

The environment in the Rotterdam region 2000

This appendix contains the English translation of the introductory paragraphs of the chapters 2-4 and all of the chapters 5 and 6 of the report called "HET MILIEU IN DE REGIO ROTTERDAM 2000". We have also included a translation of the titles of the graphs. The report is a result of a co-operation of regional environmental authorities. This co-operation is called "Milieumonitoring Stadsregio Rotterdam (MSR)".

On pages 10-12 of the report you will find the English summary, describing the main conclusions. Together with this appendix and the graphs of the report itself, we hope that you can get a good impression of the environmental quality in the Rotterdam area and of the efforts that are made to improve this quality.

Background

In the Rijnmond area living, working and recreation are accommodated within a relatively small surface area. On less than 800 km² approximately 1.2 million people live in 18 municipalities. This limited space contains both urban and rural elements. Because of the presence of the world's largest port, large industries and approximately 22,000 medium and small companies with an environmental license, the region is considered the economic driving force of The Netherlands. Many chemical and petrochemical plants, power plants and storage and transshipment companies are located here. Horticulture areas have been designated and areas have been reserved for nature and recreation. The transportation of goods and people which these activities necessitate, particularly by road, have a great impact on the environment and the land use in the region.

The concentration of so many functions in the region requires the use of effective environmental legislation in order to prevent economic growth from harming the (living) environment. As each governmental agency in the Rijnmond area has its own authority and responsibilities co-ordination is a pre-requisite. The continual developments within the "environmental field" itself also play an important role. Concepts such as 'sustainability' and 'area-oriented approach' have gained a firm hold within environmental policy. The accent within environmental policy shifts from a sectoral to an integral approach, from centralised to decentralised management. The national government wants to include citizens, companies and other government agencies in formulating and executing environmental policy. Co-operation between these parties should lead to shared responsibility for, and backing of, the environmental policy in the years to come.

Due to these changes and the diverse tasks of the regional authorities, many different policy targets and standards are used. Unfortunately some policy targets have yet to be quantified. The co-operation between governmental agencies within the region is positive. However, authorities publish their findings, endeavours and results separately, and as these reports cover different geographical areas the results are often dispersed and difficult to compare, making a total view of the region difficult.

MSR and objectives of monitoring

In 1994 eighteen governmental agencies, the police and the energy distributing company formed a co-operation under the name of Environmental Monitoring Rotterdam Region (Dutch abbreviation MSR).

In the report indicators are presented, for which policy targets or standards have been formulated. Some indicators, with no concrete targets, are included for their signalling function. Each indicator usually consists of a numerical depiction of the status or the development of environmental aspects, together with their policy targets or standards. In most cases we look back ten years. This gives the administrators and civil servants, as well as target groups (industry, consumers), pressure groups and civilians the information they require on the state of the environment in the Rotterdam region.

Working groups have named indicators that depict the status or the development of a great number of environmental aspects. The large number of data has been condensed through selection and aggregation. In some cases multiple indicators could be aggregated to indexes. The origin of all data can be traced through a systematic registration and this monitoring system is the source of the yearly report.

The first MSR report was issued in 1995, this being the sixth edition. In this sixth report we monitor environmental policy in the Rijnmond area, in order to follow the execution of environmental policy and, if necessary, adapt it. Monitoring of environmental policy in this context means comparing a situation with policy targets and standards. Several local, provincial and national policy documents are relevant in this respect.

Contents

The subjects in this report have been grouped in accordance with the internationally used pressure-state-response model, depicting information on sources, environmental quality and efforts by governments and target groups. A graph and a short explanation depict every indicator.

If possible, the information is presented in the form of an index (red frames), giving the general situation for a theme. The underlying indicators are then presented separately (green frames).

Chapters 2, 3 and 4 give a sketch of the environment in the Rotterdam region. In principle, the development over a number of years is presented, together with the policy target. From this it can be determined whether or not policy or execution of policy is on course.

We start in chapter 2 with the environmental quality because policy is aimed at reaching a certain quality of the environment. Chapter 3 deals with the sources of environmental pollution or disturbance. Governments and so-called target groups for environmental policy, such as industries and consumers, have their own activities aimed at improving the environment. Many of these efforts are described in chapter 4.

Chapter 5 is dedicated to the special themes 'Agricultural sector', 'Living environment' and 'Nature and Recreation'. Chapter 6 deals with possible developments in the (near) future.

The annexes contain a comparison of numbers of complaints about odours and noise from different municipalities and the districts of Rotterdam. Also a list of abbreviations and a key word register are included.

This chapter shows the trend in the quality of the environment in the Rotterdam region. We describe the trends over the past ten years for the quality of the water, the air, the residential areas and nature.

Water and underwater soil

Water

In the Rotterdam region four authorities measure the quality of the waters. The National Water Authority is responsible for the national waters, roughly speaking the waters that have an open connection to the sea. The inland waters have their own authorities.

The quality of the national waters and the inland waters is depicted by two indexes, consisting of a number of characteristic indicators. For each indicator, each year the distance (per cent) to the target is calculated and the average of these distances determines the index for that year.

The eco-toxicological level of protection for aquatic organisms from exposure to concentrations of toxic substances as an index for the overall quality of national waters is presented in this report for the first time ever. This eco-toxicological level of protection is expressed as the percentage of aquatic organisms that, given the occurring concentrations, will experience no effect from these substances. In recent years, the assessment of environmental quality has focused on the determination of risks from pollution, usually differentiating between risks for humans, risks for ecosystems and dispersion risks. This risk approach has led to the development of standards for eco-toxicological risks, in which the protection of species is the main objective. The conservation of species and of ecological functions is the starting point. Each toxic substance has been assigned a maximum permissible risk (MTR), protecting 95% of the species potentially present in an ecosystem. Also a level of negligible risk (VR) is determined for each substance, protecting 100% of the species potentially present in an ecosystem. Toxic substances are metals and organic micro-pollutants.

The eutrophication substances phosphorus and nitrogen are not toxic at the normal levels in surface waters and are therefore not included in the eco-toxicological risk. The Third National Environmental Policy Plan states that the MTR-level should be reached in 2000 and the VR-level in 2010. Since 1990, both the North boundary and the South boundary show an increase in the percentage of organisms that is protected. The aim for 2000, in which 95% of the species is protected, seems attainable.

The index for the inland waters is based on the average ecological quality, to be reached in 2006. On average, the water quality does not yet meet the targets. Locally the quality can suffice because of large variations in quality between locations. In the western part of The Netherlands an ecological appraisal system is used in order to give an accurate picture of the general quality of inland waters.

Water quality is influenced by a number of factors which are explained in the following sections.

Interactions

The quality of inland waters in the Dutch polders is influenced by the quality of national waters. During the summer, a lot of water is taken in from the large waterways. An improvement in the quality of the national waters therefore means an improvement of inland water quality and vice versa.

This region also has an influx of salt water, reaching far inland. This may have a negative influence on the ecological quality of inland waters.

The surface water, the underwater soil, the layout of the aquatic system and the composition of the aquatic fauna and vegetation influence each other.

- * A heavily polluted surface water will cause a polluted underwater soil and vice versa.
- * A good layout of surface waters, for instance natural banks, has a good influence on both water quality and underwater soil quality. It stimulates the development of water plants, which have a purifying effect on the water quality. It also facilitates a broader composition of small aquatic animals and fish.
- * The composition of species of aquatic fauna for its part, influences the ecosystem. Small aquatic animals for instance, such as water fleas, eat algae and will thus limit excess growth of algae. The number of different species of small aquatic animals is a measure for the ecological water quality.

Eutrophication

In a healthy aquatic ecosystem the influx of organic materials is small. In inland waters, however, this influx is often high or even extremely high because of discharges. This results in high oxygen consumption, leading to anaerobic conditions. Discharges can be point sources or diffuse sources, such as erosion of manure or pesticides. The cleanup of point sources is almost complete.

The task of removing diffuse sources (such as fertilizer seepage) is more complicated and has yet to be undertaken.

Flow

National waters are mostly large, flowing waterways, while inland waters are small and stagnant. This means that the self-cleaning capacity of inland waters is less than that of larger rivers. Stagnant waters are also far more sensitive to organic substances.

Underwater soil

No new information on the underwater soil quality of the national waters and the harbours is available. The underwater soils of the inland waters are not, or only slightly, polluted.

