

International cooperation around the North Sea basin

Tromp, D.¹, Zevenboom, W. & Stolk, A.*

RWS-North Sea Directorate, P.O. Box 5907, 2280 HV Rijswijk, The Netherlands; ¹Present address: National Institute for Coastal and Marine Management / RIKZ, P.O. Box 20907; 2500 EX The Hague; The Netherlands;

*Corresponding author: Fax +31 70 3900691; E-mail a.stolk@dnz.rws.minvenw.nl

Abstract. During the past 25 years, the management of marine ecosystems has evolved significantly. Due to the increased use of the sea and the increased awareness of adverse impacts of certain human activities in and around the sea, which has been a common good for a long time – ‘Mare Liberum’ – an international and integrated approach has become increasingly important to regulate the use of our common seas.

From the late 1960s onwards, intergovernmental meetings have taken place in order to tackle the problems of international pollution of seas and oceans. One reason for this attention was the Torrey Canyon accident in 1967, which triggered the start of the Bonn Agreement in 1969 for coordinating the combat mission against oil and chemical spills in the North Sea.

After the 1972 United Nations Conference on the Human Environment in Stockholm, with the involvement of the European Union, the International Council for Exploration of the Sea (ICES) and Non-Governmental Organizations (NGOs), other regional and global Conventions, as well as the North Sea Ministerial Conferences were established.

These continuous international efforts have resulted in a considerable reduction of the input of certain contaminants and of nutrients (in particular phosphate) into the marine environment. However, not all problems have yet been solved. The North Sea Ministers agreed at the Conference in Esbjerg (1995) to aim at a reduction of the input of all hazardous substances within one generation, in order to reach the goal of negligible risks of pollution. Furthermore, there is a general aim to minimize adverse effects of disturbing activities. The challenge, now and in the future, is to find a balance between economic development and environmental protection of our international marine waters aiming at a sustainable development of the marine resources by employing scientifically based measures and, in situations where there are reasonable grounds for concern but no conclusive links between cause and problem, applying the precautionary principle with respect to pollution and disturbing activities.

Keywords: Contaminant; Disturbance; International Convention; Marine Ecosystem; Northeast Atlantic; Pollution.

Introduction

In the early 17th century, Hugo de Groot (Grotius), the Dutch constitutional scholar of European stature,

was the first to bring marine waters to the attention of the public and governments. He argued that our seas were free to be used. In the following centuries, ‘Mare Liberum’ (a free sea) was the guiding principle for free use and exploitation of our seas and oceans by all states.

However, recently we have become more aware of the limitations of the richness of the sea and its use. A proper management of marine ecosystems, notably the North Sea, has become increasingly important to protect it from being overused and misused. There is a growing awareness, both nationally and internationally, that the increasingly intensive use of the sea – oil and gas exploration/exploitation, fishery, shipping, influx of contaminants, recreation, sand- and gravel extraction, dredging, land reclamation – can have negative impacts on its ecological functioning and its sustainable use. The increased awareness of the adverse impacts of certain human activities in and around the sea is translated into national and international measures, regulations and agreements to protect the sea against pollution and, more recently, against adverse effects of disturbing activities such as sand- and gravel extraction, and fishing activities.

The Netherlands is a dynamic lowland country. It is situated at the end of large riverine systems (rivers Rhine and Meuse) and it borders the North Sea (Fig. 1). Furthermore, the country is worldwide connected with a number of other countries by shipping from and to e.g. the large Rotterdam harbour. The Netherlands, where many activities and use of the environment are related to the sea, were confronted with an increased pollution of the sea and declining quality of the ecosystems. It is therefore not surprising that The Netherlands strongly stimulate the process of international cooperation directed at the management and sustainable development of freshwater- and marine ecosystems.

In this paper, attention is given to international forums which address environmental issues in marine waters. Some examples of results of these international efforts are presented and discussed.



Fig. 1. North Sea basin. Watershed and the continental shelf. Thick line: watershed North Sea catchment area. Dotted line: national boundaries on the Continental shelf (Andersen & Niilonen 1995).

Survey of international forums

International cooperation on marine environmental issues started in the late sixties. Since then, Conventions have been agreed upon and a number of Ministerial Conferences took place. A survey is presented in Tables 1 and 2.

