



# REGIONAL SEAS

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## ***Overview of the Coastal and Marine Environment and Environmental Problems in the Northwest Pacific Region***

***UNEP Regional Seas Reports and Studies No. 158***

## PREFACE

The first regionally coordinated investigation into marine pollution began in 1967 when the International Council for the Exploration of the Sea (ICES) set up a working group to assemble data on substances which might be discharged into the North Sea and which might be harmful to fisheries interests. While this and other scientific studies were being undertaken, political moves were under way to promote regional cooperation in the control of pollution in the Northeast Atlantic. Following the wreck of the *Torrey Canyon* in 1967, the coastal states of the North Sea adopted the Agreement for Cooperation in Dealing with Pollution of the North Sea by Oil in 1969 (the Bonn Convention). The basic concept of this agreement has been used subsequently in the drafting of similar regional agreements such as the Helsinki Convention for the Baltic Sea, and the Oslo and Paris Conventions for the Northeast Atlantic and the North Sea.

The common ingredients for these regional approaches were: a commitment to work together and cooperate towards common regional goals and objectives; mutual obligations accepted by accession to a regional convention; a policy/decision-making body; an agreed plan of action; a coordinating centre; and, shared funding of agreed activities. The same prescription was adopted for the UNEP Regional Seas Programme which had its beginnings at the UN Stockholm Conference on the Human Environment in June 1972 when the General Principles for Assessment and Control of Marine Pollution were adopted. Subsequently, the UNEP Governing Council chose "Oceans" as one of the priority areas on which it would focus efforts to fulfill its catalytic and coordinating role, and endorsed the following elements as part of the general strategy which its Oceans and Coastal Areas Programme Activity Centre (OCA/PAC) was to adopt for its "Oceans" work:

- Assessment of the state, sources and trends of marine pollution and its effect on human health, marine ecosystems, resources and amenities
- Coordination of, and support for, environmental management efforts in the protection, development and exploitation of marine and coastal area resources
- Assistance to interested governments in the implementation of existing conventions, and the promotion of new international and regional conventions, guidelines, and actions to control marine pollution and protect and manage marine and coastal area resources
- Education and training efforts to enhance the participation of developing countries in the protection, development and management of marine and coastal area resources
- Exchange of information on the protection, development and management of marine and coastal area resources.

The Third UN Inter-Agency Meeting on Regional Seas in 1981 adopted a set of guidelines and principles for the preparation and implementation of comprehensive action plans for the protection and development of marine and coastal areas of regional seas. These guidelines formally adopted the approach that was being successfully applied in the case of the Baltic, the North Sea and the Mediterranean.

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UNEP: Guidelines and Principles for the Preparation and Implementation of Comprehensive Action Plans for the Protection and Development of Marine and Coastal Areas of Regional Seas. UNEP Regional Seas and Studies (RSRS) No. 15, 1982.

More recently, the United Nations Conference on Environment and Development (UNCED) (Rio de Janeiro, June 1992), confirmed the important role of UNEP and endorsed its focus on the coastal and marine environment. Among the priority areas identified by participating States at

UNCED for UNEP to concentrate on, the following are especially relevant to the Regional Seas Programme:

- promoting international cooperation in the field of environment and recommending, as appropriate, policies to this end
- coordination and promotion of relevant scientific research with a view to providing a consolidated basis for decision-making
- further development of international environmental law, in particular conventions and guidelines, promotion of its implementation and coordinating functions arising from an increasing number of international legal agreements, *inter alia*, the functioning of the secretariats of the Conventions, taking into account the need for the most efficient use of resources, including possible co-location of secretariats established in the future
- promotion of sub-regional and regional cooperation and support to relevant initiatives and programmes for environmental protection including playing a major contributing and coordinating role in the regional mechanisms in the field of environment identified for the follow-up to UNCED
- supporting Governments, upon request, and development agencies and organs in the integration of environmental aspects into their development policies and programmes, in particular through the provision of environmental, technical and policy advice during programme formulation and implementation.

Following UNCED, UNEP's OCA/PAC reviewed its strategies, structure and performance, in the light of the agreements embodied in Agenda 21, and instigated changes to enable it to better reflect the collective sentiments expressed by participating States at Rio de Janeiro. As a result, OCA/PAC has confirmed policies which:

- give prominence to its Regional Seas Programme (assigning to it a higher priority than its global or other activities)
- promote a holistic and integrated approach to its activities in the coastal and marine environment (i.e. a multi-functional and cross-sectoral approach in preference to addressing discrete problem areas in isolation)
- address the entire zone which straddles the land-water interface (i.e. as far inland as is expected to influence the coast, and as far out to sea as information exists)
- advocate for integrated coastal area planning (through a process which is pre-emptive, predictive and precautionary)
- advocate for integrated coastal area management (i.e. an approach on a broad front which combines protection, restoration, conservation and sustainable use).

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# 1 INTRODUCTION

## 1.1 The UNEP Regional Seas Programme

The UNEP Regional Seas Programme was initiated in 1974 as a global programme implemented through regional components. It has been repeatedly endorsed by the UNEP Governing Council as a regional approach to the control of marine pollution and the management of marine and coastal resources. It is conceived as an action-oriented programme having concern not only for the consequences but also for the causes of environmental degradation and encompassing a comprehensive approach to combating environmental problems through the integrated management of coastal and marine areas. The Regional Seas Programme at present comprises 12 regions, in all stages of maturity, and a further region is being developed.<sup>1</sup> There are over 140 coastal States and Territories participating in the Programme.

The fulcrum for each regional programme is the Action Plan. All action plans are structured in a similar manner and designed to link assessment of the quality of the marine environment with the causes of its deterioration, leading to activities designed for the rehabilitation and improvement in the short term and comprehensive protection and management for sustainable development in the longer term. Action Plans usually include the following elements:

- Environmental assessment which comprises baseline studies, research and monitoring of the quality of the marine environment and the factors that may influence it. It is not to be confused with the Environmental Impact Assessment (EIA) process
- Environmental management which includes cooperative training in assessment methodologies, ecosystem management, control of industrial, agricultural and domestic wastes, and the formulation of contingency plans for dealing with pollution emergencies
- Environmental legislation which seeks legal commitments in the form of conventions, protocols and similar instruments on a regional basis and their ratification and implementation at the national level
- Institutional arrangements to provide a policy-making body for setting objectives, reviewing progress and approving activities and budgets as well as to provide a secretariat to coordinate activities
- Financial arrangements through which UNEP often provides "seed finance" until the participating governments are able to assume full responsibility for the budgetary requirements, at which stage UNEP usually assumes responsibility for administering trust funds that are set up.

The initial Goals and Objectives adopted by the various regions do have a common thread. However, there is sufficient flexibility in the system to allow for particular emphases and priorities as perceived by the States concerned. While Action Plans are fashioned in a similar mould for all regions, the priorities differ from region to region. There could even be differences within the same region over time, through the consolidation of some objectives and the weakening of others.

The key to the success of any Regional Action Plan is a common understanding and a mutual commitment by the participating States to act collectively or individually towards common regional goals. This commitment is usually in the form of legally binding conventions and protocols.

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<sup>1</sup> Mediterranean, Kuwait Action Plan Region, West and Central Africa, Wider Caribbean, Red Sea and Gulf of Aden, East Asian Seas, Southeast Pacific, South Pacific (SPREP), Eastern Africa, South Asian Seas, the Black Sea and the Northwest Pacific itself. The Southwest Atlantic is being developed and extending the Regional Seas Programme to polar waters is being explored.

## 1.2 The Northwest Pacific Action Plan

At the UNEP-sponsored symposium "Regional Cooperation on Environmental Protection of the Marine and Coastal Areas of the Pacific" held in conjunction with the XVI Pacific Science Congress, Seoul, August 1987, Dr. Tolba, then UNEP Executive Director, lauded the member States belonging to the East Asian Seas, Southeast Pacific, and the South Pacific regional seas programmes, for the scope of their agreements and the achievements they had to their credit. At the same time, he lamented the absence of the Northwest Pacific from the "*fold of regional environmental cooperation*". Dr. Tolba also expressed the opinion that political differences in the region should not be a great obstacle since similar differences had been overcome elsewhere, for example, in the Mediterranean.

Dr. Tolba was to be proven right before too long. By its Decision 15/1 of May 1989, the Governing Council of UNEP called for the development of an action plan for the protection and development of the coastal and marine environment of the Northwest Pacific Region comprising the Russian Federation, the People's Republic of China, the Democratic People's Republic of Korea, the Republic of Korea, and Japan.

As a first step in this process, UNEP initiated a series of consultations with representatives of the Governments of the region and with other organizations within the UN system. This culminated in the First Meeting of Experts and National Focal Points on the Development of the Northwest Pacific Action Plan, which was held in Vladivostok from 28 to 31 October 1991 in cooperation with the Centre for International Projects and the Pacific Oceanological Institute.

Experts and National Focal Points presented reports on aspects of the marine environment in their region. This was followed by the preparation of National Reports which reviewed the state of the marine environment and coastal areas within the country, commented on national policies, measures and relevant activities dealing with marine pollution problems, made proposals on ways and means for solving environmental problems, and finally proposed activities for the Action Plan.

At the Second Meeting of Experts and National Focal Points on the Development of the Northwest Pacific Action Plan, held in Beijing from 26 to 30 October 1992 in cooperation with the National Environment Protection Agency (NEPA), a Draft Regional Overview based on the country reports was discussed. The Draft Overview was revised in the light of comments received from National Focal Points and adopted for publication at the Third Meeting of Experts and National Focal Points on the Development of the Northwest Pacific Action plan, held in Bangkok from 25-29 October 1993 with the support of the UNEP Regional Coordinating Unit for the East Asian Seas Action Plan.

## 1.3 Aims of this Overview

This Overview is intended to provide the background for the Action Plan for the Protection and Development of the Marine Environment in the Northwest Pacific Region. The Action Plan will be based primarily on the principles and guidelines that have existed since the Stockholm Conference, which have been endorsed by the UNEP Governing Council, and which have served the existing 11 Regional Seas Programmes well. However, these principles and guidelines are augmented somewhat and reinterpreted as a result of the UNCED declarations. This "updating" does not entail any fundamental changes in principle, but it reflects a shift away from a narrow, sectoral approach which addressed single problems in isolation, in favour of a broad, integrated approach which still addresses the same problems, but it does so in relation to other activities and responsibilities in the coastal zone. In addition, while this new approach does not question the importance of assessment, measuring and monitoring, it recognizes these activities as only a means to an end, and gives higher priority to the application of solutions to problems rather than merely identifying them. This Overview therefore depicts the regional situation and, having identified problem areas, proposes possible solutions.

The Overview was prepared by UNEP Oceans and Coastal Areas Programme Activity Centre (OCA/PAC) as requested by the meetings of Experts and National Focal Points for the Northwest Pacific Action Plan at Vladivostok and Beijing. It is based primarily on the national reports prepared by each of the National Focal Points.

#### 1.4 Geographic coverage

The geographic scope within which the Action Plan is to be applied, at least initially, was agreed at the Vladivostok meeting as the *"marine environment and the coastal areas of the East Sea and the Yellow Sea, which are generally considered as the area north of the line between the mouth of the Chang Jiang River and Cheju-do Island, without prejudice to its possible future extension to cover additional marine environment and coastal areas of the participating countries as may be determined at a later stage"*. This scope was endorsed at the Beijing meeting.

The Northwest Pacific Region is, therefore, bounded on the west by the Asian mainland and on the east by the Japanese islands and Sakhalin Island, and divided by the Korean peninsula. It is bordered by the Russian Federation, the People's Republic of China, the Democratic People's Republic of Korea, the Republic of Korea, and Japan (see Figure 1).

The region is clearly divided into two hydrographic zones - the Yellow Sea and the East Sea. The limits of the East Sea are easily understood since they are surrounded almost completely by land. On the other hand, the Yellow Sea is contiguous to the south with the East China Sea and this Overview, based as it is on broad environmental characteristics, has not drawn a strict southern boundary.

The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of UNEP concerning the legal status of any State, Territory, city or area or its authorities, or concerning the delimitation of their frontiers or boundaries.

Concern has been expressed regarding the terminology for some areas of sea and other natural features in the region which are known differently in the different countries. In this Overview, references to these areas and features are kept to a minimum. Where it is unavoidable to name them, the terminology used does not imply the expression of any opinion whatsoever on the part of the author or of UNEP, and neither does it prejudice any further discussions or negotiations which might be undertaken in an effort to reach consensus on the terminology.

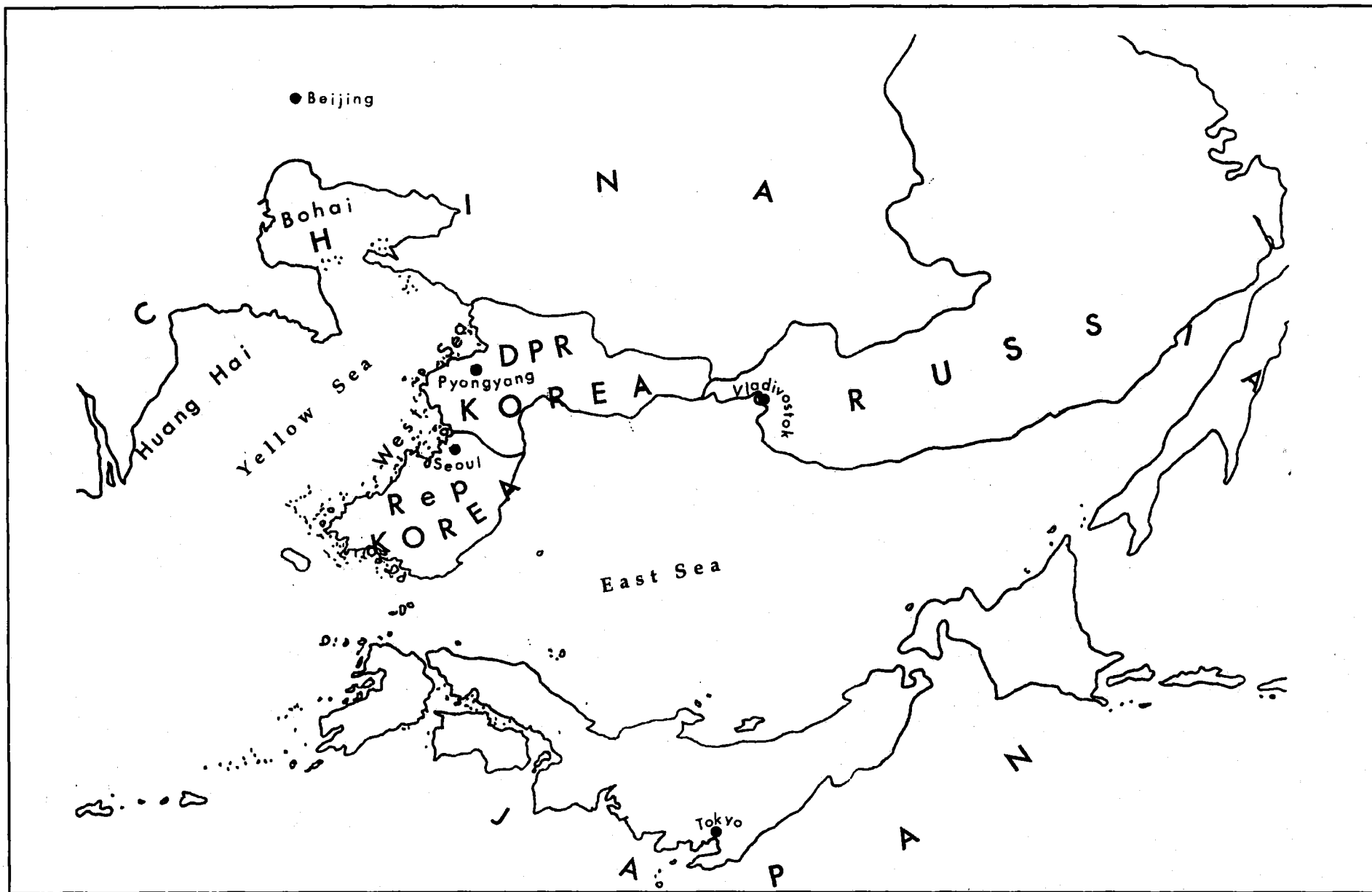


Figure 1. The Northwest Pacific Action Plan (NOWPAP) Region



## **2 ENVIRONMENTAL CHARACTERISTICS**

### **2.1 The surrounding land**

The Northwest Pacific Region is surrounded by land on all sides except at its southwest corner where it is contiguous with the East China Sea. The land surrounding the Region is extremely varied, ranging from high mountains to vast plains, from fertile river valleys to dry tundra, from densely populated areas to areas with very sparse population.

