Water pollution control in the Netherlands

Policy and practice 2001

Ministry of Transport, Public Works and Water Management

Directorate-General for Public Works and Water Management

RIZA Institute for Inland Water Management and Waste Water Treatment

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RIZA

The acronym RIZA stands for Rijksinstituut voor Integraal Zoetwaterbeheer en Afvalwaterbehandeling (Institute for Inland Water Management and Waste Water Treatment). RIZA is the research and advisory body for the Ministry of Transport, Public Works and Water Management for inland water in the Netherlands and is a leading international centre of knowledge for integrated water management.

The institute collects data on and conducts research into water quality and quantity. On the basis of these data, RIZA makes recommendations concerning the management of inland water in the Netherlands and abroad. This wide-ranging remit requires a multi-disciplinary approach. From biochemists and hydrologists to computer professionals and management experts, RIZA's staff represents a wide variety of specialisms.

RIZA has four main departments:

- Wetland development and restoration: research and advice on the restoration of wetlands to their natural state.
- Water systems: research and advice on the integrated management of inland waters.
- Water pollution control: research and advice on wastewater treatment and emissions levels.
- Information and measurement technology: collection and processing of data and research in specialist laboratories.

Clients of RIZA are water managers in the Netherlands: the regional directorates of the Directorate-General for Public Works and Water Management (*Rijkswaterstaat*), provinces and water boards. RIZA also represents the Netherlands in international consultations about water management.

RIZA was set up in 1920. Currently it has about 500 employees. The head office is located in Lelystad. There are branches in Arnhem and Dordrecht and monitoring stations in Lobith and Eysden.

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Introduction

This booklet is entitled 'Water pollution control in the Netherlands, policy and practice 2001'. It describes the main features of Dutch water management policy, and gives a more detailed account of Dutch emissions policies and their implementation. It should be remembered, however, that some aspects of policy and practice may change in the coming years as a result of the implementation of the European Union Water Framework Directive.

The booklet is divided into three parts:

I. Water management in the Netherlands

This part provides a brief introduction to water management in the Netherlands. It includes information on the historical and geographical context of water management (section 1), the institutional and planning structure (section 2) and major relevant legislation and regulations (section 3).

II. Water pollution control in the Netherlands: the policy

Section 4 discusses integrated environmental quality standards, while section 5 is devoted to the general principles of water pollution control policy.

III. Water pollution control in the Netherlands: the practice

Sections 6 to 11 shed light on the practice of water pollution control: general permitting requirements (section 6), outline permits (section 7), action to deal with diffuse sources (section 8), coordination and harmonisation (section 9), enforcement (section 10) and the charging system (section 11).

I Water management in the Netherlands

1 The historical and geographical context of water management

Water has always played an important part in Dutch life. The Netherlands (41,000 km^2, including 3,000 km^2 of fresh water and 4,000 km^2 of salt water) is a low-lying country in the delta of four European rivers: the Rhine, the Meuse, the Scheldt and the Ems. It is part of the North Sea catchment area (figure 1). More than half of the territory of the Netherlands is prone to flooding and one-third actually lies below mean sea level. The location of the country has endowed it with fertile soil and convenient waterways for the conveyance of goods and people. However, it also entails the risk of flooding when river discharges and sea levels are high.

The Netherlands has twenty-five centuries of experience in managing this difficult mix of land and water. Flood defence works and land reclamation have created the country's famous systems of polders and dikes, which allow water levels to be carefully controlled.

It is a densely populated country. During the 20th century, the population grew from 6 million to 16 million inhabitants. This sharp population increase was linked to industrialisation, urbanisation and the modernisation and intensification of agriculture. Industrial growth, increased domestic consumption and the increase in agricultural production have exacerbated the pollution of rivers and lakes.

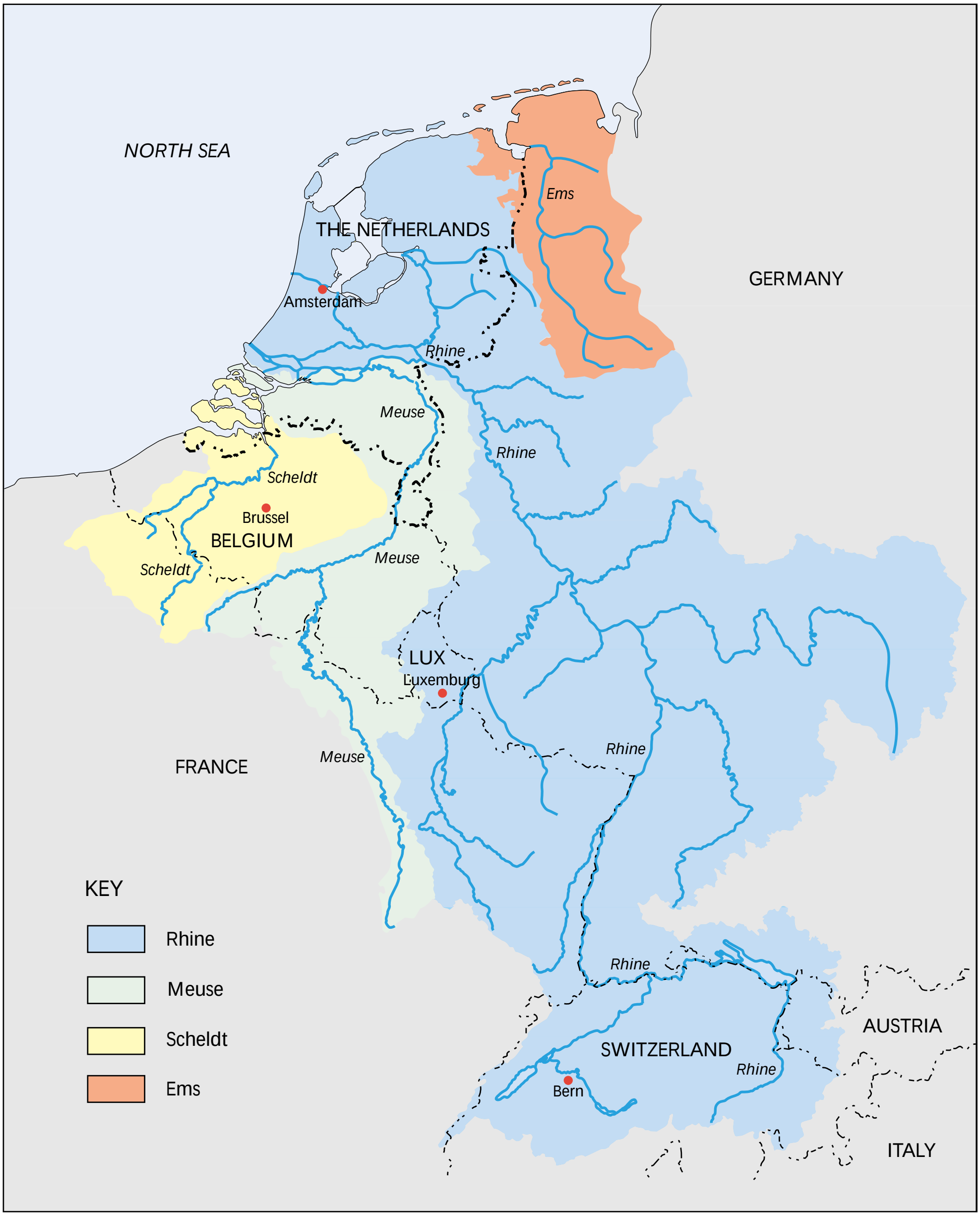
Although water quality problems had already been identified prior to the 20th century, it was not until the 1960s that the deteriorating quality of the surface waters really became apparent. By that time, the load of organic pollutants was causing acute oxygen problems. Discharges of wastewater from industry, agriculture, traffic and households also posed threats to the surface waters. Large amounts of heavy metals, pesticides, hydrocarbons and organic chlorine compounds were being discharged, causing the disappearance of indigenous species, deterioration of water quality and pollution of sediments.

By that time, in fact, pollution was serious enough to jeopardise the use of water resources for human activities such as the provision of drinking water, agriculture, fisheries and recreation. Effective action to combat the threat began in 1970, the year in which the Netherlands' first real piece of environmental legislation, the Pollution of Surface Waters Act, came into force. The Act provided the statutory means to turn the tide of pollution and bring about a considerable improvement in water quality.

Over the years since 1970, the initial approach to tackling water pollution has been modified: there has been a switch from end-of-pipe measures to measures to tackle pollution at source, from a sectoral to an integrated approach, and from national to international/regional action.

In the 21st century, the aim is to achieve sustainable water systems and integrated water management will therefore be organised at an (international) river basin level. The European Union's Water Framework Directive (see section 3) will play a major role in this respect.

Figure 1
The Scheldt, Meuse, Rhine and Ems river basins.



2 Institutional and planning structure

2.1 Institutional structure

The Netherlands has three tiers of directly elected government: national, provincial and municipal. Each of these has its own legislative assemblies and executive organisations, together with a broad range of duties within the relevant geographical area. Alongside these general-purpose government bodies, there are water boards with the sole task of managing water. They are (financially) independent of, but supervised by, provincial government. Members of the water boards are elected.

Water policy in the Netherlands is the responsibility of the Ministry of Transport, Public Works and Water Management and the 12 provinces. The ministry is also responsible for the management of state waters (sea, rivers and large lakes). The operational section of the ministry is the Directorate-General for Public Works and Water Management (*Rijkswaterstaat*).

The provinces are responsible for the management of regional waters (small rivers and lakes, and the extensive system of canals and ditches) but they all have delegated this responsibility to the water boards. Many of these water boards have existed for centuries. Their main managerial responsibilities relate to dikes, water quantity and - since 1970, when the Pollution of Surface Waters Act came into force (see section 3) - water quality. This third area of responsibility means that the water boards are responsible for the treatment of sewage (other than from industrial plants with their own treatment facilities). However, the water boards are not responsible for the provision, maintenance and operation of the sewers which convey wastewater to the urban wastewater treatment plants they operate. That is a matter for the municipalities.

2.2 Planning structure

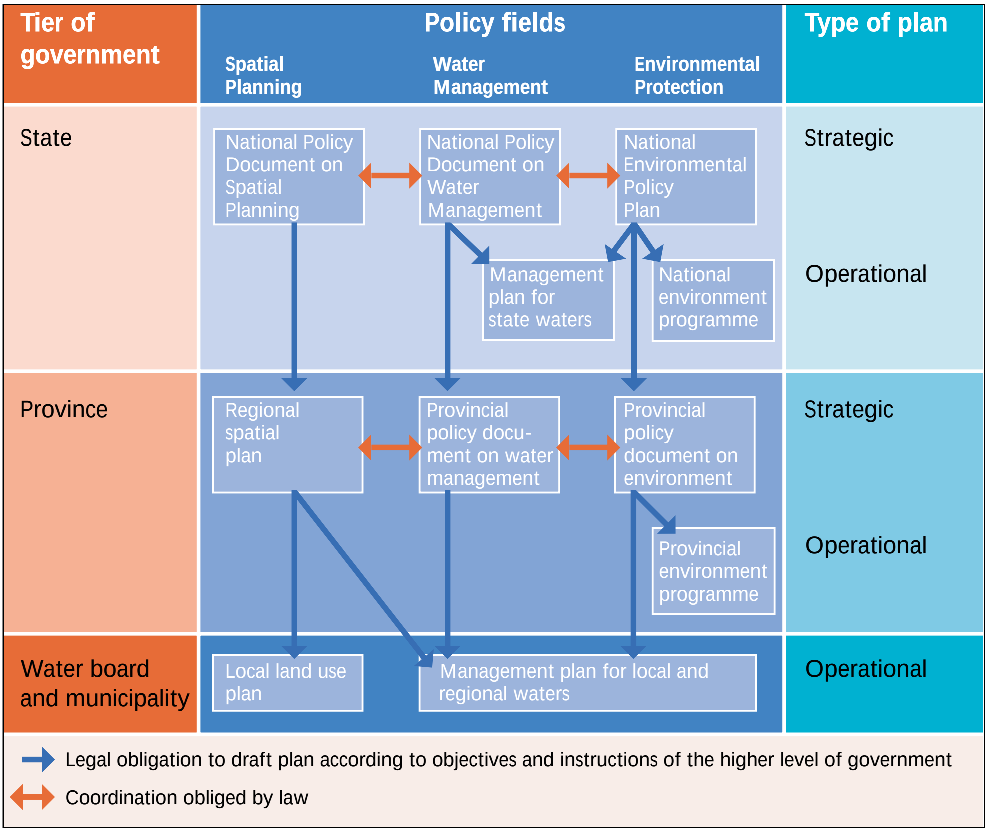
National and provincial policy documents in the fields of water management, spatial planning and environmental management are very closely interrelated (see figure 2). They all aim to achieve the best possible management of the physical environment, based on an integrated consideration of the various interests involved. Their coordination is achieved mainly through a kind of alternate 'leap-frogging' of national and provincial documents. Each new or revised policy document spells out the consequences for policy and plans in the other fields.

