OCEAN GOVERNANCE AND THE MARINE CADASTRE: THE NETHERLANDS NORTH SEA

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Abstract

There has been increasing interest in ocean governance and the concept of the marine cadastre recently. This is due to increasing pressure on the oceans, and the resulting tension between economic and environmental interests. A description and analysis of the formal system of governance of the Netherlands North Sea contributes to this debate for a number of reasons.Demands on the North Sea are intense and ocean space has been scarce for long. Shipping routes are very busy. The Netherlands is a major producer of natural gas. Naval conflicts and disputes over fishing rights involving the Netherlands date back more than 400 years. The Netherlands is hemmed in by neighbouring countries on land and at sea, and the activities in the North Sea of one country in the region can have a significant impact on the ocean environment in the other countries. Furthermore, there are a number of countries in the catchment area of rivers flowing into the North Sea. There is a need to govern the pollution and alien biological organisms that these rivers carry into the ocean.

INTRODUCTION

There is a long history of attempts to acquire and formalise exclusive and restrictive rights to particular areas of the ocean and its resources by means of proclamations, laws, treaties and naval force. Claims, disputes, laws and treaties over navigation, fishing and trading can be traced back through the histories of various European nations to the island of Rhodes in the ancient Greek world (Guy 2000).

As competition for and scarcity of ocean resources and usage rights increases, so too do the tensions between the desire to retain the sea as a pristine environment, the desire to harvest economic resources and the desire to use it

as a waste disposal site (Carr 1998, Hoogsteden 2001). There is increasing concern over access and usage of the ocean as a result of a number of factors such as technological advances in mining and fishing, and the many harmful environmental impacts associated with these activities. There are continual incidents of pollution. Poaching and over fishing have endangered certain biological species. Moreover, certain species are being exploited commercially, even though we have insufficient scientific knowledge to estimate what are sustainable levels of exploitation.

Developments in the international law of the sea have encouraged nations to extend their areas of sovereignty in order to protect, manage and exploit the ocean environment and resources. In some cases this involves a substantial area. For example, New Zealand's proposed exclusive economic zone amounts to more than 20 times that country's land area (Robertson *et al* 1999). Consequently, there has been an increase in negotiations over ocean boundaries between nations.

The tensions concerning rights of access, usage and possession of the ocean and the concomitant obligations pertaining thereto are similar to those pertaining to land. Grant and Williamson observe that modern ecological thinking draws on hunter-gatherer land tenure philosophies. These populations “could not conceive of their territory in terms of the separation of water and other resources from the land, anymore than they saw trees as distinct from their roots” (Grant and Williamson 1999). To these communities, ownership of a parcel of land is a foreign, if not objectionable, concept. In contrast, Carr (1998) argues that largely due to unsustainable exploitation practices in the oceans, hunter-gatherer philosophies are impractical. Administration of rights of access and usage of the ocean should mirror those on the land, with parcels, owners, laws and limits. Arguably, it is this latter school of thought that is driving the current interest in the notion of a marine cadastre.

Management and governance of the oceans have become increasingly important in modern times. The question of ocean governance, ocean tenure, boundaries, and the notion of the marine cadastre to support ocean governance, have recently been the subject of a number of research projects in Australia (e.g. Grant and Williamson 1999, Collier *et al* 2000), Canada (e.g. Nichols *et al* 2000, Ng’anga *et al* 2001), (New Zealand e.g. Robertson *et al* 1999, Hoogsteden 2001), South Africa (e.g. Rommelaere 1983, Watermeyer 2001, Wonnacott 2001) and the USA (e.g. Fowler and Treml 2001).

By management we mean the development of overarching systems of philosophy and values, the formulation of policy and strategy, and the implementation of strategy. Governance overlaps management to an extent, but is more directed toward setting the parameters and rules of conduct for managing a complex situation (Commission on Global Governance 1994, Centre

for Governance 2000). Governance is aimed at accommodating conflicting, diverse interests and galvanising cooperative action.

Extending the operational definitions of Nichols *et al* (2000) and Robertson *et al* (1999), ocean governance involves the following activities:

- adjudication, definition and allocation of rights, interests and stewardship over the sea and its resources;
- monitoring, information gathering and management of the information infrastructure relating to the above;
- regulation of allocated rights, interests and stewardship and the allocation processes and structures;
- policing and enforcement; and
- management of conflict.

