



Northwest Pacific Action Plan (NOWPAP)

INTRODUCTION

The Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region (NOWPAP) is composed 4 member states: the People’s Republic of China, Japan, the Republic of Korea, and the Russian Federation. The region boasts coastal and island ecosystems with diverse marine life and commercially important fishing resources. Because the region is also one of the most densely populated in the world, the four member states are committed to wisely managing and developing the marine and coastal environment to secure the region’s sustainability for future generations.



The Northwest Pacific region and its marine ecosystems provide many services including food security and contributes significantly to the livelihoods of many coastal communities. Yet, the Northwest Pacific region and its biodiversity are under multiple threats and pressures including coastal development, industry, transport, and oil production. The regional mechanism for responding to these threats that are trans-boundary in nature is the Northwest Pacific Action Plan (NOWPAP) which was adopted in 1994 and promotes compliance with existing international environmental agreements, including the Convention of Biological Diversity.

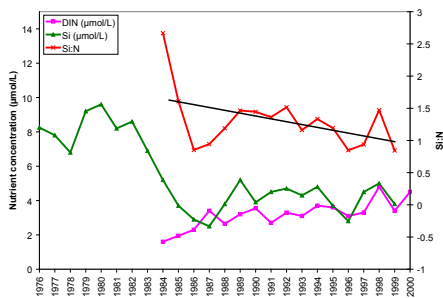
Member States of NOWPAP face many challenges in protecting and managing their marine biodiversity, economic development, food security and climate change for example. The outlook for biodiversity in marine and coastal waters of member states is uncertain, taking into account predictions of rising sea surface temperatures and acidity of marine waters, and changes in fish and fisheries. However, these forecasts and predictions on the future of marine biodiversity will undoubtedly be influenced by policy decisions taken today and the levels of investments channeled towards protecting and managing the Northwest Pacific region. This report provides a baseline based on selected marine pressure, state, response indicators and an outlook to 2050 for policy makers to measure progress in meeting marine biodiversity targets.

PRESSURES

The coastal areas of many NOWPAP member states are densely populated with some of the world's mega cities such as Tokyo, Busan, and Shanghai. Many cities in Asia have limited wastewater infrastructure with sewage often entering coastal areas untreated. These mega-cities are also important ports which facilitate international trade - key to their economic development, but also at risk of receiving alien marine species. Behind many of these densely populated areas are intense agricultural systems and in some countries aquaculture facilities..

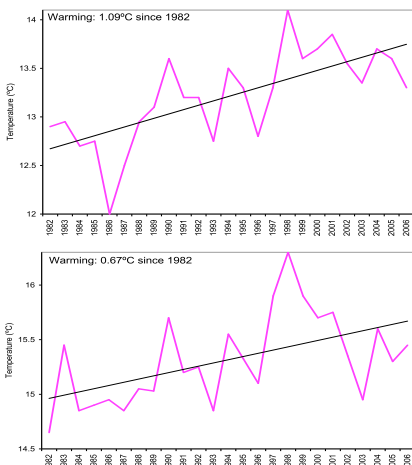
Nutrient Loading

In the NOWPAP region, nutrient inputs continue to contribute to eutrophication of coastal waters and changes in phytoplankton communities. The decreasing silica/nitrogen ratio (Si:N), and nitrogen/phosphorous (N:P) ratio in the Yellow Sea affect coastal phytoplankton communities which are the base of marine food chains.



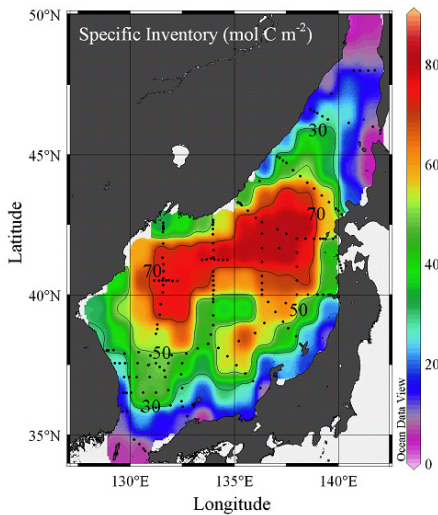
Sea Surface Temperature

The eastern part of the NOWPAP region has been classified as a super-fast warming large marine ecosystem (upper graph), and the western part as fast warming (lower graph). This warming is not uniform: it is suggested that the warming accelerated after 1985 and may be linked to intensification of weather systems that drive water circulation in the North Pacific, thus altering the environment for marine organisms. .



