh (also perishable) leafy vegetables are grown in drip irrigation through few exceptional individual initiatives.
- The number of livestock farmers in the island may remain unchanged.

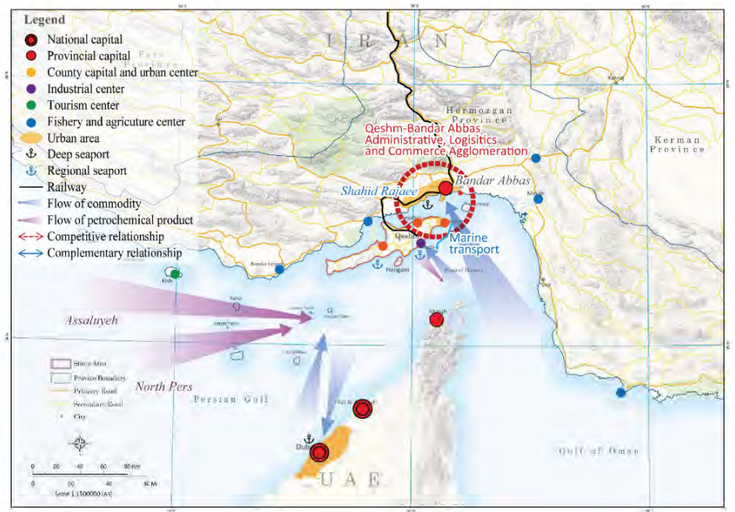
Industry

- Targeting sound export to mainland, oil and to foreign countries, natural gas development is promoted at a fairly small scale and in complementarity with the processing units settled in other cities of mainland in order to avoid regional competition.
- Oil and natural gas development increases the risk to heavily deteriorate natural resources in long term, due to an unpredicted accident.
- Benefit from the oil and natural gas development is used to support human resource development, SME, and research and development.
- On the other hand, various types of local industries and SME using local raw materials to provide daily products to the island and their visitors are organized in specialized clusters in order to maximize efficiency. The objective of increasing the competitiveness of local industries in comparison to products coming from the mainland and from other countries is to reduce the dependency to import and boost local employment.
- The main market of the "productive villages" are the "consuming cities" and their tourists coming from mainland seeking for affordable products.

Housing and community

- The island is divided in several specialized clusters which all include a productive rural area and a consuming city. The governance of those territorial clusters is equally operated by the villages and the city in the same association. Strong mechanisms of financial solidarity are established towards villages. The various social and environmental services that provide rural areas and their ecosystems are taken into account in the calculation of the solidarity assistance.
- Cities and villages with large size of population and good access from other villages are encouraged to create the market for the peripheral villages. Those cities and villages are focal point to support the SMEs by serving the financial sources, technical training, and market information.
- Foreigners are accepted by the local communities on the condition that they cope with the local traditions.

Regional integration



Spatial structure

- Specialization of industrial clusters throughout the island gathering "productive villages" and "consuming cities" towards the reinforcement of the local market.
- All efforts are developed to maximize the profit from visitors from the mainland.

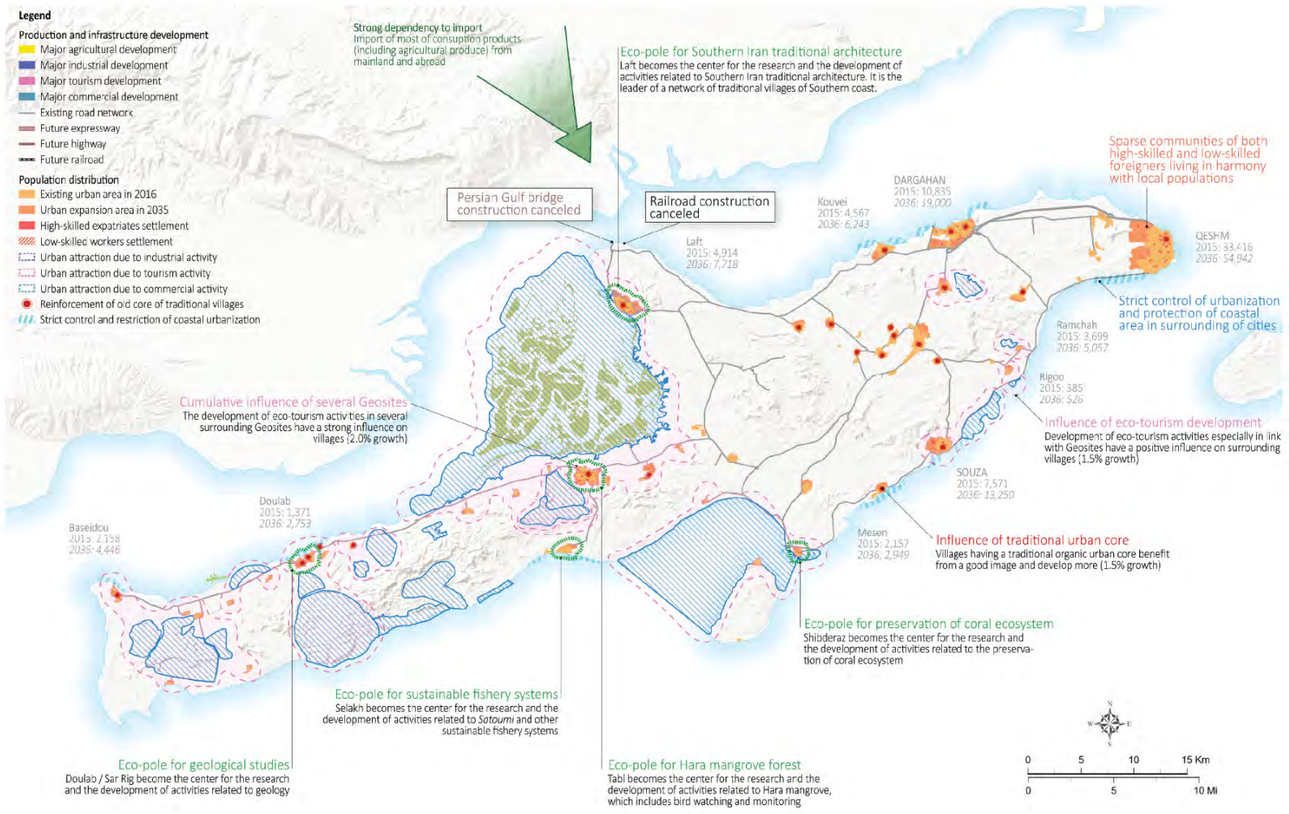
- The island is recognized as the place having the communities who are willing to conserve the unique culture and environment. This recognition helps to promote the branding of Qeshm. The eco-tourism and fishery are main economic activities. As the cities in the mainland are developed, the unique character of the island is enhanced.
- A regional seaport is developed to encourage the economy in the island. This regional seaport is effective to support Shahid Rajaee seaport as the regional seaport functions as the alternative port when Shahid Rajaee seaport receives the excessive demands in the peak time.
- The petrochemical complex creates the profit to support the economy in the island.
- As a whole, the island becomes the secondary hub in the province.

Source: JICA Project Team

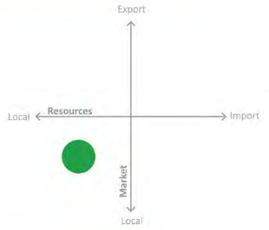
Figure 4.3.2 Detailed Presentation of Alternative B: Social Diversity Enhancement Alternative

alternative C Minimum environmental impact alternative

Alternative of maximum preservation of the natural and cultural environment of the island and of resistance towards external and exotic influence.

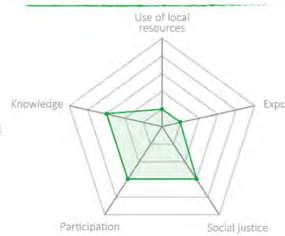


Economic model: Self-sufficiency economy

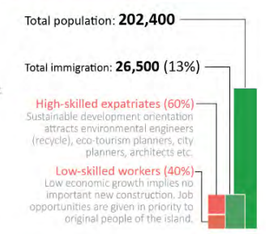


Economic resilience

(based on the five principles of the Supreme Leader)



Population and immigration



Socioeconomic framework

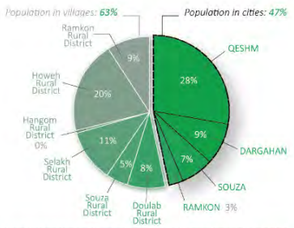
Labor force by sector

		2011		2026		2036	
		Person	%	Person	%	Person	%
Total population		111,159	-	164,700	-	202,400	-
Working age population		74,600	-	115,290	-	137,630	-
Labor force	Total	30,280	100	51,880	100	61,930	100
	Agriculture	2,500	8.3	2,330	4.5	2,170	3.5
	Fishery	6,500	21.5	7,800	15.0	9,300	15.0
	Manufacturing	2,400	7.9	6,200	12.0	8,700	14.0
	Construction	2,300	7.6	4,200	8.0	5,600	9.0
	Utilities	440	1.5	1,040	2.0	1,200	2.0
	Mining	140	0.5	2,100	4.0	2,500	4.0
	Service	16,000	52.8	28,300	54.5	32,500	52.5

Gross Regional Domestic Product (GRDP)

		Unit	2011	2026	2036
GRDP (price at 2011)	Total	IRR Billion	12,589	21,091	29,590
	Primary	IRR Billion	1,448	2,427	3,261
	Secondary	IRR Billion	4,691	7,858	11,085
	Tertiary	IRR Billion	6,450	10,807	15,244
Annual growth rate	Total	%/year		3.5	3.4
	Primary	%/year		3.5	3.0
	Secondary	%/year		3.5	3.5
	Tertiary	%/year		3.5	3.5
GRDP per capita (real)		USD	5,663	6,403	7,310
Annual growth rate		%	-	0.82	1.33

Population distribution



Population projections

	Unit	2015	2026	2036
Total population	Person	129,078	164,700	202,400
Growth rate	%		2.20	2.09
Immigration total	Person		11,500	26,500
% of immigration	%		7.0	13.1
Assumed natural growth rate	%		2.1	1.8

Source: Statistical Center of Iran and JICA Project Team

Fishery

- Resource management framework and sustainable fishing practices are established by the local communities through Satoumi concept contribute to the stabilization of the fishery resource and the development of value chain in fishery sector.
- Aquaculture is carried out in the environmental-friendly manner for sustainable use of marine environment.
- Diversification of coastal-related livelihood, in link with tourism (diving, fishing tourism, promotion of local gastronomy) will benefit to the fishery sector.
- Strict control of fishing practices and amount of catches might lead to economic suffocation of the fishery sector and social conflicts between deprived fishermen and environmental authorities.