National policy documents on water management play a key role in the Netherlands. Policy is developed via a process of broad-based consultation between the ministries involved, the water boards, provinces, municipalities and other interested parties (including non-governmental organisations representing environmental interests, consumers, industry etc.). The process is managed on behalf of the government by the Minister of Transport, Public Works and Water Management. The policy laid down in national policy documents provide a framework both for provincial policies on water and for the actual practice of water management. The policy documents also take explicit account of agreements and commitments made in international forums, such as the International Commissions for the Protection of the Rhine, the Meuse and the Scheldt (ICPR, ICPM and ICPS), the North Sea Ministerial Conference (NSMC) and the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR).

The most recent of these documents, the Fourth National Policy Document on Water Management (1998-2006), entitled ‘A Framework for Water’ (*NW4*), is based on the strategy of integrated water management first proposed in the previous national policy document. It focuses on an integrated area-specific approach and the use of hydrological processes as a guiding principal in spatial planning.

The 12 provinces draw up regional water management plans (increasingly as part of their integrated environmental/spatial plans) and oversee water management by the water boards and municipal authorities. The water boards then base their operational plans on the regional water management plans and are responsible for the implementation of policies for the regional waters. The municipalities have a role in local land use planning.

Figure 2
Planning structure.



3 Legislation and regulations

The most important legislation and regulations with regard to integrated water management are:

Pollution of Surface Waters Act (PSWA, 1969/1970)

The main objective of this act is to control the pollution of all surface waters. To this end, it provides a framework for a two-track policy: the reduction of pollution and the improvement of water quality (the 'combined approach', see section 5). Two important instruments of the PSWA are: the issue of discharge permits (see section 6) and the use of levies (see section 11).

Water Management Act (1989)

The Water Management Act defines the planning structure for water management by agencies at different levels of government and lays down rules for the quantitative management of surface waters. It provides for the following policy instruments: planning, permits, registration of abstractions and discharges, water covenants, level decisions, and charges. The act's provisions on the structure of planning are of major importance because they prescribe an integrated system of national and provincial plans under the PSWA, the Groundwater Act and the Water Management Act itself. The act also includes statutory cross-references to spatial and environmental planning (see section 2).

Environmental Management Act (1993)

The Environmental Management Act provides the legal framework for the environmental plans and programmes of central government, the provinces and the municipalities and lays down the regulatory procedures for planning and permits. The environmental aspects of a large number of industrial activities are regulated on the basis of the Environmental Management Act (integrated environmental legislation).

General Administrative Law Act (1994)

The General Administrative Law Act prescribes the procedures to be followed for the issue, modification and withdrawal of permits under the PSWA and the Environmental Management Act. These include third-party consultation.

Water Framework Directive of the European Union (2000)

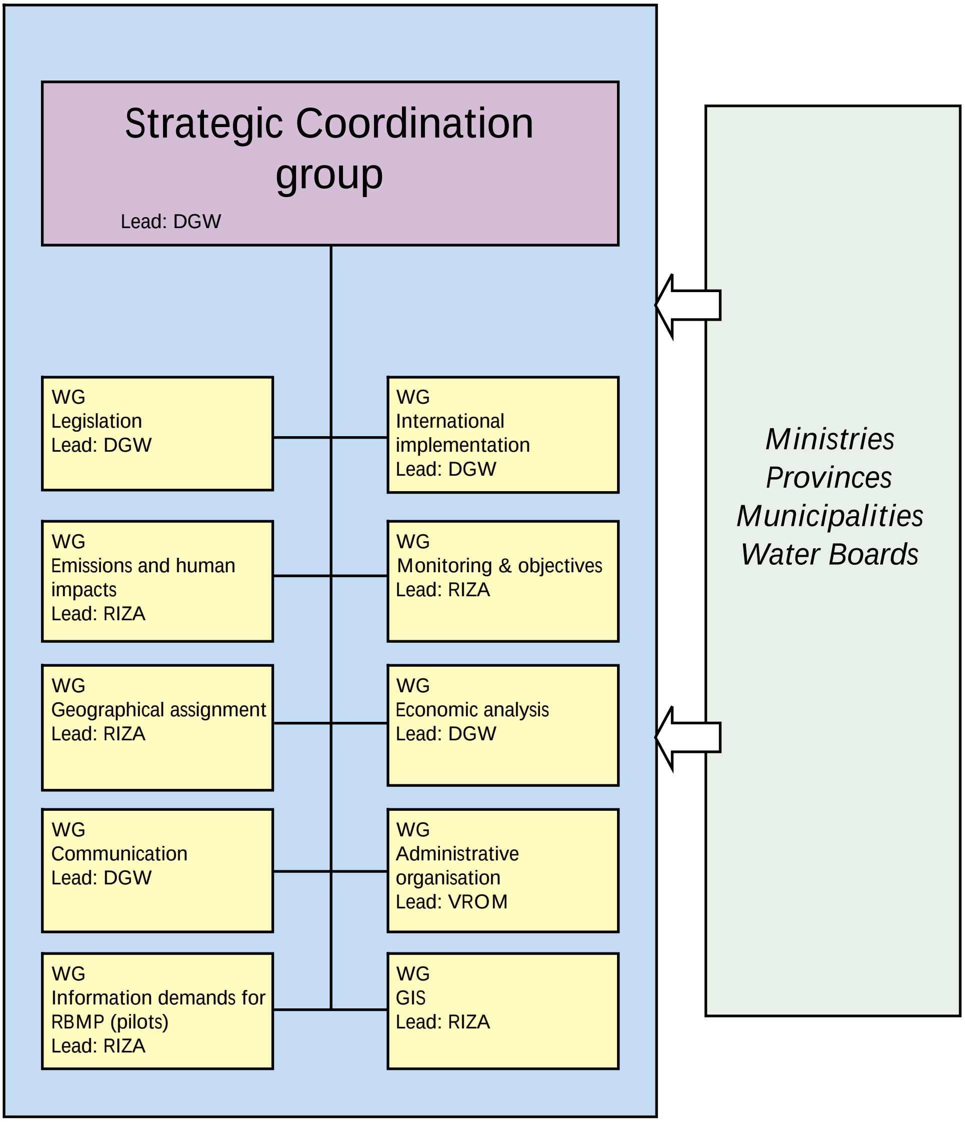
The Water Framework Directive (WFD, 2000/60/EC) came into force on 22 December 2000. It sets out a new approach to water management and is the basis of the EU's water management strategy. It establishes a framework for the protection both of all bodies of surface water (inland, transitional and coastal) and of groundwater. The WFD aims to:

1. incorporate all requirements for the management of water status into a single *river basin management* system based on geographical and hydrological areas rather than administrative and national boundaries;
2. *coordinate objectives* for the protection of different types of water (e.g. drinking, bathing, surface and groundwater);
3. *coordinate measures* to address individual and sectoral problems in order to attain the objectives;
4. define the relationship between emission limit values and quality standards through the *'combined approach'*;
5. increase *public participation* and thereby the transparency and enforceability of EU water legislation;
6. introduce a system of *cost recovery pricing* of water.

Figure 3 shows how the implementation of the WFD is being organised in the Netherlands.

Other EU directives relevant to water management include the:
- Dangerous Substances Directive (76/464/EEC) and its daughter directives.
- Urban Wastewater Treatment Directive (91/271/EEC).
- Integrated Pollution Prevention and Control (IPPC) Directive (96/61/EC).
- Nitrates Directive (Directive concerning the protection of waters against pollution caused by nitrates from agricultural sources, 91/676/EEC).

Figure 3
Organisation of the implementation of the WFD in the Netherlands.



DGW = Directorate-General of Water Affairs of the Ministry of Transport, Public Works and Water Management
RBMP = River Basin Management Plan
GIS = Geographic Information System
WG = Working Group
VROM = Ministry of Housing, Spatial Planning and the Environment

II Water pollution control in the Netherlands: the policy

4 Integrated environmental quality objectives

Dutch policy on water pollution control is based on a two-track approach: one track is concerned with emissions and the other with immissions or water quality (see also section 5). The emissions track (the source-oriented approach) takes precedence, while the immissions track includes an environmental quality standards test designed to show whether a further source-oriented approach is necessary. The Fourth National Policy Document on Water Management (*NW4*) and the Water Framework Directive also adopt this two-track approach.

The *NW4* includes general quality standards for surface water and sediments: the maximum admissible risk with associated maximum permissible concentrations and the negligible risk levels with associated target values.

The calculation of environmental quality standards is a two-stage process:
1. calculation of risk levels (research stage);
2. translation of risk levels into environmental quality standards (policy stage).

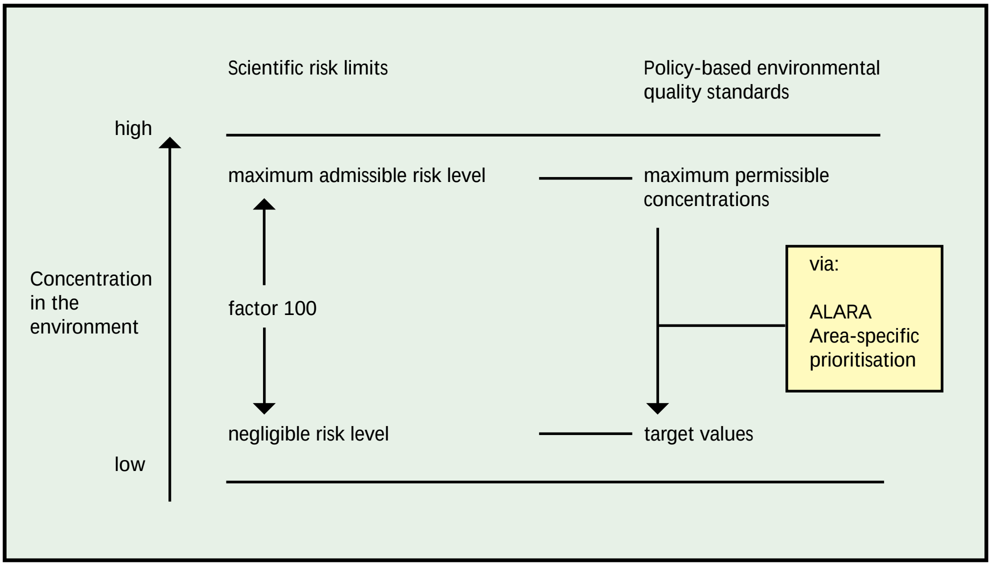
Figure 4 shows the relationship between the scientifically established risk limits and the environmental quality standards established as the result of policy decisions.

