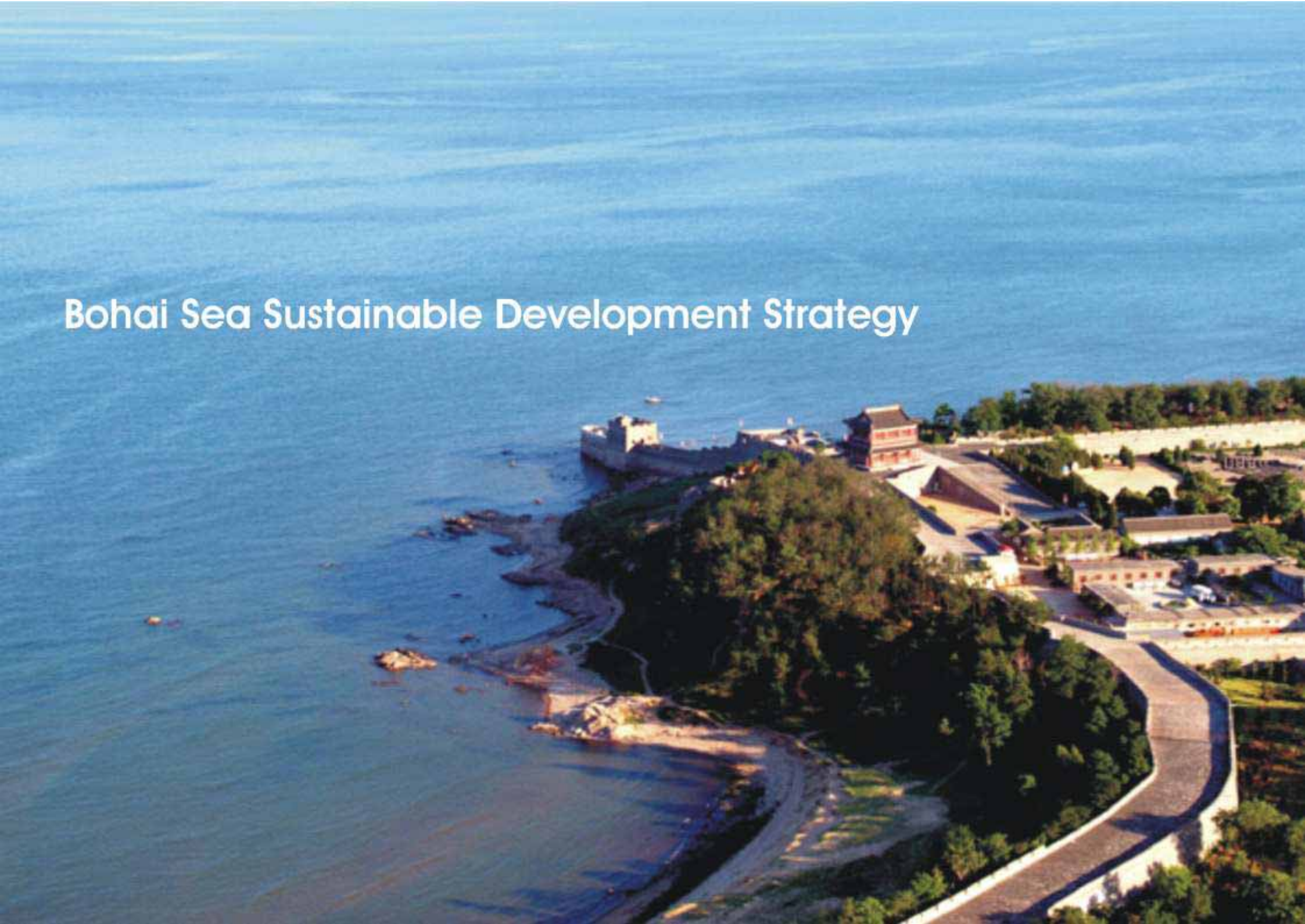
Bohai Sea Sustainable Development Strategy



Bohai Sea Sustainable Development Strategy

State Oceanic Administration

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LIST OF ACRONYMS AND ABBREVIATIONS

BSAP	–	Blue Sea Action Plan
BSCMP	–	Bohai Sea Comprehensive Management Program
BSEMP	–	Bohai Sea Environmental Management Project
BS-SDS	–	Bohai Sea – Sustainable Development Strategy
CNOOC	–	China National Offshore Oil Corp.
CPUE	–	catch per unit of effort
GDP	–	Gross Domestic Product
GIS	–	Geographic Information System
GPS	–	Global Positioning System
ICM	–	Integrated Coastal Management
MOA	–	Ministry of Agriculture
MOCT	–	Ministry of Communication and Transportation
PEMSEA	–	GEF/UNDP/IMO Regional Programme on Partnerships in Environmental Management for the Seas of East Asia
RS	–	Remote sensing
SEPA	–	State Environmental Protection Administration
SOA	–	State Oceanic Administration

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PREFACE

Ensuring sustainable use of the coastal and marine environment and the natural resources therein, and promoting healthy development of an ocean dependent economy are important management objectives of the State Oceanic Administration of PR China. It is recognized that these objectives can only be achieved through the transformation of policy into down-to-earth implementation efforts. The ongoing efforts in the Bohai Sea provide a working example of such transformation.

The semi-enclosed Bohai Sea is the only internal sea of China. Its coastal area is amongst the most economically developed areas of our country. In 2002, the national domestic product (GDP) of the three provinces and one municipality surrounding the Bohai Sea accounted for 23% of the nation's total GDP. However, the rapid socioeconomic development of the Bohai Sea region was accompanied by the tremendous pressure on the area's environment, and this pressure is still growing. Environmental and resource problems are becoming a bottleneck of further economic development. Moreover, the impact of sustainable use of Bohai Sea's environment and resources is not only affecting the Bohai Sea's economy, but also the national economy as a whole. Therefore, conservation, sustainable use and integrated management of Bohai Sea environment and natural resources are noble missions benefiting many generations to come. The national and local governments attach great importance to such objectives; the general public and coastal communities need to understand and fully participate in the process; and international organizations can help through capacity building, creating a core of expertise and experience necessary to move forward in a committed manner.

The Bohai Sea Sustainable Development Strategy is premised on the Bohai Sea Declaration adopted in 2000 by the surrounding three provinces and one municipality. It was developed through concerted consultation and consensus building among coastal provinces, municipalities, government agencies, concerned sectors and other stakeholders. It is the stakeholders' response to the Bohai Sea Declaration. I believe that this strategy will play a vital role in improving the management of the Bohai Sea, and offer fresh experience for coastal and marine management and sustainable development planning in China and elsewhere.

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ACKNOWLEDGEMENT

The Bohai Sea Sustainable Development Strategy (BS-SDS) stems from three years of consultation from 2001 to 2003 among the provinces and municipalities and various other stakeholders surrounding the Bohai Sea, particularly the provincial governments of Liaoning, Hebei and Shandong, as well as Tienjin Municipality and Dalian City. The State Oceanic Administration (SOA) of the People's Republic of China and the Project Management Office for the PEMSEA's Bohai Sea Environmental Management Project (SEMP) organized the stakeholder consultation and consensus building for the development of the BSSDS. The GEF/UNDP/IMO PEMSEA's Regional Programme facilitated technical advice and partial funding for the project.

The BS-SDS has gone through several revisions from its early draft as a Bohai Sea Strategic Environmental Management Plan to its present version. The BS-SDS has incorporated inputs from the concerned government agencies of the coastal provinces and municipalities surround the Bohai Sea, the Ministry of Foreign Affairs, the State Environmental Protection Administration, the Ministry of Transportation and Communication and the State Oceanic Administration, including its Department of Sea Area Management, Department of Marine Environmental Protection, Department of Science and Technology and Department of International Cooperation.

A multidisciplinary expert team organized by the China Institute of Marine Affairs (CIMA) undertook the preparation of the draft BS-SDS. Dr. Gao Zhiguo, Director General of CIMA, and Dr. Zhang Haiwen, Deputy Director General of CIMA, organized the CIMA team in BS-SDS preparation and reviewed the draft BS-SDS. Information collection and synthesis, as well as production of draft documents in Chinese and English were done by Dr. Lui Yan and her colleagues in CIMA, including Ms. Zheng Shuying, Ms. Fu Yu, Prof. Jiao Yongke and Mr. Li Mingjie.

Mr. Wang Shuguang, SOA Administrator, Mr. Chen Lianzhen, SOA Deputy Administrator, and Mr. Li Haiqing, Director-General of SOA Department of International Cooperation, provided policy guidance to the preparation of the BS-SDS and reviewed the draft BS-SDS.

Dr. Chua Thia-Eng, PEMSEA Regional Programme Director, provided policy advice to the preparation of the BS-SDS. Among PEMSEA staff, Mr. Stephen Adrian Ross, Dr. Huming Yu, Dr. Jihyun Lee and Ms. Ma. Teresita Lacerna contributed to the review and revision of the draft BS-SDS and Mr. Leo Rex Cayaban, Mr. Nogel Viyar, Ms. Anna Rita Cano and Mr. Jonel Dulay of the PEMSEA Communications Unit for layouting and copyediting the report.

Foreword

The Bohai Sea region, covering the three coastal provinces of Liaoning, Hebei and Shandong, as well as the municipality of Tianjin, occupies only 6 percent (567,000 km^2) of China's total land area (9.6 million km^2), but according to 2002 statistics, contributes 23 percent (2,418 billion Yuan) of the country's total GDP (10,479 billion Yuan) and shelters 16 percent (0.21 billion) of the country's total population (12.84 billion). The region, including its sea area, offers multiple values and services to society such as fisheries, oil and gas, sea salt making, hydropower, shipbuilding, coastal tourism and transportation. In addition, the region, endowed with vast coastal and marine resources, interacts with the Yellow Sea Large Marine Ecosystem and provides diverse habitats for various coastal and marine species, including highly migratory marine mammals and birds.

The Bohai Sea Economic Zone covers a broader area than the Bohai Sea region, as this includes Beijing and parts of Inner Mongolia and Shanxi Province. The economic zone is directly linked to the Northeast Asia Economic Rim, Euro-Asia Land Bridge, and Southeast Asia Marine Economic Rim. Among these economically diversified and fast-growing areas, the Bohai Sea region undoubtedly plays a pivotal role in the promotion of inter-regional interaction in social and economic development, environment and natural resources.

However, the rapid economic growth in the region is accompanied by the deterioration of environmental quality, ecosystem health and resource base of the Bohai Sea, thus calling into question the sustainable development of the region and its adjacent areas. Bohai Sea is among a few sea areas in China where red tide events have increased over the recent years in both frequency and affected areas. In the Yellow River Delta, the natural wetland area for reed field and tidal land reduced by over 60 percent in a period of eight years from 116,860 ha in 1981 to 43,485 ha in 1998. For capture fisheries, the catch per unit of effort (CPUE) decreased from 138.8 kg/net/hr in 1959 to 11.2 kg/net/hr in 1998. In several annual issues of China's Environmental Quality Reports, Bohai Bay (the innermost part of the Bohai Sea) is reported to be severely polluted. China's 10th National Economic and Social Development Programme accords priority to the integrated restoration and management of Bohai Sea. The Bohai Sea is now at a critical juncture in its historical development.

Despite years of effort to protect and manage the region's environment and natural resources, deterioration continues. Many irreversible ecosystem changes have taken place. Innovative management approaches and constant actions must be taken to arrest the adverse trend, maintain the resource base and bring economic growth into the track of sustainable development. This has both national and international significance.

The Need for a Sustainable Development Strategy

The 21st Century is the era of ocean development. The Bohai Sea Economic Zone, Zhugiang (Pearl) River Delta region and the Changjiang (Yangtsi) River Delta region are China's three major centers of fast economic growth. As such, the Bohai Sea region, with its growing population and increasing economy, is expected to usher industrial and urban development. At the core of the Bohai Sea region is Bohai Sea itself, which supports the Bohai Sea Economic Region. Bohai Sea is China's only semi-enclosed sea, covering an area of 77,284 km^2. Its unique geographic advantage and diverse resources coupled with its history makes it valuable to national development.

The coastal and marine resources of Bohai Sea have long been used to create a better life, unique culture and prosperous economy. However, there has been a lack of stewardship over its environment and resources as a basis for sustaining socioeconomic development. The value of Bohai Sea's ecosystem is poorly understood. The unregulated, open access and conflicting uses of its resources has led to serious foreshore pollution, a depletion of living resources, damage to ecosystem health and increased vulnerability to natural hazards along with socioeconomic consequences that cut across administrative boundaries. These resources are deteriorating and the resulting problems have become barriers for sustainable socioeconomic development.

With accelerated human population growth, industrialization and urbanization, the environment and natural resources of the Bohai Sea now face increased pressure. The accumulated environmental and resource degradation pose an increased drag on economic development in the Bohai Sea region. This high-risk accumulation is adversely affecting the region's environmental security and social stability as well. Effective management interventions need to be undertaken.

It is therefore imperative to develop a management strategy that will ensure a sustained and steady growth of the region's economy, protect the environment and conserve natural resources despite rapid population growth, economic expansion and increased spatial utilization. The strategy should also seek to restore fishery resources, maintain ecosystem health and improve livelihood. The strategy is to maintain the Bohai Sea region's role as a center of sustainable development through the better governance of its environment and resources.

In the Bohai Sea region, ecosystem problems are related to the region's ecosystem features and functions, socioeconomic activities and inadequate environmental management system. In short, these problems are related to the mismatches between the normal ecosystem processes and the socioeconomic system. On balance, there is an uneven level of economic growth among various areas, increased multiple resource-use conflicts, and a lack of an integrated coastal and marine management mechanism in the region. The traditional single sector or single agency oriented management approaches, mechanisms and tools fail to meet the needs of intensified multiple-use patterns. Therefore, it is necessary and timely to undertake innovative approaches and ground level actions in developing integrated management mechanisms and forging stakeholder partnerships. This will enable the participation, coordination and collaboration of national and local governments, concerned agencies, sectors, enterprises, communities and the public at large, to achieve their common goal of sustainable development in the Bohai Sea region.

Sharing a Common Vision through the Strategy

The Bohai Sea Sustainable Development Strategy (BS-SDS) represents the long term vision for the Bohai Sea shared by all the stakeholders in the region. These stakeholders include governments of all levels, agencies, research and education institutions, enterprises, people's organizations and local communities. The strategy provides a window for all stakeholders to look at their common approaches for achieving the beautiful prospects they paint for Bohai Sea.

The environment and natural resources of the Bohai Sea region provide its inhabitants with food, livelihood, recreation and a resource base for municipal and provincial economic development.

Environmental management experiences in the Bohai Sea show that, unless coastal provinces, municipalities and other stakeholders in the region undertake coordination and develop collaboration and partnerships in a common attempt to prevent pollution and strengthen ecosystem protection and management, the environmental quality and resource base of the Bohai Sea will continue to deteriorate, thus hindering socioeconomic growth and the improvement of livelihood.

The key to the formulation and implementation of the BS-SDS is to forge collaboration and partnerships among the stakeholders with diverse opinions and perspectives. This stakeholder diversity is the driving mechanism behind the efforts for consensus building for common management objectives and approaches. Therefore, the BS-SDS puts forward:

- A shared vision of all stakeholders for the future of Bohai Sea and a common mission to realize this shared vision; and

- An operational framework to realize the shared vision and common missions, including action programs for the development, utilization and management of the Bohai Sea and its coastal and marine resources.

The BS-SDS describes the socioeconomic conditions of the Bohai Sea region, its cultural and environmental background, its resources, the values of its environmental diversity and the threats facing these values. As these threats are multifaceted, it is an arduous task for stakeholders to cooperate closely with one another and work hard in partnership. This calls for a change of behavior and attitude by the citizenry towards the concept of sustainable development. The strategy is confronting this challenge by defining the roles and responsibilities of various social sectors.

To strike a balance, the BS-SDS offers a long term and comprehensive framework, desired outcomes and a series of action programs. The key to achieving the desired outcomes is the establishment and further development of collaboration and partnerships among the stakeholders, particularly the concerted efforts by different provinces and municipalities, agencies and sectors, as well as by people with different expertise and perspectives.

Joint stakeholder efforts have already taken ground. As early as December 2002, the State Oceanic Administration (SOA) and the three coastal provinces of Shandong, Hebei and Liaoning and the municipality of Tianjin signed the Declaration of Environmental Protection of Bohai Sea, planting on-the-ground essential partnerships between the central government and local governments. SOA and the State Environmental Protection Administration (SEPA) have successively implemented the Bohai Sea Comprehensive Management Program (BSCMP) and the Blue Sea Action Plan (BSAP), thus promoting interagency exchange and cooperation. In addition, to spearhead interagency and inter-provincial partnerships, the Bohai Sea Environmental Management Project (BSEMP) under the GEF/UNDP/IMO Regional Programme on Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) has been launched. BSEMP is focusing on capacity building in the application of PEMSEA's integrated coastal and marine management framework and approaches. These actions have gained vigorous support from other relevant agencies, industrial and commercial circles, local communities, and individual practitioners in the Bohai Sea region.

What's New about the Strategy

The ecological and resource issues in Bohai Sea have drawn the attention of governments. National and local governments, as well as coastal and ocean management units, have undertaken a series of efforts and achieved some progress in improving the ecological environment and sustainable use of the Bohai Sea resources.

At present, there are several ongoing projects that are important for coastal and marine environmental management and protection in the Bohai Sea. Representative of these projects are the BSAP and the BSCMP, which provides the rationale for environmental restoration and management of the Bohai Sea, as well as guidelines for marine pollution prevention and ecological protection. However, both projects have their respective objectives and emphasis. The BSAP emphasizes the prevention, control and the development of treatment facilities against pollution from land-based sources, while the BSCMP focuses on capacity building in environmental monitoring and law enforcement.

As a component of PEMSEA's overall strategy, the BS-SDS will provide a comprehensive framework within which various stakeholders will be able to achieve their common vision through coordination and collaboration between and among national and local governments, agencies, enterprises and the general public.

The BS-SDS has the following unique features:

- In approach, the BS-SDS adopts a multi-level, multi-sectoral and integrated ecological management approach, which emphasizes cooperation and partnerships among stakeholders. Thus, through sharing and exchange of information and building management capacities, the implementation of the strategy will promote efficient utilization of human and financial resources.
- It provides a long term, comprehensive and integrative policy framework for coastal management, clearly defining the roles of the various social sectors, including the central and the local governments, private sectors, social organizations, research institutions, local communities, as well as the United Nations, international donor agencies, and bilateral and multilateral financial organizations.
- It incorporates environment and resources management into the socioeconomic development program of the Bohai Sea region.
- In scope, it covers land-and sea-based development activities that impact on marine and coastal resources.
- It adopts a paradigm shift from the focus on government investments in environmental facilities and services to the development of self-sustained financing mechanisms through public and private sector partnership.