Agriculture

- To avoid an increase of the environmental burden caused by the salt concentration of the water and soil and soil erosion, expansion of acreage is not intended.
- Dates and several horticultural crops are cultivated through few exceptional individual initiatives.
- Agricultural produce, including staple food grains and forage are mainly supplied from the mainland of Iran in the same way for the last two decades.
- The population of livestock farmers may remain unchanged while working population of the sector may gradually decrease.

Environmental protection

- The large-scale development is restricted, including the Persian Gulf Bridge and the petrochemical complex.
- Public awareness of culture, tradition, and environment is raised among communities and tourists.
- The natural environment is preserved. The strict monitoring succeeds to control pollutant into the ocean. The significant increase of salinity is not observed.
- Strict preservation of natural environment causes the conflicts between communities and government due to discouraged economic growth and less employment opportunity.

Industry

- Taking into consideration the limited environmental carrying capacity of Qeshm Island, any type of large scale and polluting industrial activity, especially oil and natural gas development or steel industry, is strictly forbidden to establish in Qeshm Island.
- On the other hand, traditional handicraft know-how (sewing, Pashma and Halva confectioning) is enhanced through the consolidation of eco-tourism as a proper industry.

Housing and community

- The emphasis is put by local authorities on the reconstruction of Qeshm identity in terms of living conditions and of relation of human with nature. Targeting especially new comers in the island, various types of workshops with historians and environmentalists are held in order to raise awareness regarding the specificities of Qeshm rural communities. Urban redevelopment plans aiming at reinforcing the livability of traditional cores of villages are implemented. Regulatory landscape protection plans accompanied by incentives are elaborated in the majority of the villages of the island.
- Group of villages establish a solid unit to complement economic and social services each other. This unit is called a solar system in rural area.
- Foreigners are accepted by the local communities on the condition that they cope with the local traditions.

Tourism

- Ecotourism based on the unique tourism resources of Qeshm such as Geopark and cultural heritages is enhanced rather than the shopping tourism with mass tourists causing large amount of solid waste and wastewater. Selakh port can be utilized for new tourism activities.
- Local communities are encouraged to be involved in SMEs related to tourism business such as professional guides, guesthouse owners, boat operators, scuba diving and traditional handicrafts souvenir shops.
- Number of entrepreneurs and employment moderately increase due to newly developed tourism services.
- Ecotourism attracts international tourists who are relatively well educated and well consumers from the higher socio economic groups. Therefore, tourism expenditure spent by tourist increases.
- Since the Persian Gulf Bridge is not connected, the number of domestic tourists does not drastically change.
- Economic and cultural value exchange between tourists and local communities is enhanced. Tourism becomes one of the important sources of income of local communities. It will also contribute to conserve local traditional culture.

Regional integration

Spatial structure

- Hara mangrove, main eco-tourism attraction for foreigner visitors and most sensible environmental feature of the island, becomes the new center of development of the island, associated with Geosites of the West.
- Uniform distribution of the new population in all cities and especially villages, which consist in the new poles for employment.
- Strict environmental protection of the whole coastline of the island, in terms of regulation of land use on the coastal area and control of marine activities.

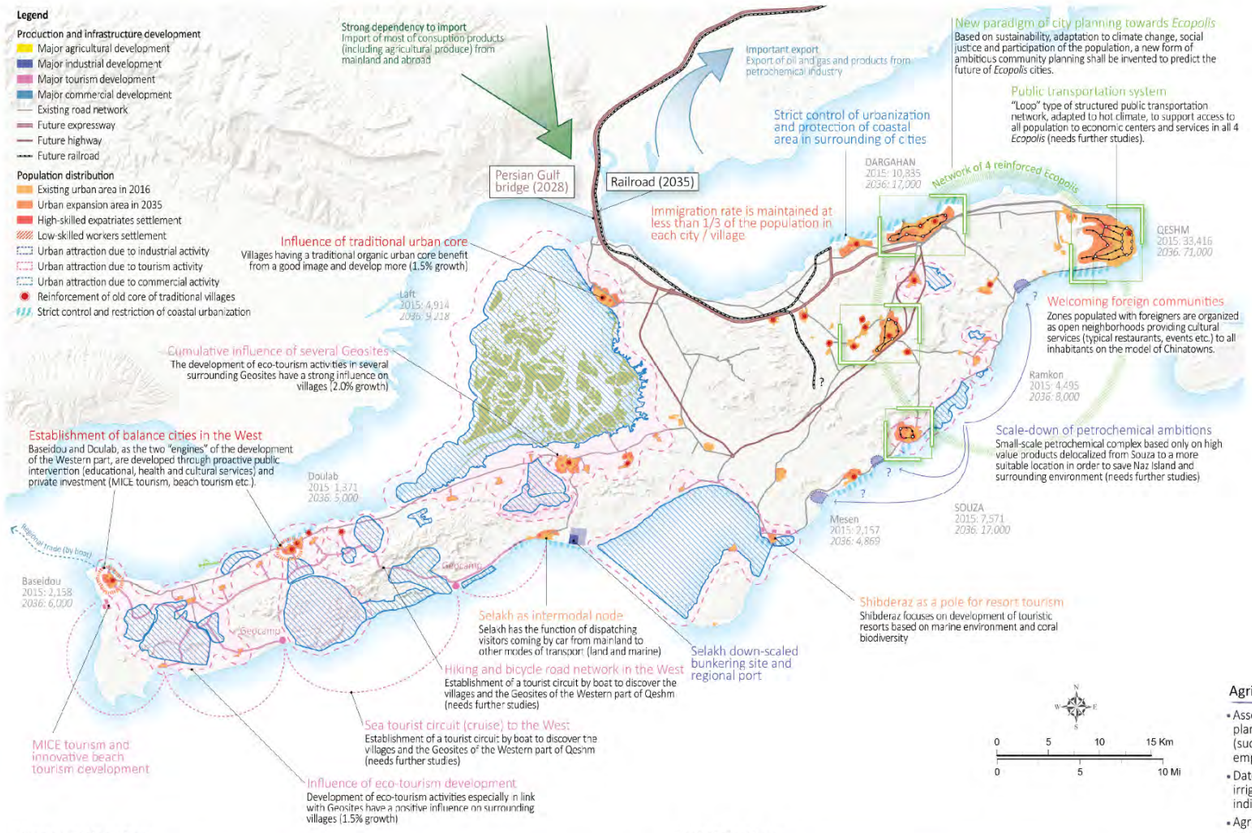
- The large development of infrastructure and economic activities are restricted in the island. The existing infrastructure is used efficiently as much as possible.
- The natural environment is strictly managed and monitored. The island becomes "Galapagos" in the Persian Gulf showing the authentic culture and tradition.
- This differentiates the island from the other part of the country, however the economic growth becomes stagnant.

Source: JICA Project Team

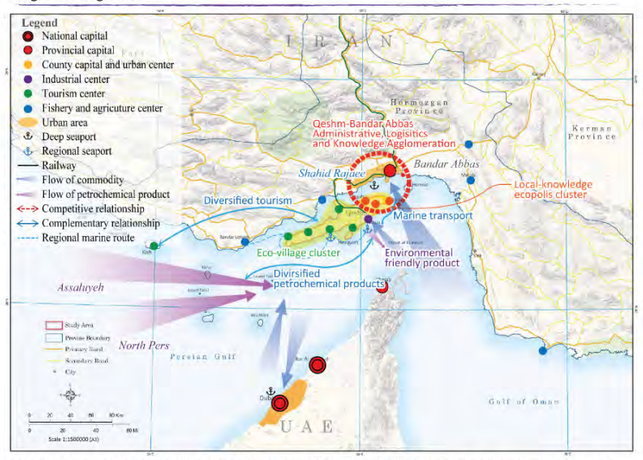
Figure 4.3.3 Detailed Presentation of Alternative C: Minimum Environmental Impact Alternative

alternative D Eco-Island towards resilience alternative

Alternative of conscious development aiming at the definition of new paradigms of balanced and sustainable growth through participation and wise use of local resources.

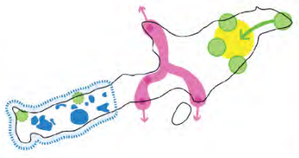


Regional integration



- The island is recognized as the place having the communities who are willing to conserve the unique culture and environment. This recognition helps to promote the branding of Qeshm. The eco-tourism and fishery are main economic activities. As the cities in the mainland are developed, the unique character of the island is enhanced.
- A regional seaport is developed to support the economy in the island. This regional seaport supports Shahid Rajaee seaport as its efficiency is maintained in reasonable level in the peak time.
- The petrochemical complex with modern technology is developed to supplement the economy in the island. Using the benefit from the logistics and industries, the appropriate technology is pursed.
- As a whole, the island envisages to establish the first example of the sustainable development in the country.

Spatial structure



- Distribution of the demographic burden between the four reinforced cities renamed "Ecopolis"
- Shift of the center of gravity of the island slightly to the west in accordance with the construction of the Persian Gulf bridge
- Overall balanced development with Ecopolis reinforcement in the East, Ecotourism Core establishment in the Center and Community strengthening in the West.