It all started in 1967 with the accident of the Torrey Canyon, close to the Scilly Islands near Lands' End, SW England. This accident caused a tremendous pollution and had an considerable impact on marine life. It also triggered the start of the Bonn Agreement in 1969 which coordinates the combat of accidental oil and chemical pollution in the North Sea (Fig.2). The experts and officials of the North Sea States meet yearly in order to prepare the regular Ministerial Conferences. These member States cooperate practically and perform, on a regular basis, joint aerial surveys, the so-called 'tour d'horizon flights', to spot accidental spills, if necessary followed by ship-based combat of (oil) pollution.

In the intergovernmental context, a series of negotia-

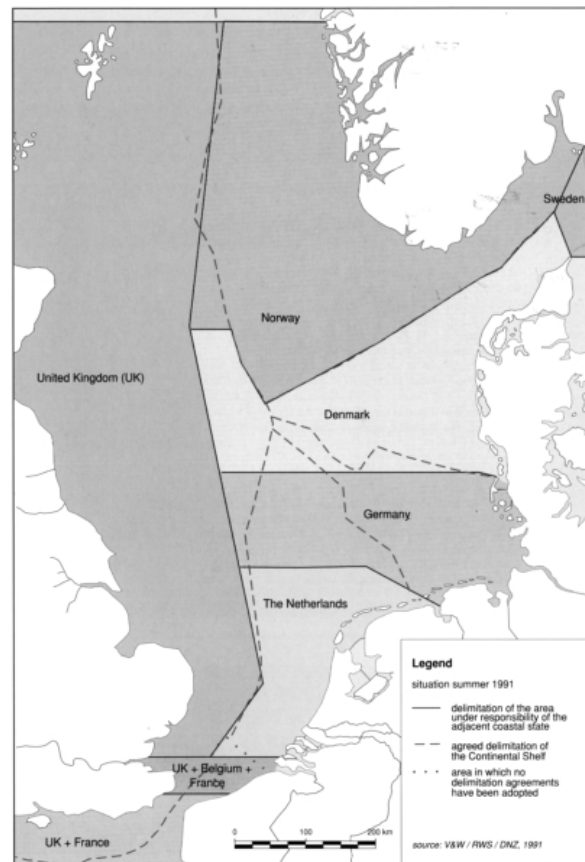


Fig. 2. Zones of responsibility for combatting accidental pollution under the Bonn Agreement (Anon.1992a).

tions took place both on a regional as well as on the global scale. These activities led to a milestone event, namely the United Nation Conference on the Human Environment, held in Stockholm in 1972. It was here that UNEP (United Nations Environment Programme) was established. In the course of the preparation of the conference it became clear that there was a lack of regulations with respect to pollution arising from dumping, discharges and incineration at sea.

This concern about dumping and incineration at sea was the reason for the start of the work by the Oslo Commission (OSCOM) under the Oslo Convention (Table 1). This regional Convention was agreed upon in 1972 for the prevention of marine pollution by regulating dumping of wastes from ships and aircrafts in the North-East Atlantic waters. It introduced the concept of 'black list and grey list substances' in international environmental management. The black list contains poisonous and bio-accumulative substances that are not naturally present in the marine environment, e.g. PCBs. It is not allowed to dump these substances in the sea. The grey

Table 1. List of international forums.

Convention/Conference	Year	Task	Issues	Area	Involved States and Organizations
Bonn Agreement	1969	Combatting accidental pollution	Mutual assistance	North Sea	North Sea States
Oslo Convention (OSCOM)*	1972	Prevention pollution from dumping of waste	Black and grey list substances	North-East Atlantic	Member States of OSCOM, ICES ¹
London Convention (LC)	1972	Prevention pollution from dumping of waste	See OSCOM; Waste Assessment Framework	Global	70 member states of LC, IMO ² , NGOs ³
Paris Convention (PARCOM)*	1974	Prevention pollution land-based sources	Regulation the use of substances	North-East Atlantic	Member States of PARCOM, EU ⁴ , ICES
OSPAR *	1992	Prevention pollution, disturbing activities	Precautionary principle, reverse listing	North-East Atlantic	Member States of OSPAR, EU, ICES, NGOs
North Sea Ministerial Conferences	1984	Protection of the North Sea	Political decisions	North Sea, Kattegat, Skagerak, Channel	North Sea States, Switzerland, Member States of OSPAR, EU, ICES, NGOs
	1987				
	1990				
	1995				
	2000/2002	Planned			

*OSPAR replaces OSCOM and PARCOM from 1998 onwards; ¹International Council for Exploration of the Sea; ²International Maritime Organization; ³Non-Governmental Organizations; ⁴European Union.

list contains substances that are naturally present in the marine environment, but are harmful when concentrations (due to high inputs) are too high, e.g. nutrients. The dumping of these substances has now been regulated.