Scope of the Strategy

The BS-SDS deals with all land-and sea-based activities that impact or may have impact on the marine environment. As shown in Figure 1, the strategy has a wide geographical scope, covering the sea area west of the line from Laotieshan in the Liaodong Peninsula to Penglai in Shandong Peninsula and a land area, which includes the three provinces of Liaoning, Hebei and Shandong and the municipality of Tianjin. The strategy also covers seven river systems flowing into Bohai Sea - the Liaohe River, Luanhe River, Haihe River and Yellow River, the rivers in Liaoxi and in the Liaodong and Shandong peninsulas.

The BS-SDS will directly benefit the 13 coastal cities within the adjacent three provinces and Tianjin Municipality namely Dalian, Huludao, Jinzhou, Panjin and Yingkou in Liaoning; Cangzhou, Qinhuangdao and Tangshan in Hebei Province; Binzhou, Dongying, Weifang and Yantai (except Laiyang County and Haiyang County) in Shandong; as well as Tinajin. It will also benefit Beijing, other parts of Tianjin as well as the entire North and Northeast China regions.

Being a long term and comprehensive strategic framework, the BS-SDS may take 25 years or more to achieve its vision. At the same time, it is dependent on the work program and operational plans of the stakeholders, their commitments and the mobilization of resources.

Strategy Adoption and Implementation

Through discussions and the consultation process (Fig. 2), consensus has been reached and commitments have been made on the future development of the Bohai Sea by stakeholders which include central and local governments, state run industries, the private sector, non-

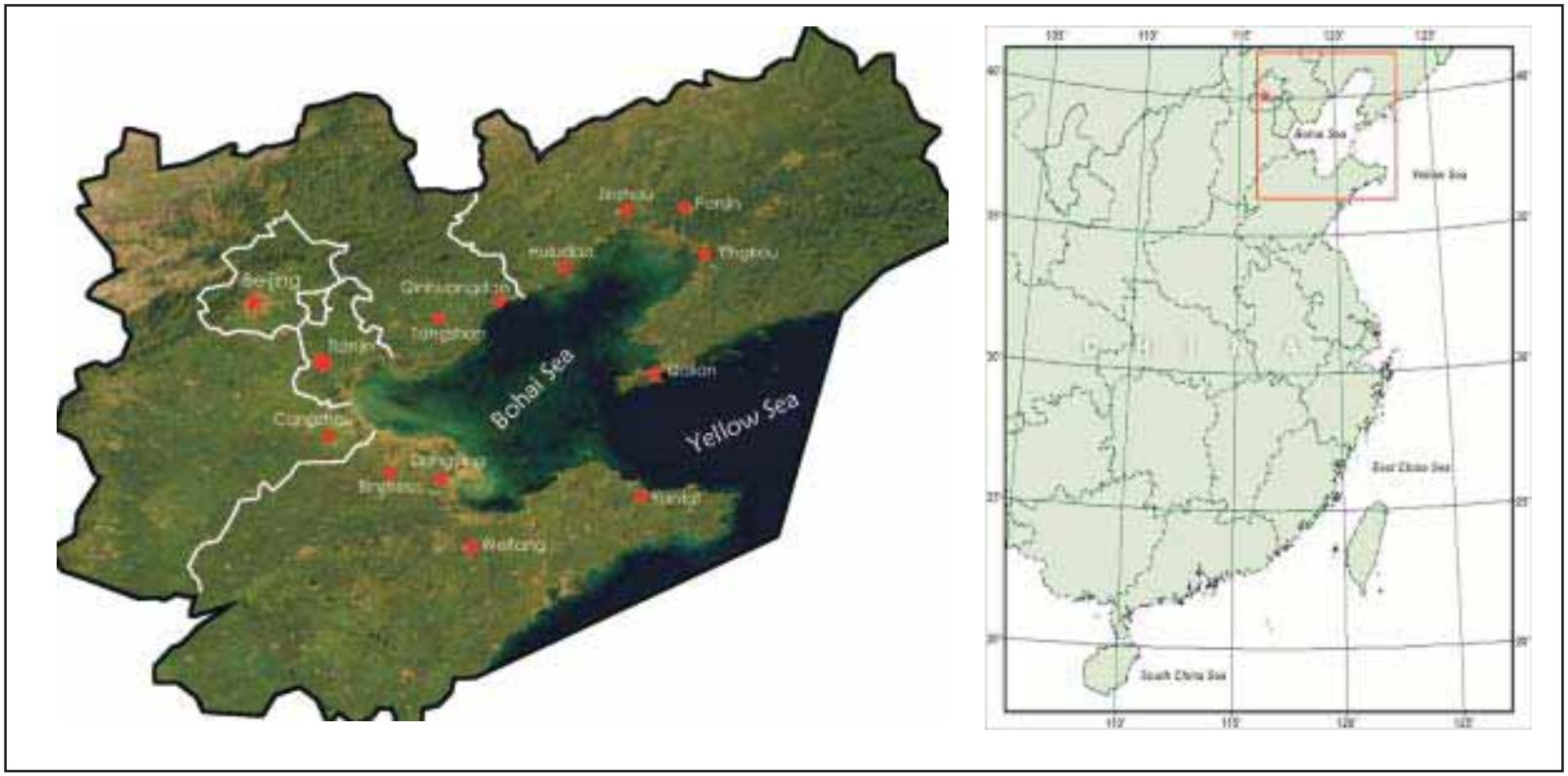


Figure 1. Geographic Scope of the Strategy: The Bohai Sea Region.

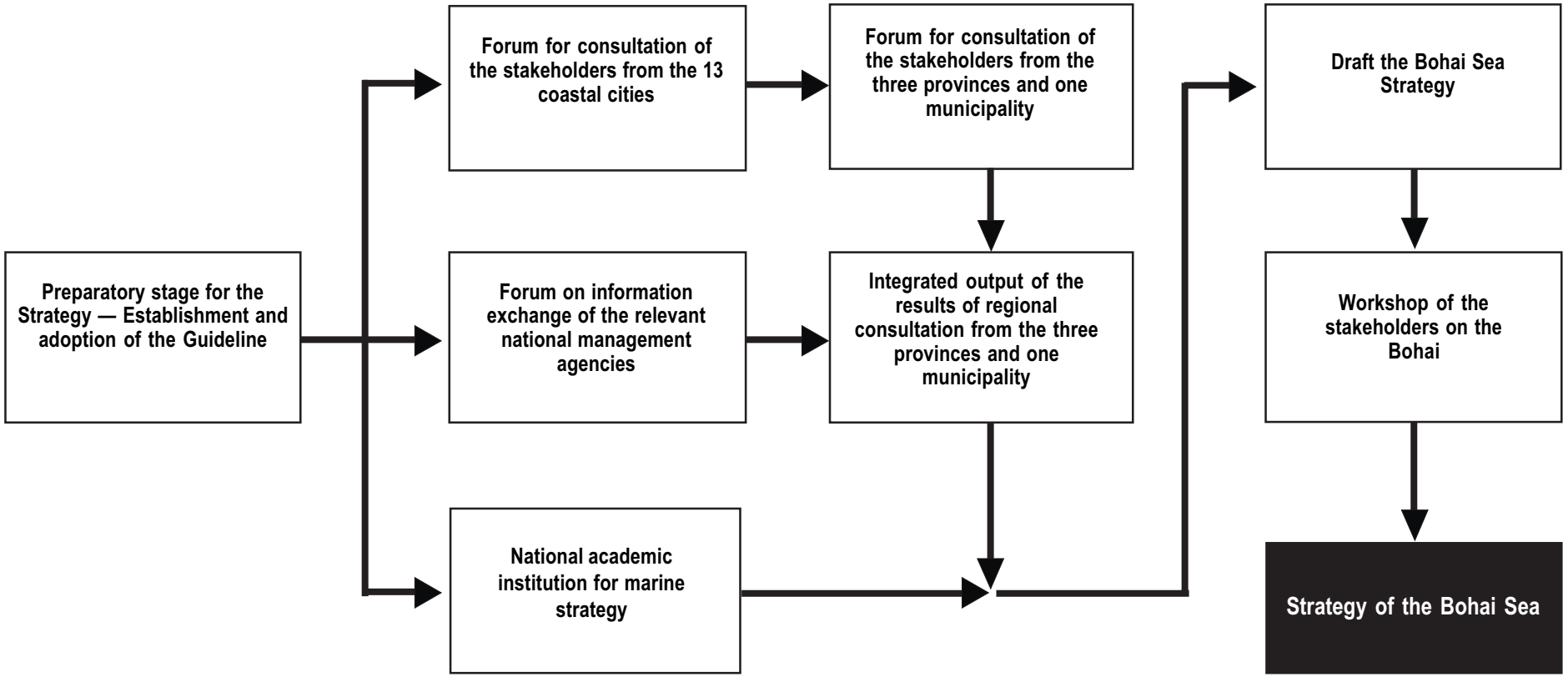


Figure 2. Consultation Process for the Development of the Strategy.

governmental organizations, research and education institutions, communities, international organizations, financing institutions and donors. Upon the finalization of the draft strategy, the stakeholders will formally adopt it through the signing of a declaration or a statement, which shall define the roles and responsibilities of the signature parties and further institutionalize the strategy through legislation, and bring it into effect.

Overview of Bohai Sea

Natural Setting

The Bohai Sea is China's only semi-enclosed inland sea. It is surrounded by Liaodong Peninsula, the North China Plain and Shandong Peninsula. It is located at 117º35' - 121º10'E and 37º07' - 41ºN, (the area west of the line linking Laotieshan in Liaodong Peninsula and Penglai, north of Shandong Peninsula), and is adjacent to the Yellow Sea to the east (Fig. 3). Its location in the north temperate zone gives Bohai Sea an average annual temperature of around 8-10ºC, with an average water temperature of around 1-2ºC in winter and 24-26ºC in summer. Annual precipitation is 300-400 m and average seawater salinity is 30 percent. It has an average water depth of 18m and has a coastline that extends to 3,748 km. Bohai Sea has an area of 77,284 km^2, which includes Bohai, Laizhou and Liaodong Bays.

The Bohai Sea region covers 567,000 km^2 of land, which includes of 268 islands, each with an area that extends to 500 m^2 or more. The coasts of Bohai Sea can be classified as silty, sandy and rocky coasts. The coasts along Bohai Bay, the Yellow River delta and the north coast of Liaodong Bay are silty. The western coasts to the north of the Liaohe River mouth are of sandy and rocky, while the northern coasts of Shandong Peninsula and the western coasts of Liaodong Peninsula are rocky. The Bohai Sea belongs to the Mesozoic-Cenozoic sedimentary basin. The bottom surface sediment in the three bays is of fine sand while the central area has coarse sand. The bottom surface sediment in Liaodong Bay is mainly silt and fine sand. In Bohai Bay, sediment is mainly composed of silty clay and clayish silt while Laizhou Bay has mainly silt.

Flowing into Bohai Sea are several river systems, these include the Luanhe River, Haihe River, Liaohe River, Yellow River and the river systems in Liaodong Peninsula, Shandong Peninsula and along the coast of western Liaoning Province. Over 40 rivers, including Shuangtaizi River, Dalinghe River, Xiaolinghe River, Xiaoqinghe River and Weihe River, flow into the sea with 50 billion m^3 annual runoff and more than a billion tons of annual input of silt and sand.

The waters of Bohai Sea, going through the water mass of the Yellow Sea, is exchanged with that of the outer sea. The slow water exchange process, which is natural in Bohai Sea, has impact on the marine environment and in the pollution of Bohai Sea.

Figure 3. The Bohai Sea Region

The People

Population

According to the fifth nation-wide census, the total population of the Bohai Sea region in year 2000 (including the provinces of Liaoning, Hebei and Shandong and the municipality of Tianjin), reached 208 million, accounting for 15.81 percent of the national population. The agricultural population was 79.8 million, comprising 38 percent of the Bohai Sea region. The population of the 13 coastal cities and counties in the region was 61 million, accounting for 29 percent of the region's total population.

In 2002, the Bohai Sea coastal population was 209 million, which showed a growth rate of 0.4 percent (Table 1) since year 2000. The population in the region's coastal cities and counties in turn grew to 62 million, showing a growth rate of 0.4 percent since year 2000.

Table 1. Population Growth in the Bohai Sea Region (millions).

Province/ Municipality	2000	2002	Net Growth (2000 - 2002)	Growth Rate (%)
Liaoning	41.353	41.554	0.201	.243
Hebei	66.74	67.346	0.60	.454
Tianjin	10.014	10.0718	0.0578	.289
Shangdong	89.97	90.82	0.85	.470
Total	208.0844	209.7918	1.7074	.410

Source: Statistic Yearbooks, 2001 and 2003 of Liaoning, Hebei, Tienjin and Shangdong.

Population Density

As of 2002, the Bohai Sea region had a population density of 370 person/km^2, 2.67 times that of the national figure at 134 person/ km^2. Moreover, the region's coastal cities and municipalities had population density of 452.97 person/km^2, 1.22 times that of the region's population density (Table 2).

Education

According to the 2000 national census, the people of Bohai Sea have relatively low educational attainment. Some 83 percent of the people in the region received primary and junior middle school education, while only 4 percent received a college level education. Figure 4 shows the different levels of educational attainment in the region's three provinces and municipality (in percentage).

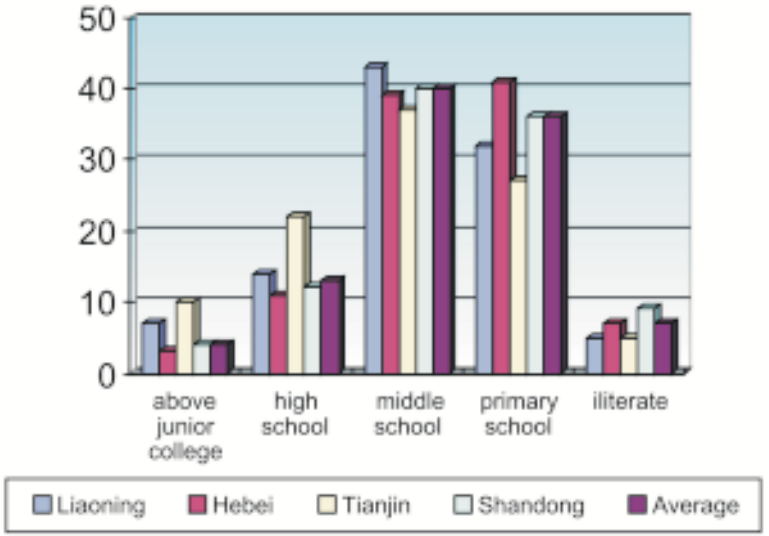


Figure 4. The Level of Education in the Bohai Sea Region

Ethnic Structure

In terms of ethnic structure, the people in the region predominantly belong to the Han ethic group, accounting for 94 percent of the population. The minority ethnic groups include the Manchus and Huis, distributed mainly in Liaoning Province (Table 3).

Religion

The people in the Bohai Sea region embrace different faiths. The major religions include Buddhism, Catholicism, Christianity, and Islam.

Employment

In 2002, only 54 percent of the Bohai Sea region's residents were employed. A majority of the employed were in the primary industry, while the rest were in the tertiary and secondary industries as shown in Table 4.

Economy

The Gross Domestic Product (GNP) of the three provinces and one municipality in the Bohai Sea region in 2002 amounted to 2,418.441 billion Yuan (about US$ 302.30 billion), accounting for 23 percent of the country's total GDP (10,479.06 billion Yuan or US$ 1,309.87 billion). The GDP of the 13 coastal cities and municipalities of the Bohai Sea region in 2002 totaled 928.656 billion Yuan (about US$ 116 billion), accounting for 38 percent of the Bohai Sea region's total GDP.

Table 2. The Population Density of the Bohai Sea Region and Its Coastal Areas.

Region	Population (millions)	Land Area (km^2)	Pollution Density (person/km^2)
Liaoning Province	42.38	145,930	290.41
Dalian	5.89	12,574	468.43
Yingkou	2.30	5,402	425.77
Panjin	1.26	4,071	309.51
Jinzhou	3.08	10,301	299
Huludao	2.58	10,415	247.72
Hebei Province	67.44	190,000	354.95
Tangshan	7.04	13,472	522.57
Qinhuangdao	2.75	7,812.8	351.99
Changzhou	6.34	14,100	470.92
Shandong Province	90.79	150,000	605.27
Binzhou	3.56	9,444.65	377.37
Dongying	1.79	7,923	226.30
Weifang	1.33	15,859	88.86
Yantan	1.62		117.49
Tianjin Municipality	10.01	11,305	885.45

Source: Statistic Yearbooks, 2001 and 2003 of Liaoning, Hebei, Tienjin and Shangdong.

Table 3. Ethnic Structure (Millions).

Region	Han Ethnic Group	Minority Ethnic Groups	Proportion of the Han Ethnic Group (%)
Liaoning	41.55	6.29	84.87
Hebei	67.346	2.627	96.1
Tianjin	10.0718	0.2638	97.39
Shandong	90.82	0.62	99.32

Source: Statistic Yearbooks, 2001 and 2003 of Liaoning, Hebei, Tienjin and Shangdong.

Table 4. Employment in the Bohai Sea Region

Region	Total Employed personnel (in millions)	Employment Distribution			Composition (% of the Total)		
		Primary Industry	Secondary Industry	Tertiary Industry	Primary Industry	Secondary Industry	Tertiary Industry
Liaoning	20.253	6.976	5.806	7.471	6.15	5.12	6.59
Hebei	32.8656	16.6259	8.7412	7.4985	14.67	7.71	6.61
Tianjin	4.9261	0.8225	2.0538	2.0498	0.72	1.81	1.80
Shandong	55.27	22.862	12.794	19.614	20.17	11.29	17.30
Total	113.3147	47.2864	29.395	36.6333	41.71	25.93	32.30

Source: Statistic Yearbook,(2003).