Site suitability analysis for deep sea port/petrochemical complex

Area (in red) that have potential to welcome supertankers (crossing of two criteria: more than 20m depth and less than 2km away from the coastline)

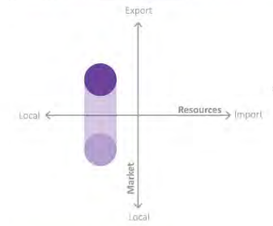
Natural environment criteria
- Turtle nesting beach overlap (weight=7.0)
- Turtle nesting beach proximity (influence=2 km; weight=3.5)
- Artificial reef proximity (influence=3 km; weight=5.0)
- Geosite protected area overlap (weight=5.0)
- Geosite protected area proximity (influence=2 km; weight=3.0)

Human environment criteria
- Qeshm city proximity (weight=10.0)
- Other human settlements proximity (villages, Souza city) (weight=5.0)
- Fishing port proximity (weight=4.0)

Physical criteria
- Slope > 20 degrees overlap (weight=5.0)

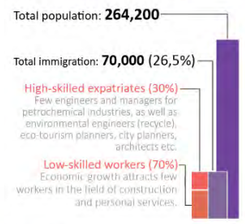
Legend
Site suitability
Very suitable
Suitable
Unsuitable
Very unsuitable
Turtle nesting site
Artificial reef
Geosite
Qeshm city
Other human settlement
Fishing port
Slope > 20°; > 50,000 m2

Economic model: Eco-resilient economy



Economic resilience
(based on the five principles of the Supreme Leader)

Population and immigration
Immigration model: Singapore



Socioeconomic framework

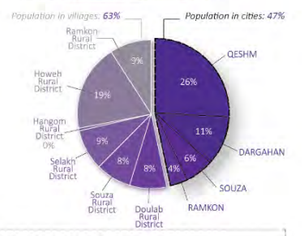
Labor force by sector

		2011		2026		2036	
		Person	%	Person	%	Person	%
Total population		111,159	-	187,600	-	264,200	-
Working age population		74,600	-	131,320	-	179,660	-
Labor force	Total	30,280	100	65,660	100	98,830	100
	Agriculture	2,500	8.3	2,300	3.5	2,470	2.5
	Fishery	6,500	21.5	6,570	10.0	6,920	7.0
	Manufacturing	2,400	7.9	17,600	26.8	26,780	27.1
	Construction	2,300	7.6	9,320	14.2	12,750	12.9
	Utilities	440	1.5	1,310	2.0	3,460	3.5
	Mining	140	0.5	5,580	8.5	12,850	13.0
	Service	16,000	52.8	22,980	35.0	33,600	34.0

Gross Regional Domestic Product (GRDP)

		Unit	2011	2026	2036
GRDP (price at 2011)	Total	IRR Billion	12,589	38,665	74,653
	Primary	IRR Billion	1,448	2,257	3,033
	Secondary	IRR Billion	4,691	15,947	31,369
	Tertiary	IRR Billion	6,450	20,462	40,251
Annual growth rate	Total	%/year		7.8	6.8
	Primary	%/year		3.0	3.0
	Secondary	%/year		8.5	7.0
	Tertiary	%/year		8.0	7.0
GRDP per capita (real)		USD	5,663	10,305	14,128
Annual growth rate		%	-	4.07	3.21

Population distribution



Population projections

	Unit	2015	2026	2036
Total population	Person	129,078	187,600	264,200
Growth rate	%		3.41	3.49
Immigration total	Person		28,000	70,000
% of immigration	%		14.9	26.5
Assumed natural growth rate	%		2.1	1.8

Source: Statistical Center of Iran and JICA Project Team

Agriculture

- Associated with eco-tourism industries, the production of traditional herbal plants (and their processed products) and high value-added agro-products (such as mangrove honey) as local-specialty products contributes the domestic employment creation and the growth of working population of the sector.
- Dates and several fresh (also perishable) leafy vegetables are grown in drip irrigation with supplemental use of recycled-water through few exceptional individual initiatives.
- Agricultural produce, including staple food grains and forage are mainly supplied from the mainland of Iran in the same way for the last two decades. Fodder crop cultivation is partially revived by using recycled-water.

Industry

- Taking into consideration the limited environmental carrying capacity of Qeshm Island, the scale and scope of oil and gas development is scaled-down and concentrated on the high value-added products such as polypropylenes, LPG or synthetic fuels. The latest technology is applied to ensure lowest environmental impact.
- The scale-down of oil and gas industry allows to search for more suitable location in terms of natural and human environment for the establishment of the plants, especially Souza complex, while ensuring sufficient economic benefit for the local community through fisheries and tourism.
- The benefits from oil and gas development are injected in various types of environment-friendly industrial clusters targeting both internal and regional market.
- Research and development regarding the potential development of high-tech biorefinery technologies, and especially the extraction of oil from microalgae for production of glycerin or reduction of GHG emission is studied in cooperation with foreign universities and under the finance of petrochemical groups.

Housing and community

- The four cities of the Island, Qeshm, Dargahan, Souza and Ramkon are reinforced within a new paradigm of urban planning based on sustainability, social justice and participation of the population. The four cities renamed "Ecopolis" share different well identified functions and operate as the whole, in collaboration with each other. This new "Urban Ecoregion" is the new core of the Island.
  - Qeshm: Administrative and knowledge Ecopolis
  - Dargahan: Identity and culture EcoPolis
  - Ramkon: Agriculture and trade Ecopolis
  - Souza: Marine Ecopolis
- In each of the 4 Ecopolis, the communities of foreigners from different horizons are integrated with the existing city and linked to the other parts through a "loop-type" internal public transportation system.
- Four villages of Laft, Tabl, Selakh, and Shibderaz are interlinked by north-south trunk road from the mainland to the Persian Gulf. Those villages interact to establish the ecotourism core in the center of the island.
- In west, autonomous livelihood development is promoted by strengthening the community. Baseidou and Doulab establish cores to support villages in their peripheral area.

Fishery

- Resource management framework and sustainable fishing practices are established by the local communities through Satoumi concept contribute to the stabilization of the fishery resource.
- Aquaculture is carried out in the environmental-friendly manner for sustainable use of marine environment.
- High value-added fishery product is achieved for domestic and international markets due to the successful value chain development.
- Scientific research in sustainable aquaculture high-technology techniques applied to endemic species is pursued in parallel to the enhancement and promotion of local traditional knowledge.
- Diversification of coastal-related livelihood, in link with tourism (diving, fishing tourism, promotion of local gastronomy) will benefit to the fishery sector.

Tourism

- Eco-friendly tourism products are highly diversified. Ecotourism which utilizes unique tourism resources in Qeshm becomes core value. Salakh port can be utilized for new tourism activities. In addition, MICE facilities and small luxury eco-resorts are established in western part of the Island in support of the balance pole of Baseidou.
- Ecotourism encourages local communities to be involved in SMEs related to tourism business.
- Number of entrepreneurs and employment increase due to newly developed tourism and services.
- Medium-scale tourism facility development accommodates more employment opportunities.
- Ecotourism attracts international tourists from the higher socio economic groups. Therefore, tourism expenditure spent by tourist increases.
- Once the Persian Gulf Bridge is connected, the number of domestic tourists increases. Families who are interested in learning unique culture and environment increase. Academics and researchers who join meetings and conferences also increase.
- The branding of Qeshm products is promoted to reinforce the local market.
- Since community involvement with tourism businesses is promoted, economic and cultural value exchanges between tourists and local communities are enhanced. As the result, tourism becomes one of the pillars of supporting local economy and local traditional culture.

Environmental protection

- Public awareness of culture, tradition, and environment is raised among communities and tourists.
- The communities make efforts to achieve two objectives of conservation of natural environment and their livelihood improvement.
- The environmental sensitive areas including the protected areas, coastal areas, and geopark are conserved well by application of community participation in integrated coastal management and Geopark management.
- The benefits from oil and gas development are used for research and development of environmentally friendly technology.

Source: JICA Project Team **Figure 4.3.4 Detailed Presentation of Alternative D: Eco-island Towards Resilience Alternative**

4.3.2 Prediction and comparison of the effects of the different strategic alternatives

The process of prediction and comparison of the effects of the strategic alternatives is realized in order to pursue the best, albeit realistic, alternative with a well-balanced combination of advantages regarding each strategic alternative, rather a selection of the most preferable out of the four strategic alternatives, which respectively emphasize economic, social and environmental objectives.

The results of the assessment and comparison of the four alternatives, according to SEA objectives and classified into distinct SEA topics, are summarized in Table 4.3.4 and detailed in Table 4.3.5 below. Where appropriate, any cumulative, secondary and synergistic, short-, medium- or long-term effect is highlighted, indicating whether it is likely to be permanent or temporary.

Table 4.3.4 Results Summary of the Comparison of the Different Strategic Alternatives

SEA topic		SEA objective	Alternative A	Alternative B	Alternative C	Alternative D
Anti-pollution measures	POL	POL-01	A-	B-	D	C-
		POL-02	A-	B-	D	C-
		POL-03	A-	B-	D	C-
	WPR	WPR-01~03	A-	B-	B+	B+
	PHH	PHH-01	B+	B+	B-	B+
		PHH-02	A-	B-	D	B-
		PHH-03	B-	B+	B-	B+
		PHH-04	B-	B-	D	C
Natural environment	BIO	BIO-ME-m	A-	B+	A+	A+
		BIO-ME-s	D	C	B+	C
		BIO-ME-t	A-	C	B+	C
		BIO-ME-c	A-	C	C	C
		BIO-TE	D	B-	B+	C
		BIO-FF-01	A-	B+	B+	B+
		BIO-FF-02	A-	B+	B+	B+
		BIO-FF-03	A-	B-	B+	B+
	ERO	ERO-01	B-	B-	D	D
		ERO-02	A-	D	D	D
	PRA	PRA-01	A-	B+	B+	D
	RES	RES-01~03	A-	B-	D	B+
Socioeconomic environment	PRS	PRS-01	B-	B-	D	D
	EMP	EMP-01~02	C	B+	B-	B+
		EMP-03	C-	B+	B+	B+
	LOC	LOC-01	B-	B+	C	B+
		LOC-02	B+	B+	B-	A+
		LOC-03	C	B-	B-	B+
		LOC-04	A-	C	C	A+
	SOC	SOC-01	A-	B-	B+	C
		SOC-02	A-	B+	B-	A+
		SOC-03	A-	C+	C+	A+
		SOC-04	B-	A+	B-	A+
		SOC-05	C-	B+	B-	B+
	DIS	DIS-01~04	B-	A+	C+	B+
		DIS-05	A-	B+	B-	A+
		DIS-06	A-	B+	C	A+
	GEN	GEN-01	B-	C+	C+	B+
		GEN-02	B-	B-	B-	A+
	CHL	CHL-01	A-	A+	B+	A+
		CHL-02~03	A-	B+	C+	A+
Global issues	TEI	TEI-01	A-	B-	B+	B-
	CLI	CLI-01	A-	A-	B+	C-
		CLI-02	B-	B-	B-	B+

Note: A+/- = remarkable positive/serious negative effect is predicted
B+/- = positive/negative effect is predicted to some extent
C+/- = limited positive/negative/neutral effect is predicted but a further survey is required
D = effect is very small or nil and a further survey is not required

Source: JICA Project Team

It is not the aim of the SEA to choose the alternative for the ECO-QESHM Master Plan, but rather to provide information on the relative environmental performance in order to make the decision-making process more transparent. As such, it seems obvious from the results of the comparison of effects that Alternative D is the most environmentally beneficial sustainable development alternative for Qeshm Island.