In the west are the densely populated and fertile plains of the Huang He (Yellow River) and the Chang Jiang (Yangtze River) in China. Both rivers arise on the Tibetan Plateau and have a combined catchment of over 2.5 million km<sup>2</sup>. The fertile land is intensely cultivated. The catchment is also heavily industrialized, particularly in the lower reaches, and includes extensive petroleum production and refining facilities.

The land surrounding the region from the north is more mountainous, with some big rivers but not so much flat land. This includes the Korean peninsula which has a backbone of high mountains with only small areas of flat land on the western side. Most steep land is still heavily forested. There are significant pockets of dense population and intense industrial development.

Mountainous lands border the region on the Russian mainland. This is the Pacific side of the Siberian Ussuri Taiga which is sparsely populated with pockets of industrial development including petroleum. Undeveloped land on the coast is also mainly forested.

In the east and southeast, the region is bordered by the Japanese islands and the island of Sakhalin. These provide a barrier between the region and the greater Pacific Ocean although the mountains are not very high. There is not much flat land bordering the region with few rivers of significance. Mountain lands are by and large still forested but there are some areas of dense population and intensive industrial development.

In summary, the Northwest Pacific Region can be characterized by vast river flats in the west which are intensely cultivated and densely populated; mountains in the north, east and southeast which are mainly forested but with pockets of intense cultivation and high population densities and a narrow southwest aspect open to the Pacific Ocean through the East China Sea.

### **2.2 Climate**

The region extends from about 115°E to 143°E longitude and from approximately 52°N to 32°N latitude. The full extent is currently under discussion. The region also lies between the world's largest land mass, the Eurasian continent, and the world's largest ocean, the Pacific Ocean. This spread and this location have a marked influence on the climate of the region making it rather varied and ranging from sub-Arctic in the north and northeast, to warm temperate in the south with marked, distinct seasons (see Table 1).

Monsoonal winds blow from the north in winter and temperatures in the region tend to fall well below those of other areas at similar latitudes. In summer, the southeast monsoon from the Pacific Ocean brings warm conditions and plentiful rain with the southern parts of the region experiencing more rain than the north. The south and east of the region are susceptible to typhoons which occur from mid to late summer (August to October).

**Table 1**  
**Rainfall and air temperature data from selected localities**  
**in the Northwest Pacific Region.**

Locality	Latitude and Longitude (approx)	Average Rainfall (mm)			Average Maximum Temperature (°C)			Average Minimum Temperature (°C)		
		Jan	Jul	Annual Total	Jan	Jul	Annual Daily Mean	Jan	Jul	Annual Daily Mean
Shanghai	32°N 122°E	48	147	1135	7	32	20	0	23	11
Pyongyang	39°N 126°E	15	236	922	-2	28	14	-2	20	4
Seoul	37°N 127°E	30	376	1249	0	28	16	-9	21	6
Vladivostok	43°N 132°E	8	84	598	-10	21	8	-17	15	1
Sapporo	43°N 142°E	103	131	1062	-1	25	13	-8	17	4
Fukuoka	34°N 131°E	66	237	1520	9	31	20	3	24	13

### 2.3 Oceanography

The Yellow Sea (Huang Hai) comprises Liaotung Bay and the Gulf of Korea (or Korea Bay) in the north reach, Hai Zhou Bay in the west and Inchon Bay on the east. It is bounded by the Chinese mainland and the Bohai Sea to the west and north, and the Korean peninsula to the east. In the south it is contiguous with the East China Sea. Its total surface area is about 400,000km<sup>2</sup>, and it is approximately 1,000km in length and 700km in maximum width. There are numerous islands in the Gulf of Korea and on the western and southern coasts of the Korean peninsula.

The seafloor of the Yellow Sea is of comparatively recent postglacial origin and it comprises a submerged, shallow continental shelf which incorporates the meandering lower reaches of the Yalu River that used to flow across the shelf in former times of lower sea level. The old river bed divides the seafloor into two distinct parts. The western side is a gentle slope extending some three-quarters of the way across the sea to a maximum depth of around 80-90m. The seafloor on the eastern side is much steeper. Bottom deposits are also quite distinct. There is a deposit of sand on the east adjacent to the Korean peninsula and a smaller one near the old delta of the old Yellow River; mud bank extends towards the centre of the area and the rest of the seafloor of the Yellow Sea is covered predominantly with silt. The depth of the Yellow Sea at its entrance is around 80m and the average depth is about 40m. There is a tidal range of between 4.5 and 8.8m and the maximum tidal speed is 1.0m/s. Yellow Sea bathymetry is illustrated in Figure 2a.

Rivers that discharge directly into the Yellow Sea (see Figure 3) include the Yalu River in the north, and the Han and Kaum rivers from the Korean peninsula in the east. The total direct discharge of freshwater into the Yellow Sea is calculated as an average of just over 28 billion m<sup>3</sup> annually. To this must be added the contribution made by the Yangtze River which, although at the southern extremity of the Yellow Sea, influences its salinity, especially during the summer monsoon. In addition, the many rivers draining into the Bohai Sea, and particularly the Huang He (Yellow River), would also contribute to the freshwater budget of the Yellow Sea, albeit indirectly. The mean salinity is around 30.5ppt, while the mean temperature is 2.8°C in winter and 28.0°C in summer. Figure 4 summarizes the data for surface temperature in the Yellow Sea in summer and winter.

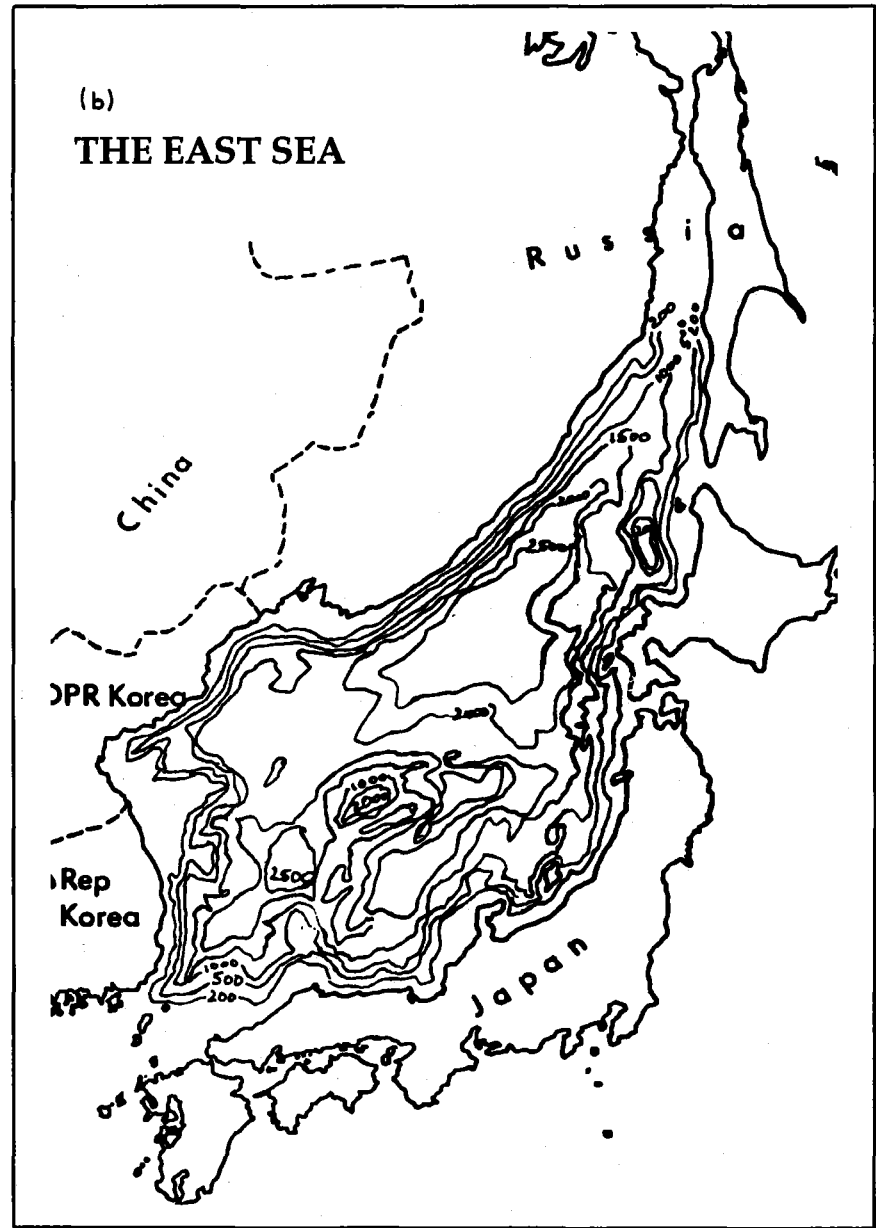
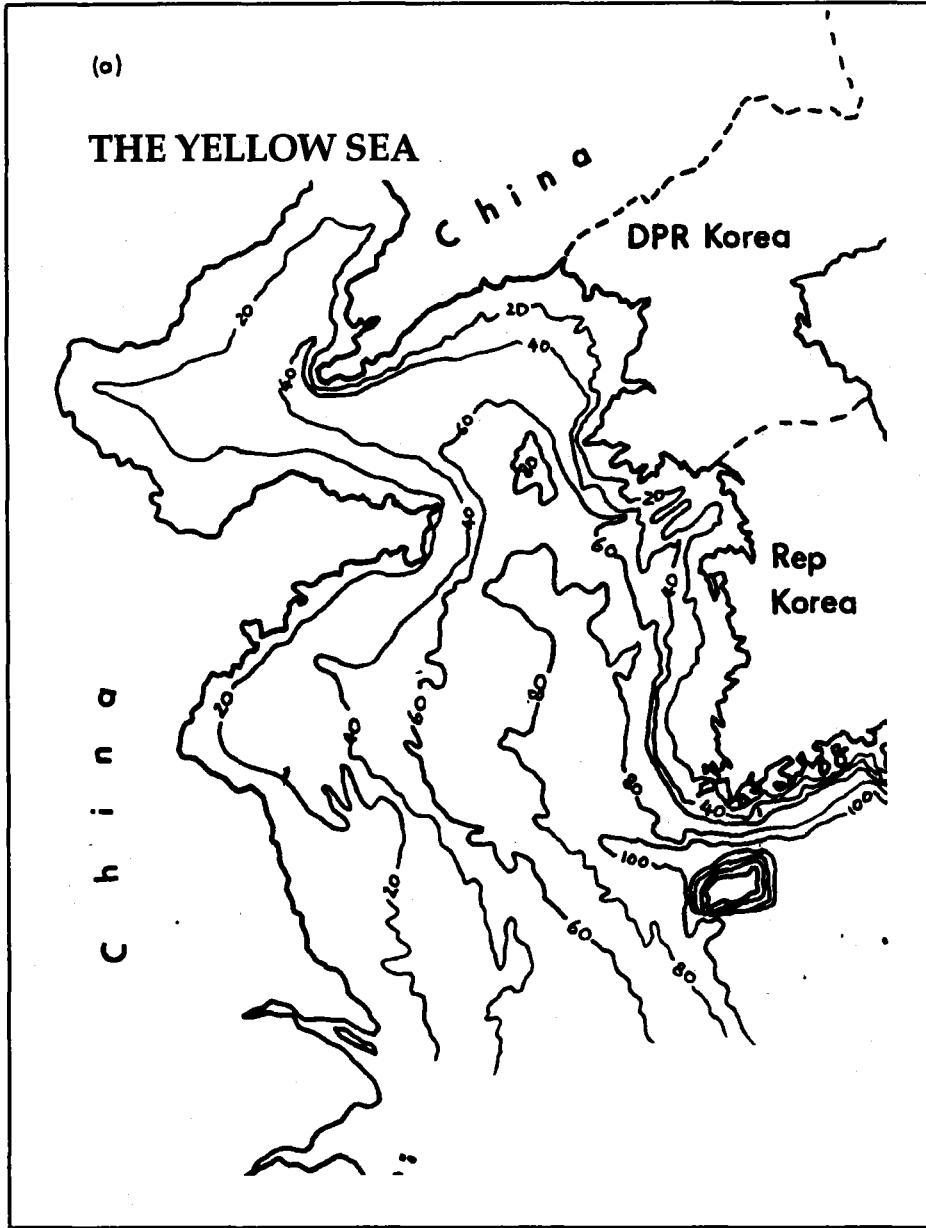