Transportation and Communication

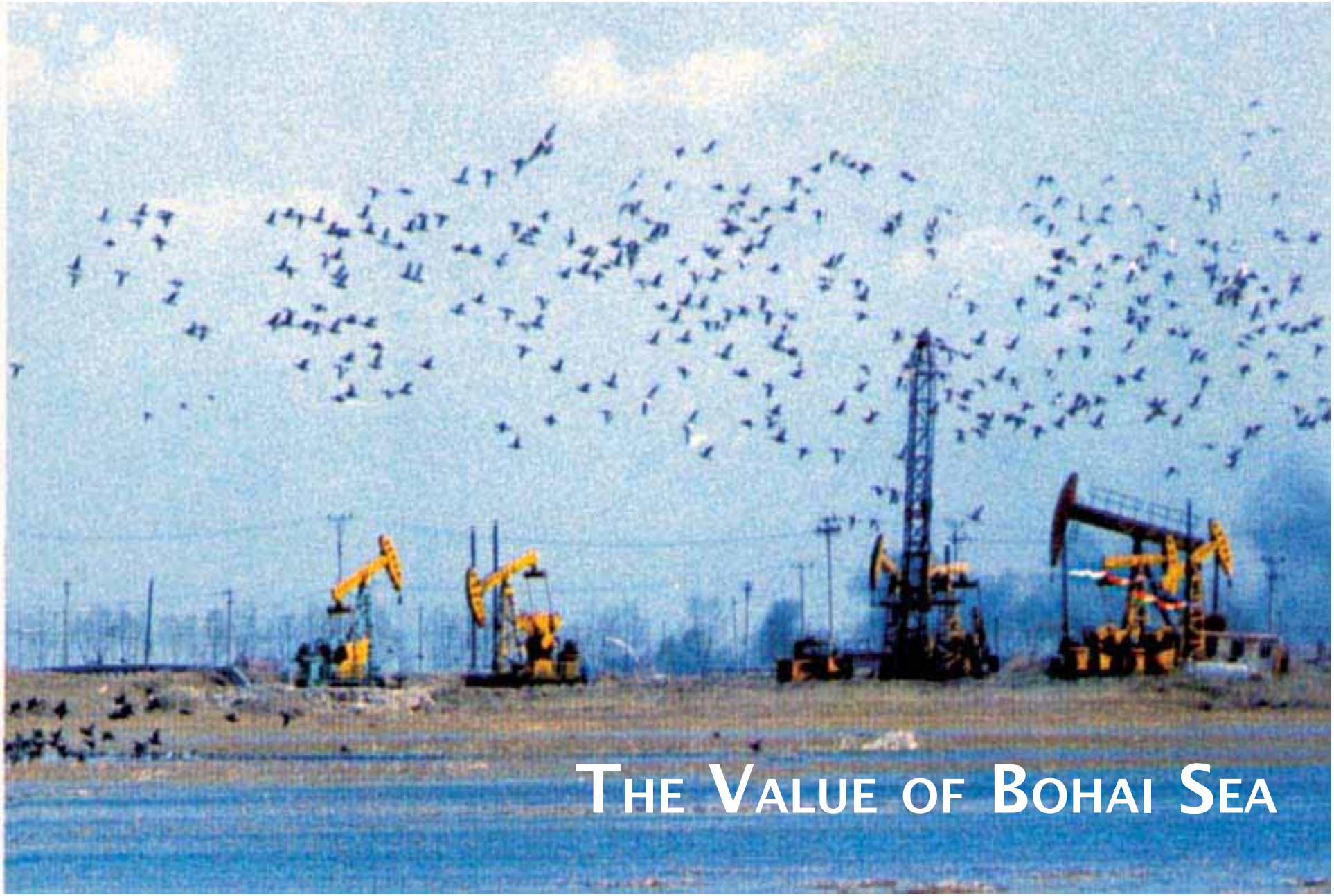
Modern transportation and communication facilities are available in the region, forming a three-dimensional transportation network of air, sea and land transport to facilitate direct connection to Northeast China, Northern China and Northeast Asia. Table 5 shows the transportation network and routes within the region.

There are 2,738 highway bridges and 240 extra large bridges in the region. As of 2002, the total length of the highways in the region measured 194,855.3 km. The region also has 18 trunk railroads, four of which are in Liaoning, eight in Hebei (including four originating from Beijing), two in Tianjin and four in Shandong. As of 2002, the total railroad length was 20,466 km.

China has 54 seaports, 10 of which are located in the Bohai Sea region. The ports in Dalian, Tianjin, Qinhuangdao, Qingdao and Yingkou are ranked among the top 10 ports in China in terms of handling capacity. In 2002, the total handling capacity of the five ports reached 349.24 million tons, accounting for 22.83 percent of the national total.

Table 5. Network of Railroads and Highways in the Bohai Sea Region

	Highways		Railroads	
	From	To	From	To
Liaoning	Shenyang	Yingchengzi Town (Inner Mongolia)	Shenyang	Jilin via Siping
	Shenyang	Zhuanghe City	Shenyang	Liaoning via Anmin Town
	Shenyang	Beijing via Shanhaigun	Shenyang	Tianjin via Shanhaiguan
	Shenyang	Dandong	Shenyang	Shahekou (Dalian)
Hebei	Beijing	Shenyang	Beijing	Qinhuangdao
	Beijing	Tanggu	Beijing	Tianjin
	Beijing	Shijiazhuang	Beijing	Henan via Heze, Shandong
	Beijing	Gu'an	Beijing	Qinhuangdao
	Shijiazhuang	(via Anyang) Henan	Shijiazhuang	Beijing
	Shijiazhuang	Shanxi	Shijiazhuang	(via Dezhou) Jinan
	Shijiazhuang	Huaian	Shijiazhuang	(via Anyang) Henan
	Shijiazhuang	(via Anyang Henan)	Shijiazhuang	Shanxi
Tianjin	Tianjin	Ansu Town (connecting with Beijing-Shijiazhuang Highway	Tianjin	Tianjin New Port
Shandong	Tianjin	Nanchengtun	Tianjin	Dezhou
	Jinan	Dongying	Port Jinan	Qingdao
	Jinan	Yantai		Shijiazhuang via Dezhou
	Jinan	Hebei via Dezhou	Jinan	Laiwu
	Jinan	Henan via Liaocheng		
	Several Highways have formed a good network			

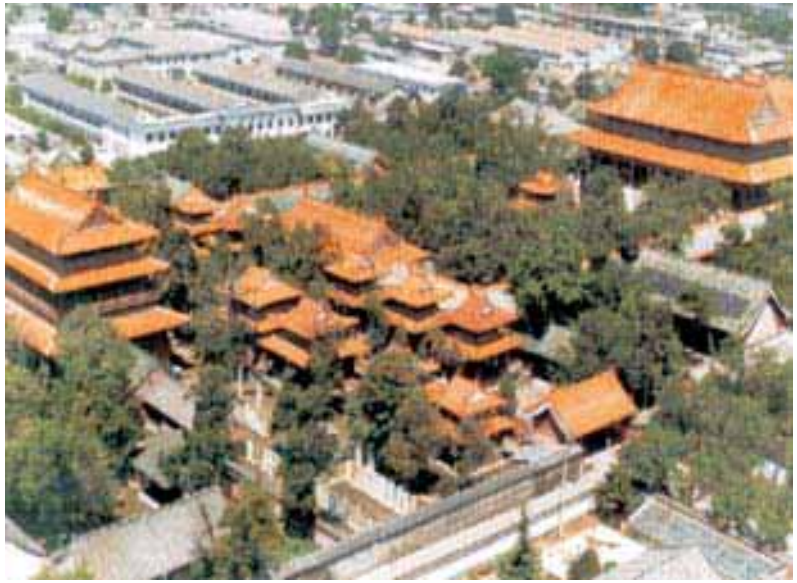


The Value of Bohai Sea

The Bohai Sea Region

The Bohai Sea is an important support system for the Pan-Bohai Sea region's economy because of its rich resources and geographical location, making the Bohai Sea region one of the country's socially and economically developed regions.

From a regional economic perspective, the Bohai Sea region forms an integral part of a wider economic zone linking up portions of Inner Mongolia and Shanxi Province, which has direct impact on the Northeast Asia Economic Rim, Euro-Asia Land Bridge, and Southeast Asia Marine Economic Rim. As such, the Bohai Sea region is at the heart of multiple regional economic, environmental, military, natural and social systems with important values associated with these systems.



Historical and Cultural Values

Strategic Historical Importance

The Bohai Sea has always been North China's direct gateway for communicating with the world and the Bohai Straits, located between the western cape of Laotieshan in Liaodong Peninsula and the north end of Penglai Island, is the strategic passage through Bohai Sea and North China. This has made Bohai Sea and its coastal ports historical maritime defense areas.

Tanggu Port in Tianjin, and Lushun Port in Dalian were the strategic sites of warring parties in the past. Today, these ports house many battle relics. Moreover, Tienjin is a well-known historical maritime port for foreign trade.

Geological and Archaeological Sites

The region has unique geological characteristics. Jixian County in Tianjin contains a middle and upper proterozoic erathem (an era that reflects major changes in the development of life on the Earth) as indicated by the International Standard Geological Profile. The area used to be an ocean around one billion years ago.

Evidence of human activities dating back thousands of years have been found in the Bohai Sea region, such as the fossil skull of an ape-man, (dated to be 30,000 - 40,000 years old), discovered in Liaoning. Shandong, where the Dawenkou and Longshan cultures were first discovered, is one of the Chinese nation's places of origin.

Cultural Relics and Sites

The flourished civilization in the Bohai Sea region carries with it many important cultural heritage sites. The renowned sites include Shanhaiguan Pass of Qinghuangdao Municipality (known as the First Pass of the Great Wall connecting the sea), Zhaozhou Bridge in Heibei Province, Huangyaguan Pass (also part of the Great Wall), the Dagu Fort, and the Ancient Culture Street in Tienjin Municipality. In addition, the Shenyang Imperial Palace and the Three Tombs (Fuling and Zhaoling in Shenyang, and Yongling in Fushun), located north of Shanhaiguan Pass, houses the historical and cultural relics of the early Qing Dynasty.

Shandong used to be ancient China's cultural center. Qufu, the birthplace of the Confucian culture in Shandong, is a famous historical and cultural city. The Confucius Temple, Confucius Mansion and the Cemetery of the Confucius family are listed in the World Cultural Heritage sites. In China's long history, Shandong was the birthplace of many outstanding statesmen, intellectuals and military experts, such as Confucius and Laozi. Their academic achievements, theories, thoughts, and wisdom have greatly influenced Chinese culture.

Natural and Ecological Values

Unique Geographical Advantages

As China's only semi-enclosed and inland sea, Bohai Sea has unique geographic advantages, which include:

- Two peninsulas (the Liaodong and Shandong peninsulas);

- Three inland regions (The Bohai Sea is the gateway to the northern, northeastern and the northwestern regions of China);
- Three major river systems (Yellow River, the Liaohe River and Haihe River) and over 40 rivers enter the Bohai Sea all-year round;
- Three major ecosystems, characterized by three major bays, namely the Bohai Bay, Liaodong Bay and Laizhou Bay; and
- Three major city clusters emerging along the river systems: the Liaohe River cluster (with Shenyang Municipality at the center, including Liaoyang, Yingkou, Benxi, Panjin, and Jinzhou); the Haihe River cluster (with Tianjin Municipality at the center, including Huanghua and Tangshan); and the Yellow River cluster (with Jinan Municipality at the center, including Weifang, Bingzhou, Lijin and Kenli).

The three major city clusters interact with the three major ecosystems in the Bohai Sea region, thus constituting the structures and functions of the region's social, economic and ecological complex.

Biological Resources

There are about 600 species of organisms in Bohai Sea, including over 120 species of phytoplanktons, (with an annual primary production of 112 mg/m^2), over 100 species of zooplanktons, 100 species of intertidal benthic plants, 140 species of benthic animals, 200 species of foreshore benthic animals, 120 species of nektons, 27 species (under 5 families) of fish. The Bohai Sea also provides other valuable sea products like prawns, sea cucumbers and abalones.

Delta Wetlands

Rivers flow into the Bohai Sea mainly through Liaodong Bay, Bohai Bay and Laizhou Bay, which make up the Bohai Sea's three major ecosystems. The natural wetland ecologies of the three bays, with their associated river systems and estuarine deltas are important features of the Bohai Sea as they provide feeding and spawning grounds as well as winter migratory areas for fish, shrimps, crabs, seabirds and other wild animals. The wetlands also purify and reduce the pollution load, modulate the climate and prevent floods, droughts and disasters. Over 150 species of birds including 97 species of waterfowls are observed in the natural wetland sanctuaries of the Bohai Sea.

Table 6. National and Local Marine Protected Areas in the Bohai Sea Region.

Protected Areas	Level	Location	Approved	Competent Agency	Area (ha)	Objectives
Snake Island/ Laotieshan Sanctuary	national	Lushun, Liaoning	1980/8	SEPA	17,000	Migrants, Pallas pit viper and their habitat
Shuangtaizi Estuary Water Birds Sanctuary	national	Panjin, Liaoning	1988/5	SFA	80,000	Valuable birds like red-crowned crane, white crane, and swan
Changli Golden Coast Nature Reserve	national	Changli, Hebei	1990	SOA	30,000	Natural landscape and the adjacent sea areas
Tianjin Ancient Coast and Wetland Nature Reserve	national	Tianjin, Municipality	1992	SOA	21,180	Shell beach, oyster beach, ancient coastal relics and wetland ecosystem
Yellow River Estuarine Delta Sanctuary	national	Dongyang, Shandong	1992	SFA	153,000	Proto-wetland ecosystem and valuable birds
Dalian Harbor Seal Sanctuary	national	Dailian	1997.12	SFA	400	Harobor seal
Suizhong Primary Sandy Coast and Marine Biodiversity Nature Reserve	local	Suizhong, Liaoning	1996	SOA	100	Primary sandy, coast, marine ecosystem and marine biodiversity
Liaodong Bay Wetland Nature Reserve	local	Panjin, Liaoning	1991	Liaoning Provincial Government	8,000	
Shijiutuo Islands Sanctuary	local	Liaoting, Hebei	2002	Hebei Provincial Government	3,775	Animal and plant resources
Ancient shellfishdam in Huanghua Nature Reserve	local	Cangzhou, Hebei	1998	SOA	117	Ancient shellfish dam, shellfish sand and plants in the area
Miaodao Island Marine Sanctuary Nature Reserve	local	Shandong	1991	SOA	8,776	Warm-temperate Zone island
Qianliyan Island Ecosystem Nature Reserve	local	Yantai, Shandong		Shandong Provincial Government	1,832	Evergreen broadleaf forest

Source: China's Marine Information Network.

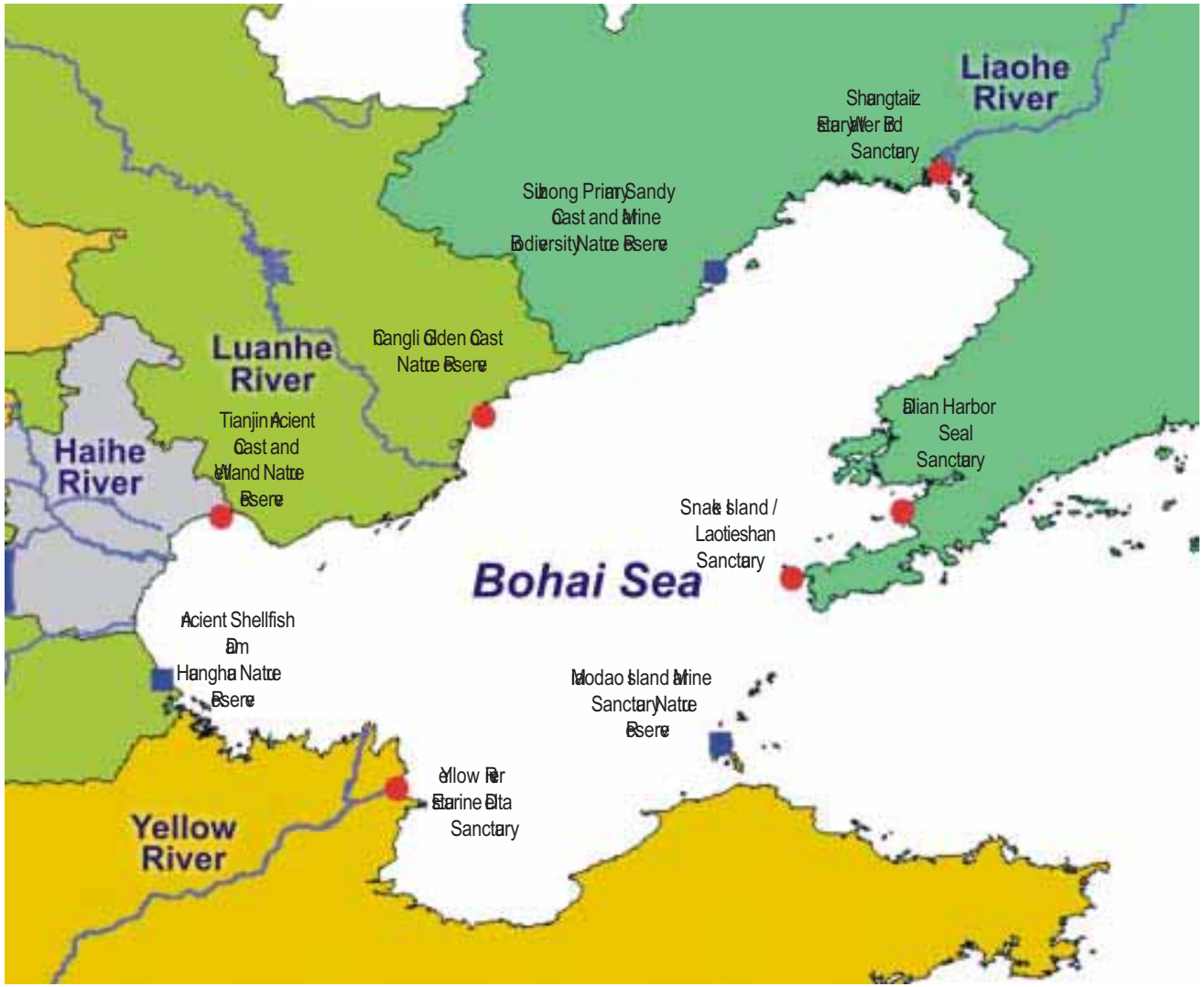


Figure 5. Distribution of National and Local Marine Protected Areas Surrounding Bohai Sea.

Natural Protected Areas

As of 2002, several natural protected areas have been established in the region covering an area of 68,200 km^2 (Table 6).

Mineral Resources

Bohai Sea is rich in mineral resources. The Bohai Sea region is China's largest salt-making base with 16 saltpans along the coast of Bohai Sea covering an area of 1,600 km^2. It is also the second largest oil producer with 64 oil and gas deposits. In 2000, the exploitable oil reserves reached 1,022 million barrels. The oil field of Penglai 19-3 in the south of Bohai Sea is China's second largest, next only to Daqing Oil Field, and is the country's largest offshore oil field. Other mineral resources in the region include bach placer, coal, diamond, gold, iron, siderite and talcum. There are 23 solid mineral deposits in the region.