The maximum admissible risk is the minimum quality objective for 2000. The numerical values (maximum permissible concentrations) are stated in the national policy documents on water management (see annex I) and filter through to the water management authorities by way of the management plans. Since this means that water management authorities have a duty to strive to achieve the maximum permissible concentrations, it is important to take into account the need to achieve these when formulating conditions for individual discharge permits under the Pollution of Surface Waters Act (see section 5). The Commission on Integrated Water Management (see section 9) has developed an immission test that can be used for this purpose.

The maximum permissible concentrations are not yet being achieved for all substances in all surface waters. Moreover, the longer-term aim is to achieve the target values (the quality standards to be achieved by 2010). For this reason, high priority continues to be attached to pollution prevention and there must be no relaxation of effort even where concentrations of substances are below the maximum permissible concentrations. This is to prevent problems being passed on to other water systems. Additional requirements and further prioritisation aimed at the eventual achievement of the target values are being decided for each individual water system, tailored to its functions. The Dutch parliament has decided that additional requirements for existing discharges can only justifiably be based on the immission test if the maximum permissible concentrations are exceeded in the recipient surface water. If the quality of the water system is somewhere between the maximum permissible concentration and the target value, further emission reduction requirements must be based on advances in technology, in accordance with the ALARA (as low as reasonably achievable) principle.

The general quality standards for surface water and sediment are listed in annex I. Except in the case of the tributyltin compounds, these are identical for fresh and salt water systems. The general quality standards for soil and air are set out in the National Environmental Policy Plan.

Figure 4
Relationship between risk limits and environmental quality standards.



5 General principles of the policy on water pollution control

5.1 Introduction

Dutch water management policy for the next few years is outlined in the Fourth National Policy Document on Water Management (*NW4*, see section 2). The guiding principles are:

- pollution reduction;
- the stand-still principle;
- the polluter pays principle.

These principles apply to all sources (industrial, municipal and diffuse).

The *NW4* makes a clear plea for prioritisation in the reduction of emissions, placing a duty on water management authorities to strive to achieve the maximum permissible concentrations (see previous section) within the plan period. In reducing emissions, priority must be given to substances where the maximum permissible concentrations are exceeded.

In addition, the *NW4* focuses on the need for integrated decision-making on environmental issues: the integrated approach. Decisions on measures to deal with emissions to water must balance the protection of the water system with that of the other two compartments of the environment (soil and air) and must also take account of aspects such as energy consumption and waste prevention. Integrated consideration of this kind is generally part of the decision process (based on the chain management approach) preceding the actual issue of a discharge permit under the Pollution of Surface Waters Act (PSWA). Guidance for integrated consideration is available in the form of the BREF (BAT reference documents) drawn up at European level for each sector of industry in the context of the IPPC Directive.

PSWA permits can be regarded as the culmination of the process of integrated consideration. Conditions attached to them must relate only to the protection of water quality and to measures safeguarding the efficient functioning of the urban wastewater treatment plant. The level of decision-making involved in the preparation of permits can range from the choice of techniques (the means) to achieve a desired reduction in wastewater discharges (the end) right through to the prioritisation of measures and investigations in different areas of the environment.

Figure 5 shows a schematic outline of the policy of water pollution control in the Netherlands.

Figure 5
Schematic outline of the policy of water pollution control in the Netherlands.

		pollution reduction		
A	**general approach (chain management):**			
step 1	*prevention:* (prevention of pollution)	source-oriented approach directed at: ♦ improved selection of base materials, additives and products ♦ use of environmentally friendly technology in the production process, corporate practices or use phase ♦ new production process or corporate practices ♦ use of process-integrated solutions		
step 2	*re-use:* (re-use of water and substances wherever possible)	♦ recycling (re-use within the production process /corporate practices) ♦ re-use outside the production process / corporate practices ♦ reprocessing for possible re-use		
step 3	*removal:* ('end-of-pipe' measures)	wastewater treatment, purification		
B	**substance-specific approach:**			
1	*implementation of 'Esbjerg/OSPAR':*	effort to end emissions by 2020•)		
		BLACK-LISTED SUBSTANCES	*OTHER POLLUTANTS*	
		organohalogenic compounds, mercury, cadmium, etc.	heavy metals, oxygen-consuming substances, P, N, etc.	sulphate, chloride, heat
2	*abatement based on:*	**emissions approach**	**emissions approach**	**water quality objectives approach**
2a	*primary approach:*	Best Technical Means (BTM)••)	Best Practicable Means (BPM)••)	admissibility of discharges and measures to be taken depending on target environmental quality standards••••)
2b	*further requirements based on (=immission test):*	MPCs•••) or other applicable environmental quality standards••••)	MPCs•••) or other applicable environmental quality standards••••)	
		stand-still principle		
C	**in case of new or increased discharges:**	no increase permitted within management area	no significant deterioration permitted in water quality	no significant deterioration permitted in water quality

→ **integrated approach** | **prioritisation**

•) Applies at any rate to the 43 priority substances/groups of substances designated under the OSPAR agreement (see annex II).

••) The term 'Best Available Techniques' (BAT), which is frequently used in international circles, encompasses both BTM and BPM.

•••) MPCs=maximum permissible concentrations
In view of the low concentrations (largely < MPCs) in the marine environment, the obligation is to strive to achieve the target values rather than the MPCs (letter of 18 October 1996 from the Environment Minister to the Lower House of the Dutch parliament).

••••) In the case of indirect discharges subject to PSWA permits, the immission test or water quality objectives approach encompasses measures to safeguard the efficient functioning of the relevant urban wastewater treatment plant as well as the protection of the receiving surface water.

5.2 Reduction of pollution

The 'pollution reduction principle' dictates that pollution should always be minimised, irrespective of the type of substance concerned (see figure 5). In this respect, a distinction is drawn between a general approach (chain management) and a substance-specific one.

A. General approach (chain management)
The principle is increasingly being implemented by giving priority to prevention and re-use. In this regard, source-oriented measures take priority over technical treatment ones. Examples are:

- selection of base materials, additives and products;
- use of clean technology;
- new production process or corporate practices;
- use of process-integrated solutions;
- closed-loop recycling;
- re-use.

B. Substance-specific approach
1 Implementation of Esbjerg/OSPAR agreements
During the fourth North Sea Ministerial Conference in Esbjerg (1995), it was agreed to strive for a continuous reduction of emissions, discharges and losses of hazardous substances (irrespective of source) thereby moving towards the target of their cessation within one generation (25 years) with the ultimate aim of concentrations in the environment near background values for naturally occurring substances and close to zero concentrations for man-made synthetic substances. Over the next few years, international efforts will be made to identify the substances involved and establish the priorities for tackling them. In 1998, as the first stage of the implementation of the Esbjerg Declaration, 15 substances/groups of substances were designated under the OSPAR Convention to be the subject of an effort to end discharges by 2020. In 2000 and 2001, OSPAR expanded this list to include a further 12 and later 16 substances (see annex II).

The European Union has recently published a list of 34 priority substances (see annex II). This list will form part of the Water Framework Directive and has been compiled on the basis of a risk assessment included in the directive. It will be reviewed every four years, at which point new substances can be added to it. The list is divided into three categories:

- priority hazardous substances (aim: zero discharges within 20 years);
- priority substances (aim: to meet quality standards, which have yet to be defined); and
- priority substances under evaluation (definitive classification to follow).

2 Emissions approach or water quality objectives approach

Depending on the substance concerned an emissions approach or a water quality objectives approach is adopted.

Emissions approach

The emissions approach is followed in virtually all instances, not only of pollution by substances included in List 1 of Council Directive 76/464/EEC or in the list of 132 substances (which are considered 'black-listed' in the Netherlands), but also of pollution of most 'other substances' (see box). The emissions approach implies that efforts must be made to prevent pollution of surface waters *irrespective* of the water quality objectives to be achieved. In the case of black-listed substances (and those with comparable characteristics), this means that the Best Technical Means (BTM*) are to be applied, whereas in the case of the other substances to which the emissions approach applies the requirement is for an abatement effort based on the Best Practicable Means (BPM*).

In addition to the use of BPM/BTM, the emissions approach can also encompass more far-reaching requirements based on the prevailing water quality objectives for the receiving water (the water quality test or immission test, see section 4).

In the case of indirect discharges from designated sectors of industry (see section 6 and annex IV), the water quality test will also take into account the need to safeguard the efficient functioning of the relevant urban wastewater treatment plant.

The impact of individual substances on the aquatic environment varies, whether or not the particular substance is black-listed. Therefore, despite the definitions, it is not the case that there are two clearly defined groups of techniques for the control of wastewater discharges. Rather, there is a broad range of technical options. The most obvious difference between treatment with BTM or BPM is that the aim in the first case is entirely to eliminate pollution of the aquatic environment, while in the second case a certain amount of residual discharge is expected and will be acceptable in terms of meeting the relevant water quality objectives.

* *Best Practicable Means* (BPM) are defined as: 'Those techniques which can be used to achieve the greatest reduction in emissions, taking account of economic aspects (i.e. the best techniques that are financially acceptable to a normal company)'.

Best Technical Means (BTM) are defined as: 'Those techniques which can feasibly be used, at a higher cost, to achieve an even greater reduction in emissions'. However, it is apparent from the jurisprudence that it is not intended that financial and economic aspects should play no part whatsoever in defining the BTM in a particular case.

The term ‘Best Available Techniques’ (BAT), which is frequently used in international circles, encompasses both BTM and BPM.

Black-listed substances
Substances on the black list (i.e. included in List 1 of Council Directive 76/464/EEC) are so harmful to the environment that emissions should, in principle, be stopped. For these and similar substances, the aim is to reduce discharges as close as possible to zero. Source-oriented measures should involve the application of BTM.

The decision to black-list a substance is based on a number of characteristics (such as toxicity, persistence and bioaccumulation). Accordingly, there is a list of 132 substances which are regarded as black-listed in the Netherlands (see annex III). However, this list is by no means exhaustive. Indeed, substances such as dioxins and dibenzofurans are not included, despite their undoubted adverse effects on the environment.

Depending on developments in the implementation of the Water Framework Directive, the categorisation of substances may change (see above: priority or priority hazardous).

Other substances
For the majority of the other substances, the requirement is for abatement through application of BPM. This primarily concerns substances which are relatively harmful and are characterised by persistence and/or toxicity: heavy metals not included in the black list, certain types of organic micropollutants, cyanide, ammonia, oxygen-consuming substances and nutrients (phosphate and nitrate).

Water quality objectives approach

The water quality objectives approach is used for a limited number of relatively harmless substances which occur naturally in surface waters and are only slightly toxic. These include sulphates and chlorides, as well as discharges of heat. The extent to which measures need to be taken to reduce such discharges depends primarily on the relevant water quality objectives for the receiving surface water. Consequently, it is impossible to lay down a general rule for the techniques to be applied.

In the case of an indirect discharge from a designated sector of industry, the water quality objectives approach will also take into account the need to safeguard the efficient functioning of the relevant urban wastewater treatment plant.

5.3 Stand-still principle

Under the stand-still principle, extra requirements may be necessary (in addition to those that follow from the emissions approach or the water quality objectives approach). The stand-still principle incorporates a distinction between black-listed substances and other substances. In the case of black-listed substances (and substances with comparable characteristics), the principle is that: 'The total amount of discharge of any of the substances or groups of substances on the black list is not permitted to increase within a particular management area'. With respect to other substances, the principle is that: the water quality must not deteriorate significantly; concentrations of substances should not be allowed to increase, even when they are below the maximum permissible concentrations.