Figure 2. Bathymetry in the Northwest Pacific Region

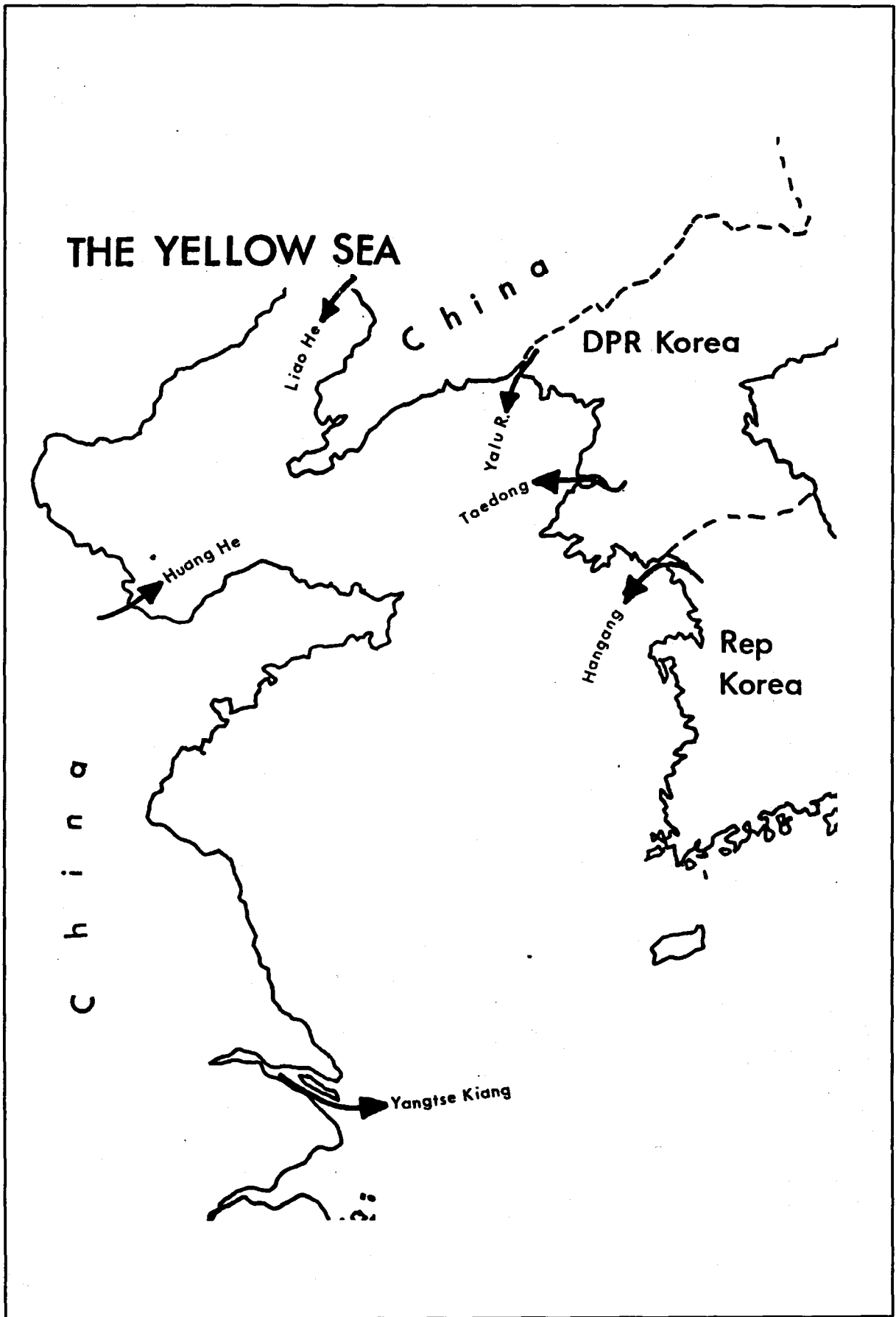


Figure 3. Main rivers discharging into the Yellow Sea

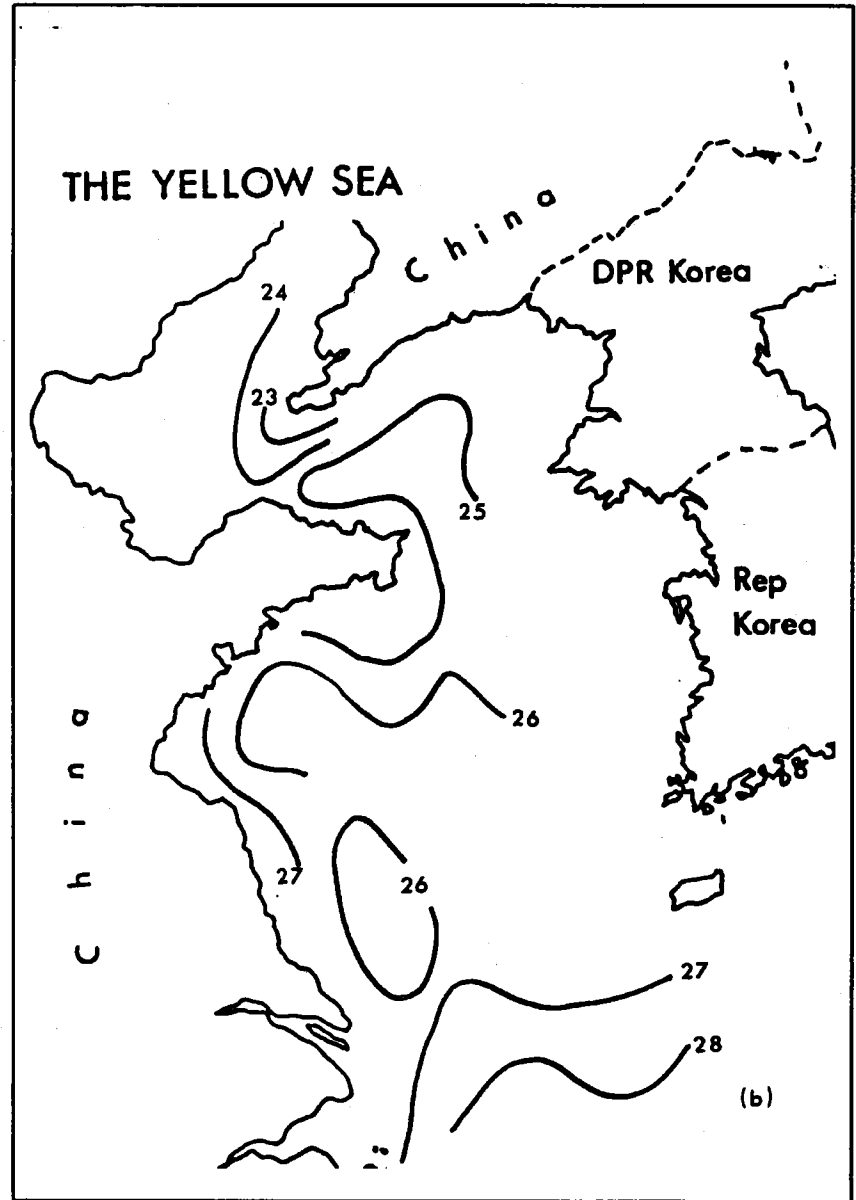
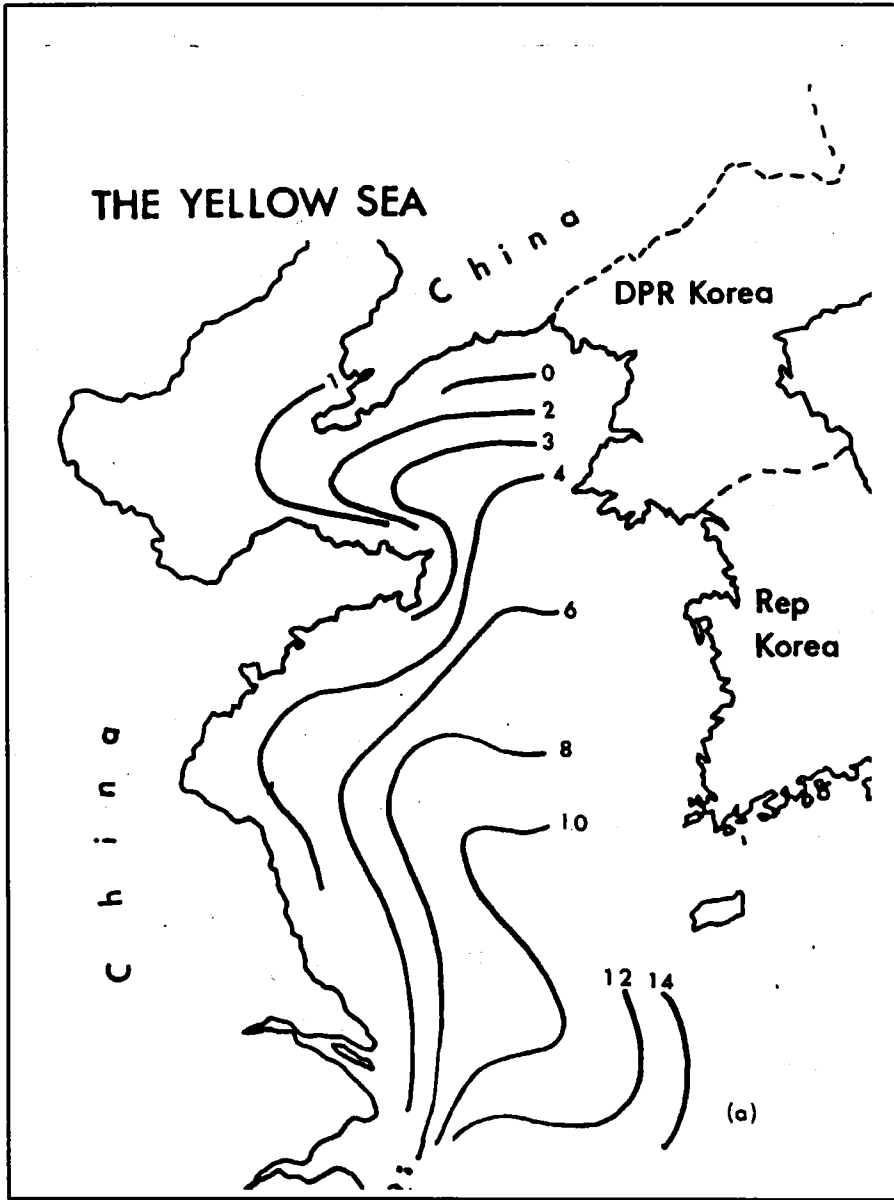


Figure 4. Surface temperatures in the Yellow Sea (a) winter (b) Summer

The East Sea has Tongjosen Gulf in the west and the extensive Gulf of Tartary in the north. Many straits and other narrow passages lead in and out of the sea. These include the Tatar Strait in the north, and Soya Strait (La Perouse), Tsugaru Channel, and the very narrow passage connecting it with the Seto Inland Sea, in the east. The southern entrance to the East Sea is through the Korea Strait west of Tsushima Island, and Tsushima Strait to the east of the Island.

The total surface area of the East Sea is nearly 1,000,000km<sup>2</sup>. The length along its long axis is 2,400km while the width at the entrance is 196km, giving it a ratio of 1:12 (entrance : length).

Figure 2b above illustrates the bathymetry of the East Sea. The margins of the East Sea are rather steep especially on its western side adjacent to the Korean peninsula and the Russian coast. The incline is a bit more gradual in the north, and more gradual still on the eastern side. The average depth is 1,350m, with depths of over 3,700m towards its centre. Its shallow entrances are less than 140m deep. The centre is characterized by the Yamato Banks and the southern seafloor is more complex.

The mean tidal range of the East Sea is 0.3m and the maximum tidal speed is 1.8m/s. The main current is the Liman cold current which flows from north to southwest at a rate of 20-30 million m<sup>3</sup>/sec. Current velocities exceed 1.5 knots in summer, are about 1.0 knot in spring and autumn, and less than 1.0 knot in winter.

The mean salinity in the East Sea is 34.0ppt with few significant rivers discharging into it (Figure 5). The average water temperature at the surface is 4.0°C in winter and 22.0°C in summer. Figure 6 summarizes the data for surface temperature for the East Sea in summer and winter. Chlorophyll-*a* concentrations are highest at a depth of between 10 and 50m where they can reach 0.71mg/m<sup>3</sup>.

## 2.4 Ecology

The coastal and marine flora and fauna of the Northwest Pacific Region vary greatly according to oceanographic, topographic and climatic conditions. Two major groups can be identified: the boreal and the temperate assemblages. There are also a number of transitional and mixed assemblages. Figure 7 shows the approximate distribution zones of the biota in the region.

The southeastern Yellow Sea biotic communities are very complex in species composition, spatial distribution, and community structure, possibly due to the rather complicated oceanographic conditions of the area. Faunal communities are composed of various ecological groups of both warm and cold water species as well as cosmopolitan and amphi-Pacific ones. The diversity and abundance of the fauna are low. Marked seasonal variations are the main characteristics of all the components of the biotic communities.

The distribution of planktonic and benthic organisms in the coastal waters of the Yellow Sea appears to be affected primarily by turbidity and sediment type, respectively. The phytoplankton populations are composed mainly of neritic diatoms with *Skeletonema costatum*, *Coscinodiscus* spp, *Melosira sulcata*, and *Chaetoceros* sp being the dominant species. The dominant zooplankton species include *Sagitta crassa*, *Calanus sinicus*, *Euphausia pacifica*, and *Themisto gracilepis*.

Out of the total benthic biomass, Mollusca are the most important and make up about 50%. Echinodermata are the next in importance, making up 29%. Then come the Polychaeta at about 11%, and Crustacea at about 9% of the total. Most of these bottom dwellers are important food items in the Yellow Sea ecosystem and some are commercially important in their own right (e.g., fleshy prawn, southern rough shrimp, and Japanese squid).