The structure and culture of a governance system and its various sub-systems are shaped by a number of forces. Culture reflects the philosophy and values embodied in how the rules of the game are formulated, and the manner in which things are done. Structure is reflected in the institutional structure, the power and mandates vested in different institutions and individuals (who does what?), and enabling policy and legislation. Broadly categorised, these forces fall into the social, economic, political, physical, technological and legal milieu. Historical influences tend to be strong across these classifications (Barry and Fourie 2002). However, our interest is in how instruments, processes and structures that influence day-to-day administrative practices develop. In our observation, three forces shape these:

1. Directory and peremptory instruments - e.g. policies, treaties, laws, edicts, decrees, regulations and proclamations;
2. Dialectic processes – continual cycles of reconciliation, reconstruction and synthesis resulting from criticism, contradictions, conflicts and compromises pertaining to the status quo; and
3. Ad hoc policies and strategies – responses to unforeseen situations arising, for which incisive, formal directives do not exist.

A description and analysis of ocean governance in the Netherlands can inform the debate on ocean governance and the marine cadastre. There is a long history of intense conflict and competition in the North Sea. Underlying this dialectic is the political geography of the Netherlands. Unlike the nations referred to above where the marine cadastre is a subject of research, the Netherlands is hemmed in by adjacent and opposite countries.

Figure 1 North Sea Catchment Area

In contrast to many countries mentioned above where the marine cadastre is an area of research, the activities of the Netherlands' neighbours have a strong influence on its part of the ocean. The relatively small area of the North Sea over which the Netherlands has sovereignty is surrounded by England, Belgium and Germany. Other European states are in close proximity and many of them have parts that fall in the North Sea catchment area. And, unlike the nations such as Australia and the USA mentioned earlier, competition for rights and access to the Netherlands' North Sea has been intense. This competition dates back more than 400 years.

The primary influences in the international law of the sea are occidental (Guy 2000). Much of this has been shaped by Netherlands experience and authoritative legal writings such as *Grotius*' *Mare Liberum*. Moreover, due to the number of nations that border on the North Sea or fall in the catchment area for rivers running into the North Sea, there is a far greater need for a regional management focus than in many other regions of the globe.

We briefly describe relevant aspects of the Law of the Sea. Then we describe the history of conflict in the oceans, the competing demands on the North Sea in the Netherlands and the regional system of governance of the North Sea. We then describe the institutions and processes in the Netherlands which govern the Netherlands EEZ and the information systems that are being used and developed to support planning, policy formulation and day to day operations management. Finally we analyse the case of ocean governance and the marine cadastre in the Netherlands in relation to what has been discussed above.

LAW OF THE SEA

Recent developments in the international law of the sea have prompted many nations to define and negotiate their ocean boundaries. In terms of the United Nations Convention on the Law of the Sea, territorial waters may now extend up to 12 nautical miles (nm) away from the coast as measured from baselines that, in general, are representations of the low water mark (UNCLOS art. 2, 3, 5). Moreover, a nation may lay claim to an exclusive economic zone (EEZ), beyond and adjacent to the territorial sea extending up to 200 nm from the baselines used to establish the territorial sea. In the EEZ, a coastal State has sovereign rights to explore and exploit, conserve and manage the natural resources and conduct other activities for the economic exploitation and exploration of the zone. Examples of “other activities” are the production of energy from the water, currents and winds (UNCLOS art. 56, 57). Resources include mobile and sedentary species and renewable and non-renewable resources (Guy 2000). In essence, rights to the resources belong to the coastal State, but all other States enjoy the freedoms of navigation and communication (United Nations 1976, Guy 2000). Similar, slightly diminished, rights and powers to those applicable to the EEZ pertain to the continental shelf in areas where the continental shelf extends beyond the 200 nm limit (UNCLOS art. 76, 77).

Adjudicating and positioning the boundaries of these zones involves a number of technical problems. For example, nations use different definitions for their chart datum, from which the low water mark is derived. Until recently, many different graphical and mathematical models were used to determine offshore boundaries. Although the median line model is universally applied nowadays, even the most rigorous methods of calculating a median line can produce zones of uncertainty in boundary positions of the order of a few hundred metres. Inaccuracies in baseline positions and effects of the geometry of baseline configurations are propagated into the precision of computed boundaries (Wonnacott 2001, Guy 2000, Elema and de Jong 2001, Watermeyer 2001, Rommelaere 1983). Moreover, as the case of the Netherlands discussed below will show, the mathematical determination of an offshore boundary based on median lines often merely serves as a basis for negotiations between adjacent and opposite nations. The final ratified boundary may be moved off a median line determination when political and equity considerations are taken into account.