In the case of these substances not on the black list, the impact of the stand-still principle lies primarily in the duty of the water management authority to monitor surface water quality in its management area, to identify any significant deterioration, and to examine the possible causes in order to assess whether the deterioration can be prevented or is acceptable.

III Water pollution control in the Netherlands: the practice

6 General granting of permits

Under Section 1 of the Pollution of Surface Waters Act (PSWA), it is forbidden to discharge waste matter, pollutants or hazardous substances, in whatever form, into surface waters without a permit. For indirect discharges (discharges via the sewage system), no PSWA permit is required unless the discharge originates from a sector of industry designated under a general administrative order known as the 'Industries Order' (see annex IV). The Environmental Management Act specifies coordination arrangements for those cases where permits are required under both the PSWA and the Environmental Management Act (see figure 6).

Conditions attached to such discharge permits can relate only to the protection of water quality and/or measures to safeguard the efficient functioning of the sewage treatment plant. In the case of substances included in list 1 of Directive 76/464/EEC, there are legal limit values for different sectors of industry. For certain sectors, recommendations may be made by the Commission on Integrated Water Management (see section 9). Work is being done to supplement the traditional conditions of discharge with a new one based on whole effluent toxicity. In addition to imposing conditions, a permit may also specify monitoring and reporting obligations.
Permits specify conditions for discharges from each individual company and are prepared on a case-by-case basis.

Applicants for discharge permits or amendments to them must supply the competent authority with various details, including information on:

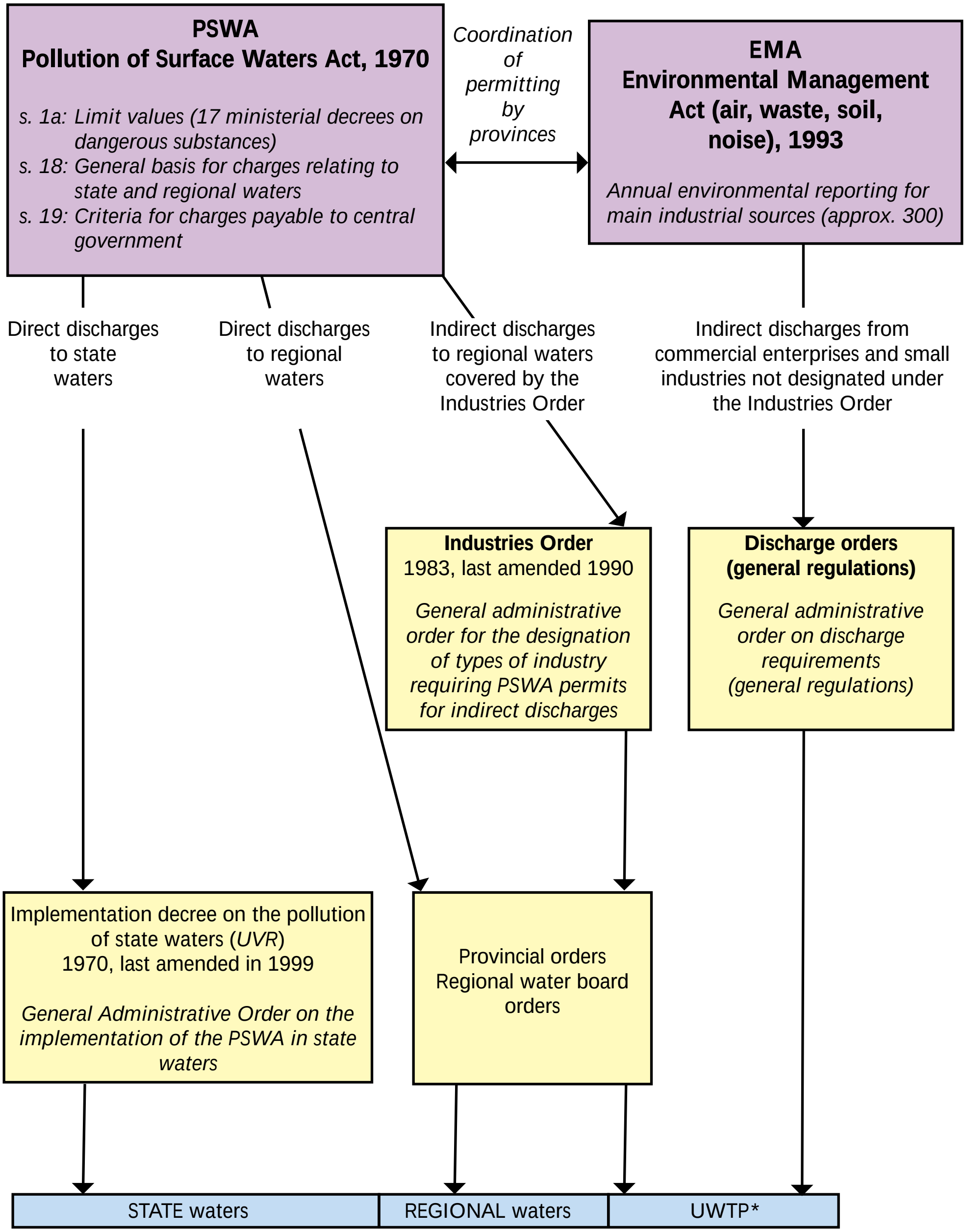
- the nature of the company and the nature and extent of its activities;
- processes and plant capacity;
- the nature, composition, properties and amount of base materials, additives, intermediate products and end products, and their location within company premises. The General Assessment System devised by the Commission on Integrated Water Management can be used to identify the necessary discharge reduction effort on the basis of the properties of the substances and preparations involved;
- the nature and extent of pollution of surface waters as a result of the discharges;
- measures or provision to prevent or reduce the discharge of wastes;
- proposed methods for measuring, recording and reporting the discharges;
- trends which the applicant may reasonably expect to occur in relation to the discharges and which may be relevant to the decision on the application.

Permitting takes place in accordance with the procedure laid down in the General Administrative Law Act (see section 3). As a rule, the application and the draft decision are published and are available for public scrutiny for a period of four weeks, during which the applicant and third parties may comment on them. The final decision, taking account of the comments received, is then available for public scrutiny for a further period of two weeks. There is a right of appeal against the final decision, but only by those parties involved at an earlier stage in the procedure.

Since 1 March 1993, the PSWA has contained provision for general regulations to be made under a general administrative order (*amvb*) to control specific designated discharges. These general regulations can (at least partly) replace the individual duty to obtain a permit.
At the time of writing in 2001, general administrative orders are in force under the PSWA (and other statutes) in relation to the prevention of water pollution from:

- greenhouse horticulture (1994);
- materials to be used for construction work in surface waters (1995);
- soil remediation and the associated removal of contaminated groundwater (1997);
- domestic sewage (1997);
- cleaning and conservation of bridges, sluices, landing stages, etc. (1998);
- field crops and livestock farming (2000).

Figure 6
Schematic diagram of the coordination of permits under the PSWA and EMA.



* Urban Wastewater Treatment Plant

7 Outline permits

New ways are being sought to control emissions and achieve ongoing improvements in environmental quality. The National Environmental Policy Plan of 1989 outlines a strategy for ensuring the environmental sustainability of Dutch society but this will require a considerable effort. The only way to make real progress is to develop new and cleaner processes and to supplement or replace end-of-pipe measures by 'in process' solutions and preventive action. This requires long-term planning and closer harmonisation with corporate investment cycles.
A command and control approach is not an effective way to achieve this long-term goal. Such an approach will not stimulate industry to identify ‘big step’ solutions. Rather, it will encourage ‘end-of-pipe’ solutions which result in ‘small step’ improvements. When environmental performance is already moderately high, further steps to achieve sustainable industrial development will become very expensive for industry.

Moreover, end-of-pipe measures are mostly just single-medium solutions tackling, for example, air, waste or water pollution while disregarding effects on other compartments of the environment. It has become clear that an integrated assessment of measures can be highly cost-effective. Another factor is that most companies have become tired of ongoing and often inopportune demands for additional measures and want better guarantees concerning the long-term requirements of the authorities and more flexibility to decide for themselves when and how to achieve the required reductions.

A different relationship between the authorities and industry needs to be found, therefore, and new instruments need to be developed to overcome these objections. In practice, individual companies and authorities have already redefined their responsibilities. Figure 7 shows how a company can pass through various phases as a result of its own attitude (horizontal axis) and that of the authorities (vertical axis). Nowadays discussions between individual companies and authorities are no longer always based on detailed permits. A mix of instruments is used:

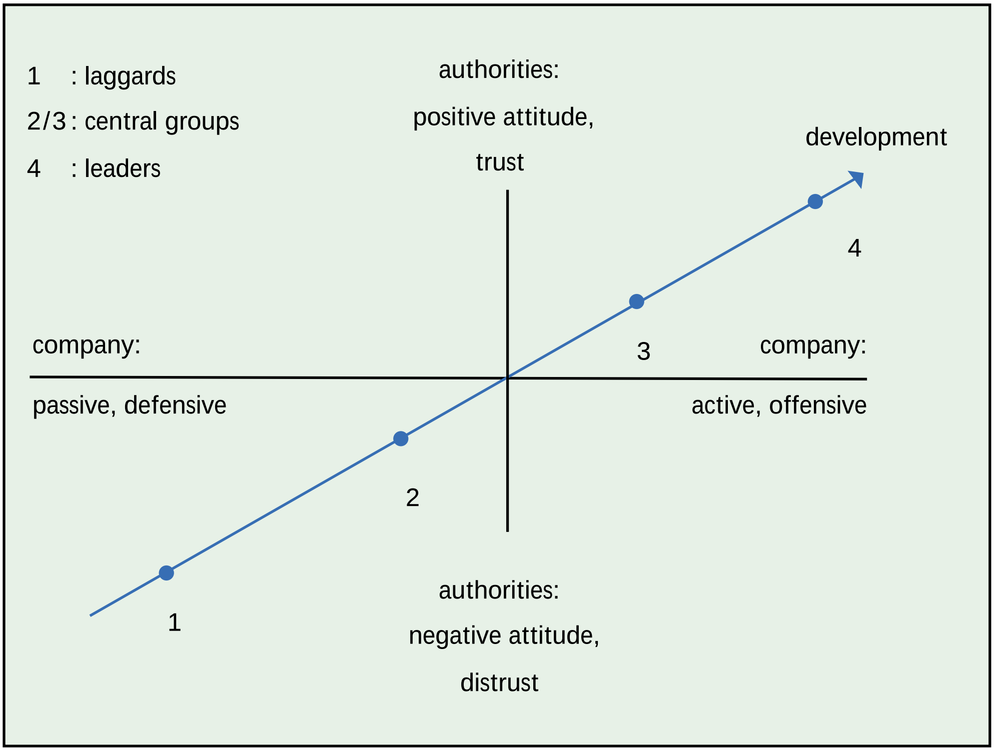
1. a *company environmental plan* (requiring the approval of the authorities) in which the company describes how it intends to improve its environmental performance in the longer term;
2. an *environmental management system* (e.g. complying with EMAS and ISO 14001) by which the company regulates its own processes;
3. an *annual environmental report* detailing the environmental performance of the company and;

4. the *outline permit*, which can be restricted to requirements concerning the most important environmental issues.

This mix of instruments presents great potential advantages for all parties involved. The introduction of environmental management systems, compiling of environmental plans and drafting of annual environmental reports certainly imposes a considerable burden on companies but, in return, they benefit from the greater degree of flexibility allowed by outline permits. These enable them to respond more quickly to market developments by launching modified products, since their environmental permits no longer need to be amended to take account of minor changes in the production process. What is more, outline permits can produce cost savings, since they allow companies to time their environmental investments to coincide more closely with their corporate investment cycles. Finally, the inclusion of an outline permit in the mix of instruments encourages companies to make further improvements in their environmental performance.

