The State of the Marine Environment of the North Sea and of the Baltic Sea: A Comparison in Relation to Dangerous Substances

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Introduction

This short overview, mainly based on information respectively from the North Sea Quality Status Report (QSR) 1993 and the Third Periodic Assessment of the State of the Marine Environment of the Baltic Sea, 1989–93, gives a comparison between the state of the marine environment of the North Sea and of the Baltic Sea and specifically in relation to the following dangerous substances: heavy metals, halogenated hydrocarbons, tributyl tin, polycyclic aromatic hydrocarbons and petroleum hydrocarbons.

The North Sea

The North Sea is here defined as including the English Channel, the Skagerrak and the Kattegat. It is situated on the continental shelf of north-west Europe and opens into the Atlantic Ocean to the north and, via the Channel, to the south-west, and into the Baltic Sea to the east. The Southern Bight is relatively shallow, with strong tidal currents, the depth increases to the north towards the Atlantic

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Ocean, while the deepest areas are in the Norwegian Trench and in the Skagerrak.

Inflow of oceanic water from the Atlantic and a dominant westerly air circulation with frequent low-pressure systems are important influences on water movements and circulation. High levels of precipitation occur in certain areas and during certain seasons. The residence time is about 2.6 years.

The southern North Sea is bordered by countries with high population densities, while in the north densities are considerably lower. The catchment areas are the rivers Elbe, Weser, Rhine, Meuse, Scheldt, Seine, Thames and Humber, all of which flow into the southern North Sea, are densely populated, highly industrialised and intensively farmed. As a consequence, these river systems are among the principal sources of contaminants and nutrients flowing into the North Sea. River run-off is highly variable from year to year, which is of importance for the transport of contaminants. Direct discharges of effluents (sewage and industrial) contribute to the overall burden of contaminant inputs, and atmospheric deposition is a further major source of certain contaminants and nitrogen.

The coastal zones contain estuarine and wetland habitats with a rich variety of flora and fauna, including large numbers of seabirds that feed on intertidal, bottom and shallow water-dwelling organisms. These areas are also important as nurseries for juvenile fish, and the intertidal shoals are attractive sites for seals. However, the natural coastline of the Southern Bight has been changed considerably by human intervention leading to the development of towns, harbours, land-reclamation projects, and coastal protection structures. Important ports, including Hamburg, Rotterdam, Antwerp, Le Havre and London, and industries are located at river mouths and along estuaries.

In addition to land-based influences on the North Sea from human habitations, industries and agriculture, other important direct uses that influence the sea include fishing, which is an activity of all North Sea countries, offshore oil and gas production, and shipping, comprising some of the world's busiest shipping routes, with an associated risk of accidents. Other relevant activities are coastal tourism and recreation, aquaculture, marine sand and gravel extraction and the disposal of sewage sludge and dredged materials.

Conditions in the North Sea are characterised by a high degree of variability, both geographically and temporally. Temporal variability on seasonal, annual and longer scales is mainly caused by variations in surface heat exchange, wind field, inflow of Atlantic water and freshwater input. Short-term fluctuations are also very important. This variability in physical conditions and processes has a strong influence on chemical and biological conditions and processes, and creates a backdrop of uncertainty to assessments of the impact of anthropogenic influences on the natural conditions and processes in the North Sea.

From 1985 to 1992, the North Sea experienced climatic conditions that were exceptional for this century. Winter periods in particular were characterised by marked changes, especially over the shallower southern North Sea, where a