HISTORY OF CONFLICT OVER THE OCEANS

There is a long history of competition and conflict relating to access and usage of the ocean for trade and fishing in the Netherlands. The modern doctrine of freedom of the seas, and the right of innocent passage, has largely been attributed to the Dutch jurist Hugo Grotius’ *Mare Liberum* and English and Dutch naval campaigns against the Spanish and Portuguese. The *Mare Liberum* was

published anonymously in 1608, during the 80 years war between present day Netherlands and Spain. It was written in response to the Treaty of Tordesillas of 1494 and papal edicts by Alexander VI (*Inter Caetera,* 4 May 1493) and Julius II (*Ea Quae*, 24 January 1493). These awarded the western part of the Atlantic Ocean to Spain and the remainder of the Atlantic Ocean and the whole of the Indian Ocean to Portugal (Guy 2000 citing van der Linden 1916). However, the legitimacy of these attempts to grab ownership of the oceans had also been challenged by naval force. The *Mare Liberum* was preceded by naval conflicts between the Spanish empire (which included present day Portugal) and the English and Dutch in the latter half of the 16th century. Moreover, English and Dutch mariners raided and plundered Spanish and Portuguese merchant ships in various parts of the globe.

There is also a long history of attempts to govern fishing and access to natural resources in the North Sea. For example, in 1609 James I of England issued a proclamation directed at the Dutch herring fleets, which attempted to place a levy on foreign fishing in English waters (Guy 2000). This tension over rights and access to fishing in the North Sea continues today.

COMPETING DEMANDS IN THE NETHERLANDS NORTH SEA

The Netherlands sovereignty over the North Sea includes an area of more than 57 000 km^2, approximately one and a half times the surface area of the country's land mass. Although it is a small, densely populated country with a population of around 16 million people, it has a strong economy reflected in a gross domestic product (GDP) that is the 14th highest in the world. Competing demands for space in the North Sea are considerably greater than the 57 000 km^2 available. Current estimates of demand amount to three times the space available (Netherlands 2000). Aspects of this intense competition are portrayed in figures 2 and 3.

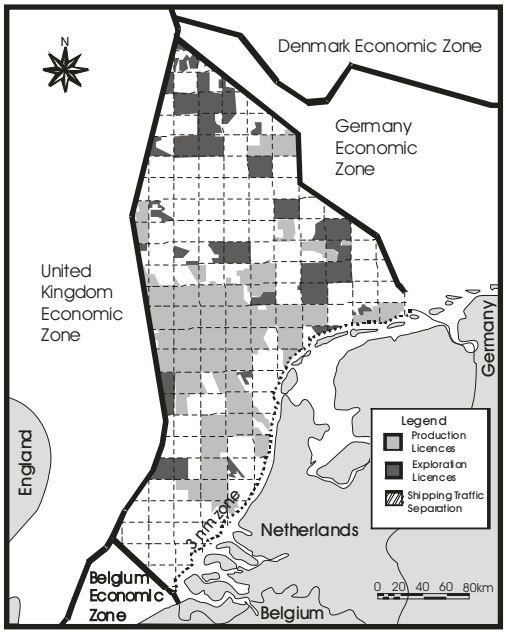

Figure 2 Netherlands North Sea Oil and Gas Permit Areas

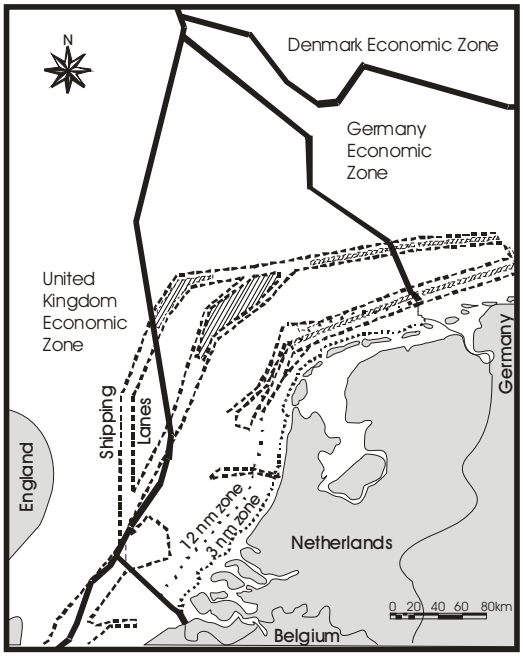

Figure 3 North Sea Shipping Routes

Fishing and North Sea oil and gas and their associated industries make an important contribution to Netherlands' (GDP). The Netherlands is Western Europe's largest natural gas producer. Trade, transportation and telecommunications are also important contributors to GDP, and they have a significant impact on shipping traffic in the North Sea. Rotterdam handles the

highest tonnage of any seaport in the world, while all traffic for German Bight and Scandinavian ports pass over the Netherlands EEZ.

Nowadays, in addition to the historical uses relating to trading and fishing, there are many competing, overlapping demands on the North Sea for access to space for infrastructure, the exploitation of natural resources, military use and the preservation of the natural environment. This necessitates increasing levels of formal governance. Expected growth in telecommunications and utilisation of smaller oil and gas fields will greatly increase the demands on space for cables and pipelines. Other demands on space in the next 30 years will be for mineral extraction, defence purposes, wind energy, shipping routes, airports, seaports, recreation and sea defences (Netherlands 2000). These demands are summarized in table 1 below.