Attention has been paid to marine pollution problems, not only at a regional but also at the global scale. In 1972, through the world-wide London Dumping Convention, nowadays called the London Convention 1972 (LC '72), it was agreed upon to prevent marine pollution originating from waste dumping (Table 1). It has, among others, produced a world-wide Waste Assessment Framework for addressing the waste issue in a clearly operational management manner. About 70 countries have ratified this convention.

Another regional Convention, the Paris Convention (PARCOM), was agreed upon in 1974 (Table 1). The European Union also participates in this Convention. Like OSCOM, this Convention covers the region of the North-East Atlantic. PARCOM regulates the discharges of substances from 'land-based sources'. This includes discharges from pipelines, the off-shore oil and gas industry, and direct and indirect riverine inputs. It also provides the possibility to regulate the use of certain substances and products in order to prevent marine pollution.

Over the years much was achieved with respect to the regulation of dumping of waste into the sea. The need was felt to consider marine pollution as an issue which could be covered by one regional convention. This triggered the integration of the Oslo and Paris Conventions into the OSPAR Convention in 1992. Again the European Union participated (Table 1). Also Switzerland, being the country of origin of the Rhine and some other rivers (Fig. 1), ratified this Convention. The OSPAR Convention has replaced the Oslo and Paris Conventions.

With the help of its various Working Groups, OSPAR is monitoring and assessing the state of the Convention area with respect to pollution but also disturbing activities. It regulates pollution, and pays attention to disturbing activities like sand- and gravel extraction, and fishing activities. Furthermore, attention is paid to the protection of species and habitats, and to the development of ecological quality objectives and the development and implementation of an ecosystem approach. Besides the precautionary principle with respect to dumping, an other guiding principle was introduced; apart from a very limited number of exceptions, no dumping of material into the sea is allowed ('reverse listing' approach). This implies that certain waste products are banned

Table 2. List of North Sea Ministerial Conferences.

Location	Year	Issues
Bremen	1984	Awareness, common responsibility, precautionary principle
London	1987	Action and prevention, reduction in inputs of contaminants and nutrients
The Hague	1990	Evaluation and reinforcement of measures, establishment of North Sea Task Force for the preparation of the North Sea Quality Status Report 1993
Esbjerg	1995	Progressive reduction of pollution, awareness of impacts of fisheries
Bergen	1997	Interim Ministerial Meeting (IMM'97); evaluation pollution reduction, and assessment impact fisheries

from being dumped or discharged into the sea, while others (like for instance dredged materials and off-shore chemicals) are subjected to thorough pre-screening, testing and assessment procedures.

Although a lot was achieved by the OSCOM and PARCOM Conventions in the 1970s, it became clear in the early 1980s that additional action was needed to protect the North Sea ecosystem. Frequent criticisms could be heard that progress was too slow.

The North Sea States recognized the need to accelerate the international environmental decision-making process. Therefore North Sea Ministerial Conferences have been held at regular intervals, which has led to political decisions on the protection of the North Sea. These political decisions are elaborated and implemented by OSPAR, EU, IMO and LC (Table 2).

Also the ICES (International Council for Exploration of the Sea) plays an important role in providing scientific advice to North Sea Ministerial Conferences, OSPAR and EU. Furthermore, many Non-Governmental Organizations make fruitful contributions to OSPAR and North Sea Ministerial Conferences (Table 1). A short overview of the North Sea Ministerial Conferences is given in Table 2.

The Netherlands participate actively in international forums by taking the lead in various actions and chairing several working groups.