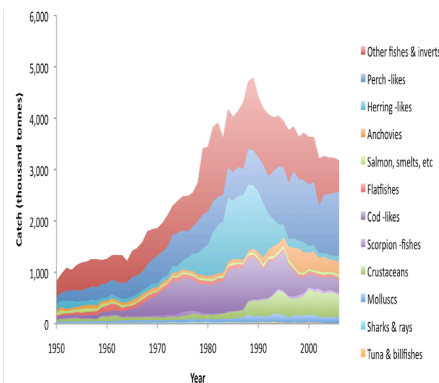
CO₂ Flux

Prior to 1992 the CO₂ uptake in the eastern part of the NOWPAP region was relatively consistent; however, CO₂ uptake in this region has been dropping for unknown reasons. There is speculation that this drop is related to increased water temperature at the bottom of the Japan Basin, thus reducing the water-column exchange..



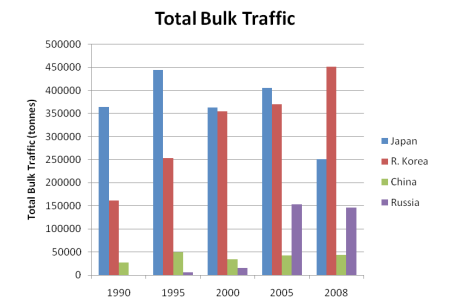
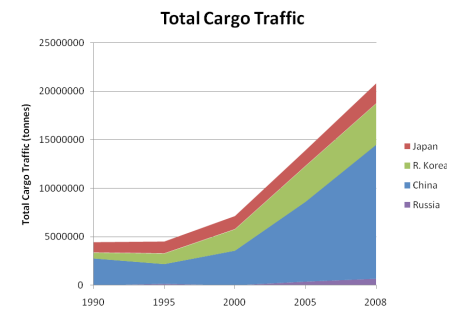
Fisheries

Fish catches (in tonnes) in the Exclusive Economic Zones (EEZs) of the western and eastern NOWPAP regional waters have increased steadily since early 1950, until catches began to decline in the late 1980s. This decline maybe linked to a period of intense herring fishing..



Port Activity

Eight of the busiest ports in the world, in terms of metric tonnes shipped, lie within the NOWPAP region. Shipping density has been steadily increasing since the early 1990's, mostly due to the economic growth of China and its high level of regional trade. Increasing shipping density also poses environmental problems such as the introduction of alien species. Of the countries, Japan and the Republic of Korea have the highest total bulk traffic (tonnes) in the region.



Summary

The indicators examined here consistently reflect the considerable pressure the marine and coastal waters of NOWPAP are under to meet the economic and social needs of the region; this puts marine biodiversity under significant threat.

STATE

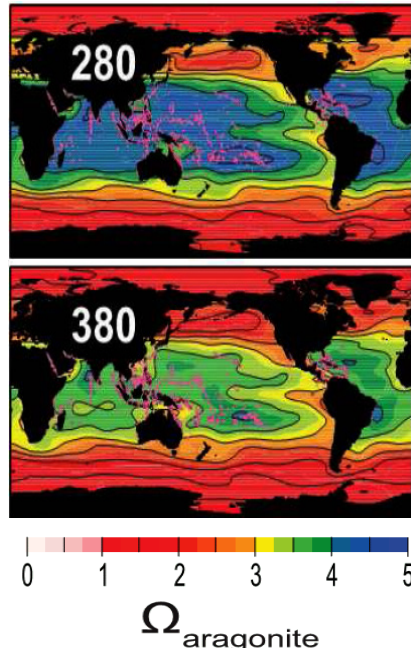
Measuring the state of the marine environment is crucial for determining the subsequent policy decisions needed to conserve the marine fauna and flora, as well as the ecosystem services that many coastal communities depend on for their livelihoods.

Acidification¹

Aragonite and other minerals in NOWPAP waters have been decreasing (to around 3.5-4) from pre-industrial levels (~5), and potentially affecting the growth of calcifying marine organisms. In the eastern part of the NOWPAP region, the saturation depth for aragonite has risen 80-220m since the industrial revolution, much faster than in other parts of the region.