Table 1 Access and Usage Demands on the Netherlands North Sea
(after Netherlands 2000)

Usage	Nature of Demand
Mining and Minerals Exploitation	Subsurface oil and gas. Mining of sand for land reclamation and sea defences.
Cables and pipelines	Oil and gas pipelines and undersea telecommunications and electricity cables.
Fishing and Aquaculture	Herring, mackerel, and demersal fish. Mussels are farmed in the Waddenzee.
Shipping and Transportation	Shipping routes, traffic separation schemes, ship queuing spaces and port sites.
Military Exercise Areas	Firing and practice ranges, ammunition depots.
Land Reclamation	Land reclamation has been practised in the Netherlands for centuries. The siting of a new international airport in what is currently open sea is under consideration.
Wind Energy	Proposals to locate wind energy farms in the North Sea are under consideration.
Recreation Areas	Beach and shoreline recreation and water-based recreation e.g. yachting.
Nature Conservation and Archaeological Sites	Ecologically sensitive areas, preservation of sea birds and marine fauna and flora. Preservation of view from the coast.
Scientific Research	Research relating to marine fauna and flora, fishing catches, sea water and seabed chemical composition, water stratification and mixing,

	meteorology, currents, sediment transport and deposition, geomorphologic processes.
Pollution Management	The Bonn Agreement of 1983 is a commitment by North Sea coastal states together with the European Union relating to pollution in the North Sea.
Dumping Sites for Dredged Material	There are designated areas for dumping of unpolluted sand and mud from dredging operations.

There are three features to the Netherlands' North Sea governance. The first feature comprises regional and international treaties, conventions and legislation. These establish the philosophy and value system relating to the North Sea region and a number of regulations relating to its usage. They address the environmental and economic conflicts by seeking debate and synthesis over the many competing demands for rights and access to the North Sea outlined in table 1. Secondly, in the Netherlands, there exists at the national level a formal institution to debate, coordinate and manage conflict relating to policies, strategies and legislation affecting access to and usage of the North Sea. The third feature is a drive toward integrated spatial information systems to support policy and strategy formulation and day-to-day administration. Networks of spatial and non-spatial databases in various government, parastatal and research institutions underlie this information infrastructure.

GOVERNANCE AND MANAGEMENT OF THE NORTH SEA REGION

A number of actors, both local and international, are involved in governance of the North Sea. Certain policies and regulations relating to the North Sea region are determined internationally. Issues that are regionally negotiated and regulated are the positions of international boundaries, fishing practices and quotas, shipping traffic management and management of the natural environment.

Boundaries

International boundaries of the Netherlands' territorial sea and the continental shelf have been negotiated with Belgium, Germany and the United Kingdom over the past half century. Boundaries relating to the continental shelf have been ratified with Belgium, Germany and the United Kingdom. The adjacent territorial sea boundary with Belgium has been ratified. However, there are still boundary issues to be finalised. The technical definition of the territorial sea boundary with Germany up to 3 nm offshore has been determined but not ratified (see figures 2 and 3), but the territorial sea boundary with Germany between 3 and 12 nm is still under negotiation.

As mentioned earlier, the technical determination of baselines and offshore boundary lines is complex. Moreover, besides geometrical determinations based

on the equidistance from baselines method, the principle of equity is often applied. Equity considerations have overridden pure technical definitions in two boundary adjudications involving the Netherlands. The continental shelf boundary with Germany was decided after the case had been brought before the International Court of Justice, which ruled in favour of Germany in 1969. Using the equidistance from baselines method, the German continental shelf would have been completely enclosed by Denmark and the Netherlands, which the Court deemed inequitable (ICONA 1992). Consequently, the continental shelf boundaries were adjusted to fit the pattern depicted in figures 1, 2 and 3. More recently, the continental shelf part of the maritime boundary between the Netherlands and Belgium involved a technical determination of the boundary being adjusted to provide a delimitation that was considered more equitable to Belgium before the boundary was ratified by the two nations.

Because there are both technical and equity considerations in these boundary negotiations, there are two main actors involved in the process. The Ministry of Foreign Affairs is mandated to negotiate Netherlands' international boundaries. Technical assistance on the application of the law of the sea is provided by the Navy's Hydrographic Service, which also adjudicates and calculates technical definitions of international boundaries.

Although the adjudication of the international boundaries has largely been determined, a number of conflicts and inconsistencies over territorial sea and continental shelf/EEZ boundaries remain unresolved. Two main reasons for this are, firstly different institutions use different definitions for the baselines from which boundaries are determined, and secondly, lags in updating national legislation to bring it into line with the international law of the sea. For example, Netherlands mining legislation relating to the continental shelf still refers to a 3 nm limit on the territorial sea. And, European fishing authorities and the Navy's Hydrographic Service do not use the same baseline to determine fishery limits (Elema and de Jong 2002).

