



Ministry of Infrastructure and the  
Environment

# River basin management plans 2016-2021 of the Netherlands

Summary



## Regge (cover)

The Regge river at Marsdijk-Oost This project is part of the Midden-Regge rehabilitation project, which transformed the Regge into a natural river system along a length of 10 kilometres. This process created a wider area along those 10 kilometres with room for water, water storage and nature development.

**For more information, go to: <http://www.vechtstromen.nl/projecten/projecten/artikel/>**

*Cover photo: Otto Cox*

# 1 Towards clean and healthy water for an attractive living environment

The quality of our water is an essential part of a healthy, productive and pleasant living environment. Clean water to enjoy, to swim in, to fish in, or to boat on. Water as a resource for the preparation of drinking water, for process water and for agricultural use. One-sixth of our economy depends on the availability of sufficient quantities of clean water. Dutch knowledge of water is a sought-after export product. Moreover, a healthy and natural living environment demonstrably contributes to a spatial quality that makes people feel at home.

Water does not automatically become or remain clean and healthy; this requires continuous effort. In the Netherlands, we have been working on clean water for decades by introducing such measures as redesigning streams, improving wastewater treatment plants, installing fish passages and reducing the concentrations of plant protection products in our water. And with result: the quality of water in lakes, ditches, streams and rivers has visibly improved in recent years.

But our work is not done yet. Despite all efforts, there still are fertilisers, plant protection products and other harmful substances in many water bodies. There still are multiple barriers for fish, blue-green algae blooms cause problems in lakes, eels from large water bodies still cannot be consumed and new substances keep appearing that affect underwater life and the production of drinking water.

Chemically clean and ecologically healthy water for sustainable use is the ambition formulated by the Dutch government. This is a joint ambition: water boards, provinces, municipal councils, Rijkswaterstaat, many non-governmental organisations and companies are working on clean and



Map 1: river basins in the Netherlands

healthy water with similar ambitions in mind. After all, water does not keep to boundaries. That is why a number of key plans for water management are based on a river-basin approach.

A key milestone concerns the adoption of the river basin management plans 2016-2021 for the Rhine, Meuse, Scheldt and Ems in December 2015. These plans are about water quality and are part of the Water Framework Directive (Kaderrichtlijn Water, or



Photo: CLM

## Clean water for Brabant

Clean water for Brabant (“Schoon Water Brabant”) is an incentive project to keep groundwater and surface water in the province clean. It was initiated by the province of Noord-Brabant, drinking water company Brabant Water, ZLTO Southern Agriculture and Horticulture Organisation, Stichting Duinboeren association and the Brabant water boards. Agricultural contractors, potato growers, arboriculturists and field vegetable growers throughout the province are taking measures to reduce the ecological impact of pesticides on water. There are eleven groundwater protection areas in which all users of pesticides participate: residents, the business community, the agricultural community, and municipal councils. And with a visible result. In the 2012-2014 period, the average environmental impact across the project, i.e. all crops in all groundwater protection areas, was far below the seepage standard of 500 environmental impact points per hectare. A similar project was launched in the province of Zeeland in 2015.

**For more information, go to:**  
<http://www.schoon-water.nl/>

“KRW” in Dutch). They provide direction on working on clean and healthy water in the next six years. This publication contains an overview of the key points from these plans. But water quality is more than the Water Framework Directive. In the Delta-approach water quality and fresh water (“Delta aanpak waterkwaliteit en zoetwater”), the Dutch government indicates what additional actions the different parties have to take. Because chemically clean and ecologically healthy water is something we achieve together.

### Vier stroomgebieden in Nederland - overzicht

	Rhine	Meuse	Scheldt	Ems
surface area in km <sup>2</sup>	30.000	7700	3200	2600
of which water	3.000		1215	
number of surface water bodies	479	158	54	21
number of ground-water bodies	11	5	5	2
highest point	110 m (Veluwe)	323 m (Vaalsberg)	26.5 m (Hazenduinen)	27 m (Drents plateau)
lowest point	- 6,7 m (Zuidplaspolder)	-1,3 m (Groote Polder)	-1,9 m (Poortvliet)	- 3 m (Kustpolder)
normative discharge	16.000 m <sup>3</sup> /s at Lobith	3800 m <sup>3</sup> /s at Eijsden	n/a	n/a



## 2 Working together on water quality

The river basin management plans provide an overview of the condition, problems, objectives and measures related to the improvement of the water quality. The river basin management plans are not isolated plans: there is a large degree of interconnectivity with the plans and measures of water managers and other plans and regulations. The objective of the river basin management plans is to improve the quality of the water in both a chemical and an ecological sense. The Water Framework Directive objectives for water quality must have been realised by 2027.