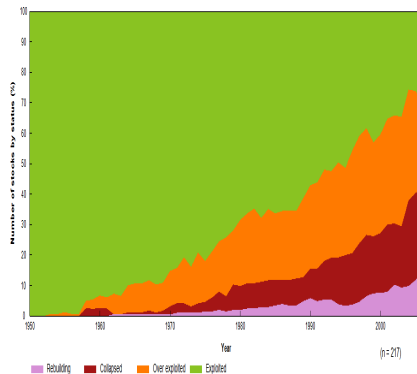
Marine Trophic Index (MTI)²

There has been a marked decline in the marine trophic index (MTI) in the past 40 years in both the eastern and western regions of NOWPAP. Levels have increased slightly after the mid 1980's, which corresponds to increasing catches of top predators until 2000. Since then trophic levels have declined again as catches in top predators has declined.



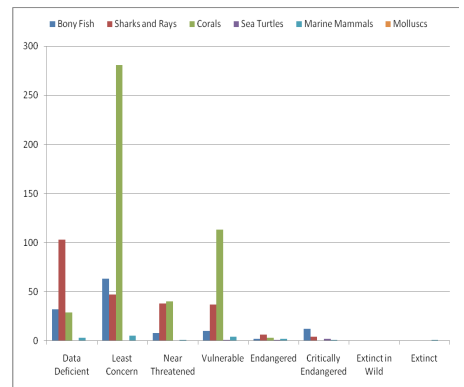
Fisheries

It appears that many fish stocks are over-exploited or collapsed, while only a small percentage is rebuilding.



Marine Fauna – Red List

In the NOWPAP region, although data are lacking for sharks and rays, and corals are considered least concern, it is important to note that many organisms are considered vulnerable. This may be due to rising ocean temperatures and increasing ocean acidification.



1. Increases in atmospheric CO₂ have had influence on the ocean's carbonate chemistry and absorptive capacity. Carbon dioxide is neutralized in the ocean by the dissolution of marine carbonates (including aragonite), which are used by corals and other shelled marine organisms that rely on aragonite for body structure. Due to the increase in anthropogenic CO₂, the depth at which seawater is no longer saturated with aragonite is rising.

2. The MTI measures the mean trophic level of fisheries landings by region and globally. The MTI describes the position of a marine organism in the food chain. A low MTI (<2) indicates an environment where catches are dominated by herbivorous fish. A higher MTI (>3) indicates the dominance by carnivorous fish.

Summary

State variables for the marine environment also indicate that conditions for maintaining and protecting marine biodiversity are declining in the NOWPAP region. Decreasing MTI values, aragonite levels, increasing overexploitation of fish stocks and many vulnerable species on the IUCN Red List point to potential declines in biodiversity. It is clear that measures must be taken to address the deteriorating situation of the region if the rich biodiversity is to be preserved for future generations. Additionally, although many marine organisms are not yet considered at risk, this may change in the future should the state of the marine environment not improve.

RESPONSE

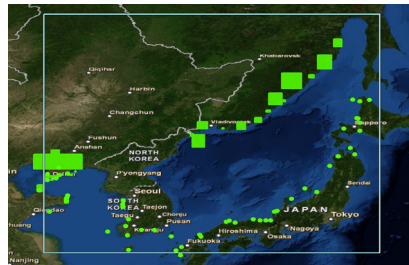
The Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region is main response instrument to address the pressures on marine biodiversity in the region. NOWPAP faces the challenge of directing the action plan based on the goodwill of the member states to comply with international treaties and conventions, as there is currently no convention in place for the NOWPAP region. Nevertheless, the member states have responded to the need to address many of the issues of protecting the marine environment as described below.

Global Programme of Action (GPA) Implementation

China has been preparing the National Programme of Action (NPAs) for the protection of the environment from land-based activities since 2006 and the process is still ongoing. The Republic of Korea already completed and submitted its NPA in 2006. The Russian Federation only has an NPA for the Arctic, as there is no NPA available for the whole country. In 2007, Japan enacted an equivalent of the NPA: the Basic Act on Ocean Policy, and established a legal system which regulates land-based activities in order to protect the marine environment.