Air

Air quality in Rijnmond is measured by DCMR at a large number of measuring stations. Calculations can give an idea of the concentrations of polluting substances in other places. As a measure for the (general) air quality we have calculated an index by aggregating the measuring data from the most relevant indicators. Measured concentrations for all substances were lower than in 1998, so the general air quality has improved further. No new data are available on the (calculated) air quality along busy roads.

In most of the graphs the air quality standard (grenswaarde) for the substance in question is indicated. This is the maximum concentration allowed at this time. Sometimes a long-term target (streefwaarde) has been formulated. The intermediate target (richtwaarde) is the policy target for the coming years.

Residential areas

The number of complaints received by the Central Control Room of DCMR dropped in 1999 by more than 2,300 to 19,848. Most complaints are still caused by air traffic.

No new data are available on the acoustic pressure on houses by air traffic noise. The most recent data are from 1996 and were presented in our previous report. There are also no new data available on the acoustic pressure on houses by road traffic and railway noise. In chapter 4 the number of dwellings for which abatement measures are necessary, is presented.

It is difficult to depict the external safety situation in graphs or maps. Industrial installations, like last year, do not breach the standards for the residential areas. About 75 houses are too close to transport routes of dangerous materials by road. A dozen houses are too close to transport routes by rail. Transport of dangerous materials by water and pipeline does not present too high a risk in residential areas. Around Rotterdam Airport, 2,422 dwellings are within the 10⁶-contour.

Nature

As an indicator for quality of nature, the presence of a number of butterfly species has been presented again. The data show that the number of species under observation have been stable over the last years. This means that natural values in the region are no longer deteriorating.

As an indicator for the water quality of the delta area, we show the population of seals and of a number of bird species. The data show no large differences.

The number of certain summer birds can determine the natural value of urban areas, agricultural areas, dry natural areas and water and swamp. This year we present a graph on these birds for the first time.

Chapter 5.3 deals especially with nature and recreation and it also includes some indicators on the quality of natural areas.

The Rijnmond area is renowned for its port with heavy industries, such as refineries, chemical plants and storage and transshipment companies. The port attracts a lot of traffic; mainly road traffic and ships. These sources are the most important target groups for (regional) environmental policy, because they are the major polluters. Other pollution sources are air traffic, consumers and agriculture. There are no emission data about air traffic in this chapter. But in chapter 2 the number of complaints due to air traffic are presented. A separate section is dedicated to the relationship between environment and economy for five target groups.

Major industries

In the Rijnmond area approximately 22,400 large and small companies are located, each having an influence on the environment. The large industries have of course the largest influence. The 96 large industries (0.4% of the total number of companies) contribute 93% of the emissions of SO₂, 52% of the emissions of NO_x, 49% of hydrocarbon emissions and 75% of CO₂ emissions. Their contribution to the total number of complaints about odour is somewhat less (41.4% in 1999).

Of the other companies, 7.1% is agriculture, 9.6% small industry, 14.3% restaurant businesses and 4.2% garages. These categories are considered to be the most polluting and comprise 35% of the total number of companies. Due to the amount of environmental pollution, this chapter deals mostly with the large industries and considerably less with the smaller companies.

In chapter 4 it becomes clear that the majority of the large industries comply with emission standards and has an adequate license. A similar overview of the smaller companies cannot be given yet.

Following a period of considerable decrease, the discharges to national waters have levelled over the last four or five years. There are still large differences in distances towards the targets. The discharges of oil, extractable organic chlorine (EOCl) en PAH are well below the target for 2000. For the heavy metals zinc, chromium, cadmium and nickel the targets have been met and for arsenic, mercury and organo-halogens they have almost been met. Discharges of phosphate and nitrogen have decreased strongly since 1990, but the target for 2000 has not been reached yet. Discharges of copper, lead and benzene also remain too high.

The long-term target (2010) for most of these substances is still far away.

The emissions of heavy metals to the air by the waste incinerators in the region have decreased strongly. The influence of flue gas cleansing units since 1994 is clearly visible. All installations comply with the Dutch emission guidelines (NER). The emissions of dioxins by waste incinerators are negligible.

The emissions to the air of acidifying substances, hydrocarbons and dust have decreased further. The emissions of carcinogenic hydrocarbons have increased slightly. It is remarkable that the industrial emissions of CO₂ have dropped in 1999. This is due to the power plants. The other branches showed a slight increase. Because of the strong coupling between economic growth and CO₂ emissions, companies will have to make a great effort to reduce these emissions. Reducing CO₂ emissions is, after all, an important world-wide goal.

Road traffic

The large number of vehicles on the road causes high environmental pressure, especially in a densely populated area such as the Rotterdam region. As industrial production becomes cleaner, road traffic becomes a relatively bigger environmental problem.

The environmental problems due to road traffic are mainly poor air quality along roads and noise pollution. Road traffic also claims space, which is limited in this region. This aspect is addressed in chapter 5.

Despite the increased number of kilometres driven (31.5% more since 1986), the emissions of hydrocarbons (-59%) and fine particles (-51%) have fallen. NO_x shows a smaller reduction (-37%). This reduction in emissions is chiefly the result of cleaner engines.

These cleaner engines do not emit less CO₂, however, so that emissions increase along with rising numbers of kilometres driven. Pressure on nature by road traffic, measured by the number of ecological barriers, also remains high. These last two factors are the reason that total environmental pressure by road traffic has decreased only very slightly.

Consumers

The 500,000 households in our region also place a considerable pressure on the environment. They not only drive a lot of car kilometres (see 'road traffic'), but also produce waste and use electricity and gas.

The total amount of waste has increased over the past few years. This is only partly because of the growing number of households. Apparently, each household also produces more waste.

The CO₂ emissions by households have decreased in 1997 and are back on the 1991 level. A positive development is the fact that the number of buyers of so called green power between 1997 and 1999 has increased by almost 300% from 2890 to 8000. The use of gas remained the same.

Agriculture

In chapter 5 a separate section is dedicated to the agricultural sector. In this chapter only the CO₂ emissions to the air and the discharges of phosphorus and nitrogen to the surface waters are addressed. In both cases there is a decrease.

Comparison of target groups

Every year we present a comparison of the air emissions by seven target groups of four important pollutants: CO₂, hydrocarbons, NO_x and SO₂. The target groups are: major industries, power plants, small industries, road traffic, ships, consumers and agriculture.

Major industries and power plants cause most of the carbon dioxide emissions. Hydrocarbon emissions are mainly from the major industries, the small industries and road traffic. Sulphur dioxide comes mainly from the major industries. Major industries, road traffic, shipping and power plants cause the major part of the nitrogen oxides emissions.

Other sources of environmental pollution

Deposition of acidifying substances, caused by different sources, is also a form of environmental pollution. Acid deposition is caused by acidifying substances in the air, such as sulphur dioxide (SO₂), nitrogen oxides (NO_x) and ammonia (NH₃). The sources of these compounds can be found far away and even abroad. Of course, sources in Rijnmond can be responsible for acid deposition elsewhere.

Acid deposition influences the acidity of the soil. Dependent on the type of soil, harmful effects are caused to woods and nature-reserves. Acidifying compounds in the air also affect buildings and works of art. Acidic deposition did not decrease further. The target for 2000 is not yet within reach.

Environment and economy

Environmental policy is aimed at detaching economic growth and environmental pressure. This is the case when economic growth is combined with decreasing environmental pressure (complete detachment) or when economic growth is more rapid than the increase of environmental pressure (relative detachment).

This year we have again determined the measure of detachment for five target groups: refineries, chemical industry, storage and transshipment, power plants and road traffic. These target groups cause an estimated 80% of the environmental pressure in the region. For each target group we show the environmental pressure, the economic development and the environmental intensity (MI). The environmental intensity is a measure for the detachment: the further the environmental intensity lies below 100, the higher the detachment is. With the intensity above 100, there is combined growth of economic activity and environmental pressure.

Current policy should cause the environmental intensity to fall to 50 or less between 1986 and 2010. Over the period 1990-1999, the refineries (MI=71) and the storage and transshipment sector (MI=35) show complete detachment. The power plants (MI=89) and the chemical industry (MI=74) show no detachment and road traffic (MI=74) seems to show complete detachment over the last two years.

Environmental quality has still not met the targets on a variety of issues. Although the environmental pressure caused by the target groups has declined per unit of production, it will have to decline even further to meet the targets set. Particularly when at the same time there is economic growth. Governments and target groups will have to continue their efforts to limit the pressure on the environment.