Fishing

Conflicts between economic interests and preservation of certain fish species in the North Sea are continual. For example, over-fishing has resulted in a number of fisheries being in danger of collapse (e.g. cod) (Ananova 2003). The European Union's (EU) Common Fisheries Policy, revised in 2003, applies to the North Sea and is binding on member states. At present, the EU holds emergency powers that permit it to make ad hoc decisions that may override existing directives and policies. For example, the cod fishing season was closed temporarily in 2001 as the resource had been over fished to the point of collapse (European Commission 2003, Reuters 2001).

As a member of the European Union (EU), the Netherlands is bound by EU fishing laws and policies in the EEZ, but not in its territorial sea. The determination of quotas, closed seasons and closed areas for breeding are major areas of conflict between the EU and member states. Sustainable practices that affect the region have to be balanced against the survival of commercial operations and the livelihoods of fishermen in individual countries. Attempts to reduce the size of fishing fleets and impose EU quotas are continually challenged and debated.

Shipping

Shipping routes in the North Sea are among the busiest in the world. Shipping routes and traffic separation schemes, shown in figure 3, were introduced in the 1970's. In consultation with coastal states, these are established by the International Maritime Organisation in terms of the International Convention for the Safety of Life at Sea (SOLAS, ch V, s8) (IMO 1998). However, as mentioned above, a coastal state may determine shipping routes in its territorial waters in terms of UNCLOS.

Natural Environment

Management of the natural environment is performed under a system of regional co-governance. European Union laws and directives, specifically the Directives relating to Birds (79/409/EEC) and Habitats (92/43/EEC) affect the governance of the North Sea (EU Nature Legislation 2001). In addition, the Council of Europe influences policy in a number of ways. For example, the Netherlands is a signatory to the Convention on the Conservation of European Wildlife and Natural Habitats, the Bern Convention. Moreover, the Council produces Guiding Principles for the Spatial Development of Europe (Council of Europe 2001). The Netherlands is also a signatory to the Convention on the Conservation of Migratory Species of Wild Animals (1979).

At ministerial level, there have been five International Conferences on the Protection of the North Sea attended by the ministers responsible for the protection of the North Sea environment and the rivers entering the North Sea. Belgium, Denmark, France, Germany, the Netherlands, Norway, Sweden, United Kingdom and the European Commission participate in these conferences. (Norway is not an EU member). Arising out of these conferences and the declarations pertaining to them, there are regular meetings of the Committee of North Sea Senior Officials (CONSSO), which comprises senior officials representing the North Sea states and the European Commission. Aspects of the Declarations have been codified in international and European Union law (North Sea Conference 2002).

The main tasks of CONSSO are to organize the work necessary to follow up on the conference declarations, to review progress in the implementation of the actions agreed upon by the previous conferences, and to organise further conferences. The first three declarations relate to the control and enforcement of regulations to reduce emissions, which affect the North Sea environment. More recently, the scope of the Convention has, *inter alia*, been extended to cover fisheries, habitats, spatial planning, the protection of species control over the release of genetically modified species into the environment, and the prevention of eutrophication (North Sea Conference 2002).

The Wadden Sea is viewed as being of special environmental significance (North Sea Conference 2002). Regional co-governance of the Wadden Sea between the Netherlands, Germany and Denmark is addressed through the Trilateral Governmental Conferences, of which the 9th was held in October 2001. At this conference, it was decided to submit an application to the IMO for the designation of the Wadden Sea as a Particularly Sensitive Sea Area (PSSA). The nomination of the Wadden Sea national parks and nature reserves, or parts of them, as a Natural World Heritage Site is also being explored (Wadden Sea 2001).

Pollution

Pollution is a major factor in busy sea-lanes and offshore mining areas. The Bonn Agreement (1983) between Belgium, Denmark, France, Germany, the Netherlands, Norway, Sweden, the United Kingdom and the European Community set guidelines for practical, operational and technical cooperation relating to pollution of the North Sea. Its primary aims are 1) to offer mutual assistance and cooperation in combating pollution; and 2) execute surveillance as an aid to detecting and combating pollution and to prevent violations of anti-pollution regulations (Bonn Agreement 1983).

The Netherlands is also a signatory to the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR 1992), which seeks to avoid pollution from land-based sources, dumping or incineration, and pollution from other offshore sources. Moreover, there is a commitment to share relevant research results.
OSPAR is now working, through the North Sea Regional Task Team, on an assessment of all aspects of the marine environment of the North Sea as part of its overall assessment of the marine environment of the convention's maritime area. OSPAR will undertake work on species and habitats by collecting and evaluating information on the impact on the marine environment (including species and habitats) of human activities identified by OSPAR, other than those leading to inputs of substances (OSPAR 1992).