Marine Protected Area (MPA) Establishment

Within the NOWPAP region there are a total of 87 MPAs covering an area of over 4 million hectares. The map shows the location of 75 of all 87 MPAs. The rectangles mark the latitude and longitude of the borders of the MPAs, and the point marks the center of the MPAs.



Ballast Water Regulations

In the NOWPAP region, only the Republic of Korea has ratified the International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Convention). China makes no mention of any ballast water regulations in the National report to the Convention on Biological Diversity (CBD), and indicates little progress has been made towards the CBD 2010 target to control pathways for major potential alien invasive species. Japan has expressed willingness in contributing to turning the Ballast Water Convention into law. Reports suggest that Russia, as part of another Regional Seas Programme (HELCOM), will ratify the Ballast Water Convention in 2010.

Climate Change Programmes

In 2007, China published a National Climate Change Programme which outlines China's challenges and policies for combating climate change. Japan revised its measures for combating climate change in the 2008 Kyoto Protocol Achievement Plan, and the Republic of Korea developed a climate change strategy in 2007. The Russian Federation developed a national climate change doctrine to enhance energy efficiency of the economy, and this was signed by the President in 2009.

Fish Stock Agreements

According to a questionnaire that measures a country's intention to comply, and actual compliance with the FAO Code of Conduct for Responsible Fisheries, Japan has made the most progress and the Russian Federation has made the least in terms of preparation for, and actual compliance. All NOWPAP member states are parties to the UN Convention on the Law of the Sea, and the UN Fish Stock Agreement. Only Japan is party to the FAO Compliance Agreement.

	China	Japan	Republic of Korea	Russian Federation
Assessment of Intention to follow Code				
Management objectives	4.89	5.5	6.56	2.67
Regulatory framework	5.43	7.64	6.07	4.14
Precautionary approach	3.67	6.28	4.89	2.11
Mean	4.6	6.38	5.82	2.88
Compliance achievement				
Regulation of stocks, fleets and fishing gears	2.57	2.31	2.38	2.05
Social and economic factors	5.33	7.92	2.83	3.92
Monitoring, control and surveillance	2.5	5.33	4.67	2.08
Mean	3.42	5.34	3.45	2.29
Overall Score	4.09	5.93	4.8	2.63

Summary

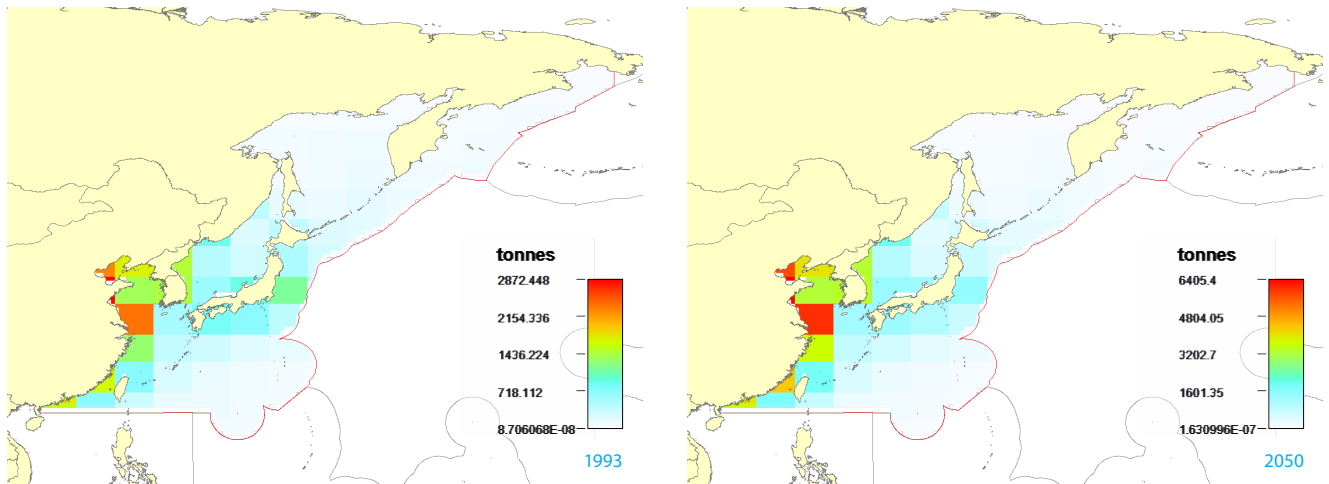
NOWPAP member states are addressing many threats to marine biodiversity, encouraging for the future conservation of biodiversity. The key to succeeding will be effective management and the latest national reports to the Convention on Biological Diversity show that the region is making slow progress in the control of the introduction of alien species through ballast water discharge.