This can be done in several ways, depending on character (preventive or curative), aim (aimed at cause or recipient of environmental pressure) and approach (imposed by the government or on a voluntary basis). The efforts in the field of licensing and spot checks for instance, are preventive and aimed at the source. Abatement measures, as for acoustic loads on dwellings or soil contamination, have a 'curative' character and are aimed at the recipients (the inhabitants and the contaminated area). Finally, efforts can be 'area oriented', e.g. aimed at nature conservation and development.

This chapter gives a summary of the efforts of citizens, companies and governments towards improving the environment.

- * The efforts that take place on a voluntary basis are in the section 'self regulation'.
- * Efforts of a preventive character are dealt with mainly in the sections 'licences', 'enforcement' and 'waste'. It is hard to quantify the effects of preventive measures, however that doesn't make them less important. The effects do exist! For instance less waste as a result of the separation of waste flows, or spot checks that prevent accidents due to the unsafe storage of dangerous goods.
- * Curative measures can be found in the sections 'clean-up' and 'waste'.
- * The effects of the efforts in the field of nature and energy are described in the sections 'nature' and 'miscellaneous'.

Self regulation and covenants

Strengthening the involvement of civilians and private parties can lead to the desired environmental behaviour. Voluntary agreements between government and industry (like covenants) have for several years been a good instrument with which to achieve social targets. Non-governmental initiatives have also become more important. The number of companies that seek advice on waste prevention and re-use every year illustrates this.

In 1999 STIMULAR (stimulating waste prevention Rotterdam region) gave advice to 73 companies. Another example is the increasing number of ecoteams; groups of 6 to 8 families who try to minimise their own pressure on the environment. In the region 768 households are or have been active in the ecoteam programme.

Licences

Most companies in the region subject to licensing procedures have an up-to-date license which is check-monitored at regular intervals. However, so far not every company has made emission-limiting arrangements which meet the technology requirements. In the coming years, the companies will implement these arrangements in accordance with their license.

Enforcement

Compliance by the sectors storage and transshipment, refineries and process industry is expressed by the number of initial warnings, related to the total number of checks performed. As in previous years, a warning was necessary for less than 10% of the total number of checks carried out.

There is a slow decrease in the number of accidental spills to the water, despite increased industrial activity.

Efforts towards nature

The total acreage of natural area, which is managed by the nature conservation associations, has increased slightly over the past three years. The acreage that is bounded for future nature development has increased considerably, but hardly any land has been acquired. The acreage bounded for reservation areas has increased and over the past three years 75 ha has been acquired. Another 188 ha have to be acquired to reach the target.

The realization of ecological corridors is well underway. 65% Of the bounded acreage will be realized and 35% is uncertain, mostly due to high land prices and lack of co-operation in acquiring the land. Of the 73 fauna bottlenecks listed within the ecological infrastructure, only one has been resolved, whereas 29 should have been.

For the provincial ecological infrastructure to be realized in 2013, it is necessary to acquire land at a faster rate, especially for nature development areas. Also more effort should be made towards removing ecological barriers.

Abatement measures

Noise

In 1997 car mobility increased faster than in previous years. There is now a 31.5% increase as compared to 1986. The regional traffic and transportation plan (RVVP) expected this and predicts a turn-around in a couple of years. If this rising trend continues however, the target for 2010 (no more than 15% increase compared to 1986) will not be met.

With car mobility increasing, the need to limit traffic noise also increases. Since 1990 the total length of noise abatement walls along highways has increased to 97 km in 1999.

Between 1993 and 1999, abatement measures against road traffic noise were taken for over 2000 dwellings in the city of Rotterdam. There are still 4600 dwellings in the whole region where measures have to be taken. At 136 dwellings measures to reduce rail traffic noise were taken. The number of dwellings where measures still have to be taken is 1228. Major efforts remain essential in order to reduce the number of dwellings exposed to road and rail traffic noise to zero.

Soil

Not all municipalities have a soil quality map, but there is a fairly complete overview of the soil clean-ups necessary for industrial sites, former gas plants and filling stations in the region. The number of cleaned sites has increased in 1999. The objectives for the different target groups will not be met, however:

- * The cleanup of former gas plant sites still stagnates for lack of money. The very urgent locations in Rotterdam-Kralingen and Schiedam have been cleaned, but in the coming years the cleanup of 6 other very urgent locations has to start.
- * The target for 1999 (in which all existing filling stations comply with environmental standards) will not be met.
- * The soil cleanup of former filling stations is on course, also in Rotterdam. The aim is to have cleaned all reported cases before 2005.

Waste disposal

The total amount of household waste has increased again in 1999. Between 1995 and 1999 the percentage of separately collected household waste increased barely (to 29%). This is still a long way from meeting the 50% recycling target for 2000.

The municipalities in the region show great differences. In nine out of 18 municipalities the amount of rest waste increased in relation to last year and in six it decreased. In seven municipalities both the amount of rest waste increased and the amounts of green waste, glass, paper and textile decreased; a very negative development indeed!

The degree of contamination of sludge which is stored in separate storage facilities on the Maasvlakte, is still decreasing. It is, however, not certain if this means that the 2010 target, that all sludge can be dumped or re-used, will be met.

The target to re-use 70% of all contaminated soil was easily met in 1999. The percentage of soil that cannot be cleaned has increased, however.

Miscellaneous

The intended energy saving target was achieved through public information programmes, and the offering of advice and subsidies by the government. Despite all this, the CO₂-emissions from households continue to rise.

Targets for reducing CO₂ by using residual heat through total energy and sustainable sources of energy have also been formulated. The energy from total energy installations has levelled off over the last couple of years. The distance to the target for 2000 is still large. Up until 1999 about 57% of the target for sustainable energy has been reached through the use of wind power and biomass.

5.1 Agricultural sector

Introduction

Agriculture is an important target group for environmental policy. On the one hand, a good environmental quality is important for agriculture, while on the other hand, this environmental quality is influenced by agriculture. In the present context, environment means air, water and soil. On a national level, the agricultural sector can, by taking environmental measures, contribute to combating climate change, acidification, eutrophication, soil and water pollution and disturbance of environmental quality. This chapter begins with a short description of the different sorts of agricultural businesses in Rijnmond. Next, we address in general the influences of agriculture and horticulture on air, water and soil pollution by fertilizers and pesticides. Finally, we present a paragraph on environmental law and regulations and compliance. This chapter does not deal with the consequences of the restructuring of cultivation under glass and with the problems of transport of agricultural products, because these subjects would make the chapter 'too broad'.

Agricultural businesses

There are 1,595 agricultural businesses in the Rijnmond area. These are cultivation under glass (44%), farming (23%) and cattle farms (15%); 13 of the latter are factory farms. Finally there are 202 vegetable farms. The number of farms may be small (there are more than 22,000 companies in Rijnmond), the agricultural sector does use a lot of space. Out of more than 79,000 hectares in Rijnmond, 25,000 hectares are for agricultural use (36%; 2% cultivation under glass and 34% farming and cattle). There are 13 businesses (40 ha) that operate biologically, meaning that they do not use pesticides and fertilizers.

Air pollution

Table 1 shows the emission of the most important air pollutants from the agricultural sector. Horticulture is responsible for most of the CO₂ emission; the other four substances mostly come from cattle and farming. For comparison, the total emission for Rijnmond and for the whole of the Netherlands is also shown.

Central supply of CO₂

One way of limiting the emission of air pollutants is the (central) supply of CO₂ by the industry to the glasshouse horticulture.

An increased concentration of CO₂ around the plants increases growth and production of the crop. Central supply means that the local installations (furnaces) that supply CO₂ do not have to be operated, especially in summer. As a consequence, the emission of NO_x has also decreased.

In 1999 the total energy plant in Rotterdam supplied more than 34,000 tonnes of CO₂ to 143 local agricultural businesses. It is not yet possible to determine any structural reduction in CO₂ emission by the market gardeners. Starting in 2001, Shell will supply CO₂ to 1,500 market gardeners in South Holland. Only a small part, however, will be supplied to the Rijnmond area.

National regulations regarding storage and application of manure have led to decreased emissions of ammonia. The effect of these measures can not be quantified because of the small scale of these activities in Rijnmond.

Odour nuisance

Odour nuisance is another form of air pollution. The hindrance caused by different forms of agriculture has a direct effect on liveability and the sense of wellbeing of the people living near the rural parts of Rijnmond. In the last years, around 330 complaints were made, mostly regarding the spreading of manure.

Water pollution

Water is an important production factor for farming and horticulture. The quality of the water system (embankment, surface water, underwater soil, ground water and technical infrastructure) has various relations with the agricultural sector. This relation is determined by land use, cultivation methods and discharges. Land use determines generally the way in which fertilizers and pesticides are administered.