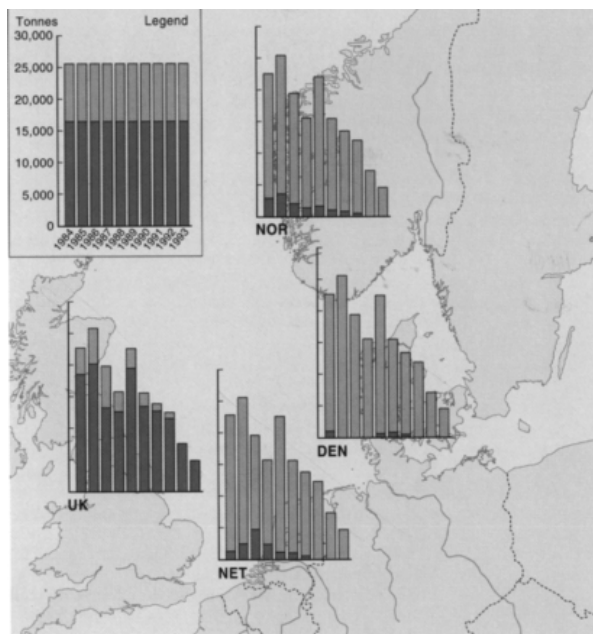


Fig. 3. Quantities of oil discharged via oil-contaminated cuttings. Columns show the national discharge (dark) compared to total discharge (light) into the North Sea (Andersen & Niilonen 1995).

Results and Discussion

The continuous international efforts have resulted in a considerable reduction in inputs of contaminants into the marine environment. Attention has also been paid to the protection of species and habitats of the North Sea ecosystems. Some examples are given below.

Contaminants

The trend in dumping all the industrial waste in the North Sea during the period 1987-1993 is clear: From 1987-1989 the amount was ca. 6 million tonnes per year (Anon. 1992a, 1993). Reduction measures caused a decrease, from 5 million tonnes in 1990 to 1 million tonnes in 1992 (Anon. 1995). The ultimate ban of the dumping of industrial waste in 1993 resulted in a large reduction of inputs of contaminants into the OSPAR Convention area. On the basis of a decision by the Ministerial Conference, the incineration at sea stopped somewhat earlier (1991).

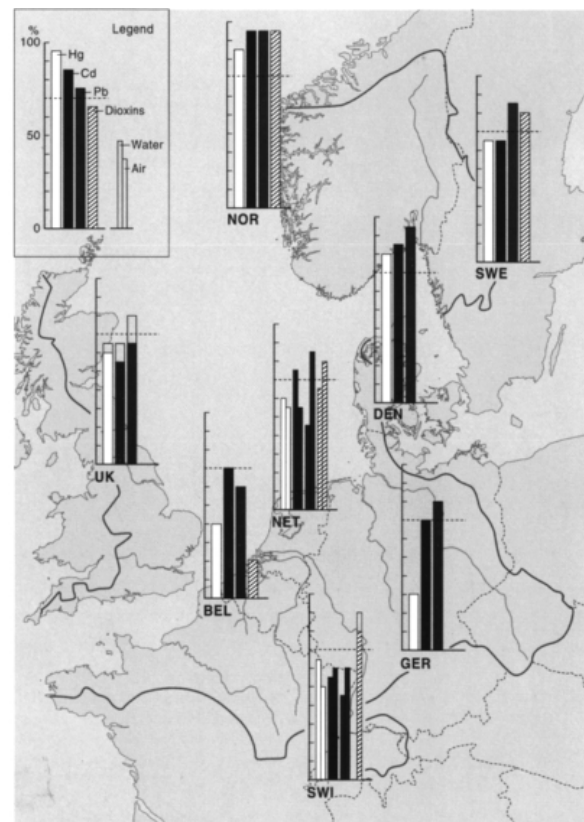


Fig. 4. Estimated reductions (%) of total inputs into the North Sea of mercury (Hg), cadmium (Cd), lead (Pb) and dioxins (1985-1995) (Andersen & Niilonen 1995).

The inputs of oil arising from discharges of oil contaminated cuttings decreased during the period 1984 to 1993 (Fig. 3). The columns in this figure provide insight in each individual country dealing with these activities in the North Sea, i.e. the United Kingdom, Norway, Denmark and The Netherlands. The columns show the national discharge compared to the total discharge into the North Sea up to, and including 1993. The discharges are prohibited by almost all North Sea countries from 1993 onwards. Germany has always transported the oil-contaminated cuttings from the sea on to land and never discharged into the North Sea.

For a number of contaminants and nutrients (see below) a 50 % reduction in the input into the North Sea between 1985 and 1995 was agreed upon and confirmed at the North Sea Ministerial Conferences in 1987 and 1990. For some hazardous substances a 70 % (or larger) reduction in input was decided. The estimated reductions for mercury, cadmium, lead and dioxins are given in Fig. 4. Some countries indeed achieved the 70 % reduction target for several of these contaminants.