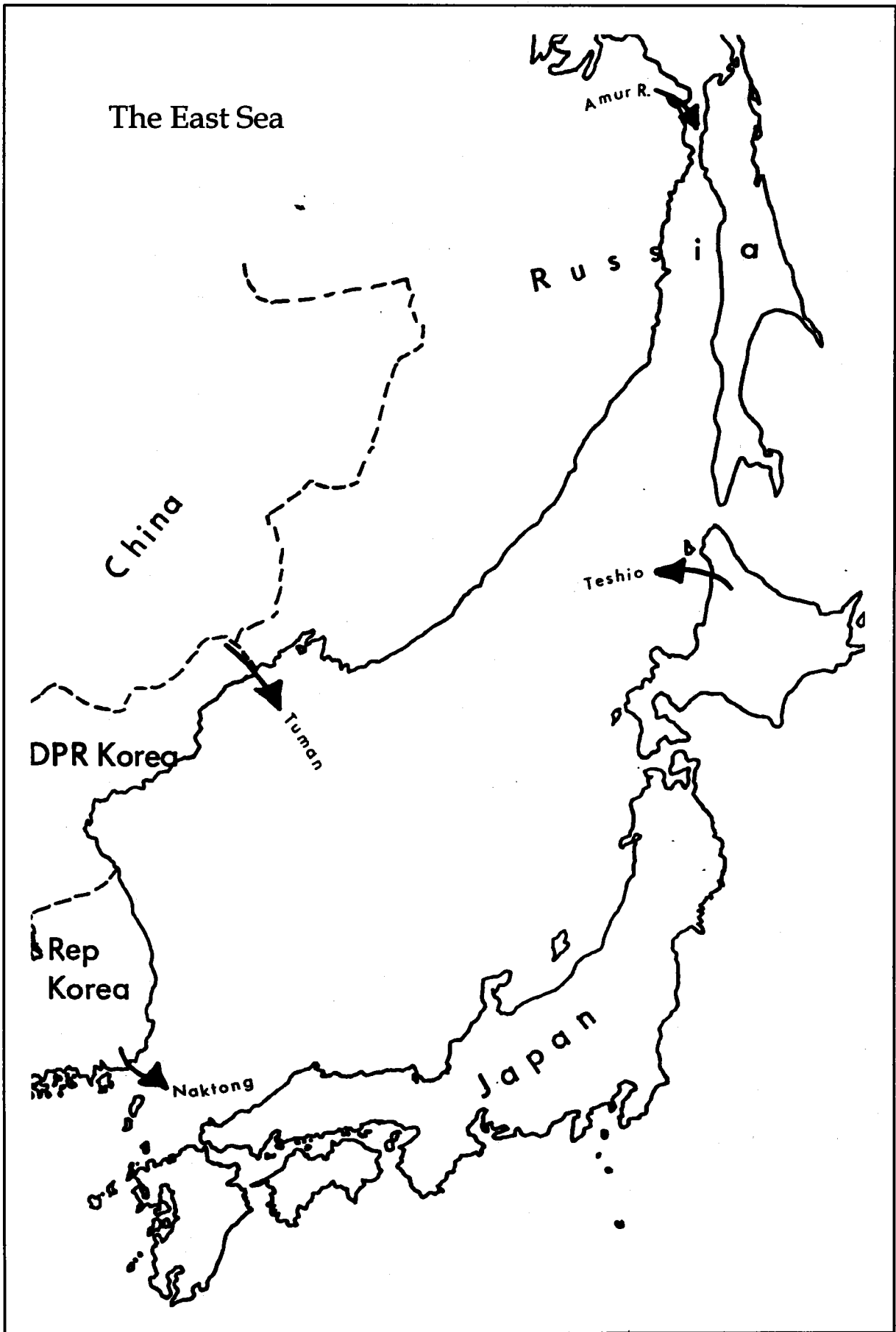


Figure 5. Main rivers discharging into the East Sea

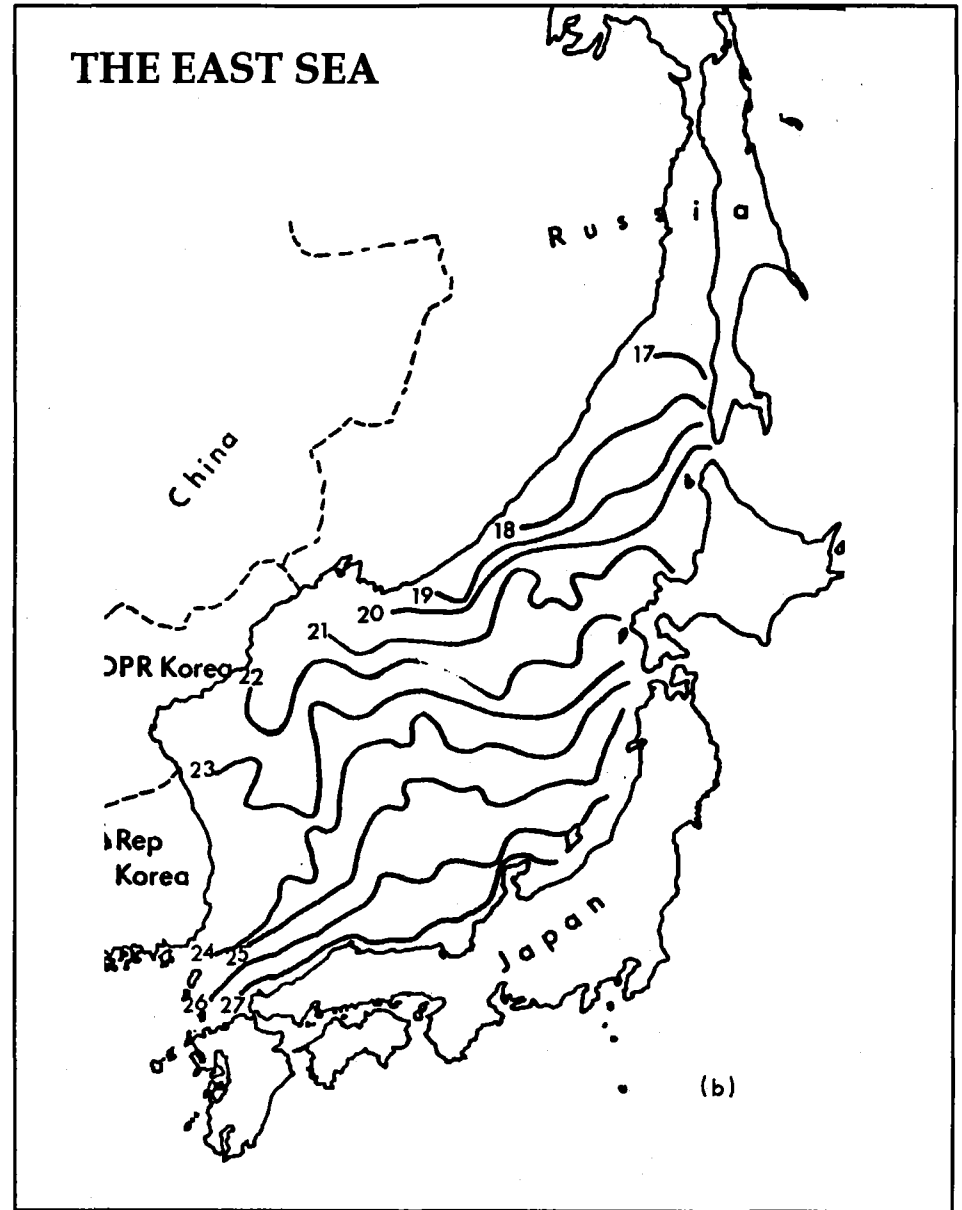
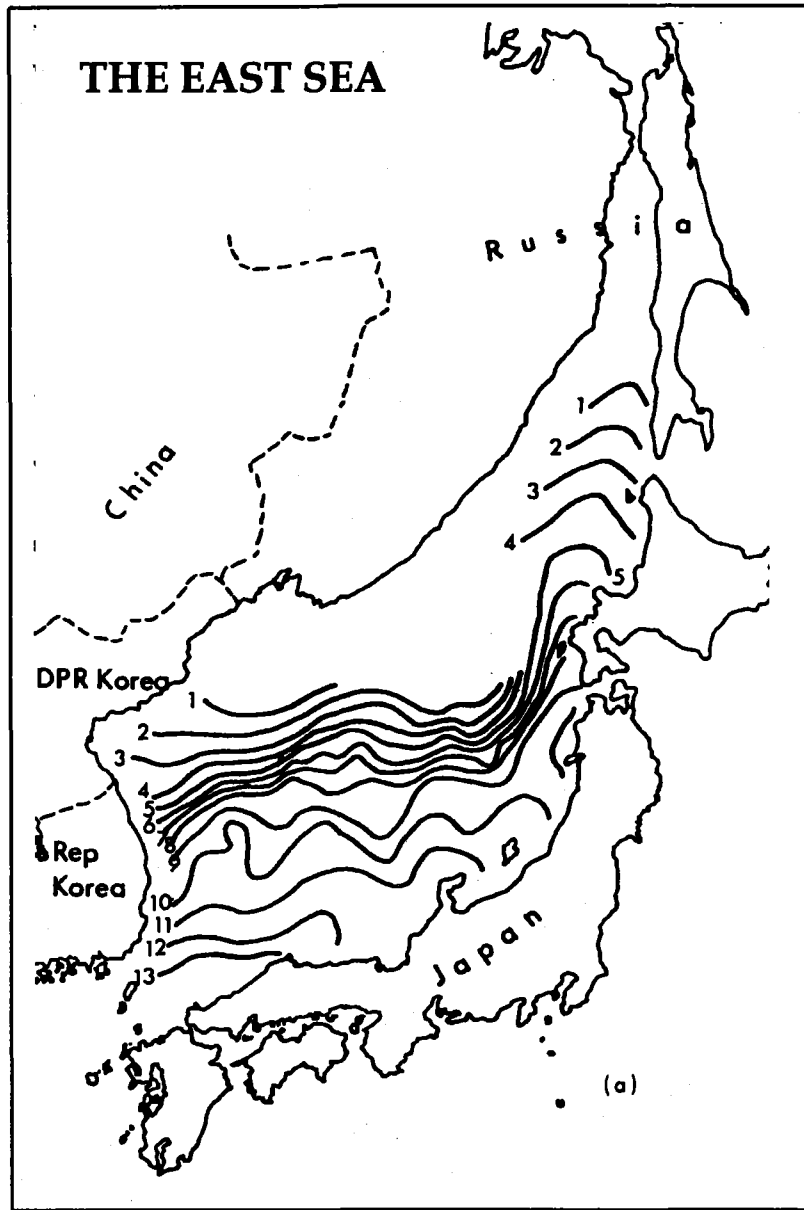


Figure 6. Sea surface temperatures in the East Sea (a) winter (b) summer



Figure 7. Ecological assemblages of the Northwest Pacific Region

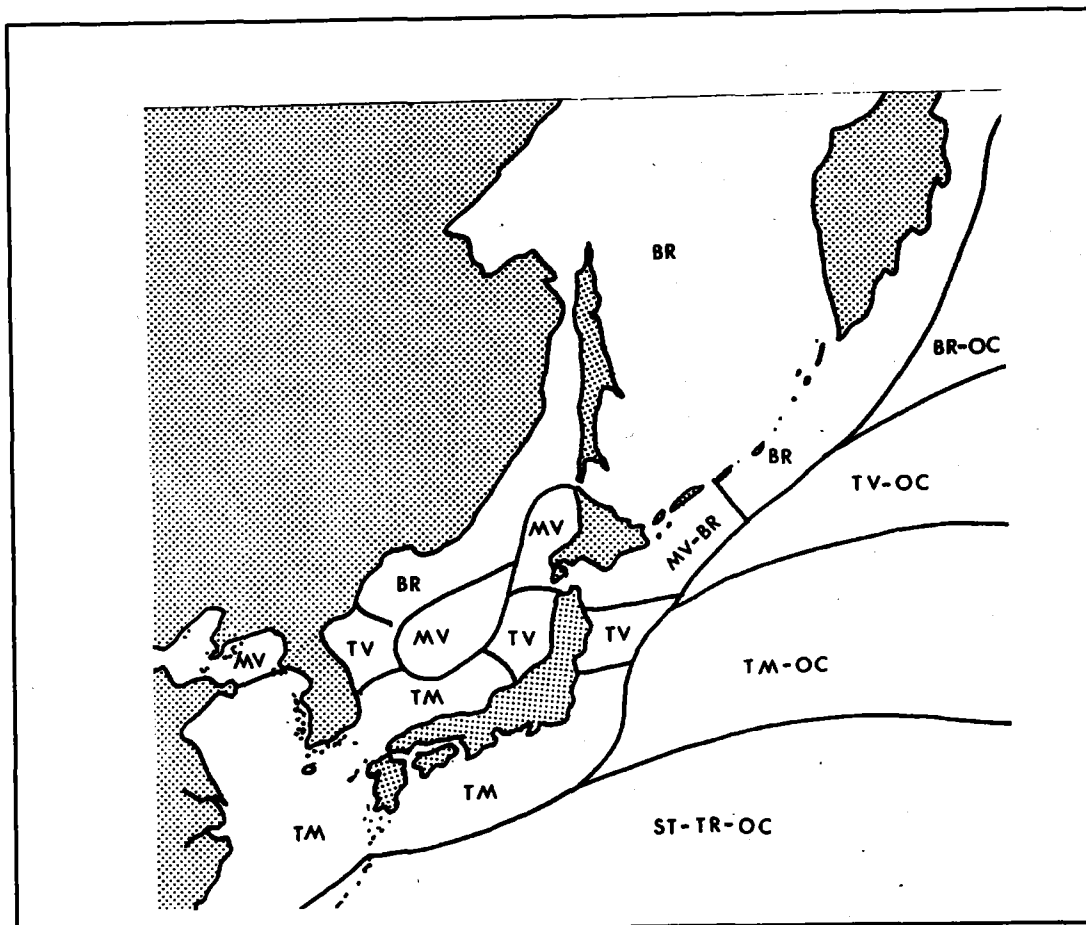


Table 2. Some coastal and marine animals from the Northwest Pacific Region which are considered to be at risk

GENUS AND SPECIES	COMMON NAME	STATUS	DISTRIBUTION
<i>Lipotes vexillifer</i>	Yangtse River dolphin	endangered	China
<i>Balaenoptera musculus</i>	Blue whale	endangered	regional
<i>Balaenoptera physalis</i>	Fin whale	vulnerable	regional
<i>Megaptera novaeangliae</i>	Humpback whale	vulnerable	regional
<i>Balaena mysticetus</i>	Bowhead whale	vulnerable	regional
<i>Eubalaena glacialis</i>	Northern right whale	endangered	regional
<i>Zalophus c. japonicus</i>	Japanese sea lion	extinct ?	Japan, N Korea, S Korea
<i>Diomedea albatrus</i>	Short-tailed albatross	rare	Japan
<i>Egretta eulophotes</i>	Chinese egret	endangered	China, N Korea, S Korea
<i>Ciconia boyciana</i>	Oriental white stork	rare	China, Japan, S Korea, Russia
<i>Nipponia nippon</i>	Crested ibis	endangered	China, Japan
<i>Plalatea minor</i>	Black-faced spoonbill	endangered	China, N Korea
<i>Anas formosa</i>	Baykal teal	vulnerable	regional
<i>Larus relictus</i>	Relict gull	rare	China, S Korea, Japan
<i>Sterna bernsteini</i>	Chinese crested tern	indeterminate	China
<i>Carcinoscorpius rotundicaudata</i>	Horseshoe crab	insufficiently known	Japan
<i>Tachypleus spp.</i>	Horseshoe crabs	insufficiently known	Japan

(From - 1990 IUCN Red List of Threatened Animals).

Some 200 species of fish are the main living resource. Of these, 45% are warm water species, 46% are warm temperate species and 9% are cold water species. The Cephalopods are represented by 14 species; *Sepia andreaana* and *Euprymna morsei* are endemic to the Yellow Sea.

Eleven species of marine mammals live in the Yellow Sea. The minke whale, sperm whale, humpback whale and finless porpoise are temperate species; the harbour seal, northern fur seal, steller's sea lion, fin whale, blue whale, right whale and gray whale are cold temperate species. The fin whale and right whale migrate into the northern Yellow Sea in winter and spring to breed; the harbour seal migrates to the northern Bohai Sea during the same season, also to breed.

Of the endangered species of seabirds of China, two are native to the Yellow Sea Region; they may already be extinct. The relict gull (*Larus relictus*) used to be collected for its plumage but there have been no recent sightings; the latest was in the 1930s near Gansu and Tianjin where it used to breed. The Chinese crested tern (*Sterna bernsteini*) was last sighted at Qingdao in 1937 and it too may be extinct. However, an unconfirmed sighting of 10-20 birds in Thailand in 1980 has raised hopes that it might still be extant.

The East Sea intertidal margins comprise about  $4 \times 10^5 \text{m}^2$ . These small margins result from the steep sides and the small tidal range. Salt marsh is very scarce and the latitude is too high for mangroves. The seagrass and algal forests are extensive and cover some  $402 \text{km}^2$ . The major algae are *Sargassum*, *Eisenia* and *Laminaria*.

Both subtropical and subarctic fauna are found in the East Sea, in particular in areas shallower than 200m. The distribution of subarctic animals extends down from the north, and that of subtropical animals extends up from the southwest, with a zone of intermingling in the central area. This mingling zone shifts with the seasons. Biological productivity overall is quite low and although no systematic surveys have been undertaken, the fauna are not thought to be too different from those of the wider Northwest Pacific. The low range of species is the result of their being hindered from entering the East Sea by the narrow, shallow entrance points. The dominant zooplankton species are the copepods *Calanus* and *Metridia*, and *Oikopleura* (Appendicularia).

About 160 species of birds are listed as known from the sea areas or the coast of the East Sea. The common ones are White-faced Shearwater (*Calonectris leucomelas*), Black-tailed Gull (*Larus crassirostris*), Herring Gull (*Larus schistisagus*), Hornbilled Puffin (*Cerorhinca monocerata*) and Sanderling (*Calidris alba*). Japan has bilateral treaties for the protection of migratory birds with both China and the Russian Federation. The treaty with China covers 227 species; while that with Russia covers 287 species.

Table 2 above lists some coastal and marine animals in the Northwest Pacific Region that are considered at risk. It is compiled from the 1990 IUCN Red List of Threatened Animals published by the World Conservation Monitoring Centre.

### **3 SOCIAL AND ECONOMIC ASPECTS**

#### **3.1 Population**

The west and south of the Northwest Pacific Region is one of the most densely populated areas of the world with a number of major cities and urban centres, each with populations of well over one million people. In contrast, the north and northeast of the region are very sparsely populated.

In addition to the many people who actually live in the coastal margins of the west and south of the region, an even greater number live only a short distance inland in large cities usually located on major rivers. The demands, wastes and other effects of all these centres have significant consequences for the seas of the Northwest Pacific Region. Figure 8 illustrates the distribution of population in the region.

Among the largest conurbations in the region are: Shanghai and Fukuoka at the southern gateway to the region with over 7 million people and nearly 5 million people respectively; and Pyongyang, Seoul and Pusan which are close to the geographic centre of the region with nearly 16 million people between them. The Bo Hai area, while not considered part of the Northwest Pacific Region for the purpose of this Overview, must be referred to when considering population figures. It is surrounded by some of the highest densities of population and it is contiguous with the Yellow Sea on which it must have an influence.

#### **3.2 Commerce and navigation**

There are more than 40 principal ports in the greater Northwest Pacific Region, with connections to 160 countries. In this number are included 3 ports in the Bo Hai area, although these are not strictly within the NOWPAP Region, they include the largest crude oil terminal and coal handling facilities in China and they handle up to 40% of the entire movement of goods by sea, in and out of China. On leaving Bo Hai waters, these ships must traverse the Yellow Sea and, when added to shipping movements which originate in Qingdao, Shanghai and Dalian in China, and Nampo and Inchon on the Korean peninsula, they contribute to a very busy stretch of water in the Yellow Sea.

The principal ports and harbours in the Northwest Pacific Region are shown in Figure 9 and are listed in Table 3 according to country.

Much of the shipping traffic indicated in Table 3 is local and between the five countries within the region. This includes an extensive passenger network with regular, frequent services to many ports within the region.

Container traffic is extensive between the five NOWPAP countries and trade volumes are indicated in Figure 10. In addition to the local trade, much traffic goes beyond the region and connects with major world shipping routes through the East Sea.