Tourism and Recreational Values

The combination of the region's natural beauty (as exemplified by mountains, seas, and islands), with that of its historical and cultural sites, and supported by its numerous tourism resources and facilities, attracts millions of tourists from within and outside the country every year.

Landscapes

The region has charming island sceneries, with over 30 spots of fine sandy beaches. Its islets come in various types and shapes, providing wonderful natural sights. The Miaodao Islands in the Bohai Straits and legendary setting of the fairy tale *the Eight Immortals Crossing the Sea*, is a picture of mountains, waters and beaches. The northern tip of Shandong Peninsula is home to the legendary Penglai Wonderland, while the southern tip of Liaodong Peninsula, known as the Laotieshan Mountain, is noted as a "transit stop" for thousands of migratory birds arriving each year.

Beaches and Resorts

The tourism industry in the Bohai Sea region is nurtured by its beautiful beaches and pleasant climate. Two large-scale summer resorts can be found in Dalian and Beidaihe. Dalian is one of the most important places in northeastern China for tourism, summer resorts and recuperation. It has swimming beaches, parks, hotels and health resorts. Beidaihe is a famous summer resort known for its beautiful landscapes and the superior quality of its swimming beaches.

National Parks

The region holds important national parks such as the Middle and Upper Proterozoic Erathem geological park, the Golden Coast in Changli (Hebei Province), and the ancient shellfish dam in Tianjin. All these natural landscapes and habitats need to be protected.

Economic Values

Bohai Sea region is the center of the Northeast Asia Economic Rim and a communications hub of the Euro-Asia Land Bridge. China's Marine Function Zonation and its component for the Bohai Sea has classified some 293 zones with different functions in the region, including export-oriented economic development zones, integrated coastal and marine development zones, ecosystem protection demonstration zones, and zones for nature reserves and marine protected areas. Among the development zones, there are 153 sites for spatial resource uses, 87 sites for mineral resource development, 28 sites for living resource uses, 23 for chemical resource uses and one for new energy development.

In terms of land use, 51.8 percent of the Bohai Sea region's land area are directly used. Of this figure, 36.6 percent are arable, 15.2 percent are for construction, and 40.7 percent are for vegetation.

By the end of 2002, the three provinces and one municipality of the region had a population of 209.8 million, about 16.33 percent of the nation's total (12.8 billion). The region's GDP reached 2,418.4 billion Yuan (about US$ 302 billion), about 23 percent of the nation's total (10,479 billion Yuan or US$ 1,310 billion). In 2001, the total output value of the region's leading marine industries was 158.735 billion Yuan (US$19.8 billion), accounting for 21 percent of the total output value of the country at 723.380 billion Yuan (US$ 90 billion).

The output value of the region's salt-making and chemical industries accounted for 89 percent of the national total, while the region's major marine industries, accounted for 80 percent. In addition, the output value of the region's mariculture industry accounted for 37 percent of the national total, while oil and gas industries accounted for 34 percent (Table 7).

Table 7. Output Values of Major Marine Industries for 2001 (billion Yuan).

	Total	Marine aquatic products	Oil/gas	Salt-making	Chemical	Medicine	Marine electric/ waterpower	Ship making	Coastal tourism	Maritime transportation
Nationwide	7233.80	2256.56	320.68	90.99	76.27	20.87	421.32	292.72	2502.87	788.93
Liaoning	362.37	245.8	2.42	4.51		0.98		60.34	27.35	21.95
Hebei	115.75	41.65		6.64	18.10		15.03	4.00	6.19	24.10
Tianjin	268.65	7.03	77.62	4.89	38.33			3.95	23.17	44.27
Shandong	840.58	554.52	30.97	65.63	4.78		45.08	35.39	25.30	75.20
Total	1587.35	849.0	111.01	81.67	61.21	0.98	60.11	103.68	82.01	165.52
Percentage of nation's total	21.94%	37%	34%	89%	80%	4%	14%	35%	3%	20%

Source: China's Marine Statistic Yearbook, 2002.

Threats and Impacts

In the Bohai Sea, some parts are seriously polluted. Eutrophication, red tide and oil spill incidents occur from time to time. Ecosystem health has been impaired, living resources sharply reduced, and fishing seasons have disappeared. The pollution severity in the ecological environment of the Bohai Sea is attributable to many factors, including population increase, weak awareness on the values of the coastal and marine ecosystem resources and services, unregulated coastal development, overuse of the living resources and inadequate integrated management systems. These have serious adverse impacts on the region's socioeconomic growth, inhibiting the region's sustainable development.

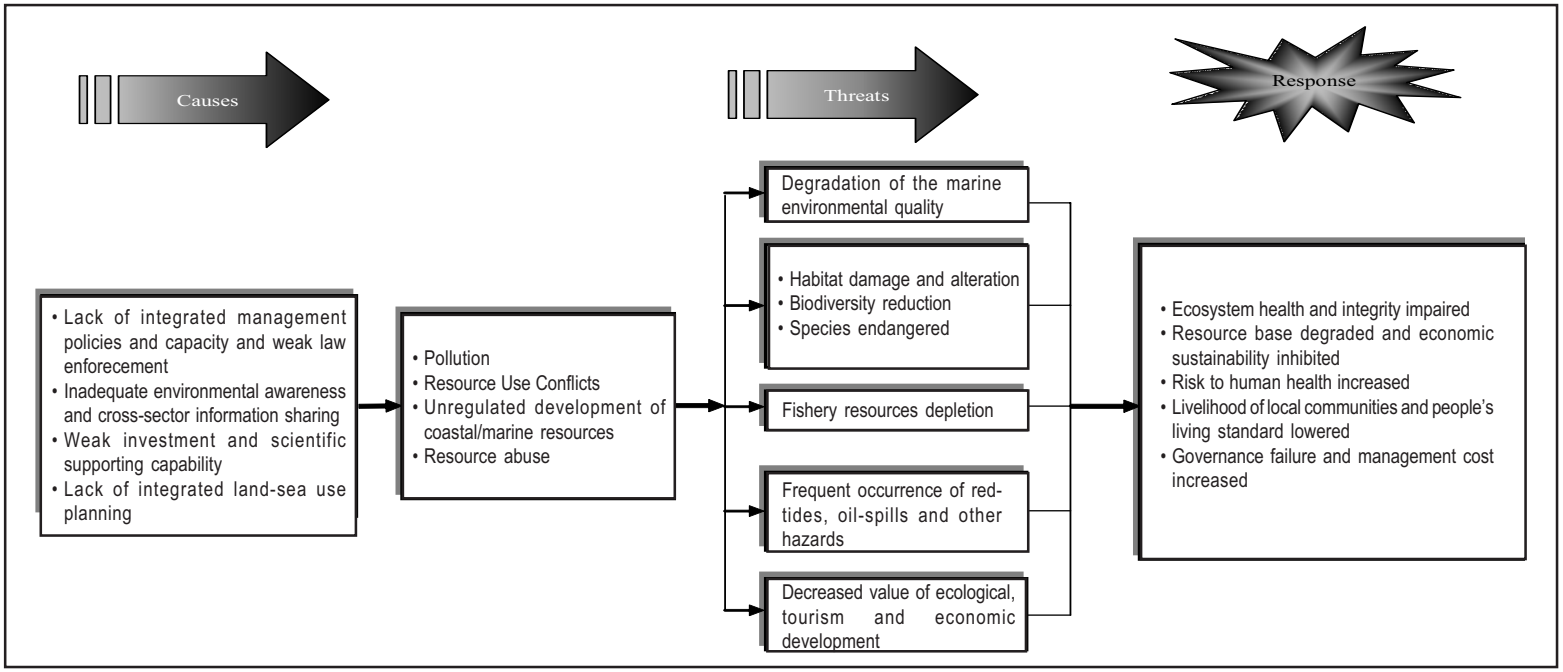


Figure 6. Threats, Causes and Impacts Facing the Bohai Sea Region's Environment and Natural Resources

Marine Pollution of the Bohai Sea

Related Issues and Concerns	Possible (Natural and Socioeconomic) Impacts
Major pollution sources: • Land-based sources • Urban domestic sewage Phosphorous pollution mainly due to non-point sources Unregulated coastal aquaculture and ships contributing to marine pollution The problems of management: • Lack of integrated land- and sea-use planning and open access in resource uses. • Resource use inefficient and the use pattern irrational. • Rapid coastal urbanization with poor infrastructure and weak capacity in the treatment of industrial and domestic sewage. • Weak management of land- and sea-based marine pollution. • Weak management of coastal aquaculture • The environmental public awareness • Low capability of marine environmental monitoring.	• Water pollution in some areas is still serious. In Liaoning Province, the polluted coastal water area was 14,270 km^2, however areas with various levels of pollution were reduced compared with previous years (2002). The major polluted areas are Shuangtaizi River Estuary, Liaohe River Estuary, Jinzhou Bay and Dalian Bay. Most of the areas of Tianjin, Shandong and Hebei are basically clean. • The bottom materials and benthic organisms were slightly polluted. The results of monitoring showed (1989) sediments off Dalian Bay, Jinzhou Bay and Qinghuangdao are polluted, and benthic organisms such as shellfishes were contaminated by heavy metals and oils, particularly mercury and cadmium . The content of non-degradable materials in shellfishes was also high. • Red-tide occurs frequently with serious economic losses. In the 1990s, 10 red-tide events occurred annually. The duration of the events become longer and the areas covered became larger. In 1998, the most serious red-tide events occurred in Liaodong Bay, Bohai Bay and Laizhou Bay, causing half a billion Yuan of direct economic losses to the marine aquatic products. • Some estuarine fishing grounds disappeared and the fishery resources have been damaged. Since the 1970s, about a 350 km^2 area of Liaodong Bay has been seriously polluted by the heavy metals, and benthic organisms have been sharply reduced in a 7 km^2 area. The fishing ground in the Haihe Estuary in Tianjin and in the Xiaoqinghe Estuary have disappeared as a result of the serious pollution. • The seafood quality reduced. The drinking water quality in some coastal areas violates the standards with adverse impact on the health of the local people. • Income of local residents in traditional industries has decreased, and their living standards lowered. There is a need to develop their alternative livelihood. • The coastal marine industries (e.g., fisheries, tourism) are adversely affected.

Pollution

The Bohai Sea nearshore areas are seriously polluted, indicating the severity of the region's environmental problem. This is an important inhibiting factor for the region's socioeconomic development. The major pollutants include organic matter, active phosphate, petroleum hydrocarbons, inorganic nitrogen and some heavy metals. Pollution caused by inorganic nitrogen is the most serious.

Pollution monitoring results taken in 2002 showed that water quality in an area of some 32,000 km^2 fell below the clean water standard. This increased the Bohai Sea's polluted area from 24 to 41 percent of the total sea area. The dominant pollutants were inorganic nitrogen, phosphates, lead and mercury.

The marine ecosystem of Bohai Sea has been damaged by pollution and has caused the sharp decline in fishery resources. Bohai Sea is now in danger of losing its service functions due to pollution.

The following is a summary of the results obtained from stakeholder surveys with regard to the major pollution problems and their related socioeconomic impacts.

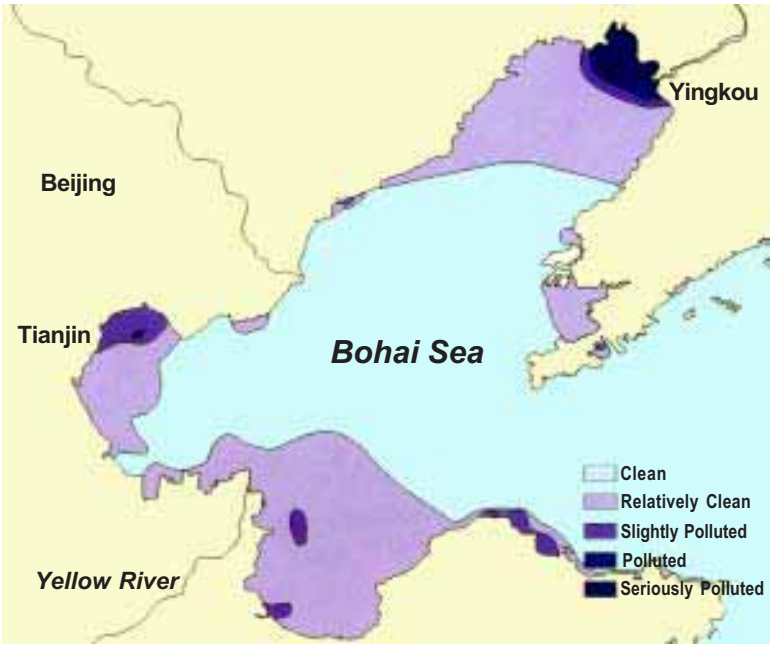


Figure 7. Pollution Distibution Pattern in the Bohai Sea.

Habitat Degradation

Coastal Erosion

Coastal erosion has become a major problem in the region, causing coastline retreat, subterranean seawater invasion, lowland flooding and the salination of paddy fields.

Coastal erosion is more serious in Qinhuangdao, Yingkou and Laizhou Bay. In Qinhuangdao and Luanhe Estuary, the shoreline retreat currently occurs at a pace of 2-3m/year. In Beidaihe, parts of the coastline are retreating due to erosion as a result of the abusive quarrying and deforestation. In Liaoxi, the natural landscape of many sections of its coastal areas were damaged, the area for saltpans reduced, and the wetland ecosystem degraded. This led to great losses to the region's tourism and salt-making industries. As a consequence of the establishment of the Bayuquan Economic Development Zone, the 30km long coastline running from Xiongyue to Bayuquan in Yingkou is retreating by 15m annually due to erosion caused by sand and gravel extraction and the cutting of the coastal forests, with an economic loss of over a hundred million Yuan. In 1970s, subterranean seawater intrussion occurred in Shandong, Hebei and Tianjin. Its rapid expansion is causing a shortage of freshwater, degradation of arable land and hazards to the coastal residents.

Damaged Natural Wetlands

In the 20th century, the region's natural wetlands have been seriously damaged. For example, the natural reed land area in Shuangtaizi Estuary was reduced from 60,400 ha in 1987 to only 24,000 ha in 2002, a 60-percent loss in just 15 years.

Partial Loss of Fishing Grounds in Natural Estuarine and Deltas.

Due to the shortage of freshwater and the construction of water dams along the main streams and branches of rivers, the lower reaches of the rivers dry up. This has been happening in the Yellow River since the 1970s, and has become serious in recent years. For example, in 1997 the Yellow River saw no runoff for 226 days causing estuary fishing grounds and fish spawning grounds to disappeared.

Management Problems

The management problems of Bohai Sea include:

- A lack of appraisal, monitoring and understanding of the value of the wetland ecosystems;
- A lack of ecosystem management approaches;
- A lack of integrated land and sea-use planning; and
- A lack of integrated coastal strategic assessment and management.

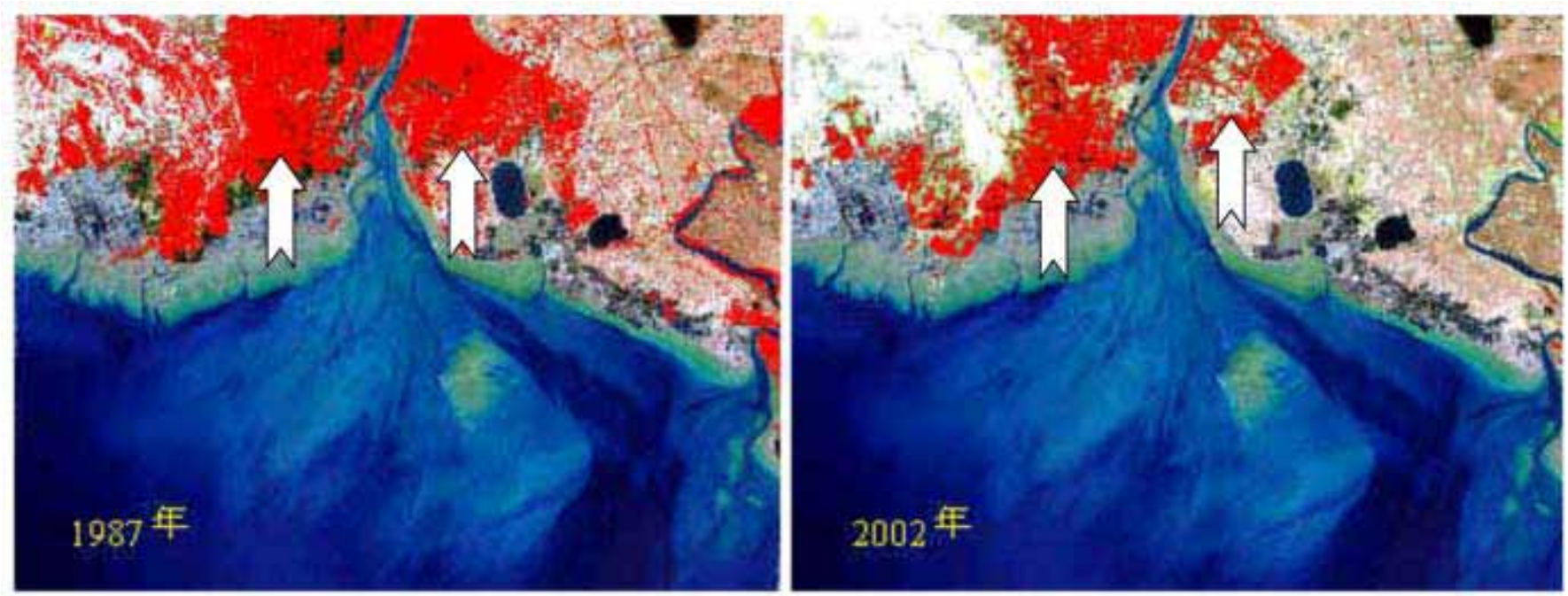


Figure 8. The Change in Natural Reed Wetland Area in Shuangtaizi Estuary.

Ecological and Socioeconomic Impacts

Bohai Sea's function as life-support system has been impaired. This has impact on fishery, tourism, agriculture and water resources, restricting the development of coastal industries and the coastal economy as a whole. It has led to a decline in the income level and living standards of the local community.

Overfishing

The degree to which the living resources is being used is higher than other coastal resources such as ports, saltpans, oil and gas, etc.

The level of fisheries production is 1.5 times beyond the maximum sustainable yield for the Bohai Sea.

Management issues affecting the living resources include the unregulated, abusive and open-access type of resource use, inadequate integrated coastal and marine management mechanisms, no incentive-based approaches for the sustainable resource uses, and ineffective policy implementation and law enforcement in coastal and marine management.