### 2.1 Interconnected plans

Every government authority in the Netherlands works on water quality. That is the reason for intensive coordination of the river basin management plans with the water plans of other government bodies. Government authorities document the objectives and measures for the water bodies for which they are responsible in their own plans. These are divided as follows:

- National Water Plan (NWP): designating water bodies for national waters and national measures.

- National Waters Management Plan (“BPRW” in Dutch) of the Ministry of Infrastructure and the Environment: objectives and measures for national waters.
- Regional water or environmental plans of the provinces: boundaries, status and objectives for regional surface water bodies, objectives for groundwater bodies and measures.
- Water management plans of the water boards: measures for regional surface waters.

In addition, municipal councils take measures, such as delinking rainwater, which is laid down in decisions in a number of cases. Non-governmental organisations, site managers and companies may also make a contribution.

#### Characteristics of the river basin management plans

Integrated approach: the plans comprise all aspects of water quality
Applies to surface water, groundwater and protected areas
River basin approach: plans are drafted for a river basin (Rhine, Meuse, Scheldt, Ems) with both an international part (part A) and a national part (part B)
Member states within a river basin hold each other accountable for objectives and measures
Describes objectives, loads, condition, measures and costs
Starting point: attainable and affordable measures
Detailed programme of measures: progress of implementation in past period (2010-2015), measures for the next period (2016-2021) and tasking remaining after 2021
Where possible, measures must be linked to measures from the Delta Decisions and other policy challenges
Coordination with other bodies by means of a bottom-up approach with own role for the regions. Key role for Regional Administrative Consultation Committees (“RBO” in Dutch)
International coordination: all EU member states draft river basin management plans and report on progress to the EU

## Water bodies and fact sheets

Under the Water Framework Directive it is mandatory to designate water bodies as basic units for the river basin management plan. Surface water bodies comprise rivers, streams, canals, lakes or a group of ditches. The coastal areas of the North Sea and the Wadden Sea are water bodies as well. There also are groundwater bodies, which comprise a coherent whole of groundwater. Together, the water bodies comprise all main water masses in the Netherlands. Fact sheets have been drafted for all water bodies, which contain all relevant data for each water body, such as type, condition, objectives, measures and exceptions. The fact sheets are part of the water plans of the water boards, provinces and Rijkswaterstaat. All fact sheets can be found on [www.waterkwaliteitsportaal.nl](http://www.waterkwaliteitsportaal.nl). In addition to the water bodies, there also are minor ditches, canals, small lakes and other water bodies in the Netherlands, together referred to as “other waters”. Efforts are also ongoing to improve the water quality of these waters.

## 2.2 Delta-approach water quality and fresh water

Water quality is more than the Water Framework Directive. Problems in specific areas, such as small waters and drinking water collection areas, sometimes receive too little attention. New, upcoming substances such as medicine residues and microplastics merit more attention. This is the area of focus of the Delta-approach water quality and fresh water. On 27 May 2015, a broad administrative conference on water quality was organised in Amersfoort. It became clear that the remaining tasking could only be solved with all parties contributing. All parties need each other. This has been laid down in the Declaration of Amersfoort.

The Dutch government aims to produce a “Delta-approach water quality and fresh water” together with all parties, as a supplement to the river basin management plans. Working together lies at the heart of this approach. The Delta-approach contains agreements on measures, collaboration and monitoring of the progress of implementation. The Delta-approach specifically addresses the organisation of water bodies, nutrients, plant protection products, medicines, (micro)plastics and a number of familiar and new harmful substances. The national government, regional authorities, social partners and the business community are working together to further elaborate the Delta-approach. They intend to finalize the Delta-approach before the summer of 2016 and will hold one another accountable for the progress of implementation of the measures on an annual basis. <https://zoek.officielebekendmakingen.nl/blg-627294>

## 2.3 Other plans and directives

### Other European directives

Water Framework Directive measures contribute to objectives for protected areas under the Natura 2000 / Birds and Habitats Directive. Similarly, measures under the Nitrates Directive, the Sustainable Use of Pesticides Directive and the Urban Wastewater Treatment Directive contribute to the objectives of the Water Framework Directive. The Water Framework Directive and the Marine Strategy Framework Directive (MSFD) are closely related. Under the MSFD, member states are obligated to take measures that contribute to a healthy environmental condition of their marine waters by 2020. A lot of the harmful effects on the North Sea can only be effectively and efficiently addressed by taking measures upstream. The agreed Water Framework Directive measures must be implemented to achieve the Good Environmental Status for the North Sea.