In parallel with this development, the role of the authorities is evolving away from traditional enforcement towards facilitation and checks on environmental management systems (see section 10).

Figure 7
Phases in the developing relations between companies and authorities.



In more detail, this can be described as:

Phase	*Companies' stance*	*Stance of the authorities*
1. inactive	defensive	coercive
2. postulant	passive	encouraging
3. novice	active	facilitating
4. advanced	pro-active	trusting

8 Approach to tackling diffuse sources

For many years, industrial discharges were seen as the main causes of poor water quality in the Netherlands. But water quality has now been substantially improved and industry is no longer the main source of pollution. Increasingly, it is diffuse sources that are dominating the load to surface waters and causing breaches of water quality objectives.

The main causes of diffuse pollution of surface water are the extensive use of agricultural fertilisers and pesticides, corrosion of building materials (copper and zinc), leaching of PAHs and metals out of impregnated bank protection materials, the use of anti-fouling paint on boats, cargo residues, the use of zinc sacrificial anodes to protect vessels against corrosion, and atmospheric deposition. In addition, stormwater overflows produce major emissions of nutrients, oxygen-consuming substances and organic and inorganic micropollutants.

The objectives with regard to diffuse sources are spelled out in the Fourth National Policy Document on Water Management (*NW4*), the Action Programme on Diffuse Sources (1997) and national and regional water quality management plans. The main priorities are:

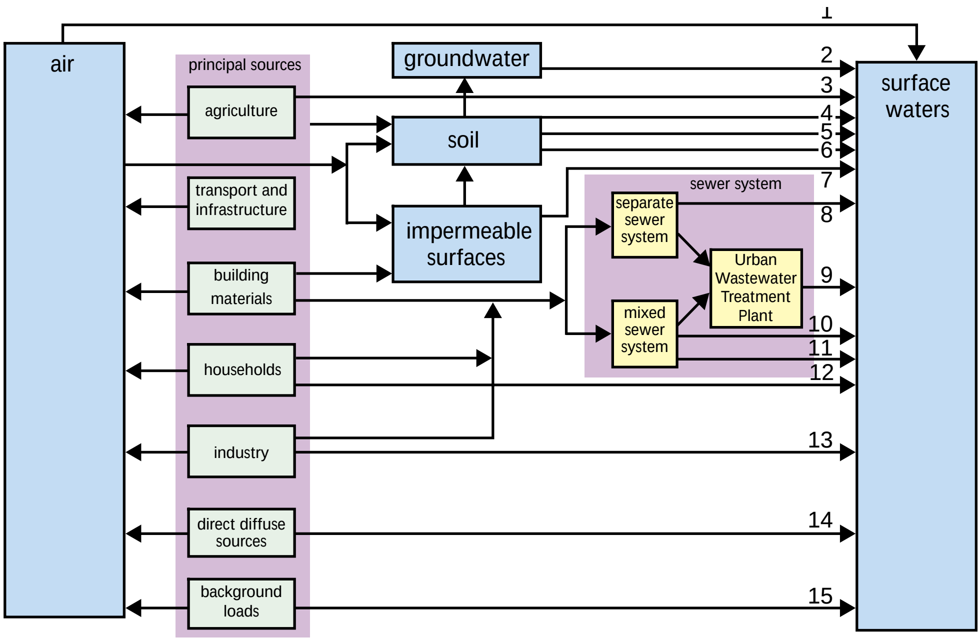
- to reduce agricultural emissions;
- to promote use of sustainable materials in new building and renovation projects;
- to promote sustainable practices in inland navigation;
- to encourage sustainable shipbuilding and vessel maintenance;
- to improve waste collection from commercial vessels and pleasure craft;
- to reduce the use of chemical weedkillers in urban areas; and
- to reduce emissions to the air (and hence atmospheric deposition).

Given that the main impact of pollution from diffuse sources is on regional water quality, a regional approach is the obvious solution. Such an approach will take account of local circumstances. Measures will be based not only on statutory instruments; public information campaigns, research, demonstration projects, covenants with target groups, monitoring and financial instruments (levies and subsidies) will also be important. Measures of this kind can be used at all levels of government. The choice of instruments and the timing of their use will depend on the specific situation. In addition, a number of general administrative orders have come into force over recent years which can be used to tackle the diffuse pollution of surface water in a generic way. There are decrees of this kind relating to matters such as greenhouse horticulture, field crops and livestock farming and materials to be used for construction work in surface waters (see also section 6).

For a long time there was insufficient support to get a blanket approach to tackling diffuse sources on the European agenda. Nevertheless, policies were developed with regard to certain individual types of diffuse sources. In the agricultural field, for example, they were developed both for fertilisers and for pesticides and strict European regulations were introduced on consumer and other products (e.g. biocides, washing detergents, paint, solvents etc.). In the case of atmospheric deposition and shipping, the nature of the source dictates an international approach. Sufficiently widespread international support is now available to permit the formulation of more generalised policies with regard to diffuse sources and, increasingly, the chosen instrument for tackling such sources is BEP ('Best Environmental Practice').

Figure 8 provides a general overview of emission routes from sources to surface water. Diagrams like this are used both nationally and internationally to prioritise action to tackle sources of pollution once emissions have been quantified.

Figure 8
General overview of entry routes to surface waters.



Entry routes to surface waters:

1 atmospheric deposition
2 groundwater
3 discharges/drifting
4 erosion
5 drainage
6 run-off from soil
7 run-off from imperm. surfaces
8 separate storm sewer
9 UWTP discharges
10 stormwater overflow
11 untreated discharges
12 not connected
13 direct discharges from industry
14 direct diffuse discharges
15 background loads

9 Coordination and harmonisation

The Commission on Integrated Water Management (*CIW*) is responsible for coordination and harmonisation in the field of water management. Chaired by His Royal Highness Prince Willem-Alexander, heir to the Dutch throne, it is an advisory committee on policy implementation and development in the field of integrated water management. The Commission includes representatives of all tiers of government: central, provincial, municipal and water boards.

The *CIW* has a fourfold function:

1. To coordinate and harmonise existing policies (making recommendations to the authorities involved in water management with the aim of achieving 'joined up government' under the Pollution of Surface Waters Act);
2. To examine and study aspects of integrated water management;
3. To advise central government on national water management;
4. To harmonise policy proposals in the field of integrated water management.

The *CIW* is composed of board-level representatives of authorities involved in water quality: water boards, provinces and municipalities in the Netherlands. The commission also includes delegates from the Ministry of Transport, Public Works and Water Management, the Ministry of Housing, Spatial Planning and the Environment and the Ministry of Agriculture, Nature Management and Fisheries.

Most of the preparatory work relating to the *CIW's* reports and recommendations is done by five 'working groups' (see figure 9). Each of these deals with a specific aspect of integrated water management, but not of course in isolation. The tasks of the working group on ‘Water and the Environment’ are:

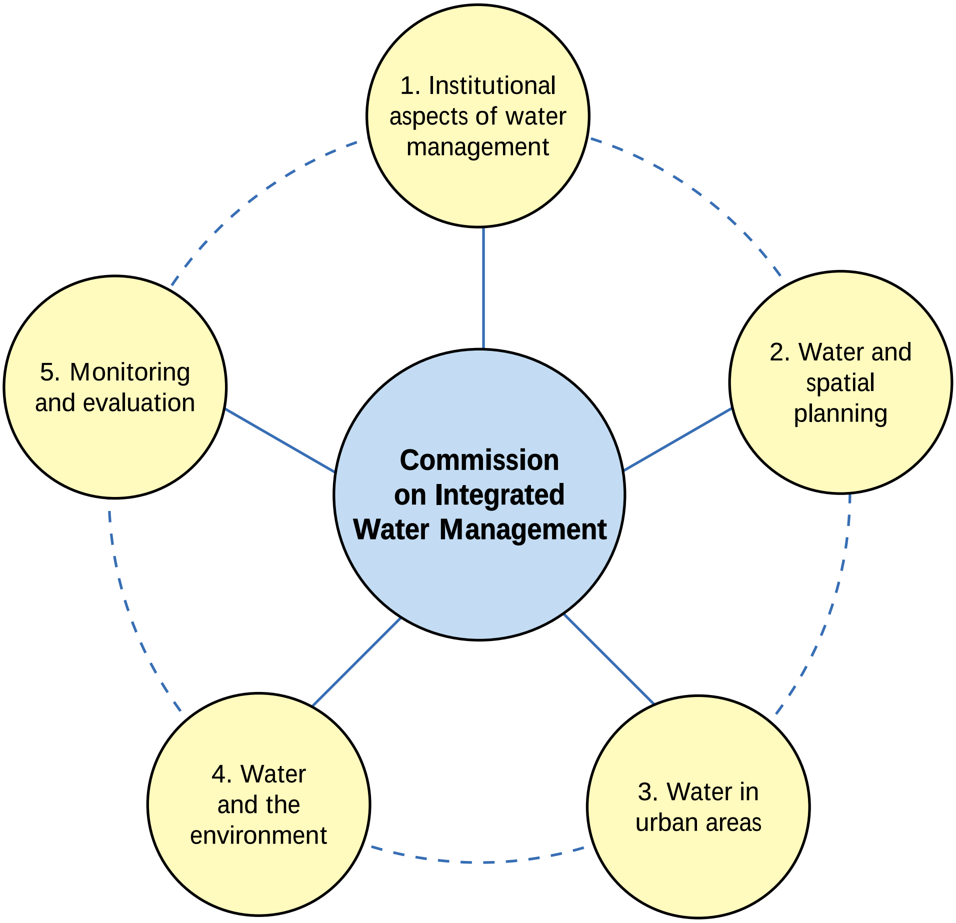
- to devise programmes or guidelines to reduce or eliminate discharges of oxidising substances, nutrients, micropollutants and other types of pollution to sewers and surface water;
- to standardise or streamline technical regulations applying to permits under the Pollution of Surface Waters Act and concerning the reduction of discharges to sewers and surface water;
- to coordinate technical and policy aspects of enforcement relating to discharges to sewers and surface water;
- to coordinate and stimulate research on diffuse sources of water pollution, and to initiate measures to combat such pollution;
- to comment on, and if necessary initiate, international proposals and developments, and to indicate effects on the implementation of

discharge reduction policies (for example, to implement BAT reference documents (BREFs) in the context of the IPPC Directive);
- to advise on, coordinate and harmonise efforts concerning the quality and quantity of surface water and aquatic soils (standards, bioassays, area-specific policies, etc.).

The membership of the working group is broader than that of the *CIW* itself: it includes representatives of industry, the Dutch federation of agricultural and horticultural organisations (*LTO*) and the environmental movement. This participation by non governmental organisations guarantees broad-based support for *CIW* recommendations.

Since the activities of the working group are so wide-ranging, the implementation of individual tasks or actions is usually undertaken by a project group (ad hoc or otherwise), to which the relevant experts and interested parties can contribute. Secretarial support is often provided by the Institute for Inland Water Management and Wastewater Treatment (*RIZA*).

Figure 9
The CIW and its working groups.



10 Enforcement

Enforcement consists of surveillance and detection. It is a matter of using surveillance and the means available in administrative, criminal and private law to ensure compliance both with blanket statutory provisions and with individual directions (definition offered by the Council of Public Administration, 1998).

To ensure a proper enforcement process, the water authority needs to have a clear understanding of the area under its control, the target groups involved and the various statutory and regulatory provisions applicable to each of them. Compliance and risk analyses can then provide a basis on which to set enforcement priorities, taking into account both the environmental relevance of the discharge and the behaviour of the discharger.