Table 4.3.5 Detailed Results of the Comparison of the Different Strategic Alternatives

SEA topic		Alternative A					Alternative B					Alternative C					Alternative D				
		Effect	ST	MT	LG	Comment	Effect	ST	MT	LG	Comment	Effect	ST	MT	LG	Comment	Effect	ST	MT	LG	Comment
POL	POL-01	**A-**	C	B-	A-	− Combined with petroleum refineries, which are a major source of hazardous and toxic air pollutants, such as BTEX compounds (benzene, toluene, ethylbenzene and xylene), heavy industries to be introduced would discharge significant amounts of air pollutants.	**B-**	D	B-	B-	− The development of the oil and gas industry, even on a small scale, and the concentration of industrial SMEs in productive clusters are likely to have adverse impacts on air quality on the island.	**D**	D	D	D	− Due to the absence of heavy industries, the level of air pollution is maintained at a low level.	**C-**	D	C-	C-	− The introduction of the petrochemical industry, even on a small scale and with a high level of pollution prevention and control technology, is likely to have adverse impacts on air quality across the entire island. This aspect shall be studied carefully in further stages.
	POL-02	**A-**	C	B-	A-	− Refineries are potential major contributors to groundwater, surface water and marine water contamination. − Important thermal pollution is forecasted due to the use of seawater as a coolant by the numerous industrial plants settled on the coastline. This leads to an increase in sea temperature and a decrease in oxygen supply, which affect the marine ecosystem composition, especially coral reefs. − Seawater pollution is expected from newly built shrimp farms and wastewater treatment plants necessary to tackle population increase. − Runoff from tourism and residential expansion on coastal areas carry large quantities of sediments and pollutants.	**B-**	B-	B-	B-	− The objective of having rapid economic development in support of import substitution, and the oil and gas industry, as well as clusters of industrial SMEs being expanded as a priority, is likely to have adverse impacts on the water quality of the island.	**D**	D	D	D	− Due to the absence of heavy industries or polluting activities, such as those of aquaculture farms, the level of marine pollution is maintained at a low level.	**C-**	D	B-	C-	− With the establishment of integrated coastal area planning, which considers the sensibility of both land and sea ecosystems, the most suitable location is searched for the construction of any new factory or desalination plant, which allows for proactively avoiding any adverse effects on marine key ecosystems. − All kinds of control measures are taken for controlling water discharges from desalination plants and thermal pollution from industries. − Research into and application of high-technology techniques regarding sustainable aquaculture lead to a reduced burden of this economic sector on the marine environment in the long term. Those aspects shall be studied carefully in further stages.
	POL-03	**A-**	C	B-	A-	− Export processing-based industries, such as iron production, are likely to have important adverse effect in terms of soil contamination.	**B-**	B-	B-	B-	− The dispersion of industries in rural areas make the control and regulation of the waste and discharge of the polluting units more difficult and thus increases the risk of dispersed soil contamination.	**D**	D	D	D	− Due to the absence of heavy industries, the level of soil contamination is maintained at a low level.	**C-**	D	C-	C-	− All kinds of control measures are taken for controlling soil contamination from the few industries to be introduced.
WPR	WPR-01 ~ WPR-03	**A-**	C	B-	A-	− Without any strong willingness from the public administration functions to introduce waste reuse and recycling, as well as promote sustainable production and consumption patterns on the island, waste generation is likely to continue to grow, especially due to the expected population increases and related consumption habits similar to those in UAE countries.	**B-**	B-	B-	B-	− The dispersion of industries and residential areas into rural clusters throughout the island leads to the necessity of building new landfills. − With the objective of rapidly achieving an import substitution economy and targeting shopping visitors from the mainland, waste production on the island is likely to be important and difficult to control.	**B+**	D	B+	B+	− Political will and substantial financial effort to become a model in the domain of recycling would lead to the establishment of a strong and high-tech system for recycling, composting and energy recovery. In addition, the limited population is likely to apply a sustainable consumption lifestyle.	**B+**	D	D	B+	− On obtaining results from the introduction of recycling systems of ordinary (urban and rural) and industrial wastes in the middle term, and thanks to the promotion and sensitization regarding sustainable production and consumption patterns in the eco-tourism sector, as well as in the whole of society, waste generation would be minimized and valuable in the long term.
PHH	PHH-01	**B+**	D	D	B+	− High economic growth allows for major investment and training in advanced healthcare technology. High-standard hospitals are to be established in the cities of Qeshm and Dargahan, while the average level of human health is to increase in the long term.	**B+**	D	D	B+	− Relatively high economic growth should allow for some investment and training in advanced healthcare technology. Fairly high-standard hospitals to be established in each cluster centers and provide services to surrounding villages in the long term.	**B-**	B-	B-	B-	− Low economic growth does not allow progress in healthcare services, which are maintained unsatisfactorily. Consequently, the average quality level of human health stagnates.	**B+**	D	D	B+	− Relatively high economic growth allows for some investment and training in advanced healthcare technology. High-standard hospitals are established in each ecopolis and in balance cities. The average level of human health is increased in the long term.
	PHH-02	**A-**	D	A-	A-	− The risk of an industrial accident (explosion) in one unit of the petrochemical complex and the potential deaths among a large amount of the population is major, as testified by the numerous accidents that have occurred in Iran in recent years.	**B-**	D	B-	B-	− Introducing a petrochemical industry, even on a small scale and with a high level of accident prevention and control technology, implies a potential risk of accidents (explosions), which might kill or wound a large section of the population.	**D**	D	D	D	− Due to the absence of industries having a potential for disaster, the level of risk is null.	**B-**	D	B-	B-	− Introducing a petrochemical industry, even on a small scale and with a high level of accident prevention and control technology, implies a potential risk of accidents (explosions), which might kill or wound large numbers of the population.
	PHH-03	**B-**	D	B-	B-	− Unbalanced distribution of social services between cities and villages and between east and west leads to a high	**B+**	D	D	B+	− With the construction of different types of hospitals in the main cities and smaller medical centers inside the	**B-**	B-	B-	B-	− Even though the smallest and most landlocked villages have gained some job opportunities, social services	**B+**	D	D	B+	− With the construction of different types of medical centers well distributed on a hierarchical base across the island, health

						degree of health inequalities.					clusters, health inequalities are expected to reduce in the long term.					including health centers are still lacking.					inequalities are abolished in the long term.
	PHH-04	**B-**	D	B-	B-	− The development of major industrial estates and fish-processing industries is likely to expose the surrounding population to offensive odors, noise and vibrations.	**B-**	D	B-	B-	− It is likely that the numerous industrial SMEs dispersed throughout the island close to human dwellings will cause serious offensive odors, noise and vibrations.	**D**	D	D	D	− Due to the absence of major industrial estates or fish-processing industries, the level of offensive odors, noise and vibrations is almost null.	**C**	C	C	C	− Legal mechanisms ensuring mandatory suitability analysis and various simulations for new industrial and residential areas would allow for potential impacts, in terms of offensive odors, noise and vibrations, to be avoided proactively.
BIO	BIO-ME-m	**A-**	C	B-	A-	− The lack of consideration for mangrove sensibility and the absence of environmental regulation, the lack of control regarding urban expansion in coastal areas, anarchic tourism developments in the form of constructing more and more jetties etc. lead to alterations in the ecological links and the integrity of Hara's mangrove forest in the long term.	**B+**	D	C+	B+	− Thanks to an effort in relation to public awareness regarding the environmental sensibility towards mangrove habitats among communities and tourists, a consensus is built on the strategy and actions to be undergone for the safeguard of mangrove forestation. The integrity of mangrove habitats is fairly well conserved in the long term, but the consensus in relation to the real value of the ecosystem services provided by mangrove ecosystems is not sufficiently confident regarding its future conservation.	**A+**	D	B+	A+	− The strict control operated by environmental authorities in the protected areas and in making impartial decisions during the EIA process when it comes to delivering building permits near protected or on coastal areas, leads to the maintenance of all the mangrove forests, which are intact from adverse impact. − Moreover, the political will and substantial financial effort to increase mangrove areas across the island lead to the creation of solid secondary mangrove habitats in support of Hara, especially assuming the role of breeding sites.	**A+**	D	C+	A+	− Based on the close collaboration of decision makers in villages, city planners, environmentalists, fishermen in the Hara mangrove forest and camel breeders, a consensus is built on the strategy and actions to be undertaken for the safeguard of the mangrove forest. Implementation starts with small-scale pilot projects and expands to large-scale actions coordinated by a special unit of the island's administration. Mangrove enhancement as a strong resilient ecosystem is achieved in the long term, while environmental education on ecosystem services relating to mangroves is well assimilated by most of the island people.
	BIO-ME-s	**D**	D	D	D	− Since major urban and industrial developments are concentrated in the east part of the island, and since the west part, where most of the seagrass beds are situated, is preserved from development, the integrity of this vulnerable habitat is maintained.	**C**	D	B-	C	− The development of the Doulab and Baseidou industrial clusters, situated close to the biggest seagrass bed habitats on the island, might have adverse effects on the integrity of this sensitive habitat − In the long term, public awareness raising regarding the sensibility towards seagrass habitats among communities and tourists might lead to remedial actions.	**B+**	D	B+	B+	− Zones of seagrass bed habitats are identified and promoted as sensible sites of natural heritage and receive the same regulatory protection as protected areas.	**C**	D	C	C	− Seagrass beds habitats are identified and considered by the local administration and communities as key habitats for the correct operation of *satoumi*, meaning that they benefit from a special protection regime. − However, the development of Doulab and Baseidou as balance cities, situated close to the biggest seagrass beds on the island, shall be carefully studied.
	BIO-ME-t	**A-**	D	B-	A-	− Urban development in the Dargahan and Kouvei areas, the construction of a refinery in Kavah, the eventual construction of new marinas and docks, dredging for shipping channels, and badly planned mangrove transplantations might reduce the surface and negatively impact mud flat habitats. − Sandy beaches are likely to be extracted until they vanish due to population pressure and the urgent need for housing construction.	**C**	D	B-	C	− The development of the Dargahan-Kouvei and the Tabl industrial clusters, situated close to the mud flat ecosystems, might impact negatively on the integrity of this sensitive habitat. − In the long term, public awareness raising regarding the sensibility of mud flat habitats among communities and tourists might lead to remedial actions.	**B+**	D	B+	B+	− Zones of mud flat habitats and sandy beaches are identified and promoted as sensible sites of natural heritage and receive the same regulatory protection as protected areas. − Sand extraction is strictly banned.	**C**	D	C	C	− The urban development of the Dargahan ecopolis and of Tabl, situated close to the biggest mud flat areas on the island, is likely to have adverse effects on the latter's habitat. The land use planning for those areas shall be carefully studied. − Sand extraction is banned and active research for more sustainable palliative construction material is undertaken.
	BIO-ME-c	**A-**	D	B-	A-	− Climate change effects on increasing seawater temperature, water pollution from shrimp farms and wastewater treatment plants, and thermal pollution from industrial activity are all factors that aggravate the pressure and degradation on coral reefs, which are likely to simply disappear in the long term.	**C**	C	C	C	− Even though all the measures are taken in terms of controlling water pollution and thermal pollution from industries on Qeshm Island, it cannot be said that it will be enough to preserve the full integrity of coral reef ecosystems, which are victims of algal blooming and bleaching due to the large-scale situation of the Persian Gulf and global warming.	**C**	C	C	C	− Even though the absence of large industry and the implementation of strict norms on discharges will limit adverse influence, it cannot be said that it will be enough to preserve the full integrity of coral reef ecosystems, which are victims of algal blooming and bleaching due to the large scale situation of the Persian Gulf and global warming.	**C**	C	C	C	− Even though all the measures are taken for controlling water pollution and thermal pollution from industries on Qeshm Island, it cannot be said that this will be enough to preserve the full integrity of coral reef ecosystems, which are victim of algal blooming and bleaching due to the large-scale situation in the Persian Gulf and global warming.
	BIO-TE	**D**	D	D	D	− Since urban and industrial development is concentrated on the east part of the island and the coastal areas, the most sensible terrestrial ecosystems are somewhat protected from development.	**B-**	D	B-	C	− The development of the Dargahan, Ramkon, Baseidou and Doulab industrial clusters, situated close to native woodlands (acacia, jujube, konar etc.), might have adverse effect on the integrity of those habitats.	**B+**	D	B+	B+	− Sensible terrestrial ecosystems, such as native woodlands (acacia, jujube, konar etc.), are identified and promoted as sensible natural heritage sites and receive the same regulatory protection as a protected area.	**C**	D	C	C	− The development of urban and industrial activities in the villages situated in the hinterland might have some effect on the terrestrial ecosystems, particularly native woodlands (acacia, jujube, konar etc.) located near Dargahan, Ramkon, Baseidou