Fertilizers

In farming and cattle areas, fertilizer is usually administered to the ground in granular or fluid form. The way in which it is administered has direct consequences for the loss of ammonia to the air. Nitrogen emission is greatly restricted when manure is administered under cloudy or slightly rainy conditions, preferably directly followed by ploughing. When the soil contains enough fertilizers, the surplus can seep through or run off and thus influence the quality of the nearby surface water.

In cultivation under glass, fertilizers are usually administered to the crops in fluid form. The amount depends on the crop requirements, but also on the state of the soil or on the concentration in the discharge water (hydroponic cultivation) or drainage water (soil cultivation).

A surplus in nitrogen and phosphorus in the surface water leads to eutrophication, a decrease in the number of species and/or to an abundant growth of duckweed or algae, suffocating other organisms. Despite the great environmental efforts of the sector, the eutrophication of the inland waters has improved only slightly since 1989. Concentrations remain well above the standard for 2000 (MI_9007, page 17). It is known that the effects of policy changes and measures take several years to become measurable. This means first of all that we have to continue on the way we have started together, but also supports the necessity of thorough investigation into the relation between discharges and pollution of water systems in agricultural areas.

Watering cattle

The quality of the surface water is an important factor when it is used as drinking water for cattle. Many cattle farmers use the surface water. At the moment a national investigation is held to ascertain if there is a relationship between the quality of surface waters that may receive sewer discharges and the health of cattle drinking this water. A close co-operation between municipality, water authority and agricultural sector is of great importance to solve this sort of problem adequately and satisfactory. Both the cattle farmers and the municipality and water authority want the number of sewer overflows to lessen. It may improve the local water quality considerably. An adequate sewerage infrastructure in rural areas is another important means to improve water quality. Within the province of South Holland, agreements were reached on that subject in 1999. Municipalities and water boards will implement these agreements.

Pesticides

Too much use of pesticides in agriculture and horticulture may pollute ground water and surface water. The combination of atmospheric deposition, local drift during use, seepage, runoff and discharges mainly determines the quality of the water system. This means that substances that are administered elsewhere and are carried by wind over large distances may also influence the water quality in Rijnmond. The effect of measures to limit use and emissions of pesticides is mainly determined by the environmental routes of the pesticide and by its chemical properties.

The cultivation under glass aims at fighting plant parasites only with biological means. In extreme cases, this is supported by local use of specific pesticides. Modern ways of growing crops and the use of environmentally friendly measures on farms will reduce emissions to water, air and soil greatly. Province, water boards and municipalities study ways to reduce diffuse discharges of pesticides and other pollutants. This will lead to an overall improvement of water quality.

In farming, pesticides are administered in the open field by means of mobile spraying equipment or occasionally planes. Drift of spraying liquid and involuntary spraying of embankments and waterways can occur. The pollution of a water system is determined, therefore, by wind speed, distance of the crop to the waterway and the way in which pesticides are administered. Grasslands are only fertilized, whereas mixed farms, which grow fodder crops, like maize, administer both fertilizer and pesticides. Maize requires heavy use of both manure and pesticides. In general cattle farming pesticides are rarely used. The graph shows how many inland waters have been checked on pesticides in 1997 en how many substances were found.

Fertilizers and pesticides pollute the surface waters, but still we see more water life in the ditches. This means that the quality of the inland waters is improving, as will, consequently, the national waters.

(Underwater) soil pollution

The problems of soil pollution in general have been addressed in the MSR report in 1999, so we will address only the main subjects in this section. Pollutants pose a threat both to the production function as well as the ecological function of the soil. A large part of the agricultural soil in the Netherlands, for instance, has too much phosphate. This influences the possibilities for exploitation[??], but also, in combination with other physical-chemical parameters, to a large extent seepage to and pollution of ground water and surface water. In The Netherlands the production demands are so high, that a one-sided flow of nutrients is necessary to realise the desired production quota.

As we have mentioned before, extensive cattle farms greatly outnumber the intensive ones. Still, defining standards for fertilizer loss and balance in fertilizing are important points of attention both in agriculture and in horticulture. Not only as a means of adequate environmental management, but also as a means to regulate and minimize ongoing processes such as eutrophication, groundwater depletion and acidification.

It is obvious that intensive agricultural businesses influence directly or indirectly the underwater soil in their vicinity. Although water management causes relatively low standing times for the surface waters, the underwater soil often remains in the same place for several years. It is a known fact that historic pollution, such as DDT-like substances, can still determine the quality of sludge from waterways. It is therefore necessary to determine when dredging is needed, whether a full cleanup is needed or maintenance will suffice.

Environmental laws and compliance

A lot of environmental laws and regulations apply to the agricultural sector, such as the environmental management law, the pollution of surface water law and the pesticides law.

But also a number of general guidelines and covenants determine and control processes and management of agricultural businesses.

In chapter 4 (page 42) the results of the spot-checks by the water boards of cattle farms and glasshouse horticulture are presented. The results with the cattle farms were that after seven out of 44 checks a warning letter was necessary and only one sanction had to be imposed. Within the cultivation under glass, compliance is much less. Out of 486 checks, 105 sanctions were necessary (21.5%). It appears that the sector is hesitant in implementing the necessary measures.

5.2 Living environment

Introduction

The MSR reports of 1997 and 1998 contain chapters on the local living environment. The chapter of 1997 dealt with the question of what the quality of the local living environment in Rijnmond was. A striking conclusion was that people experienced more hindrance than was to be expected according to government standards.

The 1998 report confirmed these conclusions. The chapter in that report was based on the then unfinished literature survey by the Rotterdam Health Service (GGD) on liveability. An important additional conclusion was that there is a strong connection between environmental pollution and environmental hindrance. Some people doubted this and thought media attention, political opinions etc. would strongly influence the amount of hindrance people experienced.

This chapter presents the latest findings from the literature survey and other surveys, together with some applications of the ideas that were developed.

Liveability in Rijnmond

Liveability can be defined simply as the opinion of inhabitants about their living environment. The chapter on the living environment in the 1998 MSR report already mentioned a number of aspects that determine the liveability in Rijnmond. The final part of the literature survey of the GGD states the most important aspects in order of importance. The table shows the results.

Importance	Liveability aspects
Most important	House (size and quality)
Very important (basic demands)	Social safety Social cohesion Clean
Also important (quality demands)	Space Green Quiet
Least important (additional demands)	Children's playgrounds Air quality Accessability Facilities/amenities

The factors that are mentioned determine the living satisfaction and partly the tendency to move house. But people generally move only from personal motives: study, work or a change in household composition. The factors from table 1 then determine whether people settle somewhere or move away.

They are, in short, competition factors of the housing market. People that can afford it, choose a living environment that complies with as many of these factors as possible.

Table 1 is a random picture for the average inhabitant of Rijnmond around the year 2000. Factors can be present more negatively or more positively in certain areas, resulting in a change of order. Other area-specific factors can also be added.

In a liveability survey, roughly three types of people can be distinguished: a large group that prefers a suburban living environment, a smaller group that prefers an urban environment and also a small group without clear preference. The last two groups do not set great store by some of the factors in the list, such as children's playgrounds, green, quiet and certain facilities. People with a preference for an urban living environment care much more about entertainment amenities. These are mostly single or two person households (e.g. students), living (temporarily) in the inner city. People with children think factors such as social safety and playgrounds more important than people without children.

Towards a concrete and practical policy on liveability

The results of this survey were sufficiently concrete to serve as basis for policy. The GGD has developed a strategy for a concrete liveability policy. For each of the factors from table 1 indicators were identified and for each indicator two check values: a current standard and a long term standard. These values separate three areas: red, orange and green. The two targets for liveability are:

- * no more red areas
- * more green areas.

An example to clarify this. For noise the current standard is 65 dB(A) and the long term standard is 50 dB(A). In the red area with levels above 65 dB(A) many people are hindered and can become ill. In the green area of 50 dB(A) and less there is a special quality that contributes positively to the attractiveness of the area and that promotes the health of the inhabitants directly or indirectly.

The most important way to improve liveability is to improve the actual situation and get direct results. In the case of noise, this simply means lowering sound levels. Another suitable way to improve liveability could be differentiation.

If all noise-sensitive people were to live in the quietest places and all deaf and noise-loving people in the noisiest spots, you would have created the most liveable situation. An important prerequisite for differentiation is the freedom of choice of housing. And there must of course also be something to choose: if your dream house can only be found in a very noisy area, you can't really speak of freedom of choice. Also, the freedom of choice in the housing market is strongly connected with wealth: if you have more to spend, you also have more to choose from.