Pollution, fishing, shipping traffic, natural environmental management and pollution control are the main factors that require regional co-governance in the North Sea. We now describe national structures, instruments and processes that govern the North Sea.

NETHERLANDS OCEAN GOVERNANCE STRUCTURES

At the national level, formal institutions for the coordination of North Sea governance and policy formulation have been in place for nearly 25 years. The most prominent institution in terms of overall national governance is IDON, an abbreviation that translates loosely as interdepartmental deliberations over North Sea policy and governance. The primary purpose of IDON is to debate and coordinate policies, directives and legislation pertaining to the North Sea that various ministries formulate. IDON was created in 1998. It superseded a similar body, the Interdepartmental Coordinating Committee for North Sea Affairs (ICONA), which was created in 1977.

We begin by discussing IDON and then discuss other relevant actors outside of this institution.

Figure 4 IDON

As portrayed in figure 4, IDON is made up of 10 representatives from different government sub-structure levels (e.g. agency, directorate general, directorate, department) in six ministries. Largely for historical reasons, some of the functions of the different ministries and their sub-structures overlap. For example, the

Ministry of Transport, Public Works and Water Management administers certain terrestrial surface mining activities (e.g. sand mining) and performs certain nature management activities. Other ministries conduct similar activities. For instance, the Ministry of Economic Affairs manages production and exploration licences for sub-surface mining of oil and gas. The Ministry of Agriculture, Nature Management and Fisheries holds overall responsibility for management of the natural environment.

The National Spatial Planning Agency is concerned with the development of national spatial policy, which serves as a framework within which detailed decisions of a spatial nature should be formulated. The land and sea are not viewed as separate in Netherlands spatial planning, although this philosophy has only been adopted in spatial planning policy in recent years (Netherlands 2000).

In terms of the fifth National Policy Document on Spatial Planning, objectives that relate to the North Sea are:

1) maintaining the vitality of the natural system of the North Sea,
2) incorporating economic uses into it in such a way that they do not damage it, and
3) coordination of the economic uses.

(Netherlands 2000)

Building on table 1, specific activities at sea that need to be managed to achieve these objectives are:

- Shipping routes, traffic separation and anchoring areas are laid down in national policy. Activities that impede shipping are excluded from these areas in accordance with the Mining Rights Map.
- The coastal zone may not be undermined by objects in the sea.
- Unobstructed views from the coast are to be maintained. Structures that are proposed within 12 nm of the coast will only receive permits if significant public interest is at issue. Moreover, good design is important.
- Cables and pipelines should be combined and limited to specific routes.
- The removal of unused cables and pipelines should become obligatory.
- The North Sea is part of the National Ecological Infrastructure
- 2nd National Military Training Grounds Structure plan will determine how much of the North Sea is required by the Ministry of Defence.
- Sand dredging for land reclamation is only permitted at depths of more than 20 metres

The Ministry of Transport, Public Works and Water Management has mandated a number of sub-structures to administer various aspects of the North Sea. The Directorate-General of Freight Transport deals with general freight transportation policy, shipping policy and safety. What is of interest in the context of ocean

governance is the determination and management of shipping routes and traffic separation schemes. These are determined by the IMO, but proposed, demarcated and managed by the Ministry of Transport, Public Works and Water Management.

The Directorate-General Public Works and Water Management, largely through its North Sea Directorate (DNZ), is mandated with the governance of North Sea business related to shipping, fishing, dredging, sand mining, the ocean environment and recreation. It has a fleet of ships which are tasked with performing certain hydrographic surveys (e.g. survey of navigational hazards), demarcating shipping routes and harbour approach routes, and pollution clean ups. It is responsible for implementing the Bonn agreement of 1983. As stated earlier, this relates to regional management of pollution in the North Sea. The North Sea Directorate maintains one of the major information systems in the North Sea, which we describe below. Environmental work relating to seabird counts is also conducted by the North Sea directorate (DNZ).

The Ministry of Defence has representatives from the Coastguard and the Department of Defence on IDON. The Coastguard involves a partnership between two Ministries. It falls under the Ministry of Defence, and personnel are drawn from the Navy. However, ships and other equipment are supplied by the Ministry of Transport, Public Works and Water Management, Directorate-General Public Works and Water Management. The Navy represents military interests (e.g. military exercise areas) and the Naval Hydrographic Service.