Fisheries Resource Depletion: Reduced Valuable Fish Species Number and Abundance

Valuable fish species dominated traditional fish products from the Bohai Sea. However, in the 1960s, these species were replaced by low value species. By the 1970s, large-sized low value species were replaced by small-sized species. Between 1982 and 1993, the fish diversity index decreased from 3.6 (85 species) to 2.5 (74 species). New biological communities dominated by poor quality fishes are emerging. In recent years, bloody clams and scallop catch in Tianjin and of hard clams and jellyfish in Liaoning have significantly decreased. This proves that intertidal shellfish resources are deteriorating.

Impairment of the Ecosystem Health

In the Bohai Sea, Chlorophyll-a and primary productivity have reduced by 37 percent and 30 percent respectively. The biomass of low trophic level species increased by 22.3 percent, while that of high trophic level species reduced by 19.3 percent.

Increased Socioeconomic Cost

For stakeholders of the Bohai Sea, resource depletion has let to a number of socioeconomic costs including:

- Increased fishing cost and reduced level of income, as well as the need for the creation of alternative livelihood for local fishers;
- Fish processing industries adversely affected and employment opportunities thus reduced; and
- Increased cost of fisheries resource enhancement.

Marine Hazards

Marine hazards such as red tide, sea ice, storm surges and oil spills exert impacts on the Bohai Sea. Oil spill events in Bohai Sea have been frequent since the 1980s. In 1991, about 70 oil spill events caused by ship-breaking, collision, and sinking, as well as oil well blowout, resulted in serious oil pollution at sea and related drainage basins. Management measures for pollution by land- and sea-based sources are inadequate. Forecasting, early warning, preparedness, responses and mitigation systems for marine hazards have much room for improvement.

Marine hazards cause environmental pollution, ecosystem impairment and natural resource damage. Hazards have direct and indirect impacts on coastal and marine uses, increasing risks of losses to life and property. For example, oil pollution has deleterious impacts on mariculture and coastal tourism.

Multiple Resource-Use Conflict

The rapid growth of coastal and marine uses, such as for fishery, salt-making, shipping, offshore oil exploitation and tourism, often result in competition for limited space and spillover effects (e.g., pollution) on one another, depending on ecological and socioeconomic conditions.

Examples of the multiple-use conflicts are:

- The salt-making industry vs. aquaculture industry for the use of the tidal flat;
- Offshore oil exploitation vs. fishery (capture fisheries and aquaculture industry) concerning the use of space and pollution effects;
- Conflicts among the shipping industry, offshore oil exploitation and fisheries; and
- Conflicts among coastal development, tourism and habitat protection.

Management systems are often sector-based and thus tend to pursue sectoral interests. Such systems are limited in their perspective of multiple-use interactions and impacts, and ineffective in handling the use conflicts. These sectoral approaches are reflected in policy, legal and regulatory frameworks, mechanisms and processes for environment and resource management, thus creating institutional barriers for sustainable development.

The main impacts are:

- Unsustainable resource uses;
- Reduced ecosystem health, integrity, values and services;
- Marine pollution;

- Marine environmental hazards;
- Inefficiency of economic activities;
- Social problems (e.g., disputes, unemployment) due to use conflicts; and
- Increased management cost (e.g., resolving legal and administrative disputes, additional implementation and enforcement efforts).

Our Response

New Approach

The issues and concerns relating to the coastal and marine environment and natural resources are brought about by rapid socioeconomic development in the Bohai Sea region, which challenges traditional management approaches. Sustainable development of the Bohai Sea region calls for innovative strategies, management approaches, measures and steps.

Stakeholders of the Bohai Sea region have agreed to undertake the following:

- Adopt a common vision for the future of Bohai Sea region and define their mission to realize the shared vision;
- Develop an operational strategy that ensures the region's sustainable development, which will involve all stakeholders; and
- Share responsibilities in resolving the problems and issues challenging the region's sustainable development, which can be single-handedly addressed by any government, agency, enterprise, organization, social sector or community.

The Governments of the Provinces of Liaoning, Heibei and Shandong and the Municipality of Tienjin endeavor to develop partnership and collaboration, and to this end, perform the following functions:

- Mobilize provincial and municipal departments/agencies, as well as local governments, to adopt equitable, efficient and transparent policies in the planning, development and management of the region's environment and natural resource uses, with guidance and support from central government and concerned agencies;
- Promote inter-regional and intersectoral cooperation and knowledge sharing, and establish integrated coastal management and decisionmaking mechanisms and processes;
- Mobilize and pool all the available resources for the pursuance of the common endeavor and promote the involvement and participation of all local communities and various other stakeholders;
- Facilitate assistance from, and collaboration and coordination with, the concerned international organizations for the pursuance of the common endeavor; and
- Develop incentive-based policies, and create favorable conditions, for encouraging investments from foreign and domestic enterprises to develop the region's environmental improvement and sustainable-use projects.

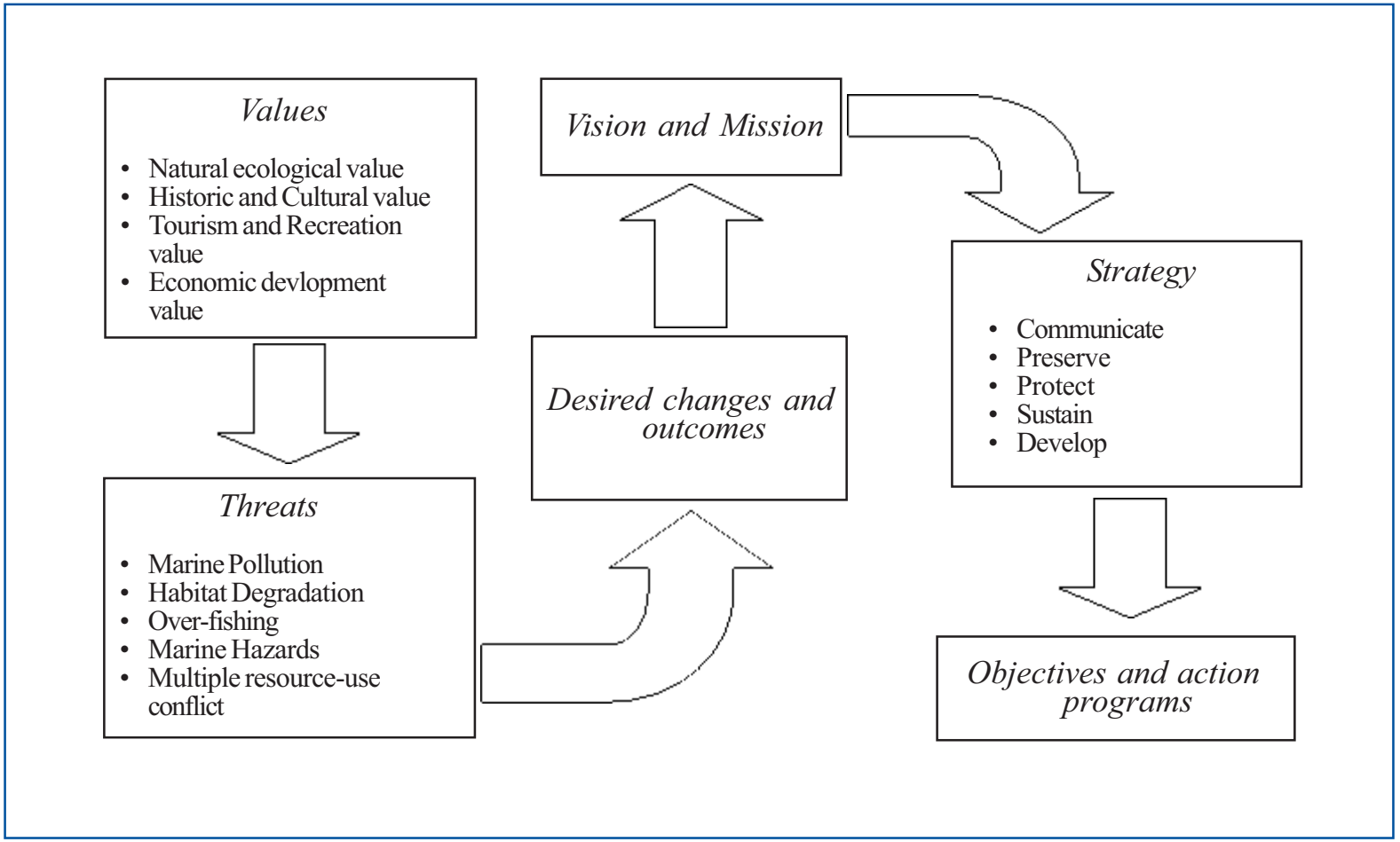


Figure 9. BS-SDS Formulation Process Diagram.

A SHARED VISION

A clean blue sea with beautiful coasts and healthy and vigorous ecosystems;
A center for marine and coastal ecotourism, with a well protected historical and cultural heritage, well conserved marine/coastal biodiversity, and unique natural habitats; and
A center of sustainable socioeconomic development with modern international ports, a large-scale petroleum production base; and rationally managed multiple resource-uses that support the people's well-being and quality of life.

This vision represents the hope of the region's stakeholders for the sustainable development of Bohai Sea. This vision has been developed and adopted by the stakeholders, including the provincial and local governments, agencies, various sectors of the society, local communities and the citizenry through consultations and consensus building. In doing so, the stakeholders are committed to their respective responsibilities in undertaking initiatives to bring the shared vision into reality.

OUR MISSION

We, the stakeholders of the Bohai Sea region, will carry out the following in the spirit of cooperation and partnership:

- ***To contribute actively to attaining the region's common goal of sustainable development, by preventing and mitigating pollution; maintaining, protecting and conserving the health of the region's ecosystem and natural processes; and preserving its social, cultural, historical and cultural values.***
- ***To develop and utilize the land and marine resources in a sustainable manner, and promote the harmony and balance between economic development and protection of the natural environment and resources.***
- ***To develop and implement relevant policies, legislations, regulations and standards for the integrated management of coastal and marine environment and natural resources.***
- ***To promote the establishment of the region's multi-sectoral, multi-disciplinary, and cross-boundary management framework, mechanisms and processes.***

This mission statement is a common expression of commitment to the concrete goals to be achieved by the stakeholders. It will be undertaken by the stakeholders through cooperative and partnership arrangements.

Desired Changes and Outcomes

Institutional Changes

- relevant international treaties signed by China strictly observed and implemented;
- integrated management policies related to the protection of marine/coastal resources and environment developed and implemented;
- the trans-provincial integrated management mechanism in the Bohai Sea region established and the Strategy implemented;
- cooperation among the national, provincial and local governments in the implementation of sustainable coastal and marine development programs achieved;
- incorporation of the BS-SDS into the overall national social and economic development programs of relevant local governments;
- the capability of local governments for managing the marine/coastal resources and environment within its jurisdiction enhanced;
- mechanisms for facilitating public participation and involvement established and strengthened; and
- for the purpose of supporting integrated coastal and marine management, diversified, market-based, and socially responsible self-sustained financing mechanisms with broad-based stakeholder participation, established.

Operational Changes

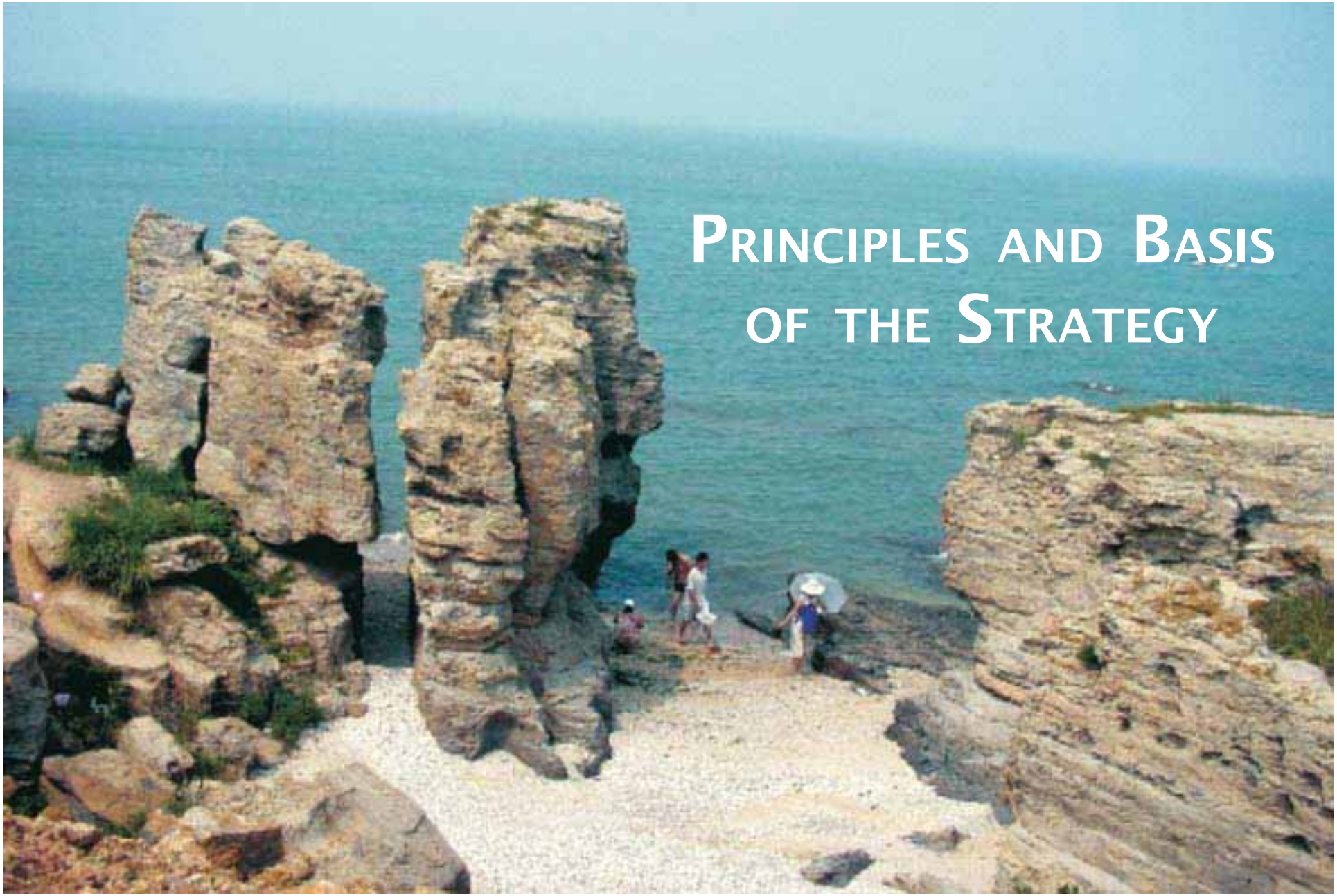
- stakeholder capacity-building programs developed in managing the coastal and marine environment and natural resources enhanced;
- the region's integrated management mechanisms established, and supporting policy, legal and regulatory framework developed and implemented;
- interagency and multi-sector cooperation and coordination to implement the Strategy achieved;
- cooperative research and information-sharing mechanisms on marine/coastal environment and resource management established;

- integrated land- and sea-use program developed and implemented;
- science based large-scale multiple-use zonation of the Bohai Sea developed and implemented;
- research in environmental carrying capacity conducted;
- integrated environmental protection and natural resource conservation program formulated and implemented;
- multisector marine environmental monitoring system, and hazard warning, prediction, preparedness and response system established;
- indicators, standards and guides for the sustainable development and management of the environment and natural resources established;
- comprehensive and strategic environmental impact assessment systems for marine development programs established and implemented;
- public awareness on marine environment enhanced and mechanisms for public participation in marine/coastal resources planning, development and management, established;
- appropriate incentive-based mechanisms created, attitude and behavior of stakeholders changed towards the objective of sustainable development of environment and natural resources;
- further involvement of private sector, industrial and commercial circles, and scientific communities in the region's management programs; and
- public-private partnerships and sustainable fiscal/financing mechanisms established.

Outcomes

- rationale multiple resource-use patterns established, particularly the pattern of sea-dependent industries, use-conflicts minimized, resource-base preserved and measurable sustainable resource uses achieved;
- guidelines for the sustainable development of major types of resources developed and implemented;

- application of the ISO 14001 and ISO 9000 certifications, promote the adoption of clean production technology, eco-industry, eco-agriculture and eco-tourism, and develop an ecosystem-based regional economy;
- facilities and installations to prevent and mitigate pollution by land- and sea-based sources put in place a total pollution load management approach developed and implemented;
- marine pollution abated and water quality conforming to relevant marine-use zonation requirements;
- sea users fee system implemented and proper rights-based fisheries management schemes developed;
- damaged living resources, including fisheries resources, restored and sustainable use targets met;
- coastal and marine habitats, ecosystems and endangered species effectively protected, the damaged ones restored, and values and services of biodiversity and the ecological functions enhanced;
- seafood quality in keeping with safety standards;
- the rate of incidents of marine hazards and their socioeconomic damaging effects minimized;
- positive perception and attitude change undertaken by the stakeholders towards sustainable development practices;
- employment opportunities increased and the living conditions and economic status of the local communities significantly improved; and
- protected areas expanded, active participation by local communities in management achieved, and protection of critical ecosystems, natural sceneries and historical and cultural sites ensured.



Principles and Basis of the Strategy

Principles

Policy Compatibility

The Strategy should be harmonized with relevant policies, statutes, mid- and long-term programs of the national, provincial and local governments and other stakeholders.

Sustainable Development

Utilization of coastal and marine resources must be sustainable based on sound ecosystem management, and within the carrying capacity of the environment and natural resources, without detrimental effects to the life-supporting system, to benefit both current and future generations. Sustainable development is the ultimate goal of the Bohai Sea strategy.

Ecological Integrity

The BS-SDS should pay special attention to coastal and marine ecosystem health, and offer appropriate and effective approaches, measures and steps to safeguard critical ecosystems, habitats and species.

Governance Strengthening

The BS-SDS should consider the improvement of governance over the coastal and marine environment and natural resources as its priority, capacity building as its major thrust, and the enhancement of public awareness of sustainable development as its cornerstone. It should focus on the mobilization of broad-based stakeholder participation, the promotion of interagency and cross-sector cooperation and knowledge sharing, the development and strengthening of the region's integrated management mechanisms, and the establishment of self-sustained and fully functional financing mechanisms for environmental improvement, resource conservation and sustainable uses.

Basis

Partnerships

The process of developing the Bohai Sea SDS involves various stakeholders, including the governments at national, provincial, municipal and county levels, the relevant agencies, enterprises, science and research groups, international organizations and funding institutions, local communities, fishers, farmers and other concerned institutions and individuals. The success of the Bohai Sea SDS depends on the stakeholders, their participation, initiatives, concerted efforts, partnerships and collaboration.