One option is to build houses for people with high incomes especially in areas that score poorly on one or more aspects of liveability. This has two advantages. Firstly, it forces the market to realize a good overall quality, because otherwise no one will come and live there. Secondly, it prevents that in areas that score poorly on certain aspects (such as noise and air quality) only people with low socio-economic status will settle. This is the present situation around the industries in the harbour area.

City and Environment project Overschie

The above mentioned ideas have been used in the City and Environment project in the district Overschie of Rotterdam. The City and Environment project is a national project aimed at solving (environmental) bottlenecks when building within cities. There are 25 experiment areas, one of which is Overschie. In these experiment areas the authorities may, under certain conditions, deviate from legal standards and procedures.

In Overschie there are several sources of environmental pollution. Legal standards for noise hindrance and air quality are exceeded. Road traffic on the highways A20/A13 is one of the most important sources of environmental pollution in Overschie. One of the striking results of the project was that inhabitants set great store by the environmental problems in Overschie. Most people would oppose to a relaxation of environmental standards and procedures and often think they should be stricter. It was also striking that people were especially concerned about the health effects of air pollution. Any concerns about the possible effects of noise and noise hindrance weighed less. This doesn't mean that the people did not think noise was a problem, or that they thought a higher noise pollution would be acceptable; on the contrary. The emphasis, however, was on air pollution.

Because of this emphasis on air pollution, the survey of GGD Rotterdam focussed on present and future air quality along the highways, together with the health influences of this form of air pollution. GGD also indicated the way in which the areas along the highways could be used. The map shows the red, orange and green areas. The red zone is the area directly along the highway where the air quality can be described as poor. This will cause adverse health effects, especially in sensitive groups, such as children with asthma. Building of houses, day care centres, schools and hospitals (also called 'sensitive locations') in this zone is advised against. It is also unwise to establish sports fields and playgrounds in the red zone.

In the green zone the highways have hardly any influence on air quality. No adverse health effects are expected and (from the point of view of air quality) there are no building limitations.

The orange zone lies between the red and the green zones. Road traffic has a negative effect on air pollution, but not so much as in the red zone. The air quality can be described as 'mediocre'. Adverse health effects cannot be excluded. GGD is of the opinion that the layout of this area should be considered carefully. Four conditions have been formulated for the building of sensitive locations.

1. The possibilities for establishing non-sensitive locations (public green, squares, shops, library, etc.) are considered, together with the advantages and disadvantages.
2. Extra attention will be given to the quality of the building and to limiting the factors that can cause health effects. Important factors are inside air quality, prevention of moisture, use of sustainable and healthy building materials and applications, layout of the house, noise isolation and quality of the living environment.
3. Future inhabitants have easy access to information on the quality of the living environment and its health significance.
4. There should be freedom of choice of housing.

Spatial Plan Rotterdam (RPR) 2010

The conclusions of the literature survey have also been used in writing the Rotterdam Spatial Plan 2010. This is a structure plan for the spatial layout of the city of Rotterdam. The plan was finished in 2000 and will be formalized in 2001. All municipal services concerned with environment and liveability worked together in writing the plan.

There is even a separate report on environmental quality and health. All projects from RPR2010 have been judged on their impact on environment, liveability and the health of the people of Rotterdam. This doesn't mean that these impacts have always been given priority, but it does mean that they have been seriously weighed against other aspects, like economy. The result is a well-balanced spatial plan with an emphasis on 'environment, liveability and health'.

Recent surveys on environmental perception

The biannual survey on environmental perception was last held in 1998 and will be held again in 2000. The sample was expanded, which means that results are also available for Rotterdam and the whole of Rijnmond, whereas before 1998 the survey was only done in areas directly surrounding the industry.

A striking result of the first Rijnmond-wide survey is that hindrance from air traffic noise occurs almost all over Rijnmond. Also, the hindrance from air pollution continues to decrease, consistent with air pollution concentrations. A graph in the 1998 report already indicated this trend. This further supports the idea that an improvement of the environmental situation goes together with a decrease in hindrance. It appears that environmental measures yield direct results in this context.

In 1998 and 1999 two surveys on 'perception values' were held in Rijnmond. They were held within the framework of the development of Rotterdam mainport. One was in relation to the expansion of the Maasvlakte and the other with more intensive use of the existing harbour areas. The following results were obtained.

- * The respondents named many of the aspects from table 1 as being important for the liveability of their living environment. Inhabitants of rural areas strongly value the rustic, panoramic, quiet and green character of their living environment. People in urban areas set less great store by green, but add crime levels and social cohesion as important determining aspects.
- * In the areas around the harbour, air pollution scores higher as an environmental problem than noise hindrance. At the same time, quietness is an especially positive quality of the living environment for almost everyone. The definition of 'quietness' in this context appears to be a combination of social stability, a low crime rate, limited built-up areas and quiet.
- * Many of the Rijnmond inhabitants are proud of the harbour, yet this pride does not overcome the hindrance that is caused by the harbour and the connected traffic. The adverse effects of the harbour obviously outweigh the positive effects, albeit that this counts somewhat less for people that work in the harbour. Most people would like to keep some distance between their home and the harbour.
- * Most people are relatively neutral towards the plans for the harbour. On average, people judge expansion somewhat more negatively than more intensive use of existing areas. The people in the rural areas of Westvoorne and Goeree have the most negative attitude to the expansion. If a new Maasvlakte is absolutely necessary, it should look as natural as possible.

5.3 Nature and recreation

Introduction

There are many claims for spatial use of the area in the Rijnmond Region. Many spatial plans have been or are being developed for sites which at present still have an open, green character (agricultural land, nature conservation areas). There are plans for expanding the mainport area (Maasvlakte 2); for realising new industrial sites; for new infrastructure and for new building locations.

At the same time the demand for open-air recreation facilities close to urban areas is growing. Also there are plans to realise more natural and recreational areas within the region (Regionaal Groenstructuurplan; 750 hectares of natural and recreational area connected to Maasvlakte 2). Finally, existing natural areas and ecological corridors connecting them should be preserved or developed.

Is there enough room for all of these claims within the boundaries of the Rijnmond region?

This paragraph deals with the following question: how many natural areas (in hectares) do we have in this region and how many are planned to be added in the next 10-15 years? Last year, MSR focused on the relationship between land use and the environment. It was concluded then that the subject of nature and recreation needed closer examination.

This year's MSR report offers the wanted follow up study. First we describe the existing policy on nature conservation and development. This is followed by a description of indicators for the area available for nature in specific land use types. These indicators are integrated into one overall indicator for the total area available for nature. Most of these indicators are described in more detail in chapter 4 of this report.

We then go on to describe the ecological quality of the available nature in these land use types by the presence of various animal species. You can find most of these indicators in chapter 2 of the report. Parts of the open-air recreational areas also have a certain ecological value. These parts have also been incorporated into the above-mentioned overall indicator. We also describe the number of recreants that visit open-air recreational areas on a yearly basis and their mode of transport. At this point in time we only have data on two of the main open-air recreational areas in this region.

Policy

Policy on nature conservation is made on a European, national and regional level, and in most cases the regional government is responsible for implementation.

- * The European Union has issued the Bird Guideline and the HABITAT Guideline. In the Rijnmond region the "Haringvliet" and the "Voordelta" are subject to both guidelines. The dune area of Voorne is subject only to the Bird Guideline.
- * In Ramsar (Iran, 1971) the Wetland convention was set up. Since 1980 the Netherlands have subscribed to this convention. On the basis of this agreement member states are obliged to bound water areas which are of international importance to water birds. All areas that are bounded according to the Wetland Convention are also bounded according to the EU Bird Guideline.
- * The national "Nature Policy Plan" aims at calling a halt to the degradation of plant and animal species and realising a good ecological infrastructure. This infrastructure allows wild plant and animal species to spread in a certain area and is called Ecological Main Structure (EMS). To realise this EMS, vast natural areas of high quality (250 hectares minimum) must be preserved or developed. Between them ecological corridors are needed. Within this region the dune areas near Oostvoorne and Hoek van Holland are part of the EMS, as well as the peat and clay areas along the rivers "Oude Maas" and "Spui". The Nature Policy Plan gives the global boundaries of the EMS, but it is at the provincial level that the EMS is bounded in more detail. After that, the land should be acquired by the government. In the year 2018 all nature conservation and development areas should be acquired, arranged and transferred to the institutions responsible for managing the natural areas.
- * The province of South-Holland has its own policy plan on nature and landscape (1991). In this plan the province has defined the Provincial Ecological Main Structure (PEMS). This PEMS coincides for the greater part with the EMS. The PEMS, however, is more detailed about the location of ecological corridors. Besides that, the province defined a local ecological infrastructure, for which a basic ecological quality should be maintained or reached. The areas outside the EMS should reinforce the relationships between the elements of the EMS. This concerns the countryside as well as the urban area. The province wants to realise this PEMS in 2013, which is 5 years earlier than the target set by the national government.