										− In the long term, public awareness raising regarding sensibility of native woodlands among communities and tourists might lead to remedial actions.									and Doulab. Land use planning for those areas shall be carefully studied.
	BIO-FF-01	**A-**	D	B-	A-	− From the perspective of maximizing the catches, intensive and destructive fishing practices are implemented. Meanwhile, since fishery resources are not managed properly, they are likely to decrease drastically and thus not meet the demand of customers.	**B+**	D	C+	B+	− A resource management framework and sustainable fishing practices would be established thanks to the collaboration of local communities in relation to the *satoumi* concept. In the long term, this would actively contribute to the stabilization of the fishery resource.	**B+**	D	B+	B+	− The strict control and regulation operated by an environmental authority specialized in fishery would allow for putting an end to destructive fishing practices, while regenerating and enhancing fishery resources.	**B+**	D	C+	B+	− A resource management framework and sustainable fishing practices should be established thanks to the collaboration with local communities through the *satoumi* concept. In the long term, this would actively contribute to the stabilization of the fishery resource.
	BIO-FF-02	**A-**	D	B-	A-	− The lack of interest in the local biological heritage and the lack of action towards invasive species would lead to the extinction of the egret and heron populations in the Hara mangrove forest due to the invasion of the black rat, as well as a growing invasion of *Prosopis juliflora* in cultivated areas and native woodlands. − In addition, the introduction of exotic species in aquaculture for high economic return would lead to major ecological disturbance.	**B+**	D	C+	B+	− Thanks to public efforts regarding awareness in terms of the threat of *Prosopis juliflora*, native woodlands and the presence of the black rat in the mangrove habitats, a consensus is built on the strategy and actions to be undertaken in terms of safeguarding these two key habitats. The integrity of native woodlands and mangroves is fairly well conserved in the long term, but the consensus over the real value of their ecosystem services is not strong enough to be confident regarding the future conservation.	**B+**	D	B+	B+	− Political willingness and substantial financial effort would lead to the complete eradication of invasive *Prosopis Juliflora* on the entire island, as well as black rat in the Hara mangrove in the middle term.	**B+**	D	C+	B+	− Based on the close collaboration with farmers on the one hand, and of Hara fishermen and environmentalists on the other hand, scientific studies and concrete actions against invasive species of *Prosopis juliflora* and black rat, respectively, grow from small-scale pilot projects to large-scale network actions coordinated by a special unit of the island's administration. Eradication of both priority species is achieved in the long term.
	BIO-FF-03	**A-**	D	B-	A-	− The lack of consideration towards biodiversity and the lack of any strict controls on hunting and capturing would lead to the extinction of the gazelle population on Hangom Island.	**B-**	D	B-	B-	− As Hangom Island is not integrated in any industrial cluster development *per se*, governance influence including environmental regulation means that there are difficulties to be enforced. Consequently, the gazelle population is relatively affected by hunting.	**B+**	D	B+	B+	− The strict control of hunting operated by a special environmental police would allow for simply stopping the trafficking of protected species in the middle term.	**B+**	D	C+	B+	− The success of eco-tourism in the middle term leads to a consensus regarding the importance of safeguarding fauna species threatened by hunting and capturing. Local communities involved in decision-making through participation stand together to face up to and eradicate hunting-based tourism.
ERO	ERO-01 ~ ERO-02	**B-**	D	B-	B-	− In order to support the massive demand of construction material for housing, limestone and sand extraction is increased. Consequently, numerous reliefs suffer from geological erosion, which causes runoff and floods in urban areas during heavy rain.	**B-**	D	B-	B-	− In order to realize an import substitution economy and depend to a lesser extent on imports from the mainland, the extraction of local limestone and sand is maintained and enhanced. Consequently, important geological erosion is forecasted.	**D**	D	D	D	− Strict control of extraction activity, limited population and thus a nominal demand in terms of housing lead to limited limestone extraction and preservation of geological structures.	**D**	B-	C-	D	− From the perspective of realizing sustainable urban development and housing production, innovative construction materials, other than the ones extracted in Qeshm, are studied. The necessary materials are imported from the mainland. Geological erosion would thus be avoided.
		A-	D	B-	A-	− With the construction of more and more industrial and trade jetties, groins and touristic resorts on the shoreline, major coastal and hydrological erosion is forecasted in terms of sedimentation, modification of sea currents and consequential ecological alteration of coral reef habitats.	**D**	D	D	D	− The development on the shoreline is limited in favor of industrial development in the hinterland, which means that hydrological erosion would be limited or non-existent.	**D**	D	D	D	− The strict control and restriction of coastal urbanization and construction of jetties and ports enforced by environmental authorities would allow for the avoidance of coastal erosion.	**D**	D	D	D	− The strict control and restriction of coastal urbanization and the construction of jetties, contained in both urban planning documents and a new type of "integrated coastal management plan" covering all the shoreline of the island, would allow for the avoidance of coastal erosion from middle term onwards.
PRA	PRA-01	**A-**	D	A-	A-	− Starting with Souza's deep-seaport and petrochemical complex, it is likely that major industrial, tourism and residential developments would be constructed, while ignoring protected areas and environmental regulations.	**B+**	D	C+	B+	− Thanks to the efforts of public awareness raising regarding environmental sensibility of protected areas and geosites among communities and tourists, a consensus is progressively built around the legitimacy of those zones.	**B+**	D	C+	B+	− Under the influence of significant administrative willingness and capacity to enforce environmental regulations, protected areas and geosites will benefit from various legal and institutional strengthening and geographical expansions.	**D**	D	D	D	− Thanks to preventative planning, geographical multi-criteria analysis and a participatory approach, the integrity of protected areas, for which natural and cultural values are recognized, is preserved. No large-scale development is implemented in protected areas, including geosites.