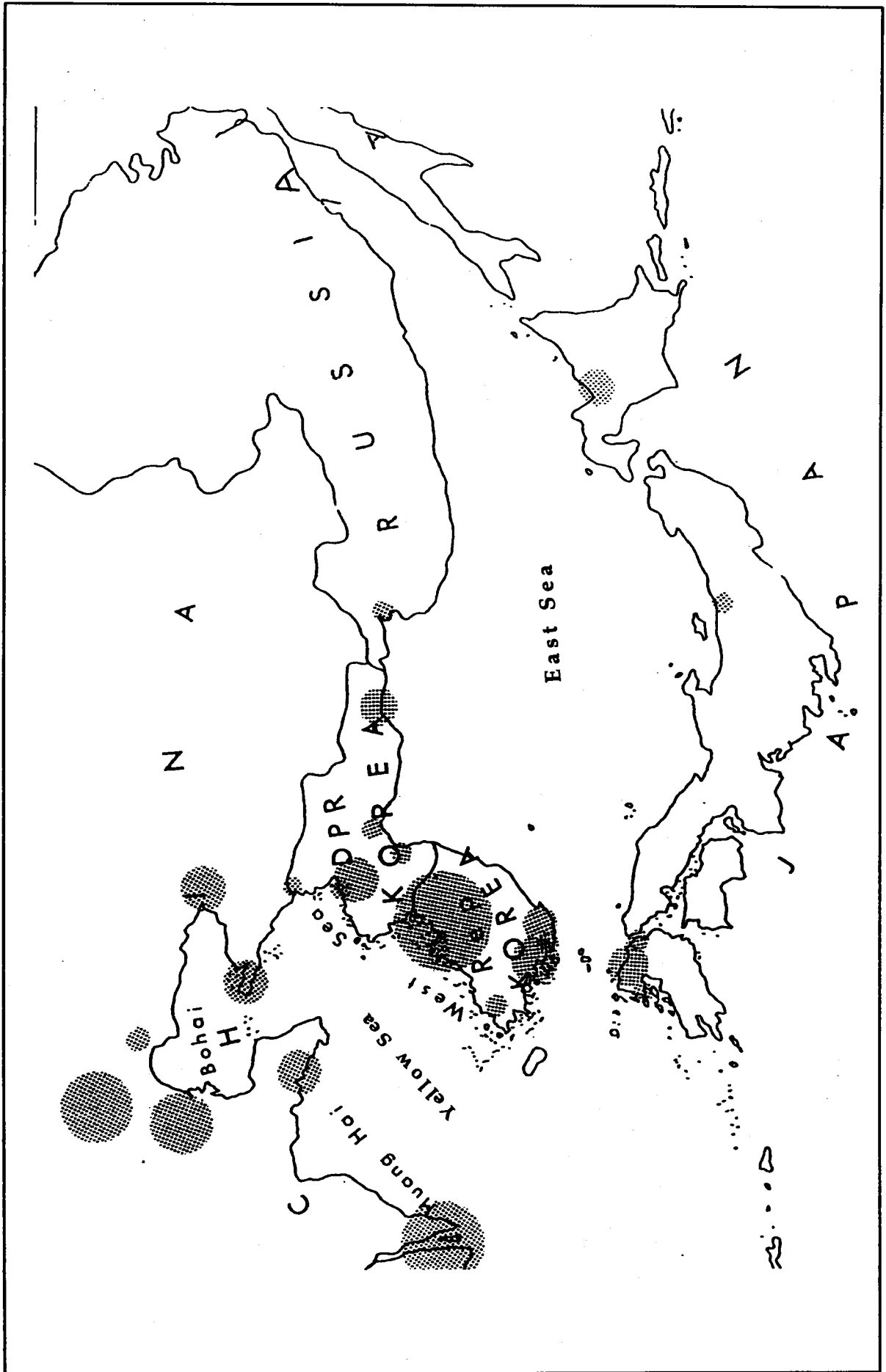


Figure 8. Centres of high population in the Northwest Pacific Region

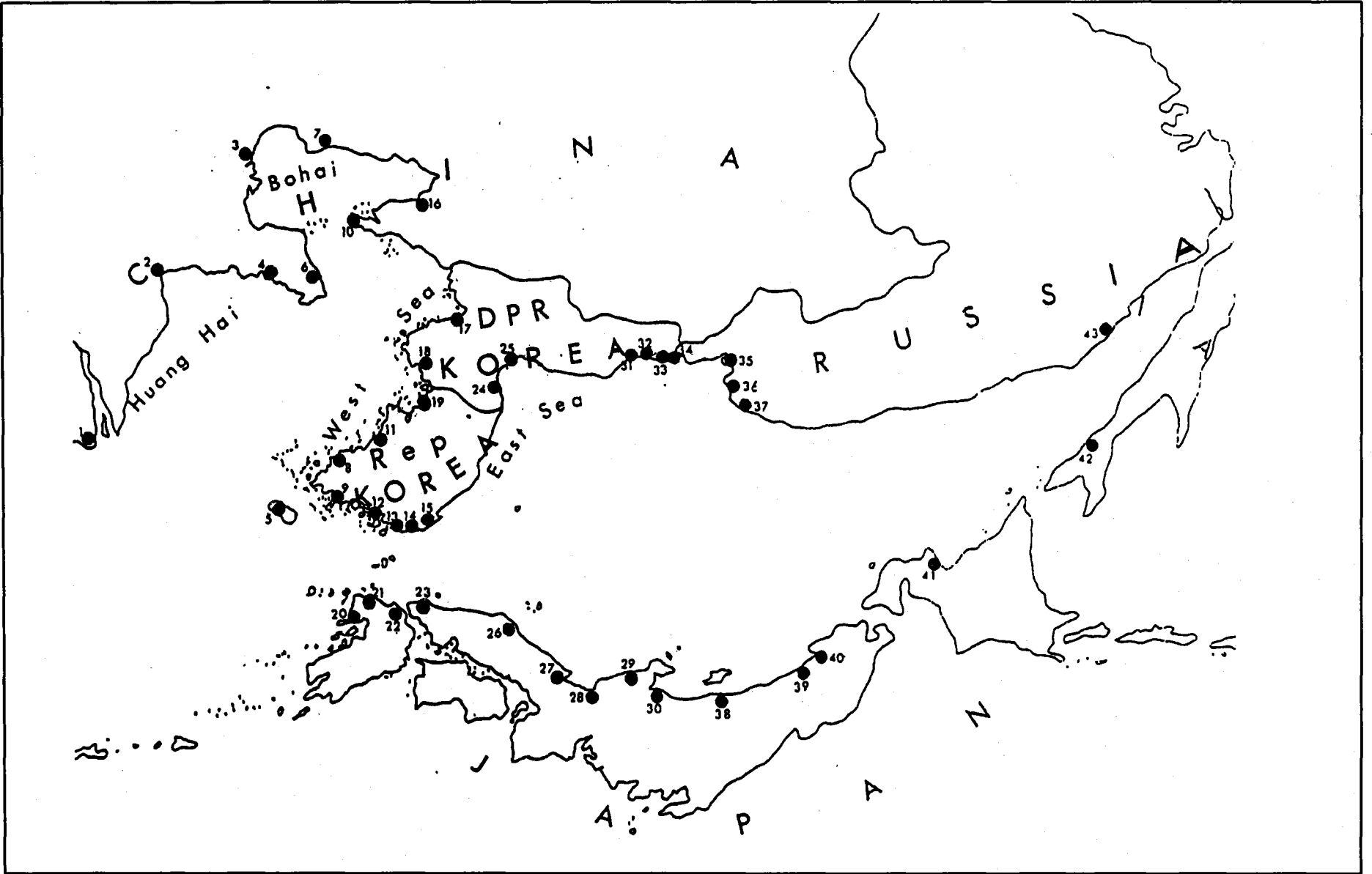


Figure 9. Main Ports and harbours in the Northwest Pacific Region

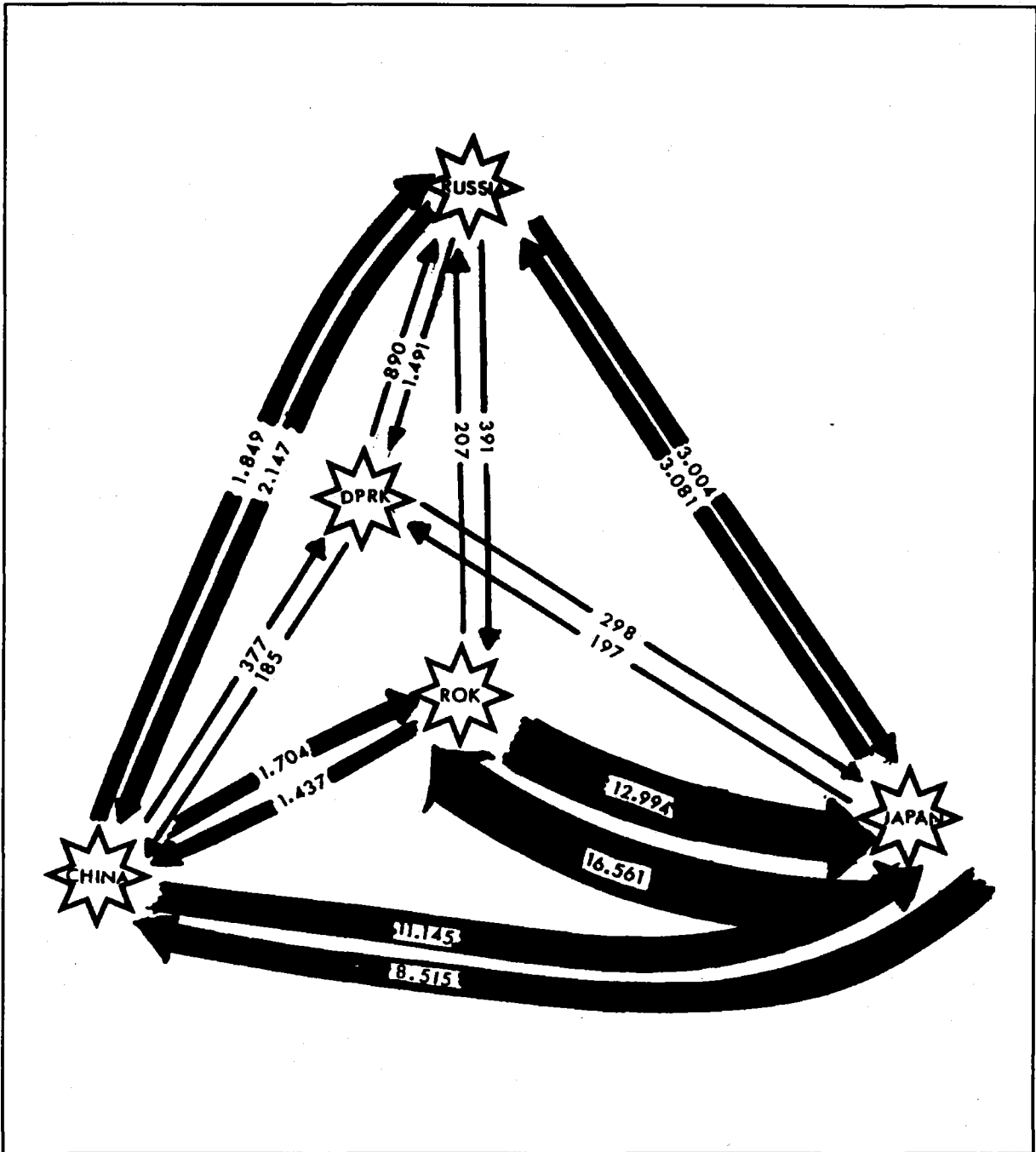


Figure 10. Trade volumes between the NOWPAP countries

**Table 3. Principal ports and harbours in the Northwest Pacific Region.**

COUNTRY	PORT/HARBOUR	TYPE OF FACILITY *	TONNAGES (million tonne)	LOCATION IN REGION
Russian Federation	Vanino Vladivostok Vostochny Nakhodka	C,O C,O,P		northernmost north central north central
Democratic People's Republic of Korea	Tumen River Unggi Najin Chungjin Hungnam Wonsan Namp'ŏ Haeju			north central north central north central east central east central west central west central
Republic of Korea	Inchon Kunsan Mokp'ŏ Yosu Masan Pusan Ulsan P'ohang Cheju	C,O,T,G  P  C,O,T,G,P G G,P	28.2   46.5 31.3 26.6	west central west central south central south central south central east central east central south central
Japan	Otaru Akita Sakata Niigata Fushikitoyama Kanazawa Tsuruga Maizuru Sakai Shimonoseki Kitakyushu Hakata Nagasaki	C,O,T,G C,O,T,G  P C C,P P	10.6 7.2   3.3 1.9	north east east east east east east east east east central southeast southeast southeast
People's Republic of China	Yingkou Dalian Qinhuangdao Tianjin Qingdao Yantai Lianyungang Shanghai	C,O,T,G C,O,T,G C,O,G,P C,O,T  C,O,G,P	46.1 53.7 21.2 0.8  130.0	northwest (Bo Hai) northwest west (Bo Hai) west (Bo Hai) west west west southwest

\* C = container; T = tanker; P = passenger; G = general cargo; O = ore and bulk

### 3.3 Industrial development

The Huang Hai (Yellow Sea) area is the most highly industrialized part of the north of China. The major types of industry include power generation, petroleum refining and related byproducts, paint manufacture, chemicals manufacturing, paper, food processing, metallurgy and electroplating. In the provinces bordering the Yellow Sea (excluding those areas that border on the Bo Hai), namely, Liao Ning, Shan Dong and Jiang Su, there are nearly 2000 major industrial complexes.

DPR Korea has been investing in heavy industry for many years. Most of these complexes are located on the coast at places such as Chongjin, Hungnam, Wonsan and Haeju. Major industries include steel mills, power generators, fertilizer plants, synthetic fibre plants and cement factories. Many of these plants have been in operation for many years, some as long as 50 years, and employ outdated technology.

Industrial development in Japan is concentrated on the Pacific side rather than on the East Sea side. Nearly 300 industrial sites are located on the coast of the East Sea as well as a further 100 only a short distance inland. There are also 9 thermal power plants and 9 nuclear power plants from which cooling water is discharged into the East Sea.

### 3.4 Mining including petroleum

Oil exploration by China in the Yellow Sea goes back to 1961. Three coastal oil fields in Bohai produce a total crude output which amounts to over 42% of the entire Chinese production.

The Sakhalin area of Russia has more than 30 oil fields and the daily output is about 50,000 barrels. Gas is found in a number of locations in the Sakhalin Basin and the Aniva Gulf Basin. There are a number of onshore seeps around the Tatar Strait Basin but only small oil and gas fields within the western Hokkaido area. There is another area of petroleum production in the south of the East Sea, in the Tsushima Basin. These are rather small wells with only 4 having a rate of more than 1,000 barrels a day. Oil exploration in the East Sea is still continuing.

Petroleum appears to be the mainstay of the mining industry in the NOWPAP region. In the Republic of Korea some 66 minerals are recognized as having commercial potential. These include iron, gold, silver, lead, zinc and copper ores. Also, the Korean tungsten reserves are considered to be among the richest in the world. Among the non-metallic minerals, limestone and coal are probably the most plentiful. Korean kaolin has gained a reputation worldwide for its high quality.

### 3.5 Fisheries resources

The diversity, abundance, production and biomass of fisheries species are low in the NOWPAP region.

The Japanese fishing industry in the East Sea targets mainly squid, mackerel, sardine and flatfish. Other species such as cod, salmon and shrimp are also fished. The stocks of the main species are generally stable with only minor fluctuations as are the catch rates. The main fishing methods are purse seine, dragnet, jigging, and setnets.

Aquaculture is a major use of the coastal waters in the Yellow Sea with nearly 1.5 million hectares in the late 1970s. Among the cultured species are oysters, mussels, razor clams, cockles, short-necked clams, pearl oysters, scallops, hard clams, Chinese shrimp, abalone, ark shell, pen shell, hen shell, and a number of species of seaweed. The amount of cultured seaweed produced in Korea is about 200,000 tonnes with *Undaria* sp being the most popular. In China, the most important cultivated species is the brown *Laminaria japonica*, which is grown on more than 3,000ha with a production of 10,000 dry tonnes per year.

In the Republic of Korea the number of shallow-water farms on the coast have increased rapidly since the 1960s. A remarkable increase in production has followed in oysters, hard-shelled mussels, anadara clams, short-necked clams, laver algae, brown seaweed and sea tangle algae.



### 3.6 Tourism and recreation

Tourism in the coastal areas of China has increased dramatically in recent years. For example, some 25 million tourists are estimated to have visited the Qin Huang Dao area since 1979. These visitors include a number of large pleasure boats, as well as smaller recreational craft including some from Japan.

The eastern shores of the Korean peninsula are very scenic with fjord-like valleys and small sandy beaches which are very clean and popular with visitors. More to the south, the sandy beaches are larger with the typical alluvial estuaries creating wide and long beaches broken only by picturesque crags and cliffs.

The Russian coastline on the western side of the East Sea has splendid beaches from Olga Bay southwards to Posiyet Bay adjacent to Peter the Great Bay. The marine park at Vladivostok is a very popular tourist destination and the main part of South and Middle Primorye has some unique tourist sites with attractive beaches and beautiful bays and islands covered by picturesque vegetation.

Japan has three national parks which are located in the coastal areas of the East Sea. These are:  
- Rishiri-Rebun-Sarobetsu National Park, Saninkaigan National Park, and Daisen-Oki National Park. While all these areas are recognized as having very popular features, Ama-no-hashidate and the Kasumi region have been designated as places of outstanding scenic value. There are 34 boating and yachting marinas on the East Sea coast of Japan. The largest, at Fukuoka, has 538 berths and the total number of berths is over 6000.

## **4 ENVIRONMENTAL PROBLEMS**

The extent of economic development is often reflected in the levels and types of pollution in coastal and offshore waters and in the degree of coastal degradation. Industrial activity, urbanization, port development, the use of agricultural chemicals, intensive aquaculture, and the development of tourism facilities are all part of economic development. Unfortunately, a country's stage of development can often be determined by the degree of stress of its coastal and marine environment. NOWPAP countries have recognized that this does not need to be so, since development and environmental protection are not necessarily in conflict. But before one can tackle the problem and start planning solutions, the problem must be quantified and its causes determined. This section discusses the environmental problems facing coastal administrators and managers in the NOWPAP region. The data are the result of research and survey activities as reported in the national reports.

### **4.1 Water pollution**

#### **4.1.1 Sources**

In common with most other parts of the world, the most serious marine pollution problems in the NOWPAP region arise from sources on land. These reach the coast either from direct discharges such as through pipelines and drains, or indirectly through rivers and streams. The latter often include non-point sources such as from agricultural and horticultural land.