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- * The authorities of the Rotterdam region have issued a regional policy plan for the ecological and recreational structure in 1996. Besides the above-mentioned targets, this plan aims at recreational use of natural and/or agricultural areas.

Areas of natural value in the Rijnmond region

Agricultural area

In 1974 a policy document on agriculture and nature conservation was introduced to safeguard natural and landscape values in agricultural areas. This is done by coming to “management agreements” with farmers in areas that will keep their agricultural function, and by acquiring agricultural areas in order to give them the status of nature reserves, which then are given to nature conservation organisations to manage.

The target for both types has grown from 540 hectares in 1996 to 586 hectares in 1999. The acquired area has increased by 75 hectares since 1996 to 398 hectares in 1999. In short: there is reasonable progress in the realisation of the target. In the years to come 188 hectares still have to be acquired (see page 44, MD_7038 of the report).

Natural areas

The Nature Policy Plan wants to stimulate the organisations that manage the natural areas to contribute considerably to preserving their ecological value. The indicator shows the trend in the number of hectares maintained by these organisations. Since 1996 58 hectares of reserve has been passed over to them. The total area to manage has grown from 2,384 hectares in 1996 to 2,442 hectares in 1999. You can find more details in the report, chapter 4 (page 43, MC_5037).

The instrument “nature development” is meant to develop new and ecologically valuable natural areas at suitable sites in the PEMS. This instrument is meant for creating large-scale natural areas. So far, 409 hectares have been bounded. Of these 409 hectares, 250 hectares are also part of the 1,000 hectares natural and recreational ground, planned for in the “Regionaal Groenakkoord”. Up till now only 8 hectares have been acquired (page 44, MD_7039).

The 750 hectares of natural and recreational area, connected to the planned expansion of the mainport area, are to be realised separately from the instrument of nature development.

Ecological corridors

The target for the area of ecological corridors, to be realised within the Rijnmond Region, amounts to 354 hectares. Of these, 97 hectares lie north of the Nieuwe Waterweg, and 256 hectares lie south of it.

A seventh part of the target is (being) realised at present (category certain). About half of the target will be realised in the short term (category probable), provided that arrangements are made to finance acquisition. One third of the target will not be realised in the short term (category uncertain), due to the lack of well-defined plans and the co-operation of farmers or because of the high land prices (page 45, MG_8005).

Open-air recreation areas

Forests

The national Forest policy Plan (“Bosbeleidsplan”) contains targets for the development of forests in the Netherlands. The main target is to preserve existing forests and to create new forests. By expanding the area with forests the government wants to improve natural and recreational values. Also, planting of forests should contribute to a sound spatial structure and to the liveability of the urban areas.

The forest area within the region of Rotterdam has grown from 1,570 hectares in 1993 to 2,163 hectares in 1999: a growth of almost 38% (page 44, MG_8006). That doesn't mean that the region has a lot of forests: the percentage of forest has grown from 2% to 2.7% of the total regional area. The growth of forest areas is concentrated in the southern part of the region, whereas in some municipalities in the northern part the forest area has decreased.

Forests are not separately mentioned in table 1 (the basis for the overall indicator). Many of the forests coincide with the existing recreational and natural areas.

Zoning

Recreational areas are being zoned into intensive parts and extensive parts.

Intensive parts have facilities such as attraction parks, playgrounds, beaches, and camping sites, and are often well accessible for traffic.

The extensive parts have ecological potential. Recreational activities are limited to well-defined paths, and do not disturb ecological values much (walking, nature watching, cycling, horse riding, fishing).

Maintenance is aimed at developing and stimulating natural processes and ecological values, although recreational values still prevail.

At the moment we only have data for the recreational areas Midden-Delfland and Rottemeren; both in the northern part of the region. In the coming years data for the remaining areas will become available.

Midden-Delfland and the Rottewig together represent 990 hectares of extensive recreational area and 220 hectares are intensively zoned. The extensively zoned areas are included in the overall indicator.

Accessibility

The availability of recreational facilities near urban dwellings is becoming more and more important. Availability is not only determined by actual distance, but also by the accessibility of recreational areas. For this, attractive routes for recreants from the city to the recreation areas must be realised. The policy goal is to stimulate the use of public transportation, of cycling and walking, and to discourage the use of cars.

How accessible are the recreational areas in the region? Once again, we can only determine this for the areas Midden-Delfland and the Rottewig.

The percentage of cyclists visiting Midden-Delfland is relatively high as compared to the Rottewig. This is due to the fact that the Rottewig possesses a number of facilities that also attract recreants from outside this region. The visitors often travel long distances and access by means of public transport is poor, so they are dependent on transportation by car.

The Midden-Delflandwig attracts a lot of visitors from Vlaardingen en Maassluis, places that lie within cycle range. Only few visitors come from places that lie further away. The visitors from nearby places also come more often than other visitors do. This accounts for the higher number of visits to Midden-Delfland as compared to the Rottewig.

In the coming years a more complete picture can be drawn of the modal split for all large recreational areas in this region. The same thing is true for the zoning of these areas. With these data we can get a complete picture of the total area available for nature-recreation and of the accessibility of these areas.

Urban area

In 1999 the bureau for urban nature (bureau Stadsnatuur Rotterdam) implemented a plan to gain more information about the existing living areas for flora and fauna in Rotterdam, by means of field inventories. This information will be used to determine indicators and to develop a monitoring program for nature in the city and the port area. In time this will lead to a set of indicators, representative for nature in the urban environment as a whole.

At this point in time there is only one indicator operational for urban area with natural value.

Ecological maintenance of public green areas will improve the living conditions of several plant species and animal species. However, the “naturally maintained area” didn’t grow in 1999 as compared to 1998 (page 44, MB_3031). What did happen in 1999 was that a start was made to define the public green area to see which green areas and how much of them can be made suitable for developing natural values by means of specific natural maintenance.

Surface water

Inland waters

Nature development areas, ecological corridors and existing natural areas are about dry as well as wet forms of nature. It is not possible to distinguish between surfaces of wet and dry nature within these areas.

National waters

The “Haringvliet” and the “Voordelta” are national waters, subject to both the Bird Guideline and the Habitat Guideline. In addition, these waters contain two wetlands of international importance. These waters can be counted as existing natural area, even if they are used intensively for fishing, sea-transport and recreational purposes. Within the boundaries of the Rotterdam region 8,010 hectares are subject to the Habitat and/or the Bird Guideline.

Complete realisation of the planned expansion of Maasvlakte 2 will result in the loss of 1,000 hectares of natural area according to these Guidelines. The national land-use plan for green areas states that natural losses must be compensated by creating areas of the same size and of equal value elsewhere. The European Guidelines only speak of compensation, not mentioning size or equal ecological value. At present it is therefore unclear if and how the loss of 1,000 hectares is going to be compensated.

Area with (potential) natural value

In this paragraph we introduce an overall indicator for the natural area in this region, composed of the natural areas in the described land-use types. This overall indicator consists of three parts:

1. existing nature (category existing);
2. area that has been acquired (category probable);
3. bounded or planned natural area, not yet acquired (category uncertain)

Table 1: Natural area for different land use types in 1999

Cat.	Land-use type	Discription	Area (hectares)	% of total nature area	% of regional area
1	Natural area	Existing natural area	2,442		
1	Recreational area	Externally zoned	990		
1	Surface water	Natural waters submitted to EU-Guidelines	8,010		
1	Urban area	Naturally maintained public greenery	404		
	Total		11,846	81%	15%
2	Natural area	Acquired natural development area	8		
2	Agricultural area	Acquired reserve area	176		
2	Ecological corridor	Catagory certain	48		
2	Agricultural area	Maintaning agreement (permanent agricultural area and future reservation area)	164		
	Total		396	3%	1%
3	Agricultural area	Maintaining agreement (permanent agricultural area)	38		
3	Agricultural area	Bounded reserve area	104		
3	Natural area	Bounded nature development area (including 250 ha Groenakkoord))	401		
3	Ecological corridor	Category probable and uncertain	306		
3	Natural and recreational area	Groenakkoord (1000 ha minus 250 ha which are counted as nature development area)	750		
3	Natural and recreational area	As part of Maasvlakte 2	750		
	Total		2,349	16%	3%
	Total overall		14,591		19%

1 = existing

2 = probable

3 = uncertain (bounded minus acquired)

Table 1 shows that at this moment 15% of the total regional area can be marked as existing nature. On 1% a "management agreement" has been arrived at, or ground has been acquired for nature development, reserve-areas or ecological corridors. Here the conditions have been met to preserve, restore or develop natural values. As the acquired grounds will in due time be passed over into the hands of the maintaining organisations, the share of natural area in this region will rise to 16%.