There should be a surveillance plan linking the permit or reporting data, the environmental relevance of the discharge (or group of discharges), the behaviour of the discharger and the necessary surveillance activities. Where a violation is identified, the processes of administrative and criminal law enforcement should be pursued simultaneously (see figure 10). Action under administrative law will normally take the form of a two-stage procedure (warning with notification that a sanction will follow if the violation continues beyond a stated deadline). Whether or not action under criminal law is appropriate will be determined by the strategy of the Public Prosecutor and the relevant list of core criteria.

Various *administrative* means of enforcement are available to the administrative authority (i.e. *Rijkswaterstaat*, the provincial and local authority or the district water board). The main ones include:

- *warnings* (verbal or in writing);
- *administrative pressure* (also called police pressure). The authority may write to the offender ordering him to desist from the offence, or may itself put a stop to it, the costs involved being charged to the offender;
- *withdrawal* of the permit;
- *amendment* of the terms of the permit;
- the imposition of *financial* damages to force compliance.

In addition, serious environmental offences are subject to a considerable range of possible judicial sanctions. These include:

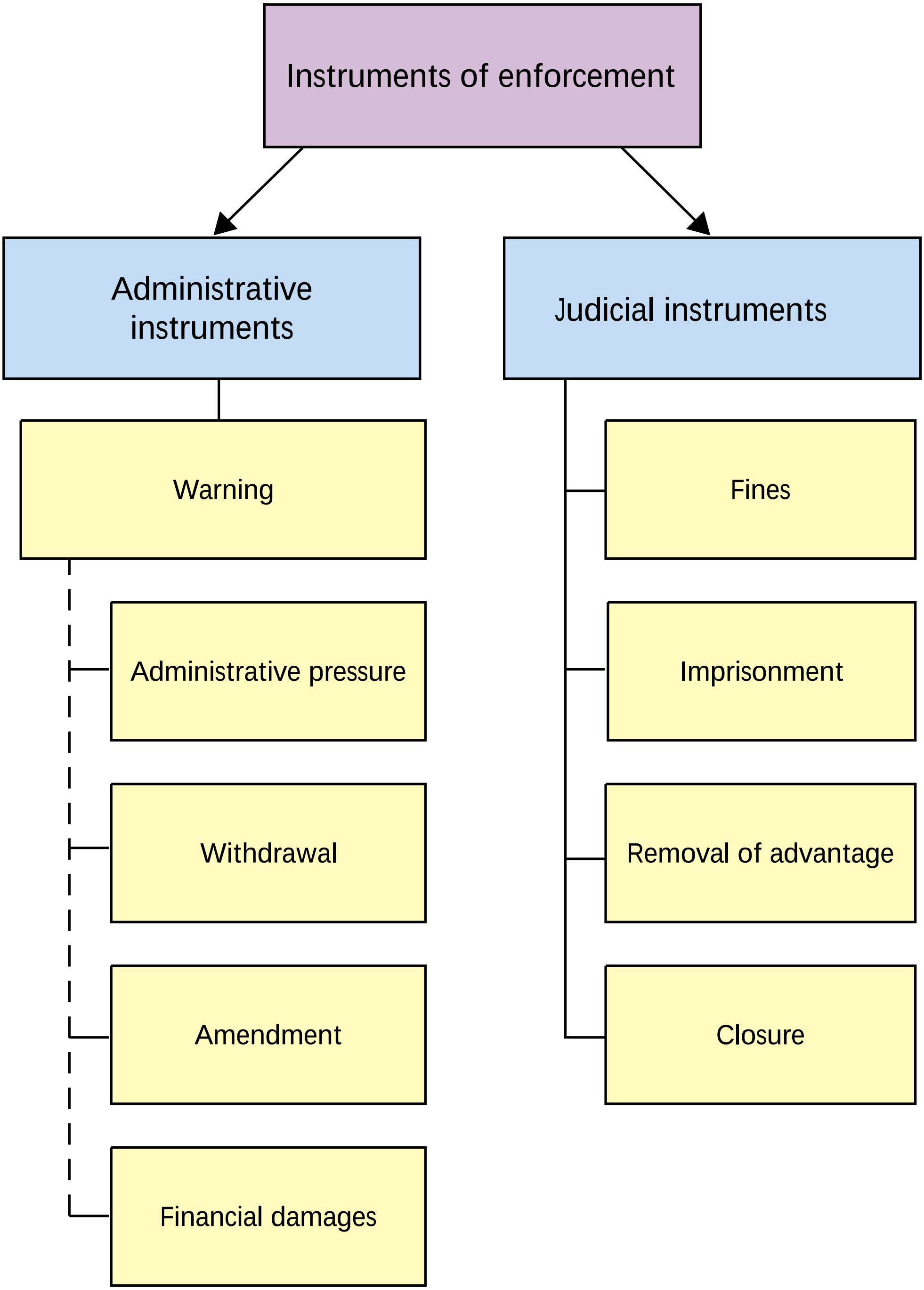
- *fines* (up to about € 50,000 for private individuals and up to about € 500,000 per offence for corporate bodies);
- terms of *imprisonment* (up to a maximum of six years);

- *removal of* any wrongfully obtained financial (or other) advantage which has been gained by committing an offence;
- *closure* of the company concerned.

As explained in section 7, a new approach is now being adopted to enforcement, with greater emphasis being placed on administrative rather than physical inspection. Permitting and enforcement will be geared to the attitude and behaviour of the discharger, as expressed for example in its environmental management systems and company environmental plan. The new individualised approach to permitting will be reflected in a similar style of inspection and enforcement. Where the emphasis used to be simply on checking emission values, it will now also be on examining the system underlying those values: why did an incident happen, what action did the company take after it occurred and how does it intend to prevent anything similar happening in the future? This approach will enable authorities to encourage companies to show greater environmental awareness and to pay more attention to controlling their processes.

Dutch environmental legislation bestows permitting and enforcement powers on a wide range of government bodies, including central government, the provincial authorities, the water boards and the police. This situation creates the risk of duplication of effort, including simultaneous (or near-simultaneous) inspections by different enforcement authorities. There is no statutory structure of cooperation to prevent this, but work is now being done to promote cooperation on enforcement between the authorities concerned. In 2001, the Ministry of Transport, Public Works and Water Management set up an inspectorate to operate independently of its policy and implementation branches and to be responsible for the enforcement of a range of environmental and other legislation, including the Pollution of Surface Waters Act.

Figure 10
Administrative and juridical means of enforcement.



11 Charging system

The Pollution of Surface Waters Act (PSWA) provides that all dischargers to surface waters and to the sewerage system (households as well as industries) are liable to pay a pollution levy. Under these provisions, wastewater charges have been levied since 1971 by central government authorities for discharges to state waters, and by regional water boards for discharges to the non-state surface waters and sewerage systems.

The purpose of charging is to raise revenue to finance measures necessary for the abatement and prevention of water pollution. Up to 2000 the revenues were used to subsidise the building of urban wastewater treatment plants; nowadays they are used to finance general water management. Although this was not a formal objective on introduction, it was foreseen that wastewater charges might provide an incentive for dischargers to reduce their pollution load.

The essentials of the charging systems for all discharges are laid down in the PSWA. Directorate-General for Public Works and Water Management (*Rijkswaterstaat*) is responsible for imposing and collecting charges for discharges to state waters. Since 1993 the relevant pollution parameters and the tariff for discharges to state waters have required the approval of Parliament, whereas previously it was the sole responsibility of *Rijkswaterstaat.*

For the non-state waters, the imposition and collection of charges is in the hands of the water boards. They have the same responsibilities in relation to discharges to non-state waters as Rijkswaterstaat has for discharges to state waters, but are free to set tariffs as they see fit.

In general terms, charges (for both direct and indirect discharges to non-state and state waters) are calculated by multiplying the pollution load expressed in pollution units (p.u.) by the unit tariff (for state waters about € 32/p.u. in 2001). They relate to discharges of oxygen-consuming substances and heavy metals (see figure 11). The PSWA also allows the water boards to adjust the pollution levy to take account of chloride, sulphate, phosphorous and silver.

Under the PSWA, the maximum assessment for households is 3 p.u. This is now the standard basis for charges to households, although it can be reduced to 1 p.u. for one-person households on request. However, there is some variation between regions in this respect.

Small businesses producing less than 5 p.u. are also charged for 3 p.u. This may be reduced to 1 p.u. for businesses discharging 1 p.u. or less. The levy for heavy metals, chloride, sulphate and phosphorous, is subject to thresholds below which no charge is imposed.

Figure 11
Calculation of the charge.

Oxygen-consuming substances

For oxygen-consuming substances one p.u. represents a yearly amount of 49.6 kg oxygen (1 p.u. of oxygen-consuming substances = 49.6 kg O_2/year), formulated as:

$$P = \frac{\text{total amount of discharged oxygen-consuming substances (COD + 4.57*N), in kg/year}}{\text{levy standard amount (= 49.6 kg/year)}}$$

where:
P = number of p.u. of oxygen-consuming substances
COD = chemical oxygen demand
N = Kjeldahl nitrogen

Heavy metals

For the heavy metals *mercury, cadmium and arsenic*, one p.u. represents a total yearly amount of 0.1 kg (1 p.u. of mercury, cadmium and arsenic = 0.1 kg/year).

$$P = \frac{\text{total amount of discharged mercury, cadmium and arsenic in kg/year}}{\text{levy standard amount (= 0.1 kg/year)}}$$

where:
P = number of p.u. of mercury, cadmium and arsenic

For the heavy metals *chromium, copper, lead, nickel and zinc*, one p.u. represents a total yearly amount of 1 kg (1 p.u. of chromium, copper, lead, nickel and zinc = 1 kg/year).

$$P = \frac{\text{total amount of discharged chromium, copper, lead, nickel and zinc in kg/year}}{\text{levy standard amount (= 1 kg/year)}}$$

where:
P = number of p.u. of chromium, copper, lead, nickel and zinc

In calculating the amount of heavy metals discharged, a deduction is made for the amount of heavy metals taken into account when calculating the amount of oxygen-consuming substances discharged.

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Annexes

Annex I Integrated environmental quality objectives

Maximum Permissible Concentration (MPC) and Target Value for Surface Water and Sediment
Ref: Staatscourant, The Netherlands, June 2000.

Hallmarks for compounds in water systems (MPC: short term, Target value: long term).
The values for total water apply to the standard containing 30 mg/l suspended solids.
The values for sediment apply to the standard containing 10 % organic matter and 25 % lutum.
For standard suspended solids (20% organic material and 40% lutum) the values for metals are a factor of 1.5 higher and for organic compounds a factor of 2 higher compared to the values for sediment.
The target value and the MPC for metals include the national background concentration.