The Ministry of Economic Affairs, mainly through the Directorate-General for Competition and Energy and the State Supervisor of Mines, administer subterranean mining and mineral exploration, which in the North Sea currently pertains to oil and gas. The Netherlands continental shelf is divided into blocks of 10′ x 20′ (N x E) for licences relating to exploration and production. These fixed term licences are governed by the Mining on the Continental Shelf Act (1996). As can be seen in figure 2, there are subdivisions of these blocks, which were done in terms of earlier versions of the Mining on the Continental Shelf Act (e.g. 1967, 1976). Conflict between mining and other interests is managed through debates in IDON and a number of formal instruments. In terms of a series of Royal Decrees, there are restrictions on production and exploration activities in certain areas. Other areas are closed to these activities (e.g. military exercise areas). Locating production and exploration drilling platforms close to shipping routes is determined in conjunction with the Ministry of Transport, Public Works and Water Management's North Sea Directorate.

The State holds the rights to minerals in the Netherlands. Oil and Gas exploration and production is done as a partnership between the State and private organisations. The licence holder holds an agreement of cooperation with Energy Control Netherlands (EBN), which falls under the Ministry of Economic Affairs.

EBN contributes 40% of the production and exploration costs, and in turn receives 40% of the profits from oil and gas production ventures.

The Ministry of Agriculture, Nature Management and Fisheries has two representatives on IDON, one for fisheries and the other for nature conservation and management. Commercial fishing permits are governed by EU quotas. However, the distribution of quotas allocated to the Netherlands is decided by fishing organisations themselves.
Actors not directly represented on IDON include the National Institute for Applied Science (NITG TNO), various scientific organisations and the Netherlands Cadastre. The Navy's Hydrographic Service is a passive member of IDON, as other defence force members represent it on IDON.

The Navy's Hydrographic Service is responsible for conducting hydrographic surveys and publishing charts and other nautical information covering the Dutch Continental Shelf and adjacent waters, together with the waters surrounding the Netherlands' Antilles and Aruba. As mentioned above, it also provides technical support to the Ministry of Foreign Affairs relating to the International Law of the Sea.

In general, the Netherlands Cadastre plays a passive role in North Sea governance. Based on boundaries determined by the Navy's Hydrographic Service, the Netherlands territorial sea has been divided up into a series of parcels. Parcels that are within 1 km of the shoreline are registered in ownership in the name of local authorities. Parcels extending from this 1km line to the 12 nm boundary of the territorial sea have been registered in State ownership. However, these State owned parcels of ocean are not used in the processes to govern the territorial sea.

INFORMATION SYSTEMS

Accurate geographic information as integral to planning, policy formulation and administration has long formed a tool of the Netherlands' North Sea management strategy. A North Sea Atlas for Netherlands Policy and Management was produced for ICONA in 1992 by various substructures in the Directorate-General Public Works and Water Management, Ministry of Transport, Public Works and Water Management. The Atlas contained information about ocean biology, minerals, shipping, water composition, recreation, data and a number of other relevant themes. It was primarily a government working document as it included tools for performing overlay analyses by tracing different thematic maps.

Nowadays, GIS have superseded the Atlas. The primary GIS for North Sea governance is run by the North Sea Directorate (DNZ). A current initiative to ensure that comprehensive information relating to various proposed projects and locations is incorporated and accessible through a single user interface is the

Law and Policy Information System (BREIN) project. The objective is to provide a facility whereby a user can access all the law and policy information relating to a particular location in the North Sea (e.g. a proposed wind farm) using the GIS. A survey and analysis of more than 60 documents relating to the North Sea, which incorporate laws, regulations, policies, covenants, international and national conventions, and guidelines has been prepared for this purpose by the Netherlands Institute for the Law of the Sea (Oude Elferink and Dotinga 2000).

Besides the GIS of DNZ, there are a number of other purpose specific GIS's, such as that of the Navy's Hydrographic Service. GIS is also used for fisheries and environmental management. NITG-TNO, the institution that manages geological data, owns a GIS for their own purposes. Data is shared and exchanged between a number of governmental and scientific institutions and private companies such as oil and telecommunications companies. However, data that are confidential to a particular institution are not shared. For example, NITG-TNO hold mineral exploration data that have been acquired through large private investments. These data are not released into the public domain.

There are initiatives to develop a national spatial data infrastructure in the Netherlands. A pilot project, National Clearinghouse for Geographic Information (NCGI), is in process. However, to date sharing of data to govern and manage the North Sea tends to be done through informal networks. As a result of applications for access and usage rights being examined by a number of different government institutions, certain role players discovered that they were duplicating the collection of data produced by others. This has resulted in particular institutions being designated "owners" of certain data and others update their data from them. Data sharing takes place, but formal data exchange standards have not been established and not all institutions keep meta-data. A possible explanation for this is that until recently many international spatial data infrastructure initiatives have tended to ignore ocean data. Moreover, meta-data do not exist for certain data sets that were collected when it was not common practice to generate meta-data.

ANALYSIS AND CONCLUSIONS

In conclusion, there is a long history of conflict over access and usage of the North Sea. Long-standing tensions have compelled different international actors to consult and cooperate. Managing and governing the tension between intense economic activity, demands for space that exceed availability and environmental interests, is a major challenge.