RES	RES-01 ~ RES-03	**A-**	D	B-	A-	− Large-scale petrochemical industries and refineries need enormous amounts of water to operate. More and more desalination plants will have to be built to support the needs of such industrial developments, as well as for residential projects spreading anarchically on the shoreline. − Recycling of wastewater and water-use efficiency are not envisaged.	**B-**	B-	B-	B-	− The dispersion of industries and residential areas into clusters across the island leads to the necessity of building more seawater and groundwater desalination plants. − With the objective of rapidly achieving an import substitution economy and targeting shopping visitors from the mainland, water consumption is likely to be important and difficult to satisfy.	**D**	D	D	D	− Due to the absence of heavy industries and limited demands from the population, the level of depletion regarding water and other natural resources is maintained to a low level.	**B+**	D	D	B+	− Obtaining results from the introduction of wastewater recycling for irrigation and regarding a better allocation of freshwater use, the depletion of natural resources would be minimized in the long term.
PRS	PRS-01	**B-**	D	B-	B-	− It is likely that major industrial, tourism and residential developments involving land use changes might lead to significant population resettlements, especially from the middle term.	**B-**	D	B-	B-	− It is likely that industrial, tourism and residential developments involving land use changes might cause some population resettlements, especially in the middle term.	**D**	D	D	D	− The emphasis on urban redevelopment, rather than large-scale housing extension, would lead to the avoidance of involuntary resettlements of populations.	**D**	D	D	D	− Thanks to the emphasis placed on participatory planning in all stages of decision-making, involuntary resettlements of populations would be avoided.
EMP	EMP-01 EMP-02	**C**	B+	C+	C	− In the short term, the development of high-quality fruits and vegetables plant factories and intensive fishing leads to an increase in employment and thus a reduction of poverty. However, in the middle term, the difficulties faced by the agricultural sector and the large-scale depletion of fishery resources in the Persian Gulf could put the majority of local farmers and fishermen out of business. − Jobs related to petrochemical activity are likely to concern only a minority of foreign expatriates and Iranian engineers coming from the mainland, meaning that this situation cannot have a positive impact on the development of local employment and the reduction in poverty.	**B+**	D	B+	B+	− Due to the comprehensive nature of the industrial process for realization of import substitution (production-transformation-export), several types of job opportunity are created, from the lowest warehousemen to the highest managers, thus employment is ensured for the majority of the population. − In addition, mechanisms of solidarity are implemented by the cluster administration in support of the reduction of extreme poverty, especially in landlocked rural areas.	**B-**	B-	B-	B-	− Due to the absence of investment and industrial development, job opportunities related to environment and eco-tourism are limited. In this context, it is hard to tackle poverty.	**B+**	D	B+	B+	− Jobs related to petrochemical activities are likely to concern only a minority of foreign expatriates and Iranian engineers coming from the mainland, meaning that this situation cannot be considered to have a positive role on the development of local employment opportunities and the reduction in poverty. − However, from the middle term onwards, the success of eco-tourism activities will create numerous and diversified job opportunities for all population categories of population across the island.
	EMP-03	**C-**	D	C	C-	− Significant income disparities might lead to the illusion of a large professional category of housemaids, who might be victims of bad working conditions due to a lack of control.	**B+**	B+	B+	B+	− Decent working conditions are ensured thanks to the proximity and the follow-up from the cluster administration.	**B+**	B+	B+	B+	− Decent working conditions are ensured by the strict implementation of island administration policies.	**B+**	B+	B+	B+	− Decent working conditions are ensured by the implementation of island administration policies.
LOC	LOC-01	**B-**	B+	C-	B-	− The increase of intensive aquaculture production generates various adverse effects on the local marine environment (transfer of diseases, contamination of bottom and benthic flora and fauna) and leads to the extinction of ornamental fish species, which raise the potential for scuba diving.	**B+**	B+	B+	B+	− Sustainable agriculture would be established through association with eco-tourism activities, production of traditional herbal plants, high value-added agro-products (honey), and use of recycled water for drip irrigation. − Sustainable fishing practices would be established thanks to the collaboration with local communities through the *satoumi* concept.	**C**	C	C	C	− To avoid an increase in the environmental burden caused by the salt concentration of the water and soil, as well as soil erosion, expansion of cultivation is not intended. − Sustainable fishing practices would be established thanks to the collaboration between local communities through the *satoumi* concept.	**B+**	B+	B+	B+	− Sustainable agriculture would be established through associations with eco-tourism activities, production of traditional herbal plants, high value-added agro-products (honey) and the use of recycled water for drip irrigation. − Sustainable fishing practices would be established thanks to the collaboration with local communities through the *satoumi* concept.
	LOC-02	**B+**	A+	B+	B+	− High economic productivity is achieved through technological upgrading and innovation in petrochemical industries, which allow for major exports. − However, from the middle term, the sectors of agriculture, fishery and tourism suffer from several difficulties and reduce the economic growth in the rural areas.	**B+**	D	C+	B+	− Relatively high economic productivity is achieved in the long term by pursuing an import substitution economy, which targets a growing internal market and enhances the role of Qeshm as a shopping pole targeting visitors from the mainland.	**B-**	B-	B-	B-	− Due to the absence of investment and development in diversified industries, technologies and innovations, a high level of economic productivity would not be achieved.	**A+**	B+	A+	A+	− Relatively high economic productivity is achieved through technological upgrading and innovation in petrochemical industries, which allow for relatively high exports. − From the middle term onwards, the success of eco-tourism activities will guarantee a diversification of jobs and stability in economic growth.
	LOC-03	**C**	B+	C	C	− The large scale and wide scope of the industrialization of different economic sectors would lead to an important increase in manufacturing value added. − However, the risky nature and the environmental burden of those	**B-**	B-	B-	B-	− The dispersion of numerous industries into different clusters across the island leads to some difficulties in terms of centralizing and harmonizing the sustainable industrialization process.	**B-**	B-	B-	B-	− Development is based on the preservation of authentic handcrafted products, which would thus be illogical to industrialize.	**B+**	D	B+	B+	− The modest scale of the oil and gas industry enables a search for the more suitable location in terms of natural and human environments for the establishment of plants, while ensuring sufficient economic benefits for the local community

						industrial activities might make industrialization unsustainable.													through fisheries and tourism. This allows the industrialization process to be more sustainable.
	LOC-04	**A-**	D	B-	A-	− Negligence in terms of biodiversity management as testified by the extinction of the egret and heron population in the Hara mangrove forest (bird watching), the gazelle population on Hangom Island (wildlife watching), and ornamental fishes species (scuba diving) would lead to the annihilation of the eco-tourism potential of Qeshm Island.	**C**	D	B-	C	− The development of different industrial clusters dispersed across the island might deteriorate some of the most important ecosystems on the island, as well as dwindle the potential for eco-tourism. − In the long term, public awareness raising regarding the sensibility of native woodlands among communities and tourists might lead to remedial actions.	**C**	C	C	C	− The excellent conservation of biodiversity and ecosystems on Qeshm Island gives a significant potential for eco-tourism activities. However, environmental authorities maintain a strict control on the habitat and forbid much of the human presence in natural protected areas, which do not fully exploit the financial potential of eco-tourism on the island.	**A+**	D	B+	A+	− Good conservation and enhancement of biodiversity and ecosystems on Qeshm Island allow for numerous eco-tourism activities to be prepared from the short term onwards. − From the middle term onwards, the success of eco-tourism activities leads to the creation of numerous and diversified direct and indirect job opportunities across the island.
SOC	SOC-01	**A-**	D	B-	A-	− Important social disparities might arise due to the difference in salaries offered, on the one hand, to highly specialized petrochemical engineers and investors, and lower jobs or even unemployment on the other.	**B-**	D	B-	B-	− Due to the hierarchical nature of the industrial process of clusters (production-transformation-export), the jobs offered and the income levels are also much differentiated between the lowest warehousemen and the highest managers.	**B+**	B+	B+	B+	− Due to the absence of extreme income differences between livelihoods, social cohesion is maintained.	**C**	D	B-	C	− Social disparities might arise due to the difference in salaries offered to highly specialized petrochemical engineers on the one hand and lower jobs on the other. − From the long term onwards, the maturation of eco-tourism activities and the numerous jobs that they create might restore the balance between income and social cohesion.
	SOC-02	**A-**	D	B-	A-	− Spatial separation of successful high-skilled expatriates (in well-equipped gated communities, such as Shibderaz Newtown and the cities) and the less successful local population (in under-equipped villages) would create social clashes and animosity towards foreigners.	**B+**	B+	B+	B+	− Spatial cohesion inside clusters (between the solar city/village and the star villages) is achieved due to the good governance and the participatory approach operated by the cluster administration.	**B-**	D	C-	B-	− Spatial cohesion is achieved to some extent at the micro level, especially thanks to the integration of foreigners in the same settlements as the locals. − However, at the macro level, villages that do not have the potential to benefit from environment-related job opportunities experience delay in their development.	**A+**	D	B+	A+	− The mixed land use proposed for foreigners' communities, which are not willing to merge with Qeshm society, but prefers to be organized as open neighborhoods providing cultural services to the locals, on the model of Chinatowns, Little Indias or other ethnic quarters in Singapore, will have a positive effect on the social and cultural well-being of all of society.
	SOC-03	**A-**	D	B-	A-	− A significant increase in foreigners, especially non-Muslims, in the form of both high-skilled expatriates and low-skilled workers, without any civic education or guidance over Islamic values, would definitely disrupt the current social and cultural balance.	**C+**	D	B+	C+	− Foreigners accepted by local authorities and communities are granted long-stay permits on the condition that they prove their compliance with Islamic values and local traditions. Globally, the cultural cohesion with locals is effective, but, in the long term, some communitarian reaction might occur.	**C+**	D	B+	C+	− The few foreigners who are accepted by local authorities and communities are granted a long-stay permit on the condition that they prove their commitment to the protection of Qeshm's environment and the preservation of its cultural heritage. Globally, cultural cohesion with locals is effective, but, in the long term, some communitarian reaction might occur.	**A+**	D	B+	A+	− Thanks to the maintenance of a relatively low immigration threshold, in relation to the guidance of newly established foreigners to respect Islamic values and to the organization of workshops with local inhabitants to help them understand and accept foreign cultures, cultural cohesion is maintained and improved on the island. The role given to foreigners to open up neighborhoods in the cities should even reinforce their acceptation by locals.
	SOC-04	**B-**	B-	B-	B-	− Privatization of the coastline through the development of beach resorts and villas would deprive locals from accessing the most valued landscapes of the island. − The logic of landscaping the cities and villages is based on appearance and beautification, not on usage by local residents, meaning that it only involves planting trees on the main streets and designing long, straight promenades.	**A+**	D	B+	A+	− Rural and natural green spaces and public spaces, such as squares of mosques, are considered as privileged spaces of communication, which allow for harmonious relations between urban and rural populations, and are in turn promoted and enhanced.	**B-**	B-	B-	B-	− Outstanding green spaces on the island are classified and protected, but their access to the presence of humans is restricted and thus cannot play any role in terms of a link with society.	**A+**	D	B+	A+	− Participatory planning at a regional, urban and neighborhood level would allow the identification and development of new green and public spaces. This not only includes large parks that are only accessible to car owners, but also to a new network of small-scale "pocket parks" in the corners of cities and villages, which are accessible by foot, as well as the rehabilitation of traditional semi-public spaces for discussion in front of houses in the villages.
	SOC-05	**C-**	D	C	C-	− Social disparities, animosity and cultural conflicts might lead to a rise in physical violence towards individuals.	**B+**	B+	B+	B+	− Social, spatial and cultural cohesion inside clusters is achieved thanks to good governance and the participatory approach operated by the cluster administration, while the risk of physical violence is limited.	**B-**	D	C-	B-	− The enforcement of environmental protection above all other values might create crispation in relation to developers and businessmen, such that violent altercations between actors might occur.	**B+**	B+	B+	B+	− Due to social, spatial and cultural cohesion being achieved, thanks to the good governance and participatory approaches, the risk of physical violence is limited.