Sustainability

The goal of the Bohai Sea SDS is to protect the environment, prevent pollution and maintain the sustainability of marine/coastal resources, while promoting socioeconomic development. The strategy accords a special emphasis to stakeholder capacity building, particularly the governments. This is to enable stakeholders to understand and confront squarely the difficulties and challenges in achieving their shared vision, coordinate and balance the interactions among resource users, beneficiaries and those affected, and secure the win-win outcome of both economic growth and environmental protection. This requires long-term policy continuity and effectiveness, long-term stakeholder commitments, self-disciplined, concerted efforts and action participation and involvement in the development and implementation of the action programs.

Synergy

The diversity of stakeholder perceptions and interests should not be taken as a constraint, but opportunities for changes and a driving force for carrying forward the Bohai Sea SDS. The multisectoral and concerted efforts of stakeholders behind the Strategy can bring into full play the initiatives of various sources and mobilize all the available efforts and resources in undertaking the common mission. This also ensures the implementation of various components of the Strategy in an effective and efficient manner.

National and Local Policies, Plans and Programs

The development of the Bohai Sea SDS is premised on the consideration of relevant national, provincial and local legislations, regulations, ordinances, policies, plans, programs and guidelines (see Table 8), which have a bearing on the Bohai Sea Region, as well as interagency and cross sector consultations and stakeholder consensus building.

International and Regional Conventions and Agreements

An important source of the Strategy is the relevant international conventions and agreements to which China is a party. Some of these conventions and agreements are given in Table 9.

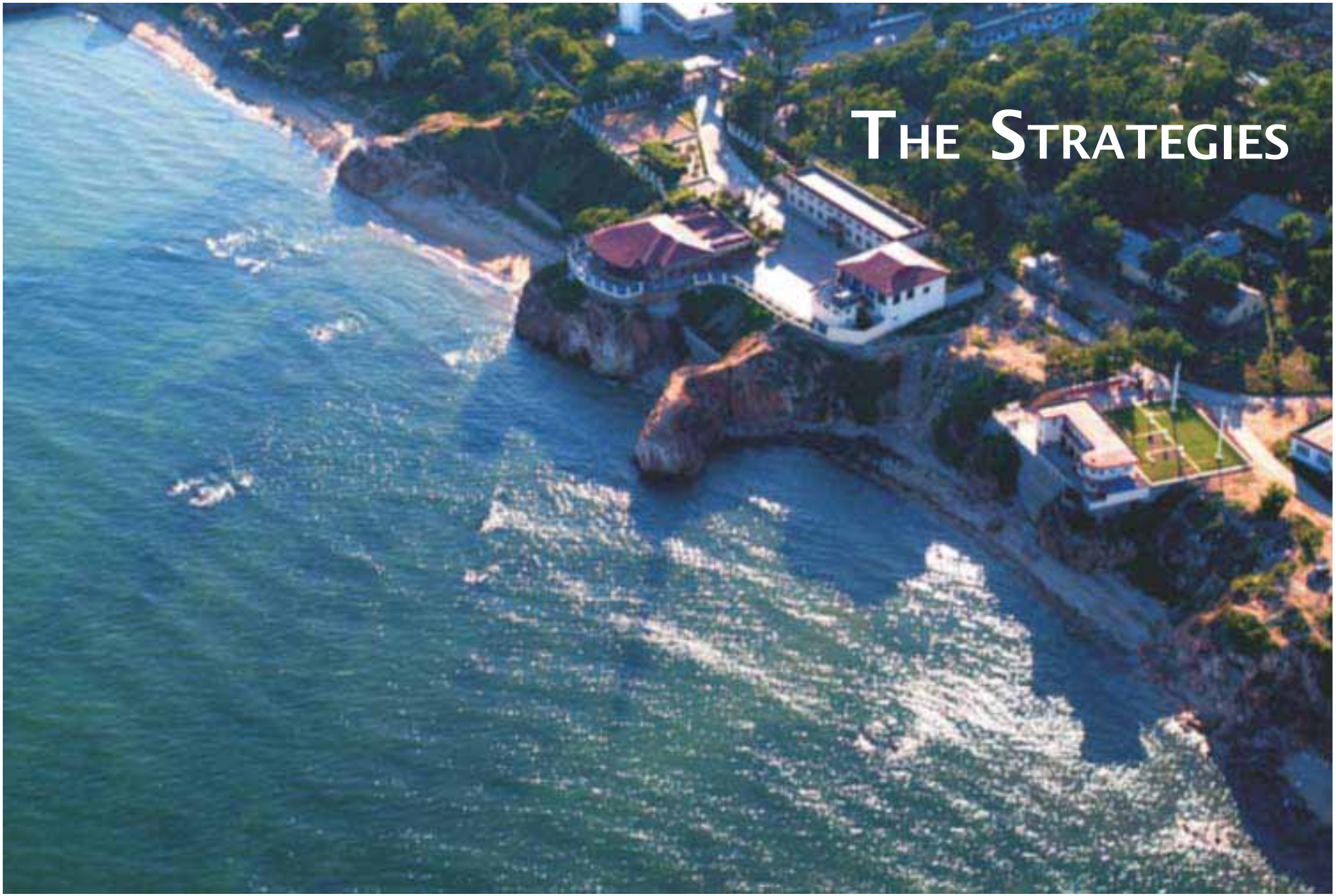
Table 8. Some National and Provincial Legal and Regulatory Instruments.

National Policies, Statutes	National and Local Laws, Regulations , Plans and Programs
Environmental Management and Protection • Environmental Protection Law of the People's Republic of China, 1989 • Marine Environmental Protection Law of the People's Republic of China, 2000 • China Ocean Agenda 21 • China Environmental Protection Agenda 21 • China Agenda 21 • Regulations of the People's Republic of China on Management of the Foreign-related Marine Scientific Research, 1996 ***Resource Utilization*** • Law of the People's Republic of China on Management of the Sea Area Use, 2002 • Law of the People's Republic of China on the Fishery Resources, 2000 • Mineral Resources Law of the People's Republic of China • Regulations of the People's Republic of China on the Exploitation of Offshore Petroleum Resources in Cooperation With Foreign Enterprises, 1982, 2001 • Regulations of the People's Republic of China on Nature Reserves,1994	***National Plans*** • Tenth Five-year Plan and the Long-range Goal of 2010 of the People's Republic of China • National Marine Development Program • National Marine Economic Development Program ***Bohai Sea Region*** • Regulation on Protection of the Propagation of the Fishery Resources in the Bohai Region • Clean-Blue-Sea Action Program • Program on Integrated Restoration of the Bohai Sea ***Liaoning*** • Program on Construction of "Maritime Liaoning" • Regulations on Environmental Protection of Liaoning Province • The Clean-Blue-Sea Action Program of Liaoning Province • Marine Functional Zoning of Liaoning Province • Regulations of Liaoning Province on Management of the Sea Area

National Policies, Statutes	National and Local Laws, Regulations , Plans and Programs
• Regulations of the People's Republic of China on the Administration of Environmental Protection in the Exploration and Development of Offshore Petroleum, 1983 ***Pollution*** • Law of the People's Republic of China on the Prevention and Control of Water Pollution, 1986,1996 • Law of the People's Republic of China on Prevention of Environmental Pollution Caused by Solid Waste, 1996 • Regulations of the People's Republic of China on the Prevention of Vessel-Induced Sea Pollution, 1996 • Regulations of the People's Republic of China on the Prevention of Pollution Damage to the Marine Environment by Land-Sourced Pollutants, 1990 • Regulations of the People's Republic of China on the Prevention of Pollution Damage to the Marine Environment by Coastal Construction Projects, 1990 • Regulations of the People's Republic of China on Control over Dumping of Wastes in the Ocean, 1985 • Regulations of the People's Republic of China on Prevention of environmental Pollution by Ships Disassembly, 1990	***Hebei*** • The Clean-Blue-Sea Action Program of Hebei Province • Marine Development Program of Hebei Province • Regulations on Environmental Protection of Hebei Province ***Tianjin*** • Marine Development Strategy of Tianjin Municipality • Regulations on Environmental Protection of Tianjin Municipality • The Clean-Blue-Sea Action Program of Tianjin ***Shandong*** • Program on Construction of "Maritime Shandong" • Regulations on Environmental Protection of Shandong Province • The Clean-Blue-Sea Action Program of Shandong Province • Regulations of Shandong Province on Management of the Sea Area Use • Methods of Shandong Province on Protection of the fishery resources

Table 9. Some International Conventions and Agreements to Which China is a Party.

International Conventions /Agreements
• United Nations Conservation on the Law of the Sea, 1982 (UNCLOS,1982) • International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol relation thereto (MAPROL73/78), Annex I/II • Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 and 1996 (London Convention, 1972/ Protocol 1996) • Basel Convention on the Control of Trans-boundary Movement of Hazardous Wastes and Their Disposal, 1989 (Basel Convention 1989) • International Convention Relating to Intervention on the High Seas in Case of Oil Pollution, 1969 (Intervention 1969) • International Convention on Oil Pollution Preparedness, Response and Co-operation (1990) • Convention on Biodiversity ,1992 (CDB) • International Convention on Salvage (1996) • Ramsar Convention on Wetlands (Ramsar Convention), 1971 • International Convention on Civil Liability for Oil Pollution Damage (CLC) Protocol 1992 • International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (1992) • Convention Concerning the Protection of the World Cultural and Natural Heritage, 1972 (World Heritage Convention), 1972 • Agenda 21 • Protocol Relating to Intervention on the High Seas In case of Marine Pollution by Substances other than Oil , 1973 Intervention Protocol



The Strategies

THE STRATEGIES

Communicate with the general public and stakeholders regarding their rights and responsibilities as well as challenges related to managing the marine and coastal environment and resources of the Bohai Sea region, to ensure their involvement and active participation in the implementation of the Strategy as informed stakeholders;

Preserve and restore the integrity of critical biota, habitats and ecosystems, and safeguard biodiversity, with a view to maintaining and recovering the ecological, historical and cultural values of the Bohai Sea region for the benefit of present and future generations;

Protect ecosystems, public health and socio-economic assets from risks caused by land- and sea-based human activities;

Sustain the goods and services being provided by natural resources of the Bohai Sea and its coasts, which support the region's economy, welfare and quality of life of the people; and

Develop integrated coastal and marine management mechanisms, including supporting policy and legal and regulatory systems, as a framework for involving various stakeholders in the sustainable, rationale use and protection of the marine and coastal resources.

COMMUNICATE

Communicate with the general public and stakeholders regarding their rights and responsibilities as well as challenges related to managing the marine and coastal environment and resources of the Bohai Sea region, to ensure their involvement and active participation in the implementation of the Strategy as informed stakeholders.

Principles

- The general public and stakeholders have the right to know and to be informed of development and management activities relating to coastal and marine areas in the region on which their livelihoods depend;

- An informed public will have a better understanding of the ecological and socioeconomic values of the region and the impacts caused by human activities and have meaningful participation and contribution to the protection and management of Bohai Sea resources and the environment;

- Right policy and decision-making depend significantly on the availability of adequate scientific and technical support, as well as the awareness and capacity of the policymakers and decision makers; and

- Local indigenous culture should be respected and protected. Local traditional knowledge and technology have a special importance to coastal environmental protection and resource conservation.

Objectives

1. Improve the environmental awareness, knowledge and understanding of the general public regarding the critical issues, as well as their responsibilities, related to the development and management of the Bohai Sea region.

2. Ensure the transparency in decision-making by providing data and information related to coastal environmental quality and development projects to the general public and stakeholders.

3. Promote mutual trust and communication through the establishment of information sharing networks, as well as the enhancement of technical services among various stakeholders including government agencies, social sectors, local communities and other civil society groups.

4. Strengthen scientific and technical inputs to integrated coastal and marine management and sustainable resource development.

Objective 1. Improve the environmental awareness, knowledge and understanding of the general public regarding the critical issues, as well as their responsibilities, related to the development and management of the Bohai Sea region

Action Programs

1. Develop a communication plan identifying specific communication strategies and approaches based upon a sound understanding of stakeholders' expectations and interests, level of environmental awareness, and concerns and perception of the coastal environment and resources.

2. Implement communication strategies applying various media and communication materials including:

    a. Setting-up of a homepage on the internet;

    b. Disseminating key messages through printed materials, film, TV, radio, newspapers, lectures, etc.;

    c. Increasing publicity and advocacy using public wall and bulletin board, newspapers, etc.;

    d. Organizing public participation and volunteering activities such as "publicity week" and "commemoration day" activities, knowledge contests, award activities, etc; and

    e. Mobilizing managers, scientists and technicians to extend their knowledge and technical advice to the local communities concerning sustainable resource utilization.

3. Develop and carry out special education and training programs for specific target groups, including coastal users (i.e. fishers, shippers, crews, workers, farmers, tourist guides and others) as well as women, related to the sustainable utilization of coastal and marine resources and environmental protection as well as skills for alternative livelihoods.

4. Prepare and apply educational curricula on sustainable resource use and environmental protection in the primary and middle schools.

Objective 2. Ensure the transparency in decision-making by providing data and information related to coastal environmental quality and development projects to the general public and stakeholders.

Action Programs

1. Establish a public notice and hearing system for informing the concerned public of major ocean and coastal development programs and projects, including opportunities to participate in environmental assessment of proposed projects.

2. Set up an incentive-based public volunteer watch program to monitor and report illegal pollution discharges or habitat destruction, in particular by major polluting industries and enterprises in coastal areas, using facilities such as mailboxes or "hotlines".

3. Support the establishment of public information services and extension centers in rural areas, building upon traditional cultural and educational facilities.

Objective 3. Promote mutual trust and communication through the establishment of information sharing networks, as well as the enhancement of technical services among various stakeholders including government agencies, social sectors, local communities and other civil society groups.

Action Programs

1. Institutionalize technical services and/or training by scientists and coastal management experts for coastal resources managers and local communities in order to strengthen the management and rational use of the environment and natural resources.

2. Establish a Bohai Sea integrated information management system for promoting inter-agency cross-sectoral information sharing and improving information services to the general public.

3. Organize community-based formal/informal public discussion, consultation and advisory meetings to address the concerns of the local communities related to the development and protection of coastal and marine resources.

Objective 4. Strengthen scientific and technical inputs to integrated coastal and marine management and sustainable resource development.

Action Programs

1. Convene regular meetings of the "Bohai Sea Forum on Sustainable Development" to raise awareness on the critical issues affecting the sustainability of Bohai Sea, to facilitate sharing of knowledge and scientific findings, and to promote consensus-building on the approaches for balancing economic development and ecosystem protection.
2. Organize a multidisciplinary group of experts, selected from the area's 13 coastal municipalities and cities, to identify and address major scientific uncertainties concerning the sustainability of the Bohai Sea ecosystem, and to provide scientific advice to the government decision-making process for coastal and marine resource management.

PRESERVE

Preserve and restore the integrity of critical biota, habitats and ecosystems, and safeguard biodiversity, with a view to maintaining and recovering the ecological, historical and cultural values of the Bohai Sea region for the benefit of present and future generations.

Principles

- The State shall endeavor to protect the integrity of the entire life support system, biodiversity, and sustainable supplying capacity of natural resources, prevent damage to the fragile ecosystem, restore the destroyed ecosystem and polluted environment, and actively participate in the cooperation for global environment and ecosystem (China Agenda 21).
- The natural landscape, ecosystem, biological communities, habitats and species that are vital to the health and safety of marine and coastal ecosystem must be carefully managed, preserved and restored.
- Rare and endangered species and genetic resources are a unique part of natural systems, which must be preserved for the sake of social and cultural growth and human well-being.
- Degraded environments and depleted living resources that are important to the economic development and ecological integrity of coastal areas must be restored.
- The area/sites that are of social and cultural value are irreplaceable assets and must be preserved and/or restored, if degraded, for the benefits of present and future generations.

Objectives

1. Preserve key ecosystems, habitats, and species, particularly rare and endangered species, genetic resources and habitats at risk.
2. Restore the functional and structural integrity of impaired coastal and marine ecosystems, habitats and living resources.
3. Preserve and/or restore, if degraded, major historical and cultural heritage sites and landscapes.

Objective 1. Preserve key ecosystems, habitats, species, particularly rare and endangered species, genetic resources and habitats at risk.

Action Programs

1. Conduct regular assessments of the health of coastal and marine ecosystems, by developing indicators and standards, with special emphasis on ecologically sensitive areas, such as estuary, islands and wetland ecosystems, as well as rare and endangered species.

2. Develop a Bohai Sea coastal ecosystem management program and a large-scale marine functional zoning plan, defining specific management measures to best serve the ecological function of each zone.

3. Establish and/or strengthen the ecological monitoring system of Bohai Sea, regularly publish monitoring results, and applying the information to improve ecosystem management strategies accordingly.

4. Develop guidelines for the preservation of the critical marine ecosystems, including habitats, biological communities and species.

5. Develop and/or strengthen programs for preservation and management of rare and endangered species, including in particular:

    a. Conduct of marine biological research and regular surveys;

    b. Preparation of a marine biological inventory of Bohai Sea and the conduct of a systematic research on the present status, habitats, distribution and abundance of the endangered species, and population dynamics mechanisms; and

    c. Establishment of guidelines or standards for protection and conservation of the rare and endangered species, population and habitats, including the development of protected areas; protection of migratory routes, areas of reproduction, breeding and hatcheries; and the updating of the management strategies and action programs, taking into account the results of the ecosystem monitoring.

6. Strengthen management of the marine protected areas and establish new marine protected areas, including:

    a. Enhancing dynamic multidisciplinary research on marine protected areas, including research on biodiversity, habitats and ecosystems;

    b. Strengthening processes for assessing protected area feasibility, streamlining the approval procedure, expanding the scope of protection, and delineating special protection areas;

    c. Improving the management of existing marine sanctuaries and nature reserves, including the development and/or the enhancement of management plans and implementation measures for the protected areas at prefecture, municipality and county levels;

    d. Establishing and improving the institutional mechanism for coordinating management activities in protected areas and strengthening collaboration among the concerned sectors; and

e. Developing a favorable policy environment and creating investment opportunities and diversified financing mechanisms for the sustainable management of protected areas.

7. Incorporate ecosystem management programs into national or local multi-sectoral development programs.

8. Establish a multi-sectoral cooperative mechanism, strengthen the enforcement of existing statutes, improve management capability, develop necessary regulations and plans, and define the responsibilities and obligations of stakeholders in support of the preservation of key ecosystem, habitats, biodiversity and important fishery resources.

Objective 2. Restore the functional and structural integrity of impaired coastal and marine ecosystems, habitats and living resources.