Pollution from sources at sea originates from shipping, from oil exploration and production platforms, and from dumping. Accidental discharges through human error or catastrophic events normally constitute very visible and acute episodes. Chronic leakages and other insidious, persistent discharges over long periods of time can be just as serious if not more so.

Significant pollution levels are also being experienced in areas where intensive aquaculture is being practised.

#### **4.1.2 Nutrients**

The most common source of nutrient discharge into the coastal and marine environment is domestic sewage. The total domestic sewage discharges from major cities into the Yellow Sea (including Bohai) amount to 75 million tonnes per year. Of this, some 77% are discharged into the Bohai with the largest single contribution coming from the city of Tianjin which accounts for more than 34% of the total figure. With the expected increases in population and in living standards, the annual domestic sewage effluent from the major cities in the Yellow Sea sub-region is expected to be close to 135 million tonnes by the year 2000. This will comprise over 0.5 million tonnes of COD per year.

About 3 million tonnes of domestic sewage flow daily into the coastal areas around South Korea, contributing 0.8 million tonnes of COD daily. Approximately 75% of this effluent is discharged into rivers and has a significant effect on the riverine systems and the estuaries before causing further damage to the coastal and marine environment. Marine pollution is caused not only by sewage but also by 1 million tons of industrial wastes which are discharged from 20 coastal industrial complexes every day. The areas affected are those around Masan, Chinhae and Pohang which have low seawater circulation. The coastal areas of Incheon, Pusan, Ulsan, Gunsan, Ansan and Mokpo, which are estuarine, are also polluted by industrial wastes and sewage.

#### 4.1.3 Heavy metals

Chinese scientists have measured the concentration of mercury, cadmium, lead, zinc, copper, chrome and arsenic. They have found that levels in the Huang Hai are similar to those in open waters. However, these levels are still below the standard of first class-sea water.

#### 4.1.4 Oil

Dalian Bay, Bo Hai Bay, Lai Zhou Bay and Jiao Zhou Bay are considered to be seriously polluted by oil. The major sources include the Da Lian No 7 Oil Refinery with its discharges, the Da Gang and Sheng Li oil production fields, the Huang Dao oil terminal, and various tankers and other vessels that use the region.

There have been more than 10 incidents between 1973 and 1989 during which over 200 tonnes of oil have been spilled per incident. In 1983 a Panamanian tanker ran aground and lost 3,343 tonnes of crude; a fire caused by lightning in 1989, resulted in a significant spill which polluted areas of sea and affected scenic tourist values.

There have been nearly 1000 significant oil spill incidents in South Korean waters between 1987 and 1991 (see Table 4). Of these, two were considered major spills. The first was in 1988 when the tanker *Kyungshin-ho* sank and affected some 2,000 hectares of aquaculture production on the coast of Youngil Bay. In the other incident, the tanker *Korea Hope* collided at Incheon in 1990 and spilled 1.5 million litres of bunker-C oil causing damage to aquaculture activities and the ecosystem in general in the bay. Of the oil spills that have been recorded in South Korean waters in the past 5 years, nearly half were the result of human carelessness, 24% were intentional discharges, and only 21% were the result of an accident.

Table 4. Oil spill incidents around the South Korean coast.

	TOTAL	1987	1988	1989	1990	1991
Number of Accidents	998	152	158	200	248	240
Quantity of Oil Spills	5,586 kl	482 kl	1,058 kl	368 kl	2,421 kl	1,257 kl
Amount of Damage (in U S Dollars)	12,000,000	11,000,000	255,000	231,000	1,000,000	ND

In contrast, DPR Korea reports no accidental or other major oil spills on its eastern seaboard. However, there are occasional fine oil films on the water surface at Hamhung and Wonsan. These are thought to originate from old equipment carried by ships and are a sign of the increasing volume of shipping traffic.

Out of 80 recorded incidents of marine pollution in the coastal areas of Japan facing the East Sea in 1990, 46 involved oil spills. Of these, 34 originated from vessels, 6 from land, and the rest were from an unidentified source.

#### 4.1.5 Radionuclides

Sewage effluents discharging into the coastal regions of the Yellow Sea are known to contain some radioactive elements. This results in higher concentrations of cobalt and strontium in inshore areas than in offshore waters. Some bottom sediments have a greater affinity for accumulating

radioactive elements, but there is no obvious difference in concentration between the upper and lower levels of the water column.

Concentrations of radioactive contaminants in marine biota vary greatly with the highest levels being found in kelp.

#### **4.2 Coastal alterations**

Ground water extraction around the Bohai area is thought to be the cause of land sinking around the coastal plain. The coastline has retreated by up to 20-30km in some places.

Infilling (reclamation) on the coast of South Korea has been undertaken on 226,000 hectares between 1980 and 1989. Because this has taken place on the Yellow Sea and the South Sea coasts which are very productive, this is particularly worrying.

On the western shores of DPR Korea, the mouth of the Taedong River has been impounded by the 17-kilometre West Sea Barrage creating a permanent, freshwater environment out of the previously brackish intertidal estuarine wetlands. The shallow tidal lands nearby are also earmarked for impoundment in an ambitious project which plans to reclaim 300,000ha of tidal land.

#### **4.3 Effects on ecological resources**

Generally speaking, the Huang Hai (Yellow Sea) and its major bays remain unpolluted and the ecological resources are mainly healthy. But at some specific locations, especially near river mouths and in estuaries, toxic substances have accumulated and eutrophication has affected ecological stability.

For example, in Chang Kou Bay near Qing Dao, the beach used to be very rich in aquatic products. With the industrialization, the beach became polluted and the ecological balance disturbed: in the 1960s there were 141 commercial species; the number decreased to 30 in the 1970s, and, at the beginning of the 1980s, only 17 species were left. In Jiao Zhou Bay, after industrial discharges blackened the sandy beach and caused a terrible smell, shellfish disappeared from the area.

Russian researchers have found that over the past 40 years both the number and succession of species have decreased in Peter the Great Bay. The average benthic biomass was reduced by 33% and polychaetes and crustaceans have tended to dominate. Organisms living in a polluted sea have pronounced physiological dysfunctions, particularly reproduction dysfunction. For example, the population of sea urchins near a sewage discharge point has vanished completely over a 6-year period. At the same time, new benthic communities, comprising more tolerant polychaetes and phoronids, have appeared.

In South Korea, the inflow of polluted organic materials causes red tides and the lack of oxygen. The first red tides occurred in Chinhae bay in 1962. Until the 1970s, these occurrences were small-scale and short in duration. Since the 1980s, the Masan-Chinhae bay, a semi-enclosed sea, has experienced more severe, and longer duration red tides. Table 5 shows the frequency of large scale red tides in major coastal regions since 1987.

**Table 5. Large scale red tides in the major coastal seas around South Korea.**

<b>YEAR</b>	<b>CASES</b>	<b>COASTAL AREAS EXPERIENCING RED TIDES</b>
1987	32	Masan-Chinhae, Gohyun, Jinju, Gwangyang, Yosu, Onsan Bay etc.
1988	33	Masan-Chinhae, Gohyun, Ch'ungmu, Gwangyang, Geoje, Mokp'o Bay etc.
1989	35	Masan-Chinhae, Gohyun, Ch'ungmu, Yosu, Onsan Bay etc.
1990	42	Masan-Chinhae, Gohyun, Ch'ungmu, Gwangyang, Geoje, Incheon Bay etc.
1991	41	Masan-Chinhae, Ch'ungmu, Yosu, Gwangyang, Yungil, Incheon Bay, etc
<b>TOTAL</b>	<b>183</b>	

The situation is especially serious in the semi-enclosed Masan-Chinhae bay, where sea water cannot be exchanged adequately. Red tides now appear regularly every year, their frequency and their duration are increasing and they are gradually spreading to other semi-enclosed coastal areas.

#### **4.4 Effects on human health**

The frequency and severity of red tides in South Korea is posing a threat to the health of coastal residents. There is also concern that those consuming marine products from areas that have been affected by oil spills may be experiencing adverse health effects.

Huang Hai coastal areas are well known for the variety and quantity of fishery resources and coastal aquaculture is very common. With recent increases in coastal agriculture, industry and tourism, there has been a worrying increase in the volume of sewage discharged. Unless this is controlled and managed, there is concern that it will be harmful to public health.

## **5 REMEDIAL MEASURES**

### **5.1 Measures already adopted**

Considerable efforts have already been made at the national and international levels to reduce marine pollution and manage coastal resources in the Northwest Pacific Region.

At the national level, most countries have enacted legislation for the control of marine pollution from both land-based and sea-based sources. They have also established (albeit quite recently in some cases) the appropriate environmental institutions to implement them. The five national reports on which this Overview is based provide details of the various measures that have been adopted to control the degradation of coastal and marine environments in the Northwest Pacific Region. Some very brief examples from these reports are given below.

In the DPR Korea, the government has enacted the Law of Environmental Protection of the Democratic People's Republic of Korea and drafted legislation controlling various discharges such as oil and solid and liquid wastes from vessels. Other regulations control port management, industrial waste treatment and agricultural wastes. Following UNCED, the environmental administrative structure has been strengthened through the establishment of the State Environment Commission which reports to the Cabinet Committee on Environment chaired by the Deputy Prime Minister. DPR Korea has also carried out monitoring and supervision of coastal waters for selected parameters.

Over the past 10 years, the Chinese government has enacted a number of laws and regulations to protect and manage the coastal and marine environment. The most significant of these is the Law of Marine Environment Protection; others include Regulations for Preventing Pollution Caused by Ship, Regulations for Oil Exploration and Development, Regulations Over Rubbish Dumping into the Sea, and Regulations Over Pollution Coming from Inland Sources. Both central and local governments have been involved in scientific research on aspects of marine pollution in the fields of water quality, geography, biology, etc. The entire coastline has been surveyed and mapped.

On acceding to the London Convention and the Marpol 73/78 Convention, Japan enacted the Law relating to the Prevention of Marine Pollution and Maritime Disasters which regulates the sea disposal of wastes and controls incineration at sea, discharge of noxious liquid substances, sewage and garbage. In order to facilitate compliance with these regulations, reception facilities for oily wastes and other pollutants have been set up at 81 ports across the country. In addition, Japan adopted Water Quality Standards as well as regulations on effluent quality to protect desired uses of zoned bodies of water. Nearly 54 million people (44% of the total population) are served by sewage treatment facilities in Japan.

Russian scientists have obtained evidence of water pollution in Peter the Great Bay through water quality analyses and ecological sampling. They are now assisting with the development of national policy aimed to achieve harmony between social demands and biosphere protection through "ecological rationing of anthropogenic impact". Further interdisciplinary research is planned to delineate the extent of anthropogenic impact by comparison with pristine areas.

In the Republic of Korea, 6 central government organizations deal with marine environment issues. The Ministry of Environment sets major policy, and manages land-based pollution control and the purification of polluted sea areas. The National Fisheries Administration manages fishery resources. The Maritime and Port Administration prevents marine pollution from port development and marine transport. The Ministry of Energy and Resources manages the exploitation of energy and seabed minerals including oil and gas. The Ministry of Construction develops coastal industrial complexes and urban areas. The National Maritime Police Administration is responsible for implementing laws controlling marine pollution and dealing with oil spill incidents at sea. Local governments are responsible for the prevention and removal of solid waste and pollution from fish farms. The South

Korean government is currently examining ways to unify these separate organizations.

Efforts have also been made by various international bodies such as IMO, UNEP, ESCAP, IOC/WESTPAC, and UNESCO through unilateral or joint activities.

The International Maritime Organisation (IMO) has promoted the accession by a number of countries in the region to international conventions such as MARPOL (International Convention for the Prevention of Marine Pollution from Ships), the OPRC convention (International Convention on Oil Pollution Preparedness, Response and Co-operation) and the London Convention (Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter). Table 6 summarizes the regional situation regarding membership of various marine management conventions.

The UN Economic and Social Commission for Asia and the Pacific (ESCAP), which covers a wide area in the Indian and Pacific Oceans, has supported several initiatives related to marine and coastal environments. ESCAP has supported training on marine and coastal resource issues and publication of guidelines for management of pollution from hazardous and industrial wastes.

The Intergovernmental Oceanographic Commission (IOC) has been active in marine research, training, education, and mutual assistance in the region. Through the Sub-Commission for the Western Pacific Region (WESTPAC), the IOC has developed a programme on marine pollution research and monitoring. This programme consists of three subprojects, including assessment of river inputs, implementation of Mussel Watch, and assessment of atmospheric inputs. UNESCO has been active in this area as well, and is interested in increasing the laboratory network for the mussel watch programme.

**Table 6. Status of main marine pollution conventions in the Northwest Pacific Region**

COUNTRY	IMO CONVENTION	MARPOL CONVENTION '78 ANNEXES	LONDON (DUMPING) CONVENTION	OIL POLLUTION RESPONSE CONVENTION	INTERVENTION ON THE HIGH SEAS CONVENTION
CHINA	✓	✓ -	✓	-	✓
DPR KOREA	✓	✓ ✓	-	-	-
JAPAN	✓	✓ ✓	✓	-	✓
REP OF KOREA	✓	✓ -	-	-	-
RUSSIAN FED	✓	✓ ✓	✓	-	✓

The past efforts of national and international agencies/institutions in the management of marine resources have been fundamental to the increased awareness of marine and coastal zone problems in the region. These initiatives have for the most part focussed on the mere delineation of problems and not the solutions. With increasing pressure from population growth and accelerated economic development, there is a critical need to move from information gathering to active management of coastal and marine resources. The Regional Seas Programme can play a significant catalytic role in the region by taking the experience of initiatives in the past as well as the existing data and information base, build upon them, and develop appropriate management measures based on them.

## **5.2 Further measures**

The countries of the Northwest Pacific Region have decided to seek a common strategy through which to implement activities that will lead to an improvement in the environmental condition of their coasts and common marine areas and the maintenance and protection of environmental quality.

In developing such a strategy, Northwest Pacific States can start by examining the successful application of similar strategies in other regions which form part of the UNEP Regional Seas Programme. These can then be updated as necessary and adjusted to suit the Northwest Pacific requirements. Table 7 provides a summary of the various regions covered by the UNEP Regional Seas Programme.

Table 8 below indicates the type of wording most commonly used in operative action plans for the development and adoption of goals and objectives. Table 9 records the frequency with which certain topics appear among the various objectives adopted by operative regional action plans for the protection of the coastal and marine environment.

The five national reports refer to their national policies and philosophies and discuss a number of goals and objectives for the Northwest Pacific Action Plan, explicitly and implicitly. As can be expected, each of the national reports tends to focus on goals and objectives reflecting the particular country's circumstances. In the main, the proposals put forward by the five national reports are in harmony with the chief adopted goals and objectives of operative action plans as summarized below.

Taking the proposals put forward in the various national reports and bearing in mind the experience in operative action plans, it is proposed that the key to a successful strategy for applying remedies where needed, protecting what is still of good quality, and obtaining the best sustainable benefits from coastal resources, lies in good management. But, good management must be preceded by a clear understanding of the environment and resources that are to be managed. This resource information must, in turn, be organized in a useable and accessible format. Then, there is a need to plan for management and, having planned, there is a need for an equitable but firm legal basis. Therefore, the strategy for good management of the Northwest Pacific coastal and marine environment should consist of 6 main elements:

- assessment of the environmental condition
- efficient and effective information base
- management of risk and pollution emergencies
- regional legal framework
- integrated coastal area planning
- integrated coastal area management

Each of these elements is discussed further below.