DIS	DIS-01 ~ DIS-04	**B-**	B-	B-	B-	− The lack of consideration for rural and western areas deepens the gap in the distribution of social services (education, health) and infrastructure (electricity, sanitation) between a well-equipped and mostly urban east part and an under-equipped and mostly rural west part.	**A+**	D	B+	A+	− Social services and infrastructure are fairly well distributed throughout the island thanks to the spatial organization and the economic cohesion of "productive villages" – namely, "consuming cities" clusters – especially through financial solidarity mechanisms towards the most deprived rural areas.	**C+**	B-	C	C+	− Due to low economic growth to support social welfare, high-quality social services are unlikely to be achieved, even though villages gather in associated groups to establish a solid unit to complement each other with primary educational and healthcare services in the long term.	**B+**	D	B+	B+	− The establishment of balance cities in the west (Baseidou and Doulab) with full coverage of high-end educational and healthcare services, as well as the spreading of fine-grain primary social services in the villages, made possible thanks to the redistribution of the gains from high value added petrochemical products, allows for equal access by all to basic social services.
	DIS-05	**A-**	D	B-	A-	− The lack of consideration towards mobility issues and the lack of political willingness to establish any public transportation system would maintain the dominance of private cars as the only means of transport, depriving the lowest classes in society of accessibility to job opportunities and social services.	**B+**	D	B+	B+	− Mobility and transportation issues are fairly well studied and organized inside clusters, thanks to good governance and the inclusive approach operated by the cluster administration.	**B-**	B-	B-	B-	− Due to low economic growth to support social welfare, equal access to an affordable transportation system is unlikely to be established.	**A+**	D	B+	A+	− Introduction of a "loop-type" internal public transportation system, which is safe, affordable and adapted to warm climates, in the four cities, as well as a minimum public transportation service in the villages, offers equal chances and services to all citizens on the island.
	DIS-06	**A-**	D	B-	A-	− The extremely unbalanced development realized on the island with, on the one hand, the macrocephalic expansion of Qeshm City and, on the other hand, the abandonment of small rural settlements, the housing market shows very high volatility and magnitudes regarding prices, thereby pushing them further and further towards the outskirts because they are not able to afford a house in the city.	**B+**	D	B+	B+	− Regulation of supply and demand, as well as the distribution of housing, is fairly well organized inside clusters thanks to good governance and the inclusive approach operated by the cluster administration.	**C**	C	C	C	− Due to low economic growth to support social welfare, financial support and policies ensuring equal access to housing (social housing) is unlikely to be established. On the other hand, due to the limited development of cities, the real estate market might not be sufficiently deregulated, while the prices of land and housing might be maintained at a low level.	**A+**	D	B+	A+	− Thanks to the realization of a balanced development across the island and, in particular, to the improvement in accessibility to service through public transportation, the housing sector gains vitality across the island in urban development private initiatives and in the publicly supported urban renewal of historical parts, giving the possibility of access to decent housing to all social classes.
GEN	GEN-01	**B-**	B+	C	B-	− Important disparities in terms of social status and income might create a demand for domestic workers and housekeepers at the service of those in the wealthiest categories. Even though these jobs are usually undertaken by women, and thus might be considered as opportunities, they are financially and symbolically unrewarding and do not promote gender equality.	**B-**	B+	C	B-	− Due to the industrial nature of the development intended to realize import substitution (industrial production-transformation-export), the jobs devoted to women might be limited to manual tasks (weaving etc.) and thus not be very rewarding in both financial and symbolic terms.	**C+**	B+	B+	C+	− As handicraft making and other tourism services, which are very feminine jobs, are promoted, job opportunities for women are automatically promoted. Particularly careful attention should be given to the professional promotion of women in the hierarchy of the biggest touristic organizations (hotels etc.).	**C+**	B+	B+	C+	− As handicraft making and other tourism services, which are very feminine jobs, are promoted, job opportunities for women are automatically promoted. Particularly careful attention shall be given to the professional promotion of women in the hierarchy of the biggest touristic organizations (hotels etc.).
	GEN-02	**B-**	B-	B-	B-	− The logic of landscaping the cities and villages is based on appearance and beautification, rather than usage by local residents, such that the use of public spaces by women is not promoted and would remain unchanged.	**B-**	B-	B-	B-	− Even though rural and natural green spaces and public spaces, such as squares of mosques, are enhanced as privileged spaces of communication, which allow harmonious relations between urban and rural populations, the use of public spaces by women is not promoted and remains unchanged.	**B-**	B-	B-	B-	− Even though outstanding green spaces of the island are classified and protected, the development of public spaces for citizens is not a priority, which means that the use of public spaces for women remains unchanged.	**A+**	D	B+	A+	− Participatory planning on regional, urban and neighborhood scales would allow for the identification and development of new types of public spaces, which are open and secure for all types of female visitors: mothers with young children, teenagers, single working women etc. respectful of Islamic values.
CHL	CHL-01	**A-**	D	B-	A-	− Tourism (beach resorts), residential (villas) and large-scale industrial development (deep-seaport etc.) would irreversibly alter valuable coastal landscapes.	**A+**	C	B+	A+	− The various environmental services provided by rural landscapes and ecosystems are considered as the basis of harmonious relations between urban and rural zones, and are promoted as a facilitator of the cohesion of the cluster as a whole.	**B+**	B+	B+	B+	− The classification of outstanding landscape features of the island and their protection through zoning and regulation would ensure their preservation.	**A+**	D	B+	A+	− Rural and coastal landscapes are preserved and enhanced based on their ecosystem services and their value of "commons", and through the essential participation of farmers, fishermen and other actors. − The variety of landscapes is promoted as pillars of Qeshm Island's identity, allowing for a link to be established between tourists and locals (through eco-tourism and agro-tourism).

	CHL-02 ~ CHL-03	**A-**	D	B-	A-	− The lack of support for traditional rural architecture preservation would lead to the slow vanishing of valuable architectural treasures on Qeshm Island. − Street enlargement to give privileged access to private cars in all parts of villages would destroy the traditional character of the original urban fabric.	**B+**	D	B+	B+	− Architectural and urban characteristics of villages are considered as valued attractions for cities' inhabitants and visitors, and are thus promoted and financially supported by the cluster administration.	**C+**	B+	B+	C+	− The classification of outstanding buildings and townscapes, as well as their protection through zoning and regulation, allows for the intact maintenance of the majority of traditional parts of villages. However, the risk of "museumification" of Qeshm's villages might become a burden for the locals in the long term.	**A+**	D	B+	A+	− "Urban, architectural and landscape renewal plans", accompanied by incentives elaborated in the majority of villages on the island, allow for the majority of the traditional parts of villages to be maintained intact and to adapt to modern living, but only after many efforts, in the long term.
TEI	TEI-01	**A-**	D	A-	A-	− An accident in a petrochemical plant would affect all of the Persian Gulf and deteriorate diplomatic relationships between concerned Arab countries. − Unlimited multiplication of desalination plants built with the aim of exporting freshwater, as well as shrimp farms, would increase the salinity level of the sea, not only around Qeshm but also in international waters.	**B-**	D	B-	B-	− Introducing a petrochemical industry, even on a small scale and with a high level of pollution prevention and control technology, implies a potential risk of accidents, which would have repercussions on all of the regional waters.	**B+**	D	C	B+	− The restriction of industrial large-scale development and desalination that would have a potential effect on other neighboring countries allows for Qeshm Island and its limited population to exist on good terms with their neighbors. − Moreover, as a major research center on the environment, Qeshm is likely to have a positive role regarding the analysis and resolution of transboundary environmental issues.	**B-**	D	B-	B-	− Introducing a petrochemical industry, even on a small scale and with a high level of pollution prevention and control technology, implies a potential risk of accidents, which would have repercussions on all regional waters.
CLI	CLI-01	**A-**	D	B-	A-	− Major industrial activity, the great influx of new populations, the lack of consideration for mobility issues, and the lack of political willingness to establish any public transportation system would maintain the dominance of private cars as the only means of transport, which would lead to consequent increases in GHG emissions and thus to a negative impact on climate change.	**A-**	D	B-	A-	− The distance created between production, transformation and export centers would lead to an increase in travel by cars and trucks, and consequently to an increase in CO2 emissions and thus to worsening climate change.	**B+**	B+	B+	B+	− The small population, an almost inexistent polluting industry and the absence of the need to travel long distances due to the proximity of dwellings in relation to livelihoods are all factors that lead to extremely minor GHG emissions and thus to a positive contribution in reducing global warming.	**C-**	D	C	C-	− The realization of compact and sustainable cities, the introduction of public transportation networks and the reduction in the need to travel long distances due to the proximity of dwellings to livelihoods are all actions towards the reduction of GHG emissions, which can be seen as compensation for the adverse air emissions of industrial and petrochemical activity. This aspect shall be studied carefully in further stages.
	CLI-02	**B-**	D	C	B-	− The lack of consideration for resilience and adaptability in local policies and plans leads to an important vulnerability regarding the effects of climate change (rain episodes, heat island phenomenon in unprepared cities, rise of the seas threatening beach resorts etc.).	**B-**	D	C	B-	− The lack of consideration for resilience and adaptability in local policies and plans leads to an important vulnerability towards the effects of climate change (rain episodes, heat island phenomenon in unprepared cities, rise of the seas threatening beach resorts etc.).	**B-**	D	C	B-	− The lack of consideration for resilience and adaptability in local policies and plans leads to an important vulnerability towards the effects of climate change (rain episodes, heat island phenomenon in unprepared cities, rise of the seas threatening beach resorts etc.).	**B+**	D	C	B+	− Thanks to the establishment of a new paradigm of resilient regional, urban and rural planning. based on sustainability and climate change adaptability, the adverse effects of climate change, such as floods, heat island phenomenon etc., are tackled at the root.

Source: JICA Project Team

Note:
- Effect = general score of the predicted effect
- ST = score of the predicted effect in the short term
- MT = score of the predicted effect in the middle term
- LT = score of the predicted effect in the long term
- A+/- = remarkable positive/serious negative effect is predicted
- B+/- = positive/negative effect is expected to some extent
- C+/- = limited positive/negative/neutral effect is predicted but a further survey is required
- D = the effect is very small or nil and a further survey is not required

4.3.3 Evaluation of the effects of the ECO-QESHM Master Plan

Based on the comparison of the potential impacts of the different strategic alternatives, the evaluation of the direct, indirect and cumulative effects of the ECO-QESHM Master Plan, namely, its proposed economic and infrastructure developments, has been undertaken.