The main lessons provided by the Netherlands case, and the North Sea case in general, is that firstly, given the nature of the dialectic, effective ocean governance requires continual, transparent debate over economic and environmental concerns. It is necessary to debate policies, management

strategies, laws, permits and other similar instruments at regular intervals at international, ministerial and operational level to achieve an integrated system of cooperative governance. And it is necessary that action extend beyond mere debate. Thus, an institution such as CONSSO has been tasked with implementing resolutions and measuring the effectiveness of various strategies that are formulated at various forums. Moreover, the fact that IDON, and its predecessor ICONA, have existed for more than 25 years underlines the need for such institutions at the national level.

Secondly, the structural tension between economic interests and environmental needs is inherent in the situation and conflict is continual and natural. Different actors can be expected to strive to maximise the benefits of their particular constituencies in debates and negotiations. The challenge is to achieve compromise and synthesis of different objectives. However, even legal decrees that may be regarded as peremptory, such as the EU requirement to reduce fishing fleet sizes, may be ignored at times. Institutions such as the European Court of Justice from part of the infrastructure required to deal with these incidents.

Thirdly, the democratic culture of the North Sea situation encourages good governance. Although there are numerous tensions and conflicts, in the long term, most of the actors in western Europe understand what needs to be done and are prepared to make compromises. Moreover, there is a great deal of transparency in the governance processes.

Fourthly, the land and sea should not be seen as separate. The entire North Sea catchment area has been included in the North Sea Conferences' area of interest and Netherlands spatial planning policy documents now emphasize this principle.

Fifthly, the debates over management and governance, and the planning, formulation and implementation of various strategies need to be underpinned by good quality, integrated spatial information. Formal and informal networks, instruments and structures and a culture of cooperation underpin this information infrastructure, which the Netherlands has been working towards for a number of years.

At a glance, the formal arrangement of rights of occupation, usage and access to the Netherlands North Sea resembles a cadastre that supports tenure security and fiscal and environmental management. However, unlike most land-based cadastral systems, the system's properties emerge from a number of institutional structures and processes that are loosely coordinated. In fact, interviews during the study revealed that many of the people involved in this governance system are unaware of how it all fits together.

The Netherlands Cadastre as an institution plays a minimal role in this system other than to divide the territorial sea into parcels and register them in ownership in the name of the State or local authority. In terms of the Law of the Sea, the State is not empowered to own parcels of ocean in the EEZ. Moreover, other than the State owned parcels in the territorial sea, parcel boundaries are determined according to usage only (e.g. minerals, aquaculture). There is not a market in ocean parcels where parcels are subdivided and consolidated and sold off, nor is the system designed to support this.

It has been necessary to adjudicate and determine the continental shelf boundaries with Netherlands' adjacent and opposite states. Based on this international boundary parcel, the EEZ and parts of the territorial sea have been divided up into parcels for the purpose of exploring and mining oil and gas. Rights of passage in the shipping lanes that overlap these parcels are servitutal in nature and superior to those of mining and mineral exploration. Other rights that are servitutal in nature pertain to cables and pipelines, albeit that their duration is limited to the useful lifespan of the cable or pipe. However, similar to many arrangements of mining and mineral exploration on land, holders of North Sea mining and exploration rights are limited to performing these activities. Holders of fishing rights are not impeded by mineral parcel boundaries, providing they do not interfere with mining and exploration operations.

Although there are calls to divide the oceans up into different parcels (Carr 1998), the North Sea case does not suggest that these should be for the allocation of long term or perpetual individual rights. Private ownership is absent as a system of tenure in the Netherlands North Sea. In consultation with various international bodies, the State has taken on the role of custodian of rights, access and usage of the oceans. Rights of access and usage are seldom allocated in perpetuity and the State retains the power to intervene on an ad hoc basis in response to unforeseen circumstances. Fishing, aquaculture and the harvesting of other marine species require permits, which although renewable, tend to be allocated for short periods. Often, the rights associated with these permits (e.g. quotas) change from year to year and can be cancelled at short notice if a species becomes threatened. Mining and mineral exploration rights are of limited duration and they are likely to take the form of a lease or prospecting permit. Moreover, generally these carry a concomitant obligation to rehabilitate the ocean floor.

In conclusion, the system of governance in the Netherlands North Sea is based on cooperation. It is a system of permits, leases and servitudes of limited duration, where the State retains substantial power. Specialists in different ministries allocate permits. Coordination is done through legislation and policy and institutions such as IDON and CONSSU. Rights are not allocated to third parties on the basis of ownership. Moreover, they are of limited duration. This allows flexibility, which is sensible given the environmental sensitivity of the

oceans and our lack of knowledge of the effects of intervention and other factors that affect renewable marine stocks.

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