	SURFACE WATER		SURFACE WATER		SEDIMENT	
	TARGET VALUE *(dissolved)*	MPC *(dissolved)*	TARGET VALUE *(total)*	MPC *(total)*	TARGET VALUE *(dry matter)*	MPC *(dry matter)*
METALS	µg/l	µg/l	µg/l	µg/l	mg/kg	mg/kg
cadmium	0.08	0.4	0.4	2	0.8	12 #
mercury (inorganic)	0.01	0.2	0.07	1.2	0.3	10 #
methyl-mercury	0.01	0.02	0.06	0.1	0.3	1.4
copper	0.5	1.5	1.1	3.8	36	73
nickel	3.3	5.1	4.1	6.3	35	44
lead	0.3	11	5.3	220	85	530 #
zinc	2.9	9.4	12	40	140	620
chromium	0.3	8.7	2.4	84	100	380 #
arsenic	1	25	1.3	32	29	55 #
antimony	0.4	6.5	0.4	7.2	3	15 #
barium	75	220	78	230	160	300
beryllium	0.02	0.2	0.02	0.2	1.1	1.2
cobalt	0.2	2.8	0.2	3.1	9	19
molybdenum	4.3	290	4.4	300	3	200 #
selenium	0.09	5.3	0.09	5.4	0.7	2.9
thallium	0.06	1.6	0.06	1.7	1	2.6
tin	0.2	18	2.2	220	..	..
vanadium	0.9	4.3	1	5.1	42	56
borium @	6.5	650	..	..	..	..
tellurium @	..	..	..	..	..	..
titanium @	..	..	..	..	..	..
uranium @	0.01	1	..	..	..	..
silver @	0.0008	0.08	..	..	..	5.5
salt water:	0.01	1.2	..	..	..	..
ORGANIC SUBSTANCES						
PAHs		µg/l	µg/l	µg/l	mg/kg	mg/kg
naphthalene		1.2	0.01	1.2	0.001 *	0.1 *
anthracene		0.07	0.0008	0.08	0.001 *	0.1 *
phenanthrene		0.3	0.003	0.3	0.005 *	0.5 *
fluoranthene		0.3	0.005	0.5	0.03 *	3 *
benzo(a)anthracene		0.01	0.0003	0.03	0.003 *	0.4 *
chrysene		0.3	0.009	0.9	0.1 *	11 *
benzo(k)fluoranthene		0.04	0.002	0.2	0.02 *	2 *
benzo(a)pyrene		0.05	0.002	0.2	0.003 *	3 *

	SURFACE WATER		SURFACE WATER		SEDIMENT	
ORGANIC SUBSTANCES *(continued)*	**TARGET VALUE** *(dissolved)*	**MPC** *(dissolved)*	**TARGET VALUE** *(total)*	**MPC** *(total)*	**TARGET VALUE** *(dry matter)*	**MPC** *(dry matter)*
. . . .	. . . .	. . . .	. . . . . .	. . . . .	. . . .	. . . .
benzo(ghi)perylene		0.03	0.005	0.5	0.08 *	8 *
indeno(123-cd)pyrene		0.04	0.004	0.4	0.06 *	6 *
chlorobenzenes		*ng/l*	*ng/l*	*ng/l*	*µg/kg*	*µg/kg*
pentachlorobenzene		300	3	300	1	100
hexachlorobenzene		9	0.09	9	0.05	5
chlorophenols		*ng/l*	*ng/l*	*ng/l*	*µg/kg*	*µg/kg*
pentachlorophenol		4000	40	4000	2	300
chloranilines		*µg/l*	*µg/l*	*µg/l*	*µg/kg*	*µg/kg*
tetrachloranilines (ind)		3	0.03	3	1.7!	1220
pentachloraniline		0.1	0.001	0.1	0.6	60
chlorinated organics		*ng/l*	*ng/l*	*ng/l*	*µg/kg*	*µg/kg*
aldrin		0.9	0.01	1	0.06	6
dieldrin		12	0.4	39	0.5	450
endrin		4	0.04	4	0.04	4
DDT		0.4	0.009	0.9	0.09	9
DDD		0.4	0.005	0.5	0.02	2
DDE		0.4	0.004	0.4	0.01	1
α-endosulphan		20	0.2	20	0.01	1
α-HCH		3300	33	3300	3	290
β-HCH		800	9	860	9	920
γ-HCH (lindane)		910	9	920	0.05	230
heptachlor		0.5	0.005	0.5	0.7	0.7
heptachlorepoxide		0.5	0.005	0.5	0.0002	0.02
chlordane		2	0.02	2	0.03	3
organophosphorus compounds		*ng/l*	*ng/l*	*ng/l*	*µg/kg*	*µg/kg*
azinphos-ethyl		11	0.1	11	0.005	0.5
azinphos-methyl		12	0.1	12	0.009	0.9
chlorfenvinphos		2	0.02	2	0.0006	0.06
chlorpyriphos		3	0.03	3	0.01	1
coumaphos		0.7	0.007	0.7	0.0006	0.06
demeton		140	1	140	..	..
diazinon		37	0.4	37	0.01	1
dichlorvos		0.7	0.007	0.7	0.00003	0.003
dimethoate		23000	230	23000	0.8	78
disulfoton		82	0.8	82	0.03	6
ethoprofos		63	0.6	63	0.003	0.3
fenitrothion		9	0.09	9	0.007	0.7
fenthion		3	0.03	3	0.004	0.4
foxim		82!	0.8!	82!	0.08!	8!
heptenofos		20	0.2	20	0.003	0.3
malathion		13	0.1	13	0.009	0.9
mevinfos		2	0.02	2	0.0006	0.06
oxydemeton-methyl		35!	0.4!	35!	0.0003!	0.03!
parathion(-ethyl)		2	0.02	2	0.001	0.1
parathion-methyl		11	0.1	11	0.01	1
pyrazofos		40	0.4	40	0.02	2
tolclofos-methyl		790!	8!	800!	1!	130!
triazophos		32	0.3	32	0.007	0.7
trichlorfon		1	0.01	1	0.00002	0.002

	SURFACE WATER		SURFACE WATER		SEDIMENT	
ORGANIC SUBSTANCES *(continued)*	**TARGET VALUE** *(dissolved)*	**MPC** *(dissolved)*	**TARGET VALUE** *(total)*	**MPC** *(total)*	**TARGET VALUE** *(dry matter)*	**MPC** *(dry matter)*
organotin compounds		*ng/l*	*ng/l*	*ng/l*	*µg/kg*	*µg/kg*
tetrabutyltins (ind)		1600!	16!	1600!	0.8!	78!
salt water:		17!	0.2!	17!	0.008!	0.8!
tributyltins (ind)		14	0.1	14	0.1	10
salt water:		1	0.01	1	0.007	0.7
triphenyltins (ind)		5	0.05	5	0.06	6
salt water:		0.8	0.009	0.9	0.01	1
organo-silicium compounds		*µg/l*	*µg/l*	*µg/l*	*mg/kg*	*mg/kg*
octamethyltetrasiloxane		0.4	0.005	0.5	0.01	1.3
acids (fenol herbicides & chlorfenoxycarbonacid herbicides)		*µg/l*	*µg/l*	*µg/l*	*µg/kg*	*µg/kg*
bentazone		64!	0.6!	64!	1!	130!
2.4-D		10	0.1	10	0.3	27
dichlorprop		40	0.4	40	32	3200
dinoseb		0.03	0.0003	0.03	0.003	0.3
dinoterb		0.03	0.0003	0.03	0.1	11
DNOC		21	0.2	21	0.7	280
MCPA		2	0.02	2	0.05	5
mecoprop		4	0.04	4	0.02	2
2.4.5-T		9!	0.09!	9!	0.2!	50!
carbamates & dithiocarbamates		*ng/l*	*ng/l*	*ng/l*	*µg/kg*	*µg/kg*
aldicarb		98	1	98	0.001	0.1
benomyl		150	2	150	0.006	0.6
carbaryl		230	2	230	0.03	3
carbendazim		110	1	110	0.03	3
carbofuran		910	9	910	0.02	2
maneb		as ETU	..	as ETU	2	..
metam-Natrium		35!	0.4!	35!	0.006!	0.6!
methomyl		80	0.8	80	0.001	0.1
oxamyl		1800	18	1800	0.01	1
pirimicarb		90	0.9	90	0.02	2
propoxur		10	0.1	10	0.0001	0.01
thiram		32	0.3	32	0.008	0.8
tri-allate		1900	19	1900	0.2	160
zineb		as ETU	..	as ETU	130!	..
triazines, pyridazines & triazoles		*ng/l*	*ng/l*	*ng/l*	*µg/kg*	*µg/kg*
anilazine		85	0.9	85	0.02	2
atrazine		2900	29	2900	0.2!	26
chloridazon		73000	730	73000	3	350
cyanazine		190	2	190	0.01!	2
desmetryn		34000!	340!	34000!	0.08!	370!
metamitron		10000	100	10000	1	95
simazine		140!	1!	140!	0.009!	0.9!
synthetic pyrethroids		*ng/l*	*ng/l*	*ng/l*	*µg/kg*	*µg/kg*
bifenthrin		1	0.01	1	0.05	5
cypermethrin		0.09	0.001	0.1	0.004	0.4
deltamethrin		0.3	0.004	0.4	0.01	1
permethrin		0.2	0.003	0.3	0.009	0.9

ORGANIC SUBSTANCES (continued)	SURFACE WATER TARGET VALUE (dissolved)	SURFACE WATER MPC (dissolved)	SURFACE WATER TARGET VALUE (total)	SURFACE WATER MPC (total)	SEDIMENT TARGET VALUE (dry matter)	SEDIMENT MPC (dry matter)
anilids & dinitroanilines		*ng/l*	*ng/l*	*ng/l*	*µg/kg*	*µg/kg*
metazachlor		34000!	340!	34000!	3	260
metolachlor		200	2	200	0.03	3
propachlor		1300	13	1300	0.06	6
quintozene		2900	31	3100	..	..
trifluralin		37!	0.4!	38!	0.1!	19!
fenylureum herbicides (aromatic chloramines)		*ng/l*	*ng/l*	*ng/l*	*µg/kg*	*µg/kg*
diuron		430	4	430	0.08!	9
isoproturon		320	3	320	0.05	5
linuron		250	3	250	0.09	9
metabenzthiazuron		1800	18	1800	0.7	67
metobromuron		10000	100	10000	1	110
carboximiden		*ng/l*	*ng/l*	*ng/l*	*µg/kg*	*µg/kg*
captafol		28!	0.3!	28!	0.03!	3!
captan		110	1	110	0.01	1
OTHER POLLUTANTS not based on ecotoxicological risk thresholds		*µg/l*	*µg/l*	*µg/l*	*mg/kg*	*mg/kg*
NTA		..	..	200	..	..
mineral oil		..	..	..	50	1000
PCBs		*µg/l*	*µg/l*	*µg/l*	*µg/kg*	*µg/kg*
PCB-28		..	..	..	1	4
PCB-52		..	..	..	1	4
PCB-101		..	..	..	4	4
PCB-118		..	..	..	4	4
PCB-138		..	..	..	4	4
PCB-153		..	..	..	4	4
PCB-180		..	..	..	4	4
screening parameters		*µg/l*	*µg/l*	*µg/l*	*mg/kg*	*mg/kg*
EOX		..	..	..	0.3	..
VOX		..	..	5	..	..
ETU		..	..	0.005	..	..
cholinesterase inhibition		..	..	0.5	..	..

GENERAL PARAMETERS	SURFACE WATER	SURFACE WATER		SEDIMENT	
	background concentration North Sea	TARGET VALUE	MPC	TARGET VALUE	MPC
nutrients & eutrophication parameters					
Ortho-phosphate (mg P/l)	0.02 (w)	..	..	..	..
total phosphate (mg P/l)	..	0.05 (z)	0.15 (z)	..	..
DIN (nitrate+nitrite+ ammon.) mg N/l	0.15 (w)	..	..	..	..
total nitrogen (mg N/l)	..	1 (z)	2.2 (z)	..	..
nitrate (mg N/l)	..	..	..	..	..
ammonia (mg N/l)	..	..	0.02	..	..
ammonium compounds (mg N/l)	..	..	..	..	..
chlorophyl-a (µg/l)	..	..	100 (z)	..	..
salts					
chloride (mg Cl/l)	..	..	200	..	..
fluoride (mg F/l)	..	..	1.5	500 (mg/kg)***	..
bromide (mg Br/l)	..	..	8	20 (mg/kg)	..
sulphate (mg SO4/l)	..	..	100	..	..
total sulfides (µg S/l)	..	..	..	2 (mg/kg)	..