There are still problems with some organic contaminants, for instance PCBs. The North Sea Ministers agreed at the Conference in Esbjerg (1995) to aim for a reduc-

tion in input of all potentially toxic substances within one generation in order to reach the goal of negligible risks of pollution. Results of these efforts are made visible by the regular OSPAR publications and are planned for the next Quality Status Report on the OSPAR Convention Area (in the year 2000). In a world-wide context and in relation to shipping, measures are developed to solve the pollution problem of the use of organotins in antifouling paints.

Nutrients

In order to solve eutrophication problems in the North Sea, like dense algal blooms, potential toxic blooms and oxygen depletion, the Ministerial Conference agreed upon a reduction by 50% – between 1985 and 1995 – of the nutrient input into areas where this input is likely to cause, directly or indirectly, pollution with harmful effects for ecosystem and man). Fig. 5 shows the total input of phosphorus and nitrogen from municipal waste water treatment plants for 1985 and 1995. A considerable reduction of the inputs of phosphorus has been achieved. Agriculture contributes to a large extent to the total input of nitrogen (Fig. 6). The nutrient reduc-

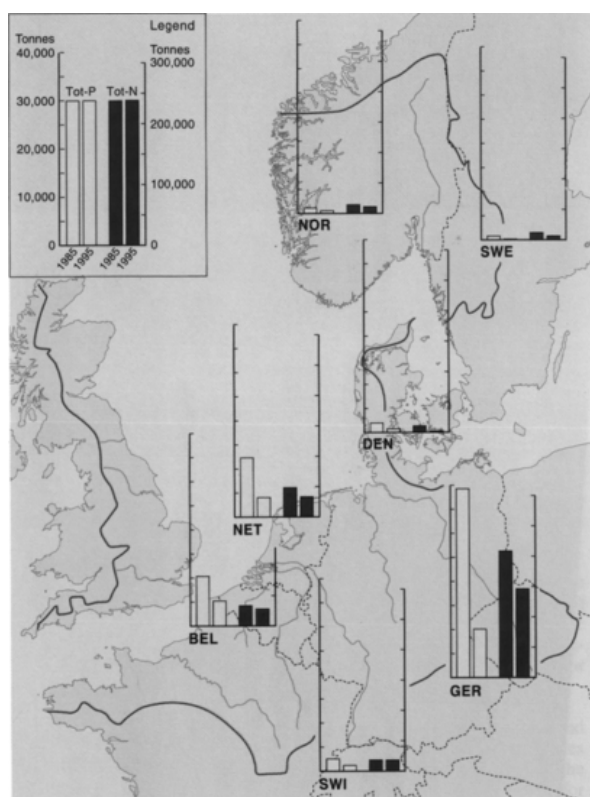


Fig. 5. Inputs of nitrogen (dark) and phosphorus (light) from municipal waste water treatment plants (Andersen & Niilonen 1995).

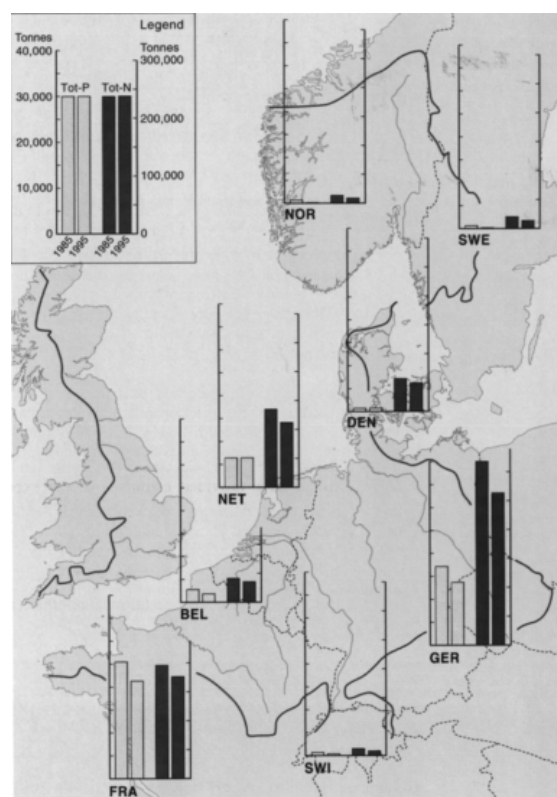


Fig. 6. Inputs of nitrogen (dark) and phosphorus (light) from agriculture (Andersen & Niilonen 1995).