Action Programs

1. Undertake a baseline survey of impaired ecosystems and habitats, assessing their status and cause of the impairment, determine the mechanisms governing the changes in species distribution and abundance,, and establish a monitoring network for the improved understanding of ecosystem processes and functions.

2. Identify concrete measures to address the root causes of impairments of critical habitats and important living resources, such as overfishing and pollution, and develop short-term and long-term plans identifying specific restoration measures of the impaired ecosystem and habitats.

3. Implement restoration projects for major impaired ecosystems, including:

   a. Major estuarine and deltaic wetland ecosystems (e.g., the Yellow River, Liaohe River, Haihe River and Luanhe River);

   b. Major coastal ecosystems (Beidaihe, Yingkou and Penglai coastal sites);

   c. Yellow River ecological flux and the spawning grounds off the estuaries of the Yellow River and Haihe River; and

   d. Benthic habitats near the Yellow River estuary.

4. Restore tourism sites, bathing beaches, special ecological areas and nature reserves that are polluted by oil and/or chemical spills in accordance with the approved contingency plan.

5. Conduct long-term monitoring of restored critical ecosystems and habitats, jointly with local governments and communities, so as to assess the progress, benefits and limitations of restoration measures.

6. Enact statutes and enhance the legal arrangements related to the restoration of marine and coastal ecosystems, habitats and species.

Objective 3. Preserve and/or restore, if degraded, major historical and cultural heritage sites and landscapes.

Action Programs

1. Conduct a baseline assessment of the major historical and cultural heritage sites, including the world cultural heritage sites, and landscapes, identifying the priorities for preservation and/or restoration, and levels of impairment and their causes.

2. Develop long-term preservation/restoration plans and define the roles and responsibilities of stakeholders and community members in the implementation of the plans.

3. Establish and improve appropriate legal and institutional arrangements as well as codes of conduct for preservation and restoration of the major historical and cultural heritage sites.

4. Create investment opportunities and diversified financing mechanisms to ensure the sustainability of preservation and restoration programs of historical and cultural heritage sites.

5. Establish a long-term monitoring and assessment program to evaluate the progress, impacts and drawbacks in the program implementation.

Protect

Protect ecosystems, public health and socio-economic assets from risks caused by land- and sea-based human activities.

Principles

- Stakeholders in the Bohai Sea region shall protect the environment, prevent pollution, and minimize the impact of human activities. (The Bohai Sea Environmental Protection Declaration).

- A sound and healthy natural environment and the ecological functions provide the foundation for human health and welfare, sustainable socioeconomic development and employment opportunities for the present and future generations.

- Marine and coastal ecosystems should be protected from the risks caused by land- and sea-based development activities to provide goods and services in a sustainable manner.

- The Bohai Sea shall be managed in an integrated manner applying the "polluter pays principle" to promote national prosperity and sustainable development as well as social well-being.

Objectives

1. Prevent and mitigate marine pollution from land-based activities.

2. Prevent and mitigate marine pollution from sea-based activities.

3. Strengthen national and local capacity to manage marine pollution hotspots in the Bohai Sea, thereby improving coastal and marine environmental quality, and water quality in particular.

4. Mitigate and manage risks to human life, health and properties arising from marine hazards.

Objective 1. Prevent and mitigate marine pollution from land-based activities.

Action Programs

1. Strengthen the implementation of water pollution prevention and management programmes of major river basins, including the Liaohe River, Yellow River and Haihe River basins, including the establishment of basin-wide river management mechanisms with stakeholder representation and participation;

2. Implement a total pollution load management programme for point and non-point discharges and emissions from land-based activities, including well-defined objectives, targets and timeframe, as well as reduction allocation and responsibility schemes, based on an assessment of environmental carrying capacities, functional uses, and water quality standards/criteria for receiving water bodies.

3. Develop and implement ecosystem-based management of river basins, estuaries and the associate habitats, addressing particularly:

    a. The management mechanism with mandates cutting across administrative areas;

    b. Coordinated pollution reduction strategies from the river basins to the adjacent seas; and

    c. Linkage of water quality management programmes with conservation of biodiversity and habitats, restoration of living resources and minimization of adverse effects of introduction of non-native species on the ecosystem.

4. Put in place concrete steps and measures to ensure a rational structure and distribution pattern of industrial development and establish a sound regional economic development plan to reduce pollution discharges by :

    a. Promoting the establishment of a rational industrial structure and distribution pattern within the framework of an integrated coastal and sea use plan, based on the sound understanding of environmental carrying capacity, functional uses, ecological, social and economic values, and development potential of the area;

    b. Identifying threats and adverse ecological impacts imposed by industries and development areas, and determining the priority targets and areas for regulatory and management interventions, through stakeholder consultation and consensus building;

    c. Linking, at the municipal level, industrial development with social and agricultural development cycles and achieving "zero growth" in pollutant generation in a stepwise manner;

    d. Establishing ecological industrial parks and facilitating integrated development of community- and township- based enterprises;

    e. Encouraging local governments, industrial sectors and enterprises to implement ISO 14000 and ISO 9000 certification; and

f. Fostering the development of necessary waste management facilities and their efficient operation, and to this end, enhancing the access by local government to technical assistance, technology transfer and financing programmes.

5. Apply market-based approaches for facilitating cleaner production:

a. Closing enterprises violating environmental quality standards with low productivity and high level of pollutant generation;

b. Strengthening enforcement of the national Clean Production Law;

c. Enacting local regulations on the implementation and management of cleaner production;

d. Actively promoting, within individual enterprises, a cleaner production technologies, and increasing resource use efficiency, particularly in the development of water conservation technology for enhancing water re-use efficiency and frequency;

e. Encouraging sound corporate mergers and the appropriate extension of production chains among enterprises, taking into account environmental impacts;

f. Formulating and implementing incentive-based policy and management tools to encourage investments for the improvement and reform of production systems and the operation of enterprises;

g. Establishing specialized waste management companies and applying a corporate management system in pollution control by types, sources and distribution, through the implementation of the "polluter pays" principle and market-based instruments; and

h. Improving and strengthening water use tariff and other user fee systems as part of the financing mechanisms for water conservation and pollution reduction.

6. Manage urban domestic pollution in coastal areas by:

a. Enhancing the capability of communities and townships to collect and treat domestic sewage, particularly nutrient (i.e., phosphorus and nitrogen) removal capacities, and implementing water conservation, reuse and recovery programs;

b. Encouraging the water supply and distribution sector to promote the production and sale of water use conservation devices;

c. Applying appropriate ocean dumping practices for the disposal of sewage sludge; and

d. Providing suitable facilities and services for the management of urban solid wastes.

7 Manage coastal land-based pollution from non-point sources by:

a. Undertaking urban greening projects;

b. Designating coastal ecological buffer zones, e.g., coastal forestation, wetland restoration and engineering improvement;

c. Implementing water conservation programs;

d. Undertaking comprehensive management of tributaries;

e. Conducting eco-agriculture and building eco-villages;

f. Undertaking peri-farmland forestation;

g. Converting rural organic wastes into resources;

h. Improving farmland spray and water irrigation technology to conserve water, while increasing productivity of farming fields with high and stable yields; and

i. Promoting the use of organic fertilizers, and appropriate and balanced farmland fertilization technology.

8. Initiate and encourage communities to carry out "green" consumption activities by:

   a. Formulating local management rules to prohibit selling and use of detergents containing phosphorus;

   b. Promoting a change in the lifestyle of the residents, water conservation, use of recycled water, and the establishment of a proper household water use system; and

   c. Implementing household based waste minimization, segregation and reuse, as well as regulating domestic sewage discharges.

Objective 2. Prevent and mitigate marine pollution from the sea-based activities.

Action Programs

1. Control pollution sources at sea by:

   a. Strengthening environmental quality monitoring and management through the application of advanced technology;

   b. Improving shore reception facilities for ship wastes, and attaining "zero discharge" target in stepwise manner for ship based oily waste water;

   c. Enhancing monitoring and assessment of adverse impacts from offshore oil exploration and exploitation activities, and improving oily water treatment and oil spill contingency planning, preparedness and response systems; and

   d. Reducing the impact of accidental oil spills by equipping all ports with oil spill response equipment, and preparing and implementing oil spill contingency plans for accidental spills from ships and offshore oil platforms in the northern sea areas of China.

2. Enhance monitoring of fishing ports and management of pollution discharges from fishing vessels by:

a. Setting up a monitoring network and management system, including a "zero discharge of oily substance program", for controlling the discharge of sewage and ballast water from fishing vessels;

b. Increasing the shore reception facilities in fishing ports; and

c. Applying market based mechanisms and economic incentives.

3. Strengthen surveillance and law enforcement with regard to the ocean dumping sites, undertake environmental monitoring and assessment of the ocean dumping sites, including the feasibility of their uses and tracking dumping activities at sea.

4. Manage pollution from aquaculture activities by:

a. Undertaking and extending scientific research and advice on ecosystem-based aquaculture and its sustainable development and application;

b. Strictly controlling the use of feeds, and regulating location, scale and area of aquaculture activities; and

c. Developing effluent discharge standards for aquaculture operations.

Objective 3. Strengthen national and local capacity to manage marine pollution hotspots in the Bohai Sea, thereby improving coastal and marine environmental quality, and water quality in particular.

Action Programs

1. Conduct basic research on:

a. Environmental carrying capacity;

b. Circulation characteristics, variation pattern and water exchange;

c. Transport, sedimentation, release and fate of pollutants; and

d. Environmental risk assessment.

2. Strengthen marine pollution monitoring system by:

a. Setting up a cross-sectoral integrated environmental monitoring network through collaboration among existing monitoring agencies (e.g., SOA, SEPA, the MOA, the MOCT and the CNOOC) for effective utilization of available resources;

b. Applying innovative technologies such as remote-sensing (RS), geographical information system (GIS) and global positional system (GPS) for marine pollution monitoring; and

c. Establishing a network of grass-root environmental monitoring efforts, including the development of an information sharing network and databanks.

3. Undertake pollution mitigation demonstration projects including:

    a. Bohai Sea pollution cap load management;

    b. Pollution prevention and management projects in some critical coastal habitats;

    c. Major estuarine pollution mitigation projects; and

    d. Ecosystem-based aquaculture demonstration projects.

Objective 4. Mitigate and manage risks to human life, health and properties arising from marine hazards.

Action Programs

1. Enhance national and local capacities for hazard prevention and reduction through development and implementation of the following:

    a. Marine pollution forecast and early warning system;

    b. Red tide early warning system;

    c. Storm surge and catastrophic cyclone monitoring, forecast and early warning system;

    d. Oil spill preparedness, warning and response system;

    e. A 3-Dimensional monitoring of sea level rise and hazard prevention system;

    f. Sea ice monitoring, forecast and hazard prevention system; and

    g. Coastal subsidence monitoring, forecast and early warning system.

2. Install wave breakers and seawalls against the floods, based on proper feasibility and environmental impact assessment, in major flood-prone coastal areas of Bohai Sea.

Sustain

Sustain the goods and services being provided by natural ecosystems and resources of Bohai Sea and its coasts that support the region's economy, welfare and quality of life of the people

Principles

- Sustainable development, not comprising the interests of the future generation for the sake of the present generation, shall be the basic goal of human beings and primary thrust that the country shall pursue, and marine environmental protection and management shall become an integral element of sustainable national development.

- Environmental protection should be considered as an organic component of the socio-economic development process and should not be pursued separately.

- Marine/coastal environment and resources are the common heritage of humankind, and thus should not be misused or abused to their deterioration.

- The coastal areas shall be developed in line with the goals, policies and plans of the overall region, without exceeding the carrying capacity of the environment and resources therein.

- National and local governments shall cooperate with concerned stakeholders to reduce and eliminate unsustainable patterns of production and consumption to achieve sustainable development and improve the living standards of the community.

Objectives

1. Establish a Bohai Sea region-wide sustainable fisheries development program as part of an integrated marine and coastal resources management program.

2. Promote sustainable tourism development in an environmental friendly and responsible manner.

3. Undertake the development of coastal land and sea space in a sustainable manner.

Objective 1. Establish a Bohai Sea region-wide sustainable fisheries development program as part of an integrated marine and coastal resources management program

Action Programs

1. Conduct baseline surveys and assessments of fish stocks in the Bohai Seas, and set strategies, action plans and guidelines for necessary protection and restoration based on the assessment results.

2. Strengthen the capacity of local officials and fishermen in fisheries management, particularly focusing on the application of an ecosystem-based management approach, and educate and train fishermen to apply sustainable fishing techniques and practices.

3. Intensify enforcement of national, provincial and municipal laws, regulations and rules related to the management of fisheries resources and habitats.

4. Develop and implement science-based specific measures for ecosystem-based fishery management, in particular with regard to protection and management of natural spawning grounds, fishing areas and seasonal closures, restoration and enhancement of degraded fish resources, and artificial fish reef formation.

5. Implement the total allowable fish catch quota system.

6. Introduce innovative fishery management approaches and methods for different types of fishing activities, such as commercial, trade, gaming, recreational, research, cultural and subsistence fishing.

7. Provide alternative livelihoods and income sources for the fishermen affected by the closure of fishing area and season as well as the reduction of fishing efforts by;

    a. Providing related education and training;

    b. Providing financial subsidies, loans and credits necessary for setting-up new businesses;

    c. Protecting the right of the community for the use of coastal resources; and

    d. Providing financial subsidies.

8. Improve the infrastructure and social services in fishing communities and create opportunities for diverse income generation by community members.

Objective 2. Promote sustainable tourism development in an environmental friendly and responsible manner

Action Programs

1. Develop and implement sustainable tourism development programmes for the Bohai Sea region, incorporating waste management, coastal habitat protection and coastal ecotourism initiatives.

2. Mobilize and encourage the tourism sector, related commercial sectors, tourists and local residents to participate in the environmental protection program of Bohai Sea.

3. Promote sustainable and equitable use of the tourism resources in Bohai Sea among communities, tourists and business groups related to the tourism industry.

Objective 3. Undertake the development of coastal land and sea space in a sustainable manner

Action Programs

1. Assess, identify and analyze the problems and impacts arising from multi-sector, multiple-use coastal development, focusing on land use pattern, industrial structure and distribution patterns, and spatial use planning and functional zoning.

2. Develop relevant policies, strategies and technical guidelines to guide, coordinate and manage the structure, types and distribution of coastal spatial development in line with its resource endowment and environmental capacity.

3. Improve the present spatial use pattern to ensure ecosystem health and welfare of the community.

4. Incorporate, in a comprehensive manner the following factors in planning and managing the spatial development of the Bohai Sea region:

   a. Socioeconomic and environmental/ecological concerns in line with the development goals of Bohai Sea;

   b. Different types and levels of development of coastal and marine activities;

   c. Population increases, changes in land use pattern, and environmental carrying capacities; and

   d. Capacities of the infrastructure and treatment facilities to meet the demands of rapid socioeconomic development and waste management.

Develop

Develop integrated coastal and marine management mechanisms, including supporting policy and legal and regulatory systems, as a framework for involving various stakeholders in the sustainable, rational use and protection of the marine and coastal resources

Principles

- Integrated management, based on risk assessment and management as well as multi-stakeholder partnerships, shall be adopted to address the problems caused by diversified multiple coastal resource and environmental use conflicts.

- Environmental law and policies shall balance the goals of environmental protection and sustainable utilization of resources with the interests of people who depend on such resources.

- The goal of sustainable development can be realized only when civil society participates actively in the development and implementation of environmental management plans and strategies.

- The creation of investment opportunities and the development of diversified sustainable financing mechanisms and options such as market-based instruments is critical to long-term environmental protection, integrated management and sustainable social and economic development.

Objectives

1. Establish an intra-regional and cross-sectoral integrated management system in the Bohai Sea region, including appropriate institutional arrangements and mechanisms for stakeholder involvement.

2. Develop national and local policies and legal framework for integrated management of Bohai Sea and establish a set of standards for environmental protection and sustainable utilization of resources to support the implementation of the Strategy.

3. Establish a transparent, cross-sectoral and multidisciplinary decision-making system and permitting scheme for planning and executing coastal development projects, to facilitate broad-based stakeholder involvement and participation, minimize adverse environmental impacts and meet local social and economic sustainable development objectives and needs.

4. Develop a comprehensive, large-scale marine functional zoning plan for the Bohai Sea to effectively resolve multiple use conflicts and protect critical ecosystems and habitats.

5. Improve national and local capacities for integrated coastal and marine environmental and resource management and decision-making.

6. Foster diversified, partnership-based and multi-channel investment and financing mechanisms to support the sustainable development of Bohai Sea and ensure effective implementation of the Strategy.

7. Facilitate multi-stakeholder partnerships for the effective implementation of the Strategy.

Objective 1. Establish an intra-regional and cross-sectoral integrated management system in the Bohai Sea region, including appropriate institutional arrangements and mechanisms for stakeholder involvement.

Action Programs

1. Strengthen organizational arrangements for integrated management by setting up a coordinating agency, such as the Office for Marine/ Coastal Integrated Management in the Bohai Sea Region, within the functional management framework of the State Oceanic Administration, and establishing an inter-provincial, cross-sectoral coordinating body for integrated management of Bohai Sea, which will be responsible for coordinating activities relating to inter-provincial marine environmental protection and resource development and utilization.

2. Incorporate marine economic development and environmental protection programs into national social and economic development programs, develop standard procedures for integrated decision-making, and define specific responsibilities and functions of various agencies to enhance coordination of government activities relating to Bohai Sea management.

3. Improve integration and enhance coordination of functional marine-related agencies at all levels of government.

4. Set up a cross-sectoral and inter-agency advisory committee in each coastal province and municipality, which will be composed of representatives from various stakeholder groups, to supervise and coordinate the formulation and implementation of plans and action programs for the implementation of the Strategy.

5. Establish incentive-based mechanisms for knowledge-sharing among marine management agencies at all levels, as well as other relevant sectors and stakeholders, including information exchange, training, and technical support to strengthen the capacity for strategy implementation.

6. Define the roles and responsibilities of governments at various levels, sectoral agencies, enterprises, social organizations, international organizations, donors and financial bodies through consultation with stakeholders of different interests.

7. Build the capacities of stakeholders and enhance their environmental awareness to enable them to assume the responsibilities and obligations in coastal resource and environmental management of the Bohai Sea.

Objective 2. Develop national and local policies and legal framework for integrated management of Bohai Sea and establish a set of standards for environmental protection and sustainable utilization of resources to support the implementation of the Strategy.

Action Programs

1. Assess the effectiveness of existing laws, regulations and rules related to marine management, and identify areas of improvement including reduction in conflicts, gaps and overlaps.