It should be clarified that impact evaluations are not performed equally for all the proposed developments, but relative to the importance of how those developments will impact on reality. It will be evaluated whether or not environment issues have been integrated, at the strategic level, in the economic and infrastructure developments. In addition, since the potential effects of oil and gas developments have already been assessed in detail (refer to Part 4), this sector will not be treated in the current evaluation.

Table 4.3.6 summarizes the results of the evaluation of the direct, indirect and cumulative effects of ECO-QESHM Master Plan.

Table 4.3.6 Results of the Evaluation of the Effects of the ECO-QESHM Master Plan

SEA topic		SEA objective	Agriculture	Fishery	Industry (excl. oil and gas)	Tourism development	Infrastructure development	Housing and land use
Anti-pollution measures	POL	POL-01	D	D	C-	D	D	D
		POL-02	D	D	D	D	D	D
		POL-03	D	D	D	D	D	D
	WPR	WPR-01~03	B+	D	D	D	D	C-
	PHH	PHH-01	D	D	D	D	B+	D
		PHH-02	D	D	B-	D	D	D
		PHH-03	D	D	D	D	B+	D
		PHH-04	D	D	D	D	B+	D
Natural environment	BIO	BIO-ME-m	B+	D	D	B+	D	D
		BIO-ME-s	D	D	B-	D	D	D
		BIO-ME-t	D	D	D	D	D	C-
		BIO-ME-c	D	D	C-	D	D	D
		BIO-TE	D	D	D	D	D	D
		BIO-FF-01	D	B+	D	D	D	D
		BIO-FF-02	C+	D	D	D	D	B+
		BIO-FF-03	D	D	D	D	D	D
	ERO	ERO-01	D	D	D	D	D	C-
		ERO-02	D	D	D	C-	D	D
	PRA	PRA-01	D	D	D	D	D	D
	RES	RES-01~03	D	D	C-	D	B+	D
Socioeconomic environment	PRS	PRS-01	D	D	D	D	B-	D
	EMP	EMP-01~02	C+	B+	B+	B+	C+	D
		EMP-03	D	D	D	D	B+	D
	LOC	LOC-01	B+	B+	D	D	D	D
		LOC-02	D	D	B+	C+	D	D
		LOC-03	D	D	C+	D	D	D
		LOC-04	D	D	D	B+	D	D
	SOC	SOC-01	D	C+	C+	C+	D	D
		SOC-02	D	D	D	D	D	C+
		SOC-03	D	D	D	C+	D	D
		SOC-04	D	D	D	D	D	C+
		SOC-05	D	D	D	D	D	D
	DIS	DIS-01~04	D	D	D	D	B+	B+
		DIS-05	D	D	D	D	B+	D
		DIS-06	D	D	D	D	D	C+
	GEN	GEN-01	D	D	D	B+	D	D
		GEN-02	D	D	D	D	D	D
	CHL	CHL-01	D	D	D	C+	D	C+
		CHL-02~03	D	D	D	C+	D	B+
Global issues	TEI	TEI-01	D	C-	D	D	C-	D
	CLI	CLI-01	D	D	C-	D	C+	D
		CLI-02	D	D	D	D	D	D

Source: JICA Project Team
Note: A+/- = remarkable positive/serious negative effect is predicted
B+/- = positive/negative effect is predicted to some extent
C+/- = limited positive/negative/neutral effect is predicted but a further survey is required
D = effect is very small or nil and a further survey is not required

The major explanation and justification of the evaluation are summarized below.

(a) Agriculture: No impact (D) in terms of any type of pollution (POL) due to the non-expansion of farmlands and the lack of promotion of chemical pesticides etc.; good effect (B+) on water resources (WPR-02) thanks to the diffusion of water-saving culture, such as drip irrigation. Apiculture promotion in the mangroves reinforces (B+) the added value of the ecosystem (BIO-ME-m). The revival of agriculture and especially date gardens allows (C+) for better control of the invasion of *P. juliflora* (BIO-FF-02).

(b) Fishery: The promotion of the sustainable form of fisheries known as *satoumi* has a positive effect (B+) on the regulation of destructive fishing practices (BIO-FF-01). Even following the principles of sustainable development, the increase in aquaculture farms could (C-) contribute to global environmental issues (TEI).

(c) Industry: Introduction of direct reduced iron (DRI) helps to lower greenhouse gas emissions (POL-01); however, it will be confirmed in subsequent steps (C-) as to whether or not the cumulative impact of emissions of other industries, such as cement factories, at the scale of the island is serious. The promotion of various types of gas-processing industries intrinsically induces a growth in the risk (B-) of industrial disasters, such as explosions (PHH-02). The development of the Kouvei and Souza Industrial Parks are likely to have a moderate negative impact (B-) on local seagrass beds (BIO-ME-s).

(d) Tourism development: Tourism promotion in the mangrove forest reinforces (B+) the added value of the ecosystem (BIO-ME-m). The numerous activities and constructions related to sea tourism proposed for the coastline could have a disrupting effect (C-) on the shoreline (ERO-02).

(e) Infrastructure development: The introduction of a public transport system serving remote villages in the western area will have a benefic effect (B+) on the accessibility to services (DIS-01 to 05) and reduce health inequalities (PHH-03). The construction of heavy transport infrastructure, such as the railway in the northern part and the expressways, will have a negative impact (B-) in terms of possible land expropriation and involuntary displacement (PRS-01). Improvements in the sanitation system will ensure a better health environment (PHH-01) and reduce offensive odors (PHH-04). The promotion of recycling wastewater and increasing water use efficiency will have a positive effect (B+) on the sustainable management of water resources (RES).

(f) Housing and community: During the first phase of implementation of the ECO-QESHM Master Plan, it is expected that a large quantity of housing units will be supplied, which could have an impact (C-) in terms of geological erosion due to mining extraction for construction material (ERO-01) and in terms of increasing construction wastes (WPR-01). The urban expansion of some coastal villages located near sandy beaches could constitute a risk (C-) to the integrity of the sea turtle population (BIO-ME-t-03) because of the light pollution that could be produced by the new constructions. The establishment of Tourian Plain Landscape Promotion Zone has a positive effect (B+) on controlling the invasion of *P. juliflora* (BIO-FF-02).

4.3.4 Mitigation and amplification measures

The following table shows some of the possible mitigation measures in terms of negative effects and some of the amplification measures in terms of positive effects.

Table 4.3.7 Mitigation and Amplification Measures of the Effects

Affected item	Potential direct, indirect or cumulative effect	Impact level	Mitigation or amplification measure	Predicted efficiency
POL-01 Limit Air Pollution	Cumulative impact of gas emissions from all the different industries on the island might lead to the degradation of air quality.	C-	Application of value engineering principles alongside the implementation of an EIA for new industries allows for the elaboration of low environmental cost designs and operational models.	Average (C- > C)
RES-03 Increase Water Use Efficiency and Reduce Losses	Industry uses large amounts of water in their production process.	C-	In order to decrease water consumption in industries, introduce water-saving technology and instruments.	Average (C- > C)
WPR-01 Minimize Waste Generation	Increase in construction waste due to the policy of supplying a large amount of new housing units.	C-	In order to mitigate the negative impact of the production of construction waste, the separation and recycling of all the materials used, such as masonry, metals, wood etc.	Average (C- > C)
BIO-ME-t-03 Turtle Nesting Site on Sandy Beach	Light pollution from surrounding residential areas or hotels.	C-	Light pollution can be mitigated by imposing the use of long-wavelength light (570 nm or longer), such as yellow, amber or red lighting on beachfront developments (housing, hotels, parks amenities) or by planting a range of very tall protective trees between the beach and the development.	Average (C- > D)
BIO-FF-02 Reduce the Impact of Invasive Alien Species	Revival of agriculture and especially of date gardens allows for better control of the invasion of *P. juliflora.*	C+	Along with the promotion of traditional date gardens, the control of *P. juliflora* can be strengthened through the introduction of new high-value-added agricultural products. Experiments will determine the most adapted crops for diffusion on the whole island.	Average (C+ > B+)
ERO-02 Reduce Hydrological Erosion	The numerous tourism activities and constructions related to sea tourism proposed for the coastline might have a disrupting effect on the shoreline.	C-	All the tourism development projects planned on the shoreline shall be covered by an EIA to evaluate their feasibility and to find appropriate design measures to minimize any erosive impact on the shoreline and on coastal ecosystems.	Average (C- > D)
PRS-01 Avoid Any Involuntary Population Resettlement	Construction of heavy transport infrastructure such as railways and expressways will generate expropriation and involuntary displacement.	B-	In order to avoid expropriation and involuntary displacement, the right of way of planned railways and expressways shall be reflected in urban plans and villages plans and frozen as "reserved land for infrastructure", so that no new development occurs.	Average (B- > C-)
TEI-01 Do Not Aggravate Water Quality on a Transboundary Scale	Increase in aquaculture farms might contribute to global environmental issues.	C-	In order to avoid aggravating global water environment quality, all new and existing aquaculture projects shall be obliged to apply to a quality management and monitoring certification program from the Aquaculture Stewardship Council (ASC) or the Marine Stewardship Council (MSC).	Average (C- > C)

Source: JICA Project Team
Note: A+/- = remarkable positive/serious negative effect is predicted
B+/- = positive/negative effect is predicted to some extent
C+/- = limited positive/negative/neutral effect is predicted but a further survey is required
D = the effect is very small or nil and a further survey is not required

4.3.5 Monitoring plan

The establishment of a monitoring plan is an important stage in the environmental assessment process. Indeed, the monitoring will allow for the development plan to be followed up throughout its implementation period. The monitoring will concern the most significant impacts, negative or positive,

and the mitigation and amplification measures.

To be effective, the monitoring plan must be easy to use, realistic and achievable. This implies that the number of indicators should be reasonable and focused on both the potential impacts of the regional development plan, as well as the capacity of the local authority to be realistically capable of carrying out the monitoring.

The monitoring indicators and targets can be based on the those established for the SEA objectives as explained above (refer to Subsection 4.2.4). However, due to the absence of information and the lack of follow-up by concerned agencies, relevant indicators and targets shall be completed.

After the project, counterpart agencies (QFZO and DoE) shall review and update the indicators and targets of each SEA objective in order to monitor of ECO-QESHM Master Plan. The frequency of monitoring could change from one indicator to another.