OUTLOOK³

The impact of climate change on marine ecosystems by the year 2050 was explored using the SRES A1B climate change scenario, an ocean model that included primary production, and in the case of fisheries this model was coupled with an ecosystem model for the relevant FAO Area.

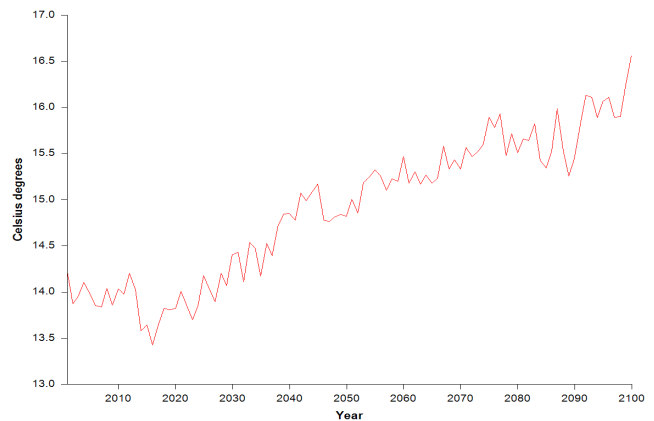
Nutrient Deposition

The predicted nitrogen deposition levels for the NOWPAP region indicate a widespread increase in nitrogen deposition levels by 2050, in particular the western part of the region.



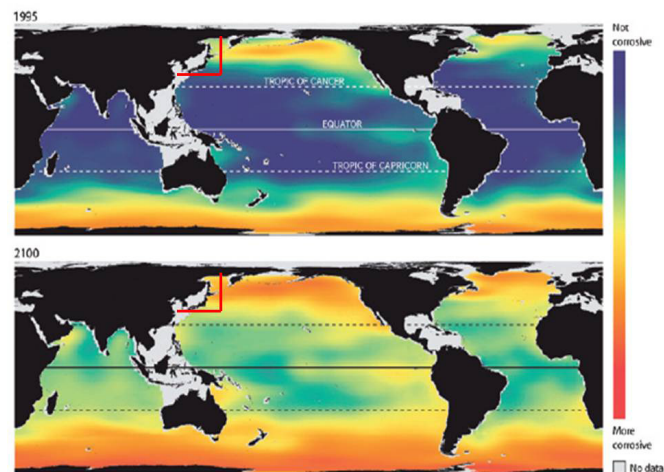
Sea Surface Temperature (SST)

The SST for the NOWPAP region will see a general, steady increase with some fluctuation until 2100. This rise in temperature will have profound effects on marine organisms that are less tolerant to changes in the physical environment. These organisms are at risk of extinction because they are unable to survive outside of specific temperature parameters. Consequently, this will alter the community structure and ecosystem functions of the NOWPAP region.



Acidification

As in many of the world's coastal waters, the region will experience an increase in acidic levels. This could have an impact on species less tolerant to changes in their environment.



Marine Trophic Index (MTI)