2. Conduct environmental, economic, policy and legal analysis to develop an appropriate management system and policies for resources and environmental management of the Bohai Sea.

3. Supplement, amend, promulgate and implement appropriate legal frameworks, such as the Bohai Sea Management Law, the Regulations on Integrated Coastal Management of the Bohai Sea, the Regulations on Management of the Sea Area of Bohai Sea, and the Regulations on the Environmental Management of the Bohai Sea. The legal framework should address the issues concerning interagency, intergovernmental, multisectoral and multidisciplinary management mechanisms and processes, common programs to be executed, the roles of major stakeholders, sustainable financing mechanisms and investment opportunitiies for sustainable resource uses and environmental improvement.

4. Strengthen the marine management and enforcement system in the Bohai Sea region, and consolidate the implementation, execution and enforcement of law, policy, plans and programs.

5. Develop, improve and strengthen a set of standards for environmental protection and sustainable utilization of resources including:

   a. Marine environmental quality standards for seawater, sediment and biota, etc.;

   b. Standards for sewage discharge and other wastewater effluents;

   c. Standards for the environmental quality of aquaculture grounds; and

   d. Standards/indicators for the health of the ecosystem.

Objective 3. Establish a transparent, cross-sectoral and multidisciplinary decision-making system and permitting scheme for planning and executing coastal development projects, to facilitate broad-based stakeholder involvement and participation, minimize adverse environmental impacts and meet local social and economic sustainable development objectives and needs.

Action Programs

1. Formulate integrated management programmes for planning and executing coastal development projects, including guidelines and reference materials for the review, approval and permit issuance, and provide clear guidance to decision-making of governments at all levels with regard to the coastal development and investment options.

2. Develop cross-sector, interagency and multidisciplinary policy-making mechanisms and processes with stakeholder involvement and participation to guide the coastal and marine resource uses.

3. Undertake environmental carrying capacity assessment, risk assessment and integrated environmental impact assessment of major development programmes and projects, and address scientific uncertainties in making decisions for the development programmes and investments affecting the fragile ecological environment, based on the principle of preventative and proactive management.

4. Take into due consideration and apply practical solutions to addressing the concerns and needs of the local communities, such as the improvement of health, education, transportation and alternative livelihood, in the implementation of coastal development programmes/ projects.

5. Streamline and integrate the review and permitting procedures for major development projects so as to ensure consistent execution of the development plan/policies and avoid conflicts on resource utilization.

Objective 4. Develop a comprehensive, large-scale marine functional zoning plan for the Bohai Sea to effectively resolve multiple use conflicts and protect critical ecosystem and habitats.

Action Programs

1. Establish an integrated land and sea use functional zoning plan for Bohai Sea and determine the dominant resource uses in the major zones of the Bohai Sea region, through stakeholder consultation and consensus building, taking into account the actual and potential multiple use conflicts and impacts.

2. Develop guidelines and procedures for coastal and marine development within the framework of the integrated land and sea use functional zoning plan, in order to guide sustainable resources uses and reduce multiple use conflicts.

3. Develop technical guidelines for assessment and management of functional zones, in particular with regard to zoning for pollutant discharge areas and environmental impact assessment of coastal construction projects.

4. Rationalize the structure and distribution of the economic growth centers as well as industrial development pattern based on functional zoning plan.

5. Establish and achieve environmental quality management targets of each functional zone.

Objective 5. Improve national and local capacities for integrated coastal and marine environmental and resource management and decision-making.

Action Programs

1. Increase training and education opportunities for decision-makers and managers at various levels, especially those at the local government.

2. Increase the awareness of government policymakers and decision-makers and coastal managers, on the importance of the coasts and oceans, national maritime rights and interests, marine resources and environmental protection, as well as the value of the marine ecosystem as a life-supporting system and a resource base for social and economic development.

3. Sponsor education and capacity-building programs for coastal managers through short-term training courses, degree programs, and specialized training to strengthen their capability and form a strong team of qualified personnel in integrated coastal and ocean planning and management.

4. Strengthen interaction and collaboration between local governments with relevant research institutions, universities and colleges in the locality.

5. Develop and implement an incentive-based mechanism for attracting professional and talented people to serve in marine scientific and technological development and management.

6. Develop "codes of conduct" for the villages and local communities, as well as community-based "good practice" recognition and awarding system in environmental and resource protection, to promote environment-friendly modes of economic activities and lifestyles of coastal residents.

Objective 6. Foster diversified, partnership-based and multi-channel investment and financing mechanisms to support the sustainable development of Bohai Sea and ensure effective implementation of the Strategy.

Action Programs

1. Develop a favorable policy environment, improve investment climate and conditions, and create environmental investment opportunities.

2. Streamline the review and approval process for environmental investment projects and give priority to projects yielding environmental benefits.

3. Without compromising the implementation of the existing industrial management policies, provide incentives to investments in ecosystem-friendly practices, including those concerning eco-industries, eco-agriculture (both in fishing and aquaculture), communications, energy, infrastructure, marine ecosystem protection and public works, through amenable policies and priority consideration in the use of facilities, land, loans and taxation.

4. Encourage and support environmental industries to adopt diversified financing mechanisms for resource mobilization.

5. Strengthen the capacity of local government officials in packaging environmental investment opportunities into bankable projects, collaborating with businesses and enterprises, and marketing environmental services.

6. Establish a government budget system to support the sustainable development of Bohai Sea , in particular the annual budget allocation for the implementation of the Strategy.

7. Develop national and regional policies favorable to industries related to environmental protection, and encourage stakeholders, individuals and private enterprises to invest in marine environmental management.

8. Adopt the public-private partnership (PPP) approach as a viable investment and financing mechanism to replace the traditional model of government planning, development, investment and operation.

9. Foster building partnerships among stakeholders including governments, enterprises, investors, international agencies, and financing institutions, to expand environmental investment opportunities, apply for international loans and financial aid, and facilitate the development of bilateral and multilateral technical assistance programs/projects.

10. Set up regional/subregion special investment fund(s) and other financing tools, to especially meet the needs of many small cities and townships in waste management, water supply and sanitation conditions, through the best use of contributions mainly coming from:

    a. Financial investments by the State for the Bohai Sea management / environmental protection;

    b. Users' fees, e.g. fee for the use of the sea area and the facilities, etc.;

    c. Fees charged from pollutants discharge;

    d. Compensation for ecological loss;

    e. Levied tax and fines;

    f. Favorable loans from domestic banks; and

    g. International loans, grants and contributions.

Objective 7. Facilitate multi-stakeholder partnerships for the effective implementation of the Strategy.

Action Programs

1. Encourage partnerships between local industries and commercial enterprises to contribute to the sustainable development of Bohai Sea and implement jointly the Strategy by taking the following measures:

    a. Voluntary agreements to increase the rate of resource recycling and waste reduction;

    b. Demonstration and promotion of optimum environmental management practices;

    c. Improved capability of operation, self-auditing, and compliance with relevant environmental standards and statutes; and

    d. Implementation of environmental management policies and ISO14000 certification.

2. Highlight the roles of the NGOs, communities and marginalized groups as partners in the sustainable development of Bohai Sea and the implementation of the Strategy through the following:

    a. Involving the NGOs in the process of planning, development and management of Bohai Sea, particularly in the fields of education, capacity building, poverty alleviation, environmental protection and resources restoration;

    b. Providing the communities with accessible information and data on the development and management of Bohai Sea and establish a system that will ensure the consideration of their proposals and opinions on the design, implementation and assessment of action programs;

    c. Improving environmental awareness of consumers and emphasize their role in reducing waste products and avoiding unsustainable utilization patterns of marine/coastal resources;

    d. Training on development of alternative means of livelihoods, including credit and loans facilities for the development of a "green yard economy";

    e. Providing the youth with educational programs on environment and environmental management; and

    f. Mobilizing the community to participate in environmental management through local schools and health centers to make them fully aware of their roles and responsibilities in implementing the Strategy.

3. Apply scientific inputs and traditional knowledge as a basis for decision-making and management, through the following measures:

    a. Partnerships and knowledge sharing among local governments, the general public and scientists;

    b. Research in the aspects of ecological management, environmental risk assessment and carrying capacity; and

    c. Close coordination between scientists and local residents in the collection of information and assessment of the changes in habitats and biodiversity in Bohai Sea, including formulation and execution of the necessary management programs.

Executing the Strategy

Executing Partners

The Strategy requires all stakeholders to actively participate and dutifully perform their roles and responsibilities accordingly.

Central Government

- define the roles and responsibilities of relevant agencies under the various action programs of the Strategy;
- set up a coordinative mechanism that will involve relevant stakeholders including national and local governments, management agencies, enterprises, social organizations, community residents, news media and research institutions in the implementation of the Strategy;
- ensure implementation and enforcement of statutes and policies;
- formalize, through policies and/or legislation, institutional arrangements, management regulations, budget support, and planning and clearance mechanisms that supplement the implementation of the Strategy; and
- Establish a system for monitoring and assessment of progress and results of implementation of the Strategy.

Local Governments

- develop and implement local action programs that support the Strategy;
- formalize, through policies and/or legislation, local institutional arrangements, management approaches, budget support and planning and clearance mechanisms that supplement the implementation of the Strategy;
- establish partnerships with the private sector and other stakeholder groups;
- mobilize local stakeholders to participate in the implementation of the Strategy;
- identify economic development opportunities that will support the implementation of the Strategy; and
- establish a local system to monitor and assess the progress and results of the local strategies' implementation.

State Run Industries and the Private Sector

- perform duties and responsibilities related to sustainable development and resources utilization;
- invest in activities that promote simultaneous development of the environment and economy; and
- work as partners of governments and communities in the implementation of the Strategy.

Non-governmental Organizations

- develop and implement environmental information and educational program/projectsp;
- organize and mobilize communities and other stakeholders to participate in action programs;
- tighten the links between environmental and social programs/ projects such as gender equality, poverty alleviation and alternative means of livelihood;
- protect the rights of the community to use the resources of Bohai Sea; and
- provide financial support.

Education and Research Institutions

- provide relevant expertise and make recommendations at the national and local levels;

- conduct related research, interpret monitored data, and provide information;
- participate in the policy- and decision-making process; and
- help in building local capacity through training and formal education.

Communities

- assist in public information campaigns specifically in informing the people of the status and problems of Bohai Sea and the responsibilities of the community in environmental management;
- mobilize the community to actively participate in, and support the action programs of the Strategy; and
- volunteer in environmental communication, education and other related initiatives.

UN and International Agencies and Donors

Through providing technical and financial assistance for the implementation of the Strategy, will help:

- implement capacity building programs;
- provide opportunities for education and training;
- support demonstration projects;
- disseminate experiences;
- provide support for the establishment of networks for exchange and cooperation among organizations in-situ or from outside;

- provide access to new technologies and approaches;
- promote effective implementation of the international treaties;
- foster and establish the partnerships among foreign investors, corporations and the local stakeholders; and
- provide financial assistance as supplement to environmental investment.

Financial institutions

Provide specialized services, such as:

- sustainable environmental facilities and services;
- soft loans;
- guarantee for loans;
- public bonds and securities;
- green funds/environmental funds; and
- small loans.

Implementing the Strategy

Governments and relevant management agencies at all levels shall work in coordination and cooperation with the stakeholders and be highly responsible for the effective implementation of the Strategy for the realization of their shared vision.

Monitoring the Strategy

Strategy monitoring requires an indicator system that will assess and evaluate the results and progress of implementation efforts and identify problems and constraints in the course of implementation.

The key indicators to assess the results of implementation are the changes introduced by the intervention. These may include: changes in the level of stakeholder recognition in the value of the marine environmental resources in the Bohai Sea and their enthusiasm and pleasure of participation; preservation and restoration of the resources foundation; as well as changes in environmental quality. These changes take place gradually and can be monitored and assessed.

The indicators are classified into three categories:

- institutional changes/activities, including policies, statutes and administrative agencies and mechanisms;
- operational changes/activities, such as approaches, technologies, measures and actions adopted by stakeholders to prevent, mitigate and control damage caused by natural process and human development activities; and
- outcomes or changes in the state of the environment, indicating quality and quantity, status of human health and health of the ecosystems.

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ANNEX

The Bohai Declaration on Environmental Protection

On the occasion of the Seventh Meeting of the Steering Committee of the GEF/UNDP/IMO Regional Programme on Building Partnerships for Environmental Protection and Management of the Seas of East Asia held in Dalian, July 26-29, 2000 and the formal launching of the Programme's Bohai Demonstration Project, the State Oceanic Administration, the Bohai coastal provinces of Liaoning, Shandong and Hebei and the municipality of Tianjin, realizing the severity of the state of marine pollution and resource depletion as well as the present and future challenges; exploring possible appropriate remedial measures for natural resource development and management as well as for the protection and preservation of the marine environment in achieving sustainable development of the economy and well being of the society; recognizing the significant role of the Bohai region in China's economic and social development and considering the present state of legislation, management and protection in respect of the Bohai marine environment, hereby unanimously make the declaration as follows:

I. Importance of the Bohai Environment

1. Bohai is a large-sized internal sea of China. The peripheral area of the Bohai is an economically and socially developed region. The conditions of the ecological environment of the Bohai relate not only to the continued prosperity of the Bohai economic circle but also to the economic and social development of the entire Northeast, North and even the vast Northwest of China. Therefore, the health of the Bohai ecological environment plays a very important strategic role in China.

2. Along with the rapid development of Bohai economy, the rate of discharge of land-based pollutants into the sea remains high. The marine ecological environment is currently facing and coping with the enormous impacts of increasing pollution pressure. The aggravation of the Bohai environmental degradation and the damage to the natural resources therein have already led to the sharp decline of the service functions of the sea area and increasingly eroding the Bohai's capacity for sustainable development and utilization. The worsening of the Bohai environment and its resource condition not only threaten the development prospects of the economic circle of Bohai region but could also drag down national economic development as a whole.

3. Ensuring sustainable development of the Bohai is an issue of vital importance to the overall well being of China's national economy and social development. Bohai environ- mental improvement is a major task requiring systematic and programmatic approach, joint efforts of the coastal and other concerned provinces, municipalities and all walks of life in the whole society, and the application of effective measures over a long period of time. For promoting the sustainable development of the economy, society and culture of the Bohai region, we hereby solemnly declare: During the Tenth Five-Year Plan, keeping in mind the general goal and direction for action enumerated below and being committed to our common responsibilities, we pledge to take actions immediately and to launch activities for the protection and rehabilitation of the Bohai natural ecosystems and the environment.

II. Concept, Principles and Objectives for Saving the Bohai

4. The "1996 China Ocean Agenda 21", the White Paper entitled "China's Ocean Policies" published by the Chinese Government, and the "Law of the People's Republic of China on Marine Environmental Protection " which came into force on April 1, 2000, provide the overall concept, principles and objectives as well as policy and legal framework for us to undertake improvements of the Bohai environment.

5. The worsening Bohai environment is also closely related to the economic and social activities in the periphery area surrounding the sea. The environmental issue of the Bohai is not isolated. It is therefore necessary to combine the need for environmental protection with the demand for economic growth and development and to solve the environmental problems in the process of development. It is imperative to emphasize and implement the concept concerning coordination of environmental protection and resource development.

6. It is essential to give full consideration to the natural processes and characteristics of the Bohai; fully understand its current environmental and natural resource development problems and future trends. The guiding principles for the protection and preservation of the Bohai resources and environment should include the principle of integrated planning on the use of land and the sea resources; the principle of moderate development and rational environmental protection; the principle of equal importance to administrative and legislative management; and the principle of environmental protection and sustainable development of natural resources.

7. The initial target of the protection and the preservation of the Bohai environment are that damage to the ecological environment is under control and improvements in environmental quality. The ultimate goal is to realize the overall coordination of the Bohai economic and social development towards sustainable development of its natural resources and the environment.

III. Measures and Actions

8. We realize that establishing a highly efficient management mechanism is one of the solutions for realizing the improvement of the Bohai environment. We propose that a trans-regional coordination structure for the integrated management of the Bohai be established, comprising the staff members from both the central and local governments for jointly undertaking marine resources conservation, ocean environmental monitoring, marine supervision and law-enforcement in the Bohai area.

9. The Bohai is a subregional sea with cross-administrative boundaries and possesses unique socio-economic and physiographical features. Efforts for the improvement and recovery of the Bohai environment should follow the relevant

policies, general principles, standards and requirements of the laws and regulations of the State concerning marine environment. At the same time, considering the specific characteristics of the Bohai, it is imperative to enact and implement the "Bohai Management Law" so as to provide the legal basis for the implementation of various activities pertaining to the development, management, protection and rehabilitation of the Bohai.

10. The Bohai is a focal sea area along China's coast. In accordance with the Law of the People's Republic of China on Marine Environmental Protection, it is necessary to implement as soon as possible the quota system of "total quantity control " for major pollutants discharged into the sea and allocate the controlled amount and quota of discharge for the main pollution sources.

11. Study and establish a model in the form of a special "Blue Fund" or "Save the Bohai" Fund for Bohai environment management. The relevant international organizations, the central and local governments, public and private enterprises, societal organizations and individuals will be invited to jointly fund and manage the Special Fund. The fund will be used mainly for public education and awareness campaigns, marine environmental protection, related scientific and technological researches, capacity building and human resources development.

12. Solutions to the Bohai marine environmental problems require the support of marine scientific research, availability of environmental technologies, financial inputs, and extensive international cooperation. We are aware of the vital importance of the dissemination and interchange of marine environmental information to effective resolution of the Bohai environmental problems. We support and promote the regional dissemination and interchange of marine information. We are willing to exchange experiences in marine environmental protection with the relevant international organizations and other coastal countries in the world and strengthen mutual technological cooperation and transfer so as to make contributions to the improvement of marine environment in the region and the world at large.

13. We propose that governments at all levels in the Bohai region and the society as a whole pay attention to and maintain the ecosystem health of Bohai; develop, utilize and protect the marine resources and environment in a scientific and rational way so that the state and all sectors of the society could benefit from the sustainable use of the sea.

14. We stress once again that, in making relevant policy decisions and taking specific actions in the future, we shall always bear in mind and follow the above-mentioned principles and, conscientiously protect the marine environment and natural resources of the Bohai for a brighter future of the contemporary and coming generations.

Signed and sealed on the 25th day of the month of July in the year 2000 at Dalian, People's Republic of China.

On behalf of:

Mr. Wang Shuguang
Administrator
The State Oceanic Administration

Mr. Yang Xinhua
Deputy Governor
The People's Government
of the Liaoning Province

Mr. Chen Yanming
Deputy Governor
The People's Government
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Mr. He Shaocun
Deputy Governor
The People's Government
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Mr. Liang Su
Deputy Governor
The People's Government
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