**Table 7. UNEP Regional Seas Programme - Summary**

NAME OF THE REGION	MEMBER STATES AND TERRITORIES	AGENCIES INVOLVED	ACTION PLAN		CONVENTION			PROTOCOLS
			YEAR ADOPTED	COORDINATION	SIGNED	IN FORCE	SECRETARIAT	
<b>Mediterranean Action Plan (MED)</b>	Albania, Algeria, Bosnia and Herzegovina, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Morocco, Slovenia, Spain, Syria, Tunisia, Turkey, Socialist Federal Republic of Yugoslavia	UN, UNDP, ECE, FAO, UNESCO, IOC, WHO, WMO, IMO, UNIDO, IAEA, IUCN, EC, ICSEM, ICES.	1975	MEDU (Athens) Greece	1976	1978	UNEP (Nairobi) Kenya	Dumping from Ships and Aircraft. Cooperation on Oil Combating. Land-Based Sources. Specially Protected Areas.
<b>Kuwait Action Plan (KAP)</b>	Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates	UN, UNDP, ECA, FAO, UNESCO, IOC, WHO, WMO, IMO, UNIDO, IAEA, IUCN.	1978	ROPME (Kuwait)	1978	1979	ROPME (Kuwait) Kuwait	Cooperation on Oil Combating. Shelf Exploration and Exploitation. Land-Based Sources.
<b>West and Central African Action Plan (WACAF)</b>	Angola, Benin, Cameroon, Cape-Verde, Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mauritania, Namibia, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone, Togo, Zaire	UN, UNDP, ECA, FAO, UNESCO, IOC, WHO, WMO, IMO, UNIDO, IAEA, IUCN.	1981	OCA/PAC UNEP (Nairobi) Kenya	1981	1984	UNEP (Nairobi) Kenya	Cooperation on Pollution Combating.
<b>Caribbean Action Plan (CAR)</b>	Antigua and Barbuda, Bahamas, Barbados, Belize, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, EEC, France, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Netherlands, Nicaragua, Panama, St. Kitts and Nevis, St. Lucia, St. Vincent and Grenadines, Suriname, Trinidad and Tobago, United Kingdom, United States of America, Venezuela	UN, UNDP, ECLAC, FAO, UNESCO, IOC, WHO, WHO/PAHO, WMO, IMO, UNIDO, IAEA, IUCN, CCA, CARICOM, OAS, EC.	1981	CAR RCU (Kingston) Jamaica	1983	1986	UNEP (Nairobi) Kenya	Cooperation on Oil spills Combating. Specially Protected Areas.
<b>Red Sea and Gulf of Aden Action Plan (RED)</b>	Egypt, Jordan, Palestine, Saudi Arabia, Somalia, Sudan, Yemen	UN, UNDP, ECA, FAO, UNESCO, IOC, WHO, WMO, IMO, UNIDO, IAEA, IUCN, ALECSO.	1982	PERSGA ALECSO (Jeddah) Saudi Arabia	1982	1985	PERSGA (Jeddah) Saudi Arabia	Cooperation on Oil Combating.

NAME OF THE REGION	MEMBER STATES AND TERRITORIES	AGENCIES INVOLVED	ACTION PLAN		CONVENTION			PROTOCOLS
			YEAR ADOPTED	COORDINATION	SIGNED	IN FORCE	SECRETARIAT	
East Asian Seas Action Plan (EAS)	Australia, Cambodia, China, Indonesia, Malaysia, Philippines, Singapore, South Korea, Thailand, Vietnam	UN, UNDP, ESCAP, FAO, UNESCO, IOC, WHO, WMO, IMO, UNIDO, IAEA, IUCN, ASCOPE.	1981	EAS RCU (Bangkok) Thailand	no	con	vention	
South East Pacific Action Plan (SE/PCF)	Chile, Colombia, Costa Rica, Ecuador, El Salvador, Honduras, Nicaragua, Panama, Peru	UN, UNDP, ECLAC, FAO, UNESCO, IOC, WHO, WMO, IMO, UNIDO, IAEA, IUCN, CPPS, OAS.	1981	SE/PCF RCU CPPS (Lima) Peru	1981	1986	CPPS (Lima) Peru	Cooperation in Case of Emergencies. Cooperation on Oil and Harmful Substances. Combating Land Based Sources. Conservation of Protected Areas. Against Radioactive Contamination.
South Pacific Action Plan (SPREP)	American Samoa, Australia, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, New Zealand, Niue, Northern Marianas Islands, Palau, Papua New Guinea, Pitcairn, Solomon Islands, Tonga, Tuvalu, United States of America, Vanuatu, Wallis and Futuna, Western Samoa and South Pacific territories of France.	UNDP, ESCAP, FAO, UNESCO, IOC, WHO, WMO, IMO, IAEA, IUCN, SPC, Forum Secretariat.	1982	SPREP SPC (Apia) Western Samoa	986	1990	SPC (Noumea) New Kaledonia	Cooperation on Pollution Emergencies. Prevention of Pollution from Dumping.
Eastern African Action Plan (EAF)	Comoros, EEC, France, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, United Republic of Tanzania, France (La Reunion).	UN, UNDP, ECA, FAO, UNESCO, IOC, WHO, WMO, IMO, UNIDO, IAEA, IUCN, EC.	1985	OCA/PAC UNEP (Nairobi) Kenya	1985	not yet in force	UNEP (Nairobi) Kenya	Protected Areas and Species. Cooperation on Oil Combating

<b>South Asian Seas Action Plan (SAS)</b>	Bangladesh, India, Maldives, Pakistan, Sri Lanka (Indian Ocean Basin-wide Experiment (IOBE)).	UN, UNDP, ESCAP, FAO, UNESCO, IOC, WHO, WMO, IMO, UNIDO, IAEA, IUCN, SACEP, IOMAC.	1995	SACEP (Colombo Sri Lanka)	n o	c o n v	e n t i o n	
<b>Black Sea Action Plan (BSAP)</b>	Bulgaria, Georgia, Romania, Russian Federation Turkey, Ukraine,	World Bank, UNDP, IOC, FAO, IMO, IAEA, WHO	plan being developed	-	1992	1994	to be established	Pollution from Land-Based Sources. Oil Pollution Emergencies. Against Dumping Pollution.
<b>Northwest Pacific Action Plan (NOWPAP)</b>	China, Japan, the Democratic People's Republic of Korea, the Republic of Korea, Russian Federation	-	1994	-	n o	c o n v	e n t i o n	
<b>Southwest Atlantic Action Plan (SWAT)</b>	Argentina, Brazil, Uruguay	-	plan being developed	-	n o	c o n v	e n t i o n	

**Table 8. Goals from a number of operative regional action plans**

REGION	WORDING FOR OVERALL GOALS AND PRINCIPAL OBJECTIVES
East Asian Seas <sup>2</sup> , West & Central Africa <sup>3</sup> , Kuwait Region <sup>4</sup>	The development and protection of the marine environment and the coastal areas for the promotion of the health and well-being of present and future generations ... to provide a framework for an environmentally-sound and comprehensive approach to coastal area development particularly appropriate to the needs of the region.
Southeast Pacific <sup>5</sup>	To protect the marine environment and coastal areas, in order to promote the conservation of the health and well-being of present and future generations ... to provide an appropriate framework for the establishment of a suitable comprehensive policy which will enable this objective to be attained, bearing in mind the specific needs of the region.
Caribbean <sup>6</sup>	To assist the Governments of the region in minimizing environmental problems in the wider Caribbean through assessment of the state of the environment and development activities in environmental management ... a framework for activities requiring regional cooperation in order to strengthen the capacity of the States and Territories for implementing sound environmental management practices and thus achieve the development of the region on a sustainable basis.
South Pacific (SPREP) <sup>7</sup>	To help the countries of the South Pacific to maintain and improve their shared environment and to enhance their capacity to provide a present and future resource base to support the needs and maintain the quality of life of the people.

### 5.2.1 Assessment of the environmental condition

The wise use, development and management of resources must be based on a sound information base, adequate knowledge of natural processes, an understanding of the interrelationships between living resources and between them and their environment, as well as their range of tolerance to various stresses. It is, therefore, appropriate for the Northwest Pacific Action Plan to adopt such an assessment of the environment as its first area of activity. This assessment and recording of environmental characteristics, the living and non-living resources, and the human use of the resources, is needed on a comprehensive, regional basis. It is also important to establish a baseline against which the NOWPAP activities can be evaluated. Such evaluations have already been undertaken in places, but this is a continuing process and comprises monitoring, sampling and review.

<sup>2</sup> Action Plan for the Protection and Development of the Marine and Coastal Areas of the East Asian Region. UNEP Regional Seas Reports and Studies No. 24, 1983.

<sup>3</sup> Action Plan for the Protection and Development of the Marine Environment and Coastal Areas of the West and Central African Region. UNEP Regional Seas Reports and Studies No. 27, 1983.

<sup>4</sup> Action Plan for the Protection of the Marine Environment and the Coastal Areas of Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. UNEP Regional Seas Reports and Studies No. 35, 1983.

<sup>5</sup> Action Plan for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific. UNEP Regional Seas Reports and Studies No. 20, 1983.

<sup>6</sup> Action Plan for the Caribbean Environment Programme. UNEP Regional Seas Reports and Studies No. 26, 1983.

<sup>7</sup> Action Plan for Managing the Natural Resources and Environment of the South Pacific Region. UNEP Regional Seas Reports and Studies No. 29, 1983.

**Table 9. Summary of topics covered by objectives set in the ten operative action plans.**

OBJECTIVES, OR TOPICS COVERED BY OBJECTIVES	TALLY
Promote sustainable development and sound management; protect and manage; develop guidelines for management activities with an impact.	//////
Promote appropriate policies and legislation for protection and development of marine and coastal environment at national and regional level, including compensation measures for ecological damage.	//////
Enhance consultation and technical cooperation among the States of the region; strengthen and encourage regional collaboration on projects of mutual interest; promote regional self-reliance through sharing common experiences.	//////
Assess state of the environment, including socio-economic development, environmental quality, needs of governments to enable them to solve problems; inventory of natural resources, as a sound basis for environmental management.	//////
Institutional mechanisms and structures, financial measures and supporting measures for successful implementation.	//////
Stimulate growth of public awareness.	///
Prevent coastal and marine pollution; consolidate pollution monitoring, research and control.	//
Provide protection and rational development of living resources, and ecosystems, of the region.	//
Encourage development to be directed towards maintaining or enhancing environmental quality.	//
Emphasize economic and social importance of coastal and marine resources.	//
Improve training and assistance at all levels.	//
Increase preparedness to respond individually and collectively to pollution emergencies and other disasters whether natural or of human origin.	//
Control pollution from land-based sources.	//
Promote integrated coastal zone management to prevent chronic erosion.	✓
Develop conventions/protocols to counter hazardous wastes dumping.	✓
Reduce atmospheric pollution.	✓
Avoid/mitigate impact of human activities through means such as the EIA process.	✓
Manage and sustain marine environment and resources to safeguard quality and meet needs and promotion of health and well-being of present and future generations.	✓
Stimulate and coordinate international assistance to region; provide assistance to all countries recognizing especially the needs of the smaller countries in the region.	✓

Regular monitoring and surveillance of coastal and offshore waters involve maintaining a continuous record of selected variables, usually over a long period of time. It involves checking and controlling of activities to ensure compliance with set conditions. It ensures that predictions about the consequences of a particular decision were correct and provides early enough warning of performance failures to mitigate them according to a planned strategy. Unfortunately, much monitoring is done without adequate justification or planning, resulting in extravagant and expensive masses of data being collected never to be used. This is brought about by a misunderstanding which leads to monitoring being seen as an end in itself instead of as a means to an end.

In order to achieve regional harmony in assessment and monitoring, it is essential that member States agree on consistent parameters that are to be measured, consistent measuring techniques and consistent analysis of the results. International agencies such as IOC can assist with intercalibration to ensure that measurements and data processing are not only compatible within the region, but also in harmony on a global scale. Collaborating States will also benefit from the opportunities for technology transfers, specialized training, and the creation and use of regional centres of excellence.

NOWPAP States have already identified some tasks and activities along the above lines which they wish to collaborate on. These involve proposals for investigative research (Russia, Japan, China) and surveys and monitoring (South Korea, DPR Korea, Japan).

### **5.2.2 Efficient and effective information base**

The countries of the Northwest Pacific region are rich in data and information. Other data systems have also been developed by international agencies such as IOC and FAO on a regional basis. The above activity will generate even more data on a region-wide basis. This information and these data are useless unless they are properly organized and managed in a manner which will make it accessible to those who need it most (usually, not the scientists and researchers who collected the data in the first place).

It is proposed that administrators and managers who seek a wise balance between the many conflicting demands being made on the coastal environment ensuring that its limits of tolerance and its capacity for sustainability are not exceeded, are the priority users of the resource data. The data should, therefore, be organized and structured to satisfy their needs.

One instrument that can help collate, analyse, synthesise and apply large amounts of information in a simple, visual representation, is the electronic database organized on a geographic spatial basis (GIS). It is its capacity to juxtapose resource data, demands, potential effects and the various factors influencing them, on to a single, graphic representation, that makes an electronic database such a versatile and sound tool for decisions on resource use.

However, although a GIS is likely to meet the current needs of a number of administrative institutions in the NOWPAP region and perhaps a few academic and research agencies as well, its electronic format will keep a GIS beyond the reach of a large number of potential users. It will probably exclude the teaching profession, the tourism and hotel industry, village administrators, conservationists, fishing cooperatives and the general public from gaining the potential benefits. Therefore, as a first, major substantive output of the database, consideration should be given to a series of maps, at an appropriate scale, covering the entire NOWPAP coastline and marine areas. The maps should be accompanied by explanatory text and produced firstly in country sets for use as working documents; secondly, bound together and published as a single regional atlas.

The beneficiaries of the GIS database, the country map sets and the NOWPAP Regional Atlas will be the people of the Northwest Pacific region who, in the face of development, must make hard decisions affecting the coastal environment and resources. Better planning and soundly-based decisions, made possible by the comprehensive information base provided by resource maps, will lead to wiser use of resources, help reduce wastage of non-renewable resources, avoid conflicts and ensure sustainability for future generations. The following table identifies the likely beneficiaries of the GIS Database, the country sets of maps, the Regional Atlas, and printouts which will be available on demand from the database.

**Table 10. Likely beneficiaries for the products of an effective information base**

	GIS DATABASE	COUNTRY ATLAS	REGIONAL ATLAS	DEMAND PRINTOUT
National leaders Politicians Decision-makers		✓	✓	✓
Contingency planners Emergency services	✓	✓		✓
Administrators Managers Planners	✓	✓	✓	✓
Universities Other tertiary institutions Research institutions	✓	✓	✓	
Teachers Senior secondary pupils		✓	✓	
Developers Industrialists Public utilities	✓	✓	✓	✓
Port developers Shipping concerns Sport yachtsmen	✓	✓	✓	
Tourism operators Hotel owners		✓	✓	
Fisheries concerns Marine farmers		✓		
Museums Conservation NGOs Residents' groups	✓	✓	✓	
International aid agencies Investment organizations Donor institutions	✓	✓	✓	
Tourists, visitors General public		✓	✓	

### 5.2.3 Managing risk and pollution emergencies

As can be seen from Table 7, nine operative action plans include provisions for regional collaboration in case of marine pollution emergencies. The most common of such emergencies is a shipping disaster which gives rise to the spillage of oil or a similar hazardous substance. Although such eventualities will be covered by broader commitments to cooperative action, the urgency that accompanies them requires special arrangements and undertakings.

For example, the region must have an inventory of equipment stockpiles in each country as well as a directory of regional experts who may be required to give advice. Channels of communication, even outside office hours, must be predetermined and tested regularly. Experts who are likely to be required to travel to the scene of a disaster should be pre-cleared or exempt of all border, visa and similar formalities to expedite their deployment anywhere within the region in the shortest

possible time. Likewise, materials and equipment needed to combat the emergency should be exempt from any customs or other duty requirements.

Consideration should be given to the setting up and staffing of one or more regional emergency centres to be maintained in a continuous state of readiness to assist whichever country in the region requires assistance.

Total compatibility of plans, procedures and equipment between member countries is absolutely essential. This can be achieved through the cooperative approach to contingency planning on a regional basis, as well as the collective training of emergency personnel. The regular secondment or mutual exchange of personnel will engender familiarity with each other's working environment and smooth the way to effective assistance in an emergency.

The need for such cooperation in the NOWPAP Region has been recognized by the member states and is mentioned specifically by China, Republic of Korea and Japan.

#### **5.2.4 Regional legal frameworks**

It is more effective to prevent the degradation of the environment than to attempt to rehabilitate affected areas. This is best done through the implementation of fair and equitable laws, regulations and procedures. This is obvious in the case of national territory, but it is also true for international waters. Without regional or international agreements to govern behaviour in international waters, national efforts in coastal and territorial waters might be ineffective.

In adopting the Northwest Pacific Action Plan member States will be entering into a commitment to act in a collaborative manner with respect to their common coastal and marine environment. The depth of the commitment to act collectively or individually towards agreed common goals is demonstrated best through the exchange of legal undertakings in the form of a regional convention. Such a convention, together with its corollary protocols, also provides the reassurance needed for States to rely on the regional capabilities to cope with marine and coastal emergencies many of which transcend national boundaries.

As of early 1994, UNEP had facilitated nine regional conventions (of which eight have come into force) and some 23 protocols and agreements for the protection and management of the coastal and marine environment (see Table 7). Only the East Asian Seas region and the South Asian Seas region, among the operative regional seas programmes, do not have a convention.