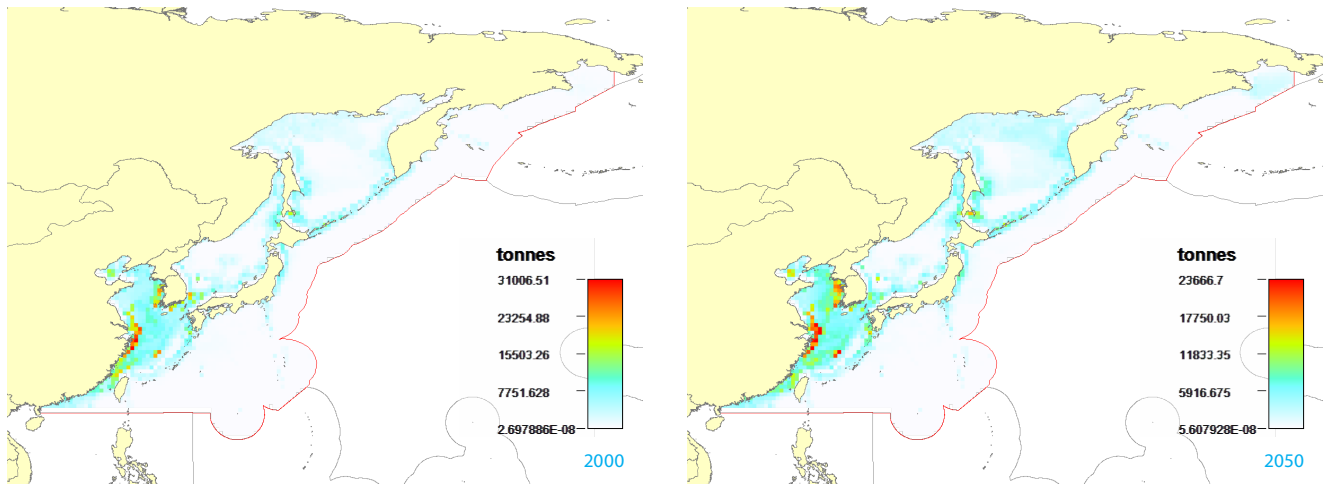
The MTI will decline under all three fishing scenarios.

The MTI values for the NOWPAP region will remain at present levels if the fishing effort remains similar. If there is an increase of 3% in fishing effort, the MTI values will decrease thus reflecting less top predator species in the fish catches of the region. If the fishing effort decreases by 3%, the MTI values will also decrease but not as much as if the fishing effort increases.

3. The information provided in this section is based primarily on a report by Christensen et al. (2010): Indicators for Outlook Reports on the State of Marine Biodiversity in Regional Seas which can be accessed at www.marinebiodiversityseries.org, the acidification map is based on Orr et al. (2005)

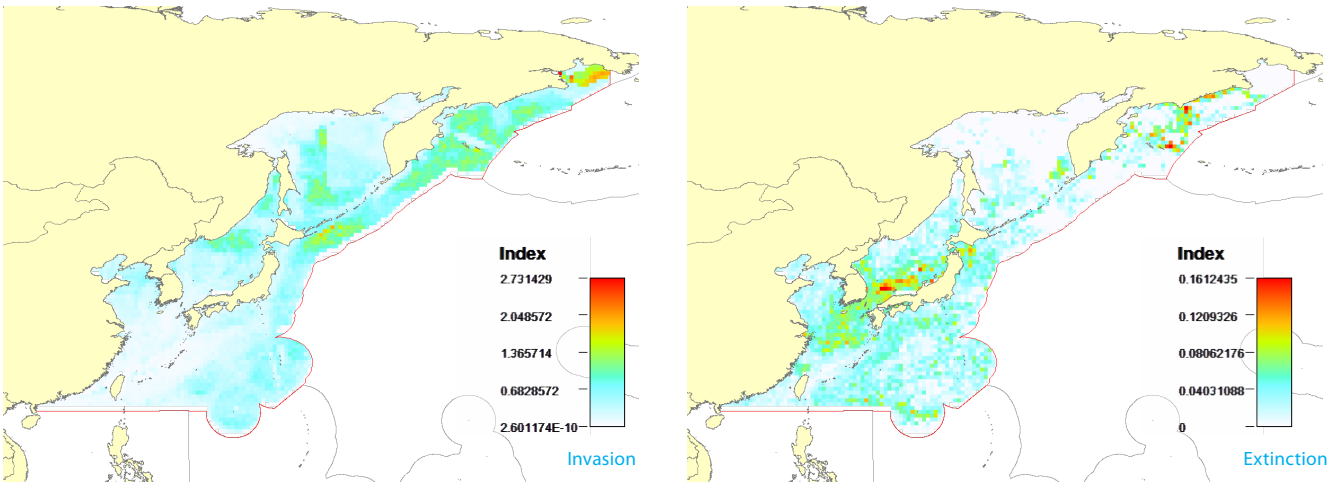
Fish Catch Potential

Potential fish catches in the NOWPAP region are predicted to decrease from 2000 except in the Yellow Sea area where catches may increase, however since the trophic index is predicted to decline under the three effort scenarios, the catch may be composed of more lower-trophic species such as Japanese scad (*Decapterus maruadsi*).



