

Conclusions and recommendations

YELLOW SEA & BOHAI SEA

The GIWA assessment of the Yellow and Bohai Seas aimed to identify actions for remedial and mitigatory actions. The report investigates the ecological status, the causes of their degradation and the policy options available to improve their status. From an ecological perspective, the Bohai Sea proper is a large, shallow embayment of the Yellow Sea. The Yellow Sea, in turn, is a shallow continental sea of the northwest Pacific Ocean. These relationships are important because of the physical and biological links between these systems; in particular, the fish and shellfish stocks in the Yellow Sea are dependent on the Bohai Sea as a reproduction and nursery area. Given that the Bohai Sea is not a transboundary waterbody, the assessment report of the Bohai Sea is included in this report as an appendix to be used as a reference for further understanding of the Yellow Sea's environmental problems.

The GIWA assessment ranked modification of stream flow, pollution of freshwater supplies, loss and modification of ecosystems, overexploitation of fish resources and destructive fishing practices as having severe impacts and were considered the priority issues in the Yellow Sea region. The region has experienced both significant reduction of water flow in the major river systems on both the Chinese and Korean side, as well as pollution of existing water resources, mainly from agriculture and industrial activities. There have been significant losses and modification of habitats in the region during the past 30 years. Increased industrialisation has attracted mass migration of the rural population to urban areas. This rapid population growth has resulted in the need to convert more lands for human settlement as well as an increase of discharge of harmful pollutants to the water bodies. At the same time, the population growth has increased the demand for food and agricultural products, resulting in the increased use of freshwater for crop production.

The Yellow Sea is one of the most exploited areas in the world. The increase in fishing effort following the introduction of bottom trawler

in the early 20th century resulted in that almost all major stocks were fully fished by the mid-1970s and overfished by the 1980s. Fishing with destructive methods is common throughout the region and many aquatic habitats in have been destroyed and fish stocks have collapsed. Common destructive fishing practices in the region include indiscriminate trawling along the coastal waters of Yellow Sea, fishing with explosives in lakes, and use of pesticides for fishing.

The transboundary issues that need to be addressed are the management of marine resources, industrial pollution, and ecosystem health. Progress is being made in the introduction of ecosystem-based management for this region.

However, policy options involving the management of transboundary issues in the region may be hindered by several factors such as the ineffectiveness of measures for the control of the overexploitation of shared stocks in the Yellow Sea and deficiency of existing national and international efforts to arrest degradation of coastal water quality due to discharge of pollutants from land- and sea-based activities.

In the Bohai Sea region, modification of stream flow, pollution of existing freshwater supplies, changes in the water table, loss and modification of ecosystems, overexploitation of living resources and impact of fisheries on biological and genetic diversity were ranked as severe and were considered the priority issues in the region.

Stream flows of the major river basin of the Bohai Sea region have been severely reduced and business costs have increased by 10% with frequent interruption of water supply. More than 30% of the major river basins in the region have also been polluted, resulting in a quality of their surface water that is below the World Health Organization (WHO) drinking water standards. Moreover, large-scale salinisation of coastal aquifers has occurred over the past decades.

Over the past few decades, many critical ecosystems and habitats in the region have been lost mainly as a result of human activities. The extent of these losses is estimated to account to 30-50% of their total area. The lost ecosystems have been found to include freshwater marshlands, running water wetlands, saline habitat wetlands, rivers, lakes, sandy foreshores, rocky foreshores, sand and gravel bottoms and mud bottoms. As a result of this loss, more than 50% of employment opportunities in aquatic product processing industries have also been lost.

Although policy options are defined for every specific root cause, some policy options are universally applicable, and could be recommended as the actions of highest priority for the Bohai Sea region. These are:

- Adoption of policies, laws, regulations and enforcement mechanisms;
- Introduction of green production technologies;
- Integration of river basin management;
- Adoption of public awareness campaign and stakeholder participation programmes;

- Development of small, rural-oriented urban centers in rural areas to cope with population migration;
- Finding alternative energy sources to reduce the use of petroleum;
- Training programmes on sustainable aquaculture production technology, and relocation programmes for traditional fishermen;
- Alternative livelihood programmes to reduce fisheries capacity.

The management of the Yellow Sea and the adjacent Bohai Sea is especially complicated in that it is surrounded by nations that share some historical and cultural aspects but differ in political systems, political and economic alignment, and levels of economic development. There are several agreements for bilateral regulation or development of the Yellow Sea Large Marine Ecosystem, however none of them are binding on all the nations and nor is any nation a party to all the agreements. In addition, many of the existing national management policies or bilateral management programme for the region have been designed and carried out with insufficient attention to transnational issues.