It is, therefore, considered desirable for NOWPAP States to work towards the development of a regional convention for the protection and management of the coastal and marine environment and the resources of the Northwest Pacific region, and to explore the possible protocols that could be adopted to formalize the commitment to mutual cooperation, assistance (especially in emergencies), and collaboration.

The South Korea national report discusses the need for such an agreement which it says, could be modelled on the Paris or Helsinki conventions which govern environmental behaviour in other parts of the world. The national report of China also proposes that NOWPAP States should work towards a "regional compact".

#### **5.2.5 Integrated coastal area planning**

The NOWPAP region is among the most highly populated areas of the world, and the pressures and demands that this large population brings to bear on the environment are also considerable. It is possible to strike a wise balance between providing for human needs, resource use, and



development on one hand, and the protection, enhancement and sustainability of the environment, on the other. Such a balance will be struck through an effective administrative system that relies on good planning and management.

Environmental planning is an orderly and rational process which prepares for the wise management, protection and use of the environment, its resources, and the actions of those who live within it and depend on it. The aim of environmental planning is to predict the likely consequences of decisions and actions on the wide environment and to provide an opportunity to eliminate or minimize unwanted consequences. Environmental planning eliminates "surprises". It also prevents embarrassment through unexpected effects. The process of environmental planning sets or underscores existing goals and objectives, identifies and helps to resolve conflict, provides a framework for rational and purposeful decisions, guides the deployment of finite resources, and provides a mechanism by which the performance of environmental managers can be measured. It is foolish to attempt to manage environment and resources without adequate planning.

#### **5.2.6 Integrated coastal area management**

Economic development and environmental protection need not be incompatible. Many countries have responded positively to the need to harmonize economic development with protection of the environment.

The extent of economic development is often reflected by the extent of environmental damage in coastal and marine waters. Industrial activities, urbanisation and human settlement, port development, chemical use in agriculture, intensive aquaculture and tourism development often accompany economic development. Discharges into coastal waters directly or indirectly (through rivers) from such land-based sources comprise the major sources of marine pollution. It is necessary to search for an effective mechanism to reduce, control and manage environmental damage while at the same time encouraging rational development and use of coastal resources.

The integrated coastal zone management (ICZM) approach is one way through which coastal managers can attempt to resolve these conflicts in resource use. ICZM represents a shift from a reactive, problem-oriented approach to a planned, pre-emptive, and management-based approach. It is comprehensive, embracing both land and water and addresses the multiple demands on both. It provides a conceptual framework within which the cumulative, multisectoral environmental consequences of development can be managed to remain within assessed and tolerable limits. The ICZM approach was identified by Agenda 21 of UNCED as the most effective mechanism that could manage the marine environment and achieve sustainability.

#### **5.3 Collaborative and cooperative framework**

The Activities selected by NOWPAP member countries will require review from time to time, and their relative priority could change to reflect the changing regional situation. The Projects will certainly be finite and those completed successfully will need to be wound up and evaluated and new ones adopted. These changes in Activities and the closing of old Projects and adoption of new ones is something which will need to happen regularly - annually, or at least biennially. The body charged with this review function must be made up of senior representatives of the member States. Some examples of the mechanisms set up by other Regions are summarized in Table 11. It would seem that the most successful and stable decision-making bodies for a number of action plans are those that are set up under a regional convention as a bureau or council of the contracting parties.

The implementation of the Action Plan will comprise a number of projects running in parallel. These projects will be entrusted to national institutions to the extent that the institutions are capable. In this the institutions should be supported by relevant regional and international organizations, particularly those that are already active in the region. Where necessary, national institutions

should be strengthened to enable them to participate effectively in the various projects. Until such time as national and regional institutions can undertake all activities under the Action Plan, and whenever a particular project so requires, local capabilities may be supplemented by assistance of experts from outside the region.

In view of the multiple projects that are possible and the scattered nature of the various activities, as well as the wide scope of input possible from both within and outside the region, implementation of the Action Plan must be coordinated. Of the eleven Regional Programmes that are fully operational, three rely entirely on UNEP's OCA/PAC in Nairobi, three others have a UNEP coordinating unit within the region, the other four have set up their own coordinating units within the region (with the help of UNEP and other agencies), while one is currently operational with GEF support.

Until such time as an RCU is established and functioning effectively, the member Governments should consider designating UNEP as the organization responsible for the coordination of the implementation of the Action Plan, and invite the Executive Director of UNEP to prepare, in cooperation with the competent international, regional and national organizations, a detailed programme document describing the operational details of projects to be developed on the basis of priorities identified by the member Governments.

In the early phases of the implementation of an action plan some external financial assistance is usually required. Direct financial support from UNEP and in-kind contributions from United Nations and other bodies have been made available in the initial stages of various regional seas programmes. However, participating States are made fully aware of the need for financial commitments on their part and the gradual reduction of UNEP financial support. These commitments usually result in the establishment of a trust fund for the implementation of the action plan. The ratio of members' financial contributions to contributions from the United Nations system should increase until the financing of the action plan is independent of funding from the United Nations system. Nevertheless, United Nations bodies and other international and regional organizations, may (and usually do) continue to make contributions, in cash or in kind, to the work being carried out under the action plan.

Some of the current financial arrangements of operational regional programmes are listed in Table 11 above. UNEP Regional Seas Reports and Studies No. 19 Rev. 6 "UNEP Oceans Programme: Compendium of Projects" contains basic information on practically all projects supported by UNEP which were, or are, related to the protection of the oceans and coastal areas and the development of their resources. It also comprises information on the size and origin of the financial resources used in these projects. This publication can be used for a quantitative analysis of financial aspects of the operational regional seas programmes.

All operative regional seas programmes have established a Trust Fund and it is recommended that the NOWPAP member States establish a Trust Fund for the Protection and Management of the Coastal and Marine Environment and the Resources of the Northwest Pacific region. The Trust Fund will be managed by the decision-making body and will be contributed to by each of the member States. The frequency of contributions will be annual or biennial as decided by the decision-making body. The overall amount will be agreed to mutually, according to the budget set at the beginning of each year or biennium and the relative amounts will be according to the established United Nations formula.

NOWPAP member States may also wish to consider making voluntary contributions towards the implementation of the Action Plan through donations in cash or in kind to any of their national institutions which are serving as NOWPAP centres of excellence, or participating in any other way in NOWPAP activities.

**Table 11. Decision-making bodies set up by operative Regional Seas Programmes and examples of existing financial arrangements for operational action plans.**

REGION	DECISION BODY	COMMENTS	FINANCIAL ARRANGEMENTS
Mediterranean	Intergovernmental meeting of the contracting parties to the Barcelona Convention	Continuous control over the programme is carried out through an elected Bureau of six members headed by a minister, that meets every six months.	Trust Fund, UNEP Environment Fund, Others
Caribbean	Intergovernmental meeting of the Contracting Parties to the Cartagena Convention	In recent times, the intergovernmental meeting has been held jointly with a meeting of the contracting parties to the Cartagena Convention.	Trust Fund, UNEP Environment Fund, Others
Southeast Pacific	Intergovernmental meeting of the Contracting Parties to the Lima Convention	Programme control carried out by regular intergovernmental meeting on the Action Plan.	Trust Fund, UNEP Environment Fund
Kuwait Region	Council and an Executive Committee of Regional Organization for the Protection of the Marine Environment (ROPME)	Control over programme and budget by the Council and intersessionally by an Executive Committee of ROPME composed of four members headed by the current Chairman of the council.	Regional Trust Fund, managed by ROPME and with limited support from UNEP Environment Fund
Eastern Africa	Intergovernmental meeting on the Eastern African Action Plan	When convention is ratified by six parties and it enters into force, control will pass to the meeting of contracting parties.	Trust Fund, UNEP Environment Fund
West and Central Africa	Intergovernmental meeting of the Contracting Parties to the Abidjan Convention	Regular meetings of the contracting parties exercise control.	Trust Fund, Contracting Parties, UNEP Environment Fund
East Asian Seas	Coordinating Body on the Seas of East Asia (COBSEA)	Reviews and evaluations undertaken by regular meetings of COBSEA.	Trust Fund, UNEP Environment Fund, Support from others
South Pacific (SPREP)	Intergovernmental meeting of the Contracting Parties to the Noumea Convention	Reviews and evaluations undertaken by regular meetings of the governments and SPREP Administration parties.	Trust Fund, UNEP Environment Fund
Red Sea & Gulf of Aden	Council of the Programme for the Environment of the Red Sea and Gulf of Aden (PERSGA)	Reviews of programme implementation by an Interim Council of PERSGA under the auspices of the Arab League.	Limited budget provided by the Arab League
South Asian Seas	Intergovernmental meetings	Cooperative environment programmes are expected to assume a more active role.	UNEP Environment Fund Support from others
Southwest Atlantic	Plan still under consideration		
Black Sea	Plan still under consideration	The Black Sea Convention provides for a Commission and meetings of the Contracting Parties.	

## **6 CONCLUSIONS AND RECOMMENDATIONS**

- 6.1** The Northwest Pacific Region can be characterized by vast river flats in the west which are intensely cultivated and densely populated; mountains in the north, east and southeast, which are mainly forested but with pockets of intense cultivation and high population densities and a narrow southwest side open to the Pacific Ocean through the East China Sea.
- 6.2** In common with most other parts of the world, the most serious marine pollution problems in the Northwest Pacific Region arise from sources on land. These reach the coast either from direct discharges or indirectly through rivers and streams. The latter often include non-point sources such as from agricultural and horticultural land. Pollution from sources at sea originates from shipping, from oil exploration and production platforms, and from dumping. Accidental discharges normally constitute very visible and acute episodes. However, chronic leakages and other insidious discharges over long periods of time can be just as serious if not more so. Significant pollution levels are being experienced in areas where intensive aquaculture is being practised.
- 6.3** Most sources of pollution such as industrial activity, urbanization, port development, the use of agricultural chemicals, intensive aquaculture, and the development of tourism facilities are all the result of economic development. Northwest Pacific countries have recognized that this does not need to be so, since development and environmental protection are not necessarily in conflict.
- 6.4** In order to achieve the balance necessary for sustainable use of coastal and marine resources the countries of the Northwest Pacific Region have decided to adopt a joint action plan for the region.
- 6.5** Many past efforts by national and international agencies/institutions in the management of coastal and marine resources and have been fundamental to the increased awareness of marine and coastal zone problems in the Northwest Pacific Region. However, these initiatives have for the most part focussed on the mere delineation of problems and not the solutions. It is now necessary to move from information gathering to active management of coastal and marine resources.
- 6.6** The UNEP Regional Seas Programme can play a significant catalytic role in the Northwest Pacific Region by taking the past experiences and successes of the Programme in other regions, as well as the amassed data and information base available locally, and develop the proposals put forward in the various national reports into a successful strategy for applying remedies where needed, protecting what is still of good quality, and obtaining the best sustainable benefits from coastal resources. These are the elements of good management.
- 6.7** Good management must be preceded by a clear understanding of the environment and resources that are to be managed, and this resource information needs to be organized in a usable and accessible format. Then, there is a need to plan for management and, having planned, there is a need for an equitable but firm legal basis. Therefore, the strategy for good management of the Northwest Pacific coastal and marine environment should consist of 6 main elements:
  - assessment of the environmental condition
  - efficient and effective information base
  - managing risk and pollution emergencies
  - regional legal framework
  - integrated coastal area planning
  - integrated coastal area management

- 6.8 The wise use, development and management of resources must be based on a sound information base, adequate knowledge of natural processes, an understanding of the interrelationships between living resources and between them and their environment, as well as their range of tolerance to various stresses. It is therefore appropriate for the Northwest Pacific Action Plan to adopt such an assessment of the environment as its first area of activity.
- 6.9 Information and data are useless unless they are properly organized and managed in a manner which will make them accessible by those who need them most (usually, not the scientists and researchers who collated them in the first place). One instrument that can help collate, analyse, synthesise and apply large amounts of information in a simple, visual representation, is the electronic database organized on a geographic spatial basis (GIS). It is its possibility to juxtapose resource data, demands, potential effects and the various factors influencing them, on to a single, graphic representation, that makes an electronic database such a versatile and sound tool for decisions on resource use. However, the electronic format of a GIS will keep it beyond the reach of a large number of potential users such as the teaching profession, the tourism and hotel industry, village administrators, conservationists, fishing cooperatives and the general public. Therefore, as a first, major substantive output of the database, consideration should be given to a series of maps accompanied by appropriate text and produced firstly in country sets for use as working documents; and secondly, bound together and published as a single regional atlas.
- 6.10 In adopting the Northwest Pacific Action Plan member States will be entering into a commitment to act in a collaborative manner with respect to their common coastal and marine environment. The depth of the commitment to act collectively or individually towards agreed common goals is demonstrated best through the exchange of legal undertakings in the form of a regional convention.
- 6.11 A regional convention, together with its corollary protocols, also provides the reassurance needed for States to rely on the collective regional capabilities to cope with marine and coastal emergencies, many of which transcend national boundaries.
- 6.12 Environmental planning is an orderly and rational process which prepares for the wise management, protection and use of the environment, its resources, and the actions of those who live within it and depend on it. The aim of environmental planning is to predict the likely consequences of decisions and actions on the wider environment and to provide an opportunity to eliminate or minimize unwanted consequences. Environmental planning eliminates "surprises". It also prevents embarrassment through unexpected effects. The process of environmental planning sets or underscores existing goals and objectives, identifies and helps to resolve conflict, provides a framework for rational and purposeful decisions, guides the deployment of finite resources, and provides a mechanism by which the performance of environmental managers can be measured. It is foolish to attempt to manage environment and resources without adequate planning.
- 6.13 The integrated coastal zone management (ICZM) approach is one way through which coastal managers can attempt to resolve conflicts in resource use. ICZM represents a shift from a reactionary, problem-oriented approach, to a planned, pre-emptive, and management-based approach. It is comprehensive, embracing both land and water and addresses the multiple demands on both. It provides a conceptual framework within which the cumulative, multisectoral environmental consequences of development can be managed to remain within assessed and tolerable limits. The ICZM approach was identified by Agenda 21 of UNCED as the most effective mechanism that could manage the marine environment and achieve sustainability.
- 6.14 The Activities selected by NOWPAP member countries will require review from time to time, and their relative priority could change to reflect the changing regional situation. The Projects

will certainly be finite and those completed successfully will need to be wound up and evaluated and new ones adopted. These changes in activities and the closing of old Projects and adoption of new ones is something which will need to happen regularly: annually, or at least biennially. The body charged with this review function must be made up of senior representatives of the member States. It would seem that the most successful and stable decision-making bodies for a number of existing regional action plans are those that are set up under a regional convention as a bureau or council of the contracting parties.

- 6.15 In view of the multiple projects that are possible and the scattered nature of the various activities, as well as the wide scope of input possible from both within and outside the region, implementation of the Action Plan must be coordinated. This is best achieved through the establishment of a Regional Coordinating Unit (RCU). Until such time as an RCU is established and functioning effectively, the member Governments should consider designating UNEP as the organization responsible for the coordination of the implementation of the Action Plan, and invite the Executive Director of UNEP to prepare, in cooperation with the competent international, regional and national organizations, a detailed programme document describing the operational details of projects to be developed on the basis of priorities identified by the member Governments.
- 6.16 Direct financial support from UNEP and in-kind contributions from United Nations and other bodies have been made available in the initial stages of various regional seas programmes. However, participating States are made fully aware of the need for financial commitments on their part and the scaled reduction of UNEP financial support. These commitments usually result in the establishment of a trust fund for the implementation of the action plan. It is therefore recommended that NOWPAP participating governments establish a Trust Fund to be managed by the decision-making body and will be contributed to by each of the member States. The frequency of contributions will be annual or biennial as decided by the decision-making body. The overall amount will be agreed to mutually, according to the budget set at the beginning of each year or biennium and the relative amounts will be according to the established United Nations formula.

## **7. REFERENCES**

**This Overview is based primarily on the national reports prepared by the National Focal Points of the People's Republic of China, the Democratic People's Republic of Korea, the Republic of Korea, the Russian Federation, and Japan. The national reports will be published in the UNEP Regional Seas Reports and Studies series.**

**Additional data, maps, and other documents were kindly made available by experts from the above member countries. They have been deposited in the library of the UNEP Oceans and Coastal Areas Programme Activity Centre (OCA/PAC), UNEP Headquarters, Nairobi, Kenya.**