GENERAL PARAMETERS (*continued*)	SURFACE WATER	SURFACE WATER		SUSPENDED SOLIDS		
	background concentration North Sea	TARGET VALUE	MPC	*background concentration North Sea*	TARGET VALUE	MPC
radioactivity parameters						
(1Bq = 27 pCi)	mBq/l	mBq/l	mBq/l	Bq/kg	Bq/kg	Bq/kg
Total α-activity	500	100	..	..	..	..
rest β-activity	300	200	..	..	..	..
tritium-activity	10,000	10,000	..	..	..	..
radium-226	5	5	..	..	..	..
strontium-90	15	10	..	..	..	..
cesium-137	20	..	..	..	40	..
lead-210	..	..	..	100	100	..
polonium-210	..	..	..	100	100	..
cobalt-58	..	..	..	10	10	..
cobalt-60	..	..	..	10	10	..
iodium-131	..	..	..	..	20	..
other γ-radiators	..	..	..	< 2	2	..

GENERAL PARAMETERS (*continued*)	SURFACE WATER TARGET VALUE	MPC
. . . .	. . . . . .	. . . .
general		
colour, odour, foam, waste, turbidity	..	not polluted
temperature (°C)	..	25
oxygen (mg/l)	..	5****
acidity (pH)	..	6.5 - 9
transparency (s, metre)	..	0.4
bacteriological parameters		
thermotolerant coli's (80 perc., MPN/ml)	..	20
enteroviruses / phages	..	not present in 10 l

Key

#		value = intervention value
!	:	an extra uncertainty factor of 10 is used due to limited amount of data (derivation method: EPA/1000)
..	:	no value established
*	:	no soil type correction for sandy sediments (organic matter < 10 %)
**	:	in areas with marine influence higher values occur naturally (salt and brackish ground water)
***	:	differentiation on soil lutum content: F = 175 + 13L (L = % silt)
****	:	measurements during morning hours
@	:	the derivation of these MPC values deviates from the standard procedure for deriving MPC values for metals, because insufficient data is available to set national generic background concentrations. These provisional MPC values are reported due to a case at the European Court with respect to Directive 76 / 464 / EC. Local background values are to be added to these MPC values.
w	:	winter averaged value (Dec. - Feb.)
s	:	summer averaged value (Apr. - Sep.) for stagnant waters susceptible to eutrophication. When monitoring trends in surface water quality of flowing waters the value for stagnant waters can be used as an annual averaged reference value.
z/kv	:	the value of 0.4 mg P/l holds for sandy sediments. The value of 3.0 mg P/l holds for clay-based and peaty soils the value of 2 mg N/l holds for sandy soils, the value of 10 mg N/l holds for clay-based and peaty soils.
ind	:	value holds for each individual compound

Annex II Priority substances in the field of water policy

List of priority substances under European Union Water framework directive

Priority hazardous substances	Priority substances under review	Priority substances
Pentabromodiphenylether (PBDE)	Atrazine	Alachlor
Cadmium and its compounds	Anthracene	Benzene
C_{10}-C_{13} chloroalkanes	Chlorpyrifos	Chlorfenvinphos
Hexachlorobenzene	Di(2-ethylhexyl)phthalate (DEHP)	Dichloromethane
Hexachlorobutadiene	Lead and its compounds	1,2-Dichloroethane
Hexachlorocyclohexane (Lindane)	Endosulphan	Nickel and its compounds
Mercury and its compounds	Naphthalene	Trichloromethane (Chloroform)
Nonylphenols	Octylphenols	Fluoroanthene
Pentachlorobenzene	Pentachlorophenol	Brominated diphenyl-ethers (with the exception of pentabro-modiphenylether)
Tributyltin compounds	Trichlorobenzenes	
PAHs (with the exception of Naphthalene, Anthracene and Fluoranthene)	Trifluralin	
	Simazine	
	Isoproturon	
	Diuron	

OSPAR list of chemicals for priority action

Identified at 1998

Brominated flame retardants
Cadmium
Certain phthalates – dibutylphthalate and diethylhexylphthalate
Hexachlorocyclohexane isomers (HCH)
Lead and organic lead compounds
Mercury and organic mercury compounds
Musk xylene
Nonylphenol/ethoxylates (NP/NPEs) and related substances
Organic tin compounds
Pentachlorophenol (PCP)
Polyaromatic hydrocarbons (PAHs)
Polychlorinated biphenyls (PCBs)
Polychlorinated dibenzodioxins (PCDDs)
Polychlorinated dibenzofurans (PCDFs)
Short chained chlorinated paraffins (SCCP)

Identified at 2000

2,4,6-tri-tert-butylphenol
4-tert-butyltoluene
1,2,3,4,5,5-hexachloro-1,3-cyclopentadiene
Dicofol
Endosulphan
HMDS (Hexamethyldisiloxane)
Methoxychlor
Octylphenol
TBBA (Tetrabromobisphenol-a)
Trichlorobenzene
1,2,4-trichlorobenzene
1,3,5-trichlorobenzene

Identified at 2001

Pentabromoethylbenzene
1,3,5-tribromo-2-(2,3-dibromo-2-methylpropoxy)benzene
EPN (phosphonothioic acid, phenyl-, O-ethyl O-(4-nitrophenyl) ester)
Flucythrinate
Heptachloronorbornene
Isodrin
Heptachloronaphthalene
Hexachloronaphthalene
Octachloronaphthalene
Tetrachloronaphthalene
Trichloronaphthalene
Neodecanoic acid, ethenyl ester
Pentachloroanisole
Triphenylphosphine
Tetrasul
N,N'-bis[(5-isocyanato-1,3,3-trimethylcyclohexyl)methyl]-urea

Annex III 132 ‘black-listed’ substances

1 *	aldrin
2	amino-4-chlorophenol, 2-
3	anthracene
4	arsenic [and compounds]
5	azinphos-ethyl
6	azinphos-methyl
7	benzene
8	diaminodiphenyl, 4,4'- (benzidine)
9	chlorotoluene, alpha- (benzylchloride)
10	dichlorotoluene, alpha, alpha- (benzylidenechloride)
11	biphenyl
12 *	cadmium [and compounds]
13 *	tetrachloromethane (carbon tetrachloride)
14	trichloroethanal (chloral, trichloroacetaldehyde)
15	chlordane
16	chloroacetic acid
17	chloroaniline, 2-
18	chloroaniline, 3-
19	chloroaniline, 4-
20	chlorobenzene
21	chloro-2,4-dinitrobenzene, 1-
22	chloroethanol, 2-
23 *	trichloromethane (chloroform)
24	chloro-3-methylphenol, 4-
25	chloronaphthalene, 1-
26	chloronaphthalene [all isomers]
27	chloro-2-nitroaniline, 4-
28	chloronitrobenzene, 2-
29	chloronitrobenzene, 3-
30	chloronitrobenzene, 4-
31	chloro-2-nitrotoluene, 4-
32	chloronitrotoluene [all isomers]
33	chlorophenol, 2-
34	chlorophenol, 3-
35	chlorophenol, 4-
36	chloro-1,3-butadiene, 2- (chloroprene)
37	chloropropene, 3- (allylchloride)
38	chlorotoluene, 2-
39	chlorotoluene, 3-
40	chlorotoluene, 4-
41	chloro-4-aminotoluene, 2- (chloro-4-toluidine, 2-)
42	chloroaminotoluene [all isomers] (chlorotoluidine)
43	cumafos
44	trichloro-1,3,5-triazine, 2,4,6- (cyanuricchloride)
45	dichlorophenoxyacetic acid, 2,4- (d, 2,4-)
46 *	ddt
47	demeton
48	dibromoethane, 1,2-
49	dibutyltinchloride
50	dibutyltinoxide
51	dibutyltin salt [all]
52	dichloroaniline [all isomers]

* Substances for which emission limits have been established

53 dichlorobenzene, 1,2-
54 dichlorobenzene, 1,3-
55 dichlorobenzene, 1,4
56 dichlorodiaminodiphenyl [all] (dichlorobenzidine)
57 bis(2-chloroisopropyl)ether
58 dichloroethane, 1,1-
59 * dichloroethane, 1,2-
60 dichloroethene, 1,1- (vinylideenchloride)
61 dichloroethene, 1,2-
62 dichloromethane (methylenechloride)
63 dichloronitrobenzene [all isomers]
64 dichlorophenol, 2,4-
65 dichloropropane, 1,2-
66 dichloro-2-propanol, 1,3-
67 dichloropropene, 1,3-
68 dichloropropene, 2,3-
69 dichlorophenoxypropanoic acid, 2,4- (dichlorprop)
70 dichlorvos
71 * dieldrin
72 diethylamine
73 dimethoate
74 dimethylamine
75 disulfoton
76 endosulfan
77 * endrin
78 epichlorohydrine
79 ethylbenzene
80 fenitrothion
81 fenthion
82 heptachlor
83 * hexachlorobenzene
84 * hexachlorobutadiene
85 * hexachlorocyclohexane
86 hexachloroethane
87 isopropylbenzene (cumene)
88 linuron
89 malathion
90 methyl-4-chlorophenoxyacetic acid, 2- (mcpa)
91 methyl-4-chlorophenoxypropanoic acid, 2- (mcpp)
92 * mercury [and compounds]
93 methamidophos
94 mevinphos
95 monolinuron
96 naphtalene
97 omethoate
98 oxydemeton-methyl
99 pah [6 of borneff]
100 parathion-ethyl
101 pcb
102 * pentachlorophenol
103 foxim
104 propanil
105 pyrazone (chloridazon)
106 simazine
107 trichlorophenoxyacetic acid, 2,4,5- (2,4,5-t)
108 tetrabutyltin
109 tetrachlorobenzene, 1,2,4,5-
110 tetrachloroethane, 1,1,2,2-
111 * tetrachloroethylene
112 toluene

* Substances for which emission limits have been established

113 triazophos
114 tributylphosphate
115 tributyltinoxide
116 trichlorofon
117 * trichlorobenzene [all isomers]
118 * trichlorobenzene, 1,2,4-
119 trichloroethane, 1,1,1-
120 trichloroethane, 1,1,2-
121 * trichloroethylene
122 trichlorophenol [all isomers]
123 trichlorotrifluoroethane, 1,1,2-
124 trifluralin
125 triphenyltin acetate
126 triphenyltin chloride
127 triphenyltin hydroxide
128 chloroethene (vinylchloride)
129 xylene [all isomers]
130 * isodrin
131 atrazine
132 bentazone

* Substances for which emission limits have been established

Annex IV Types of industry designated under the Industries Order *(Amvb-inrichtingen)*

1. Chemical and petrochemical industry
2. Ore processing industry
3. Storage, treatment or processing of waste
4. Surface treatment (including electroplating)
5. Paint, lacquer and printing ink manufacturing
6. Tanneries
7. Wood impregnation
8. Container, tank and tank lorry cleaning
9. Paper and cardboard factories
10. Screen printing
11. Photographic companies with laboratories capable of processing more than 20,000 m^2 paper annually on the basis of 2,500 working hours per year
12. Textile finishing
13. Companies applying backing layers to carpets
14. General, teaching and specialist hospitals
15. Integrated laboratories discharging more than 10,000 m^3 of wastewater per year, as well as analytical laboratories
16. Wood cleaning (remove coats/layers of paint or lacquer from wooden materials with the help of a chemical treatment)
17. Companies removing preservatives from more than 1,000 cars per year
18. Companies discharging 5,000 population equivalents or more, as well as companies discharging 500 m^3 per twenty-four hours, both as an annual average