If we add the natural area that is planned for, the percentage of natural area in this region will in the long end rise to 19%. This includes grounds already bounded, but not yet acquired, and hectares for nature planned for in the "Regionaal Groenakkoord" and "Maasvlakte 2".

The table shows that eventually (for the most part that means in 2013) 14,591 hectares in the Rijnmond region will have an ecological function. 81% of this area already exists and another 3% will soon be added.

To meet the target, another 2,453 hectares (16%) will have to be acquired. However, this last 16% is unlikely to become "probable", given the slow progress in acquiring grounds for ecological purposes. The hectares of nature planned for in the "Groenakkoord" and the "Maasvlakte 2" are not even bounded yet.

To reach the set target for 2013 (19% of natural area) more financial reserves are needed, given the high land prices in this region.

Ecological value

What ecological meaning do the above mentioned land-use types have?

Although we cannot describe this in terms of an index for the ecological quality, we can describe a number of animal species that are considered characteristic for these land-use types.

Some of these species have been indicators in the MSR reports for several years now.

Butterflies are indicative for the quality of natural green in public areas. Seal, Sea Swallow, Redshank and a number of duck species are indicative for the quality of the national waters of the Voordelta.

This year we have new indexes for a number of bird species. Each of these species is characteristic for one land-use type: the Blackbird for the urban area, the Willow Warbler for dry natural area, the Lapwing for agricultural area and the Reed Warbler for inland waters and swamps. These indicators are presented in chapter 2 of the report (pages 23, 24, 25).

Another new indicator for ecological value is the number of sites in the region where birds of prey have been spotted. Birds of prey are good indicators for ecological quality, as they are at the top of their food chain. The Sparrowhawk is at present a widely spread phenomenon in this region. There are only a few sites where this bird hasn't been spotted.

Twenty-five years ago the Sparrowhawk was not spotted here at all! The number of sites where the Kestrel presents itself hasn't changed much in the last 25 years.

Regarding these indicators for ecological value, we come to the following conclusions.

The Rijnmond region is becoming an increasingly popular habitat for a number of bird species. This is particularly gratifying since in the early sixties many of these species had virtually disappeared as a result of insecticide use, PCB's and other harmful substances.

There are even some species that are thriving more here than anywhere else in the Netherlands (Sparrowhawk, Blackbird, Willow Warbler, Reed Warbler). The Voordelta has long been of international importance for aquatic birds and the seal population is also increasing.

Four things cause this positive development. Firstly, the use of harmful substances has dropped, which accounts for cleaner air, water and soil. Secondly, more measures are being taken to improve ecological conditions, such as the making of nesting places and natural maintenance of watersides and public greens. Thirdly, the planting of new forests creates better ecological conditions. Finally, the Reed Warbler, the Sparrowhawk and the Willow Warbler profit from more growth of vegetation in swamps and new forests in recreational areas in the Rijnmond region.

This upward trend will probably continue, partly due to a nature conservation policy aiming at acquiring acreage for the conservation, restoration and development of natural areas.

In the next 13 years a few thousand hectares will have to be acquired in the Rijnmond region for this purpose. To achieve this, a new impetus is needed. The overall-indicator presented in this paragraph allows us to monitor whether the targets for more natural area in the Rijnmond region will be met.



Monitoring environmental policy on the basis of the subdivision quality-sources-efforts, has taken place for a number of years, but new developments still occur regularly. Together with the co-operation with new partners, new themes such as “soil” and “land use and environment” are clear examples of the dynamics in monitoring. This final chapter addresses the developments in monitoring and the desired developments in the (near) future.

Living environment

The subject of the living environment has been a regular theme in the past years, as is the case in chapter 5 of this report. Since we now have a good picture of the factors that influence the appreciation of the local living environment, we think it is time to see if we can make a comparison between Rijnmond and another part of the Netherlands, the Veluwe. Are we indeed so different from the Veluwe? The result of this study will be incorporated in next year's report.

Recreational areas

At the moment, only a few recreational areas around the cities have been mentioned in chapter 5.3. There is not enough information available on the rest of them. Next year this information probably will be available, which means that next year's report can give a complete picture of the total amount of recreational areas in the region and their accessibility.

Arguments underlying ON COURSE/NOT ON COURSE

The most important part of the monitoring reports is the analysis of the results: will we meet the targets, given the trend in environmental quality over the past ten years? In order to effectively carry out such an analysis, it is necessary to take into account expected developments in the coming years. In next year's report a special chapter may look at arguments underlying the decision as to whether a particular element is ON COURSE/NOT ON COURSE. We have given the idea a trail run in this chapter for the subjects of air quality and road traffic.

The bases for the expected developments are, for instance, the draft policy documents on spatial planning, traffic and transportation, environment and nature. What will new policy mean for the present policy targets and thus for monitoring? What is the influence of new policy on the quality of the environment? In next year's report we will address this further.

Air quality

In the past years, developments have been started that will lead to (further) decreasing of the emissions of various pollutants into the air, leading to a decrease in air concentrations of these substances. In this section we will mention the expected developments and their consequences for the air quality in 2010. For each substance the long-term air quality target (streefwaarde; some legally bounded, some not) is set as target for 2010.

- * SO₂, lead and cadmium have already reached the long-term target and will not be discussed here any further.
- * The long-term target for benzene will probably be met. The industrial emissions are expected to decrease further and the decreased benzene content of gasoline will result in lower emissions of road traffic.
- * The long-term target for ozone will probably also be met. Ozone is the result of reactions between hydrocarbons and nitrogen oxides under the influence of sunlight. The emissions of hydrocarbons will decrease in the years to come, meaning that ozone concentrations will also decrease.
- * NO₂, fine particles and black smoke will not reach the long-term target. Improved vehicle technique will probably decrease vehicle emissions, despite increased numbers of kilometres driven (see next section). Also the large industries will take measures to decrease their NO_x emissions, although no firm agreements have been made. For the calculations we have used a 30% reduction in NO₂ levels as compared to 1999. The calculated level of 60 µg/m³ (98-P) still is way over the (assumed) long-term target of 13.5 µg/m³. Fine particles also are a problem to be tackled on a European level. Since the origin of the particles has not been determined properly, the effect of measures is uncertain and the reduction will probably be slower than for other compounds. We have (optimistically) calculated a reduction to 30 µg/m³ (target 20). Black smoke is closely related to the emissions of (diesel) traffic. Improved vehicle technique and other measures are expected to reduce emissions. As a consequence, concentrations are expected to decrease by 30% (expected concentration 35 µg/m³, target 9).

What can we expect in 2010? The expected levels of the above mentioned substances have been combined into an index for 2010 in the same way as the index in chapter 2. The graph shows the result since 1990 and the expected level in 2010. NO₂, fine particles and black smoke will not reach the long-term target, leaving the index on 66 and the target for 2010 a long way out of sight.

Road traffic

Road traffic is becoming a greater burden on the environment, relatively speaking. Since 1986 31.5% more vehicle kilometres have been driven in Rijnmond and further developments are hard to predict. The Regional Traffic and Transportation Plan (RVVP) expects, after an initial larger increase, a final growth of 15% as compared to 1986. This is not a too high assumption; on the contrary! Several recent studies express stronger increases than RVVP.

These studies comprise different study areas, but provide a good basis to make an estimate for the whole region. The estimates from these studies have been used to calculate the index for the environmental pressure by road traffic (MI_9005, see chapter 3 (page 32)) also for 2010. The index consists of the emissions to air of NO_x, SO₂, CO₂, hydrocarbons, fine particles and lead, hindrance from odour and noise and the number of ecological barriers.

The different studies yield different changes in air emissions. They give no expectations on hindrance from odour and noise, so we have assumed no changes in the present levels. According to its planning, the National Water Authority will remove six of the 47 ecological barriers. We estimate that the province of South Holland will also lift five barriers.