Marine Species Invasion and Local Extinction

By 2050 species invasions are predicted to increase northwards (poleward) in the region, and their intensity is higher than the global average. Overall, extinctions are predicted to be low to moderate in many areas, but there may be hotspots most prevalent in the marine area between Japan and Korea and the northern area offshore of Russia.



State of the Marine Biodiversity in the NOWPAP Region

- Serious
- Moderate
- Low

	Pressure	State	Response	Outlook
Water Quality: Nutrients	● Moderate	-	● Serious	● Moderate
Temperature	● Serious	-	● Moderate	● Serious
Acidification	● Moderate	● Moderate	● Moderate	● Serious
Marine Fauna: Fish and Fisheries	● Moderate	● Low	● Moderate	● Low
Others	-	● Low	● Moderate	-
Shipping/Ballast Water	● Serious	-	● Serious	-

The North-West Pacific Region is vast and features a large variety of marine and coastal ecosystems, from cold and deep water ecosystems in the north, to seagrass beds and coral reefs in the south. The region comprises semi-enclosed marginal seas situated in both the sub-polar and temperate zones. It has spectacular marine life, commercially important fishing and mariculture grounds and rich offshore mineral resources such as oil. However, some coastal areas are among the most highly populated in the world, resulting in enormous pressures and demands on the environment. Its people are particularly dependant on the sea for their food and livelihoods. Yet their health and the health of their environment are under growing threat, mainly from land-based activities and other sources of pollution.

Coastal development, industry, transport, oil production and activities such as land reclamation and intensive mariculture take an ever-greater toll on coastal ecosystems. Chemical and industrial wastes, untreated municipal sewage, agricultural pesticides and nutrients in run-off cause widespread damage and stimulate eutrophication and harmful algal blooms. Added to these are oil pollution from accidental spills, atmospheric pollution and marine litter.

The countries of the region realized that by joining forces they could strike a wise balance between the provision for human needs, use of resources, and economic development on one hand, and the protection of the environment on the other. During the 1st NOWPAP Intergovernmental Meeting in 1994, the four member states adopted the Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific, also called Northwest Pacific Action Plan (NOWPAP), and established the NOWPAP Trust Fund. The NOWPAP member states are the People's Republic of China, Japan, the Republic of Korea and the Russian Federation.

The Northwest Pacific Action Plan focuses on the wise use, development and management of the coastal and marine environment in order to achieve the greatest long-term benefit for the human populations of the region while protecting human health and ecological integrity for future generations. NOWPAP projects are implemented mainly through a network of Regional Activity Centres (RACs). Currently, four RACs are in operation: The Special Monitoring and Coastal Environmental Assessment RAC (CEARAC) in Toyama, Japan; the Data and Information Network RAC (DINRAC) in Beijing, China; the Marine Environmental Emergency Preparedness and Response RAC (MERRAC) in Daejeon, Republic of Korea; and the Pollution Monitoring RAC (POMRAC) in Vladivostok, Russian Federation. These centres are responsible for carrying out their activities at the regional level and serve all member states of NOWPAP.

NOWPAP's Regional Coordinating Unit (RCU), which is administered by UNEP, was inaugurated in November 2004 and is co-hosted by Japan (in Toyama) and the Republic of Korea (in Busan) and serves as nerve centre and command post for the implementation of NOWPAP activities. NOWPAP is a young programme, with challenging goals for the coming years: to implement the Regional Contingency Plan for Oil and Hazardous and Noxious Substance (HNS) Spills, to apply principles of integrated coastal and river basin management, to mitigate marine litter pollution and to deal with issues related to the protection of marine and coastal biodiversity, climate change and alien species invasions. In the future, NOWPAP will serve as a regional platform for the implementation of Multilateral Environmental Agreements and other global programmes and initiatives concerning the sustainable management of the marine and coastal environment.

Regional Seas Action Plans, Conventions and Protocols

North-West Pacific

- North West Pacific Action Plan adopted 1994
- NOWPAP Regional Oil Spill Contingency Plan adopted 2003
- NOWPAP Regional Action Plan on Marine Litter adopted 2008

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