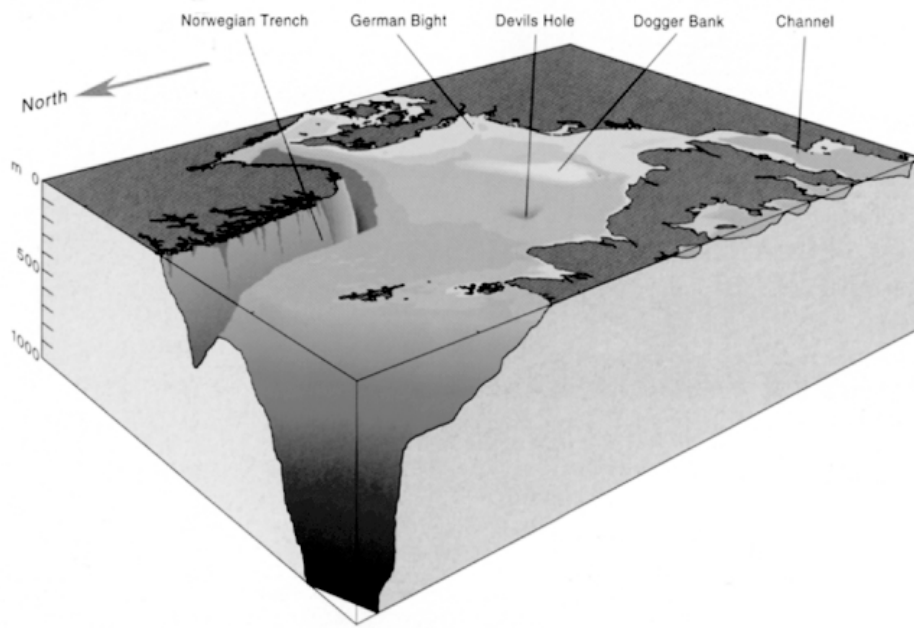


Fig. 7 A, B. Conceptual view of the bottom of the North Sea as seen from the northwest (A), and North Sea sediment types with topographical names for the mud and sandy mud areas (B) (Anon. 1993).