The end result is not too rosy. All studies expect fine particles and lead to meet the target for 2010. The other variables remain more or less far from their target, leading to an index of 438-446. It is clear that the target for 2010 will not be reached. The main causes are the assumptions on hindrance from odour and noise and the ecological barriers, with no or hardly any improvement. Some say that even these assumptions are optimistic!

'The environment in the Rotterdam region 2000'

Overview indicators per page

Indicator	page	chptr	type	name
MI_9002	17A	2.1	line	Index quality national waters
MI_9006	17B	2.1	line	Average ecological quality inland waters
MI_9007	17C	2.1	line	Eutrophication of surface waters
MI_9008	17D	2.1	line	Heavy metals in surface waters
MA_1039	18A	2.1	line	Heavy metals in sludge, national waters
MA_1040	18B	2.1	line	Organic micro pollutants in sludge, national waters
MA_1041	18C	2.1	bar	Ecological quality large inland waters
MA_1028	18D	2.1	line	Quality in relation to function inland waters
MA_1025	19A	2.1	bar	Intake stops Meuse water (drinking water production)
MI_9003	19B	2.2	line	Index air quality
MB_3075	19C	2.2	line	SO ₂ in air, 98-percentile daily averages
MB_3072B	19D	2.2	line	NO ₂ in air, 98-percentile hourly averages
MB_3067	20A	2.2	line	Benzene
MB_3049	20B	2.2	line	Benzo(a)Pyrene
MB_3079	20C	2.2	line	Fine suspended particles
MB_3073A	20D	2.2	line	Ozone
MB_3082	21A	2.2	bar	Summer smog
MB_3083	21B	2.2	bar	Signalling codes
MB_3085	21C	2.3	line	Complaints about odour, dust and noise
MB_3003	21D	2.3	line	Complaints about noise
MB_3087	22A	2.3	map	Odour, complaints per municipality
MB_3088	22B	2.3	map	Dust, complaints per municipality
MB_3089	22C	2.3	map	Noise, complaints per municipality
MB_3029	22D	2.3	line	Nuisance by industry
MB_3035	23A	2.3	map	Acoustic load by industry
MB_3036	23B	2.3	map	Total acoustic load Rijnmond area
MD_7004	23C	2.3	line	Handling of complaints by medical service (GGD)
MCB_5055	23D	2.4	line	Number of butterflies
MA_1047	24A	2.4	bar	Natural banks (inland waters)
MA_1048	24B	2.4	bar	Types of small aquatic animals
MA_1049	24C	2.4	bar	Number of seals
MA-1050	24D	2.4	bar	Number of common terns
MA_1052	25A	2.4	bar	Number of redshanks
MA_1051	25B	2.4	bar	Number of water birds
MB_3030	25C	2.4	line	Number of summer birds
MI_9004	29A	3.1	line	Index environmental pressure major industries
MA_1030	29B	3.1	line	Discharges heavy metals by major industries
MA_1031	29C	3.1	line	Discharges PAH and pesticides
MA_1032	29D	3.1	line	Discharges benzene and chlorides

MA_1004	30A	3.1	line	Discharges phosphate and nitrogen
MA_1007	30B	3.1	line	Discharges oil
MB_4001	30C	3.1	line	Emission acidifying compounds
MB_4002	30D	3.1	line	Emission carcinogenic compounds
MB_3009	31A	3.1	line	Emission hydrocarbons
MB_3025	31B	3.1	line	Emission particles
MB_3092	31C	3.1	line	Emission heavy metals waste incinerators
MB_3094	31D	3.1	line	Emission dioxins waste incinerators
MB_3006	32A	3.1	line	Emission CO ₂
MI_9005	32B	3.2	line	Index environmental pressure road traffic
MB_3046	32C	3.2	line	Emissions road traffic (CO ₂ , NO _x , hydrocarbons, particles)
MCA_6001	32D	3.3	line	Domestic waste (total)
MD_7081A	33A	3.3	bar	Electricity use consumers
MD_7081B	33B	3.3	bar	Natural gas use consumers
MD_7092	33C	3.3	bar	Use of green power
MB_3027	33D	3.3	line	CO ₂ -emission consumers
MCB_5054	34A	3.4	line	CO ₂ -emission agriculture and horticulture
MCB_5053	34B	3.4	bar	Discharge of eutrophication substances by agriculture
MB_3090	34C	3.5	pie	Comparison of emissions of target groups
MCB_5051	35A	3.5	line	Acidic deposition
MI_9010	35B	3.6	line	Refineries (environment and economy)
MI_9011	35C	3.6	line	Chemical industry (environment and economy)
MI_9012	35D	3.6	line	Power plants (environment and economy)
MI_9013	36A	3.6	line	Storage and transshipment (environment and economy)
MI_9014	36B	3.6	line	Road traffic (environment and economy)
MD_7005	39A	4.1	bar	Dutch emission guidelines and Hydrocarbons 2000 programme
MD_7001	39B	4.1	line	Advice on waste prevention by industries
MD_7078	39C	4.1	bar	Ecoteams
MD_7031	39D	4.1	bar	Implementation internal environmental care in industries
MD_7047	40A	4.1	bar	Local Agenda 21: projects and parties involved
MD_7080	40B	4.2	bar	Effective level of measures (major industries)
MD_7088	40C	4.3	bar	Results of checks (stevedores)
MD_7070	40D	4.3	line	Compliance index branches
MD_7072	41A	4.3	line	Enforcement refineries
MD_7085	41B	4.3	line	Enforcement process industry
MD_7073	41C	4.3	line	Enforcement storage and transshipment
MD_7091	41D	4.3	bar	Enforcement power plants
MD_7090	42A	4.3	bar	Enforcement waste processing plants
MD_7086	42B	4.3	line	Enforcement cattle farms
MD_7087	42C	4.3	line	Enforcement cultivation under glass
MD_7024	42D	4.3	bar	Enforcement municipal industries

MD_7074	43A	4.3	bar	Spills in the harbour
MD_7076	43B	4.3	bar	Enforcement by police
MB_3016	43C	4.4	line	Ecological bottlenecks
MC_5037	43D	4.4	bar	Nature area
MB_3031	44A	4.4	bar	Urban green in Rotterdam
MD_7038	44B	4.4	line	Progress agriculture and nature conservation areas
MD_7039	44C	4.4	line	Progress nature development
MG_8006	44D	4.4	bar	Acreage of woods
MG_8005	45A	4.4	pie	Ecological corridors
MD_7025	45B	4.5	line	Noise protection screens along highways
MB_3004	45C	4.5	line	Noise abatement measures to be implemented
MCB_5048	45D	4.5	bar	Soil cleanup of industrial sites
MCB_5049	46A	4.5	bar	Soil cleanup former gas factory sites
MD_7023	46B	4.5	bar	Soil cleanup filling stations
MCB_5058	46C	4.5	bar	Soil protection act
MD_7062	46D	4.5	map	Cleanup of underground tanks
MG_8004	47A	4.5	map	Availability of soil quality map
MC_5010	47B	4.6	bar	Domestic waste
MC_5004	47C	4.6	bar	Separately collected domestic waste
MD_7063	47D	4.6	map	Separate waste collection per municipality (green and rest)
MG_8002	48A	4.6	map	Separate waste collection per municipality (glass, paper, textile)
MC_5027	48B	4.6	line	ships' waste inland shipping
MC_5025	48C	4.6	line	ships' waste sea shipping
MC_5014	48D	4.6	line	Quality and quantity of sludge
MCA_6003	49A	4.6	pie	Disposal of contaminated soil
MD_7082	49B	4.7	line	CO ₂ -reduction through energy saving
MD_7083	49C	4.7	bar	CO ₂ -reduction through sustainable energy
MD_7048	49D	4.7	bar	Energy efficiency of new housing locations
MB_4003	50A	4.8	line	Total energy plants
MG_8001	50B	4.8	map	Sustainable building activities 1999
MB_3028	50C	4.8	line	Number of car kilometres driven
MB_3086	50D	4.8	line	Emission factors road traffic
MG_8009	51	5.1	map	Surface area for agriculture
MA_1045	53	5.1	bar	Pesticides in surface waters
	56	5.2	map	Air quality situation Rotterdam Overschie 2000
MG_8010	60	5.3	map	Nature and recreation areas
MB_3042	62	5.3	bar	Number of visitors of recreational areas and modal split
MG_8009	65	5.3	pie	Acreage of nature areas
INWON_99	71	BY1	map	Municipality borders and number of inhabitants