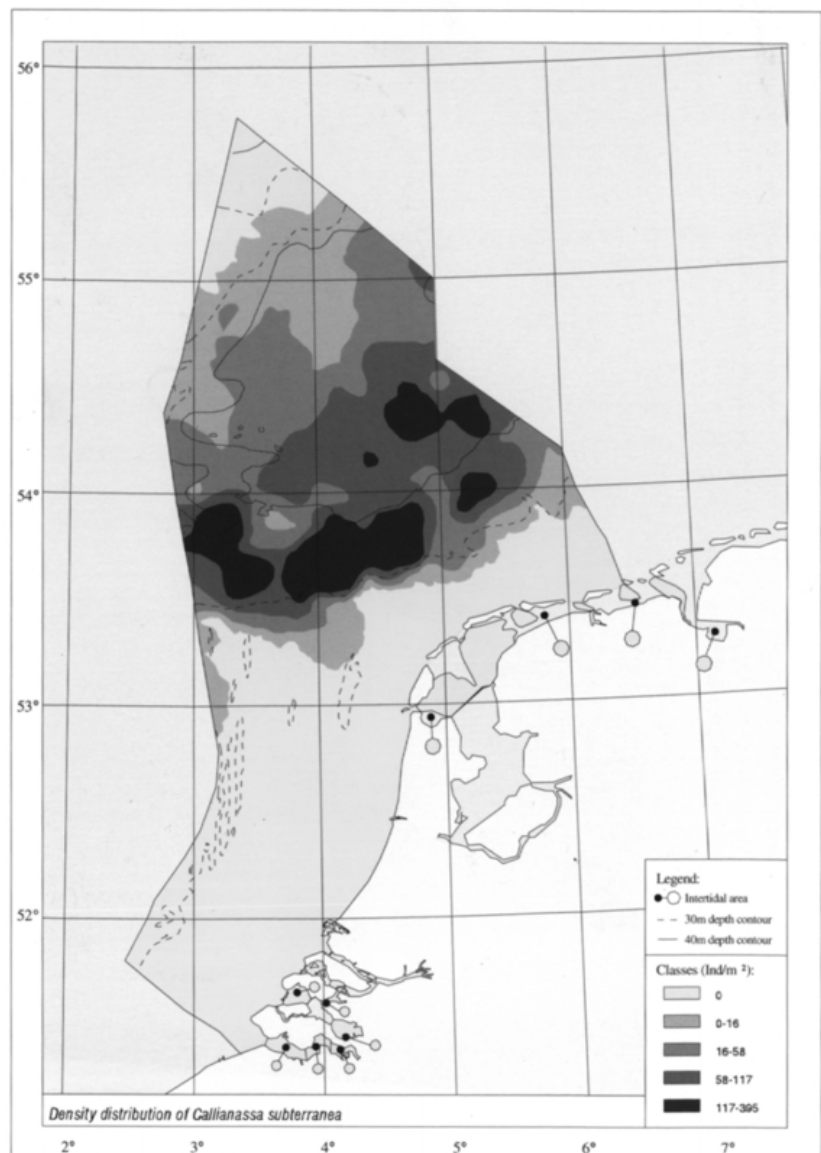


Fig. 8. Density distribution of *Callianassa subterranea* (Holtmann et al. 1996).

tion effort by the OSPAR member State the United Kingdom is not presented here, because this country did not consider the situation in its waters as a serious problem. Therefore it has been agreed upon to develop and implement an international common assessment procedure.

Although some reduction was achieved, it is clear that the 50% reduction target for nitrogen input was not achieved in 1995. However, this target could be reached by the full implementation of agreed measures.

North Sea ecosystem

For a long time, the North Sea was regarded as a relatively small and homogeneous basin. However, it is

realized nowadays that the ecosystem is far from homogeneous with respect to watermasses, morphology of the seabottom (Fig. 7A) and type of sediments such as mud, sand, and gravel (Fig. 7B). The seabottom plays an important role in the ecological functioning of the North Sea. The high diversity in sediment type and gradients in bottom morphology create many different specific habitats for a variety of different species. As an example, Fig. 8 shows the spatial distribution of the shrimp *Callianassa subterranea* in the Dutch Continental Shelf. High densities and biomass of this benthic species are mainly found at the Oysterground, an area with fine sediments and a large amount of silt.

If insufficient care is taken, natural habitats of ecological and economic valuable marine species may well

be destroyed by polluting activities but also by disturbing activities like sand and gravel extraction, and trawling fishing activities.

Conclusions

There is a national and international awareness that the increased intensive use of the sea (oil and gas exploration/exploitation, fisheries, shipping, input of contaminants, recreation, sand and gravel extraction, dredging, land reclamation) can have negative impacts on the ecological functioning of the sea. International Conventions and Ministerial Conferences nowadays share international responsibility for regulating the use of 'Mare Liberum'.

The international objective is to ensure sustainable, sound and healthy international waters/ecosystems. The guiding principle for achieving this objective is the precautionary principle with respect to pollution and disturbing activities.

Structured international cooperation is a slow but steady way to reach this objective. This cooperation is executed along various tracks:

- practical cooperation in research, monitoring and aerial inspections;
- structured communication between scientists, user groups and -sectors, managers and policymakers, ministers;

- adjustment of national regulations on the basis of international conventions.

We are on the right way but the ultimate goal has not yet been reached, and much work has still to be done. The challenge now and in the future is to find a balance between economic development and environmental protection of our international waters.

References

- Andersen, J. & Niilonen, T. (eds.) 1995. *Progress report of the 4th International Conference the protection of the North Sea, Esbjerg, Denmark, 8-9 June 1995*. Ministry of Environment and Energy, Danish Environment Protection Agency, Copenhagen.
- Anon. 1992a. *North Sea atlas for Netherlands policy and management*. ICONA Stadsuitgeverij, Amsterdam.
- Anon. 1992b. *Dumping of wastes at sea (1987-1990), Part A*. Oslo and Paris Commissions (OSPARCOM), London.
- Anon. 1993. *North Sea quality status report 1993*, pp. 1-32. North Sea Task Force, Oslo and Paris Commissions, London.
- Anon. 1995. *Dumping at sea in 1991 and 1992*. Oslo and Paris Commissions (OSPARCOM), London.
- Holtmann, S.E., Groenewold, A., Schrader, K.H.M., Asjes, J., Craeymeersch, J.A., Duineveld, G.C.A., van Bostelen, A.J. & van der Meer, J. 1996. *Atlas of the zoobenthos of the Dutch continental shelf*. North Sea Directorate of the Ministry of Transport, Public Works and Water Management, Rijswijk.

Received 16 September 1997;
Revision received 30 September 1998;
Accepted 21 October 1998.