### Floods Directive

There is also a close relationship with the European Directive on the assessment and management of



Photo: Brabantse Delta water board

## Field margin management along the Agger

An active field margin management project was realised along the Agger water body in western Brabant. The green strip is allowed to become overgrown in spring and summer, forming a buffer zone between the field and the water. This project covers over 31 kilometres of field margin management. The measures are part of the elaboration of the Delta Plan on Agricultural Water Management in the management area of the Brabantse Delta water board. In addition to field margin management, the water board also takes measures to restore streams, creeks and wet natural areas.

**For more information, go to:**  
[www.randenbeheerbrabant.nl](http://www.randenbeheerbrabant.nl)

flood risks. This Directive requires member states to draw up flood risk management plans. A flood risk management plan provides an integrated description of existing measures for the management of flood risks and future changes. Measures focus on protection and prevention as well as crisis management. The objectives are partially complementary. Synergy between both plans is particularly promising for the implementation of spatial measures, such as retention areas, parallel channels and flood

plain lowering, which contribute to decreasing flood risks but also to improvement of the water quality, recovery of habitats, and ecological links. An example is the Room for the Vecht project, <http://www.overijssel.nl/thema's/water/waterprojecten/ruimte-vecht/>

### Delta Programme Freshwater

The Netherlands is researching future developments, such as the consequences of climate change and the related measures in the Delta Programme, in terms of both safety and freshwater supplies. The Dutch government adopted the Delta Decisions in the autumn of 2014. While water quality is not a part of the Delta Programme, there is a clear interconnectivity with measures from the programme, particularly in the area of freshwater supplies. Availability of clean freshwater is also important for water quality. At low discharge levels, concentrations of chemical substances and the temperature of

the water increase, use of scarce water may result in groundwater depletion, and water shortage may lead to salinisation. Conversely, increased rainfall may lead to sewer overflows and the resulting surface water peak load. Many of the measures for freshwater supplies also have a positive effect on water quality. The National Water Plan and the Delta-approach water quality and fresh water explicitly focus on linking plans and measures.

The STRONG programme for soil and subsoil and the Framework Vision Subsoil (to be published in 2016) provide impetus to the protection and improvement of groundwater. Special attention is being paid to groundwater for public drinking water provision and industrial extraction for human consumption. The national government, decentralised authorities, the business community and other non-governmental organisations will substantiate resulting measures during the next few years. These measures can then be added to the programmes of measures for the river basin management plans 2022-2027.

#### **Involving non-governmental organisations**

In drafting the plans there has always been space for contributions from non-governmental organisations and citizens. Important means for realising this were the area-based processes in 2013 and 2014. On a national level, there were theme meetings and coordination through the Infrastructure and Environment Consultation Committee.

Collaboration with non-governmental organisations and companies, such as angling organisations, leisure organisations and the agricultural community, has also increased where implementation of the measures is concerned. Some of the measures are implemented as part of the Delta Plan on Agricultural Water Management of the LTO, the Dutch Federation of Agriculture and Horticulture.

## **Public participation and decision making**

The river basin management plans, the National Water Plan (NWP) and the plans of the water boards, provinces and national government were available for inspection from 22 December 2014. The period for the public to comment on the river basin management plans and the National Water Plan extended until 22 June 2015. A total of 54 comments were submitted, half of which by government authorities. These concerned both water quality and other subjects of the National Water Plan. Often mentioned in the responses were concerns about the feasibility of the Water Framework Directive objectives and the approach to medicines, litter and drinking water. A wide range of other subjects was mentioned, including more natural level management, fish stock management, groundwater depletion and drinking water protection. The public comments prompted a number of modifications:

- inclusion of a prognosis of the expected effect of measures;
- greater interconnectivity between exceeding objectives, description of the sources and designating measures;
- taking a closer look at changes in fish stocks;
- inclusion in the programme of measures of a passage about lead use in angling;
- supplementary measures for plant protection;
- evaluation and, where necessary, adjustment of the monitoring programme;
- updating condition data and minor text amendments.

The public consultation procedure also provided an impetus for setting up the Delta-approach water quality and fresh water. The National Water Plan and other plans of the national government, water boards and provinces were adopted in December 2015. The river basin management plans will now be sent to the European Commission.

# 3 What is the assignment for clean water?

Water quality has clearly improved in many respects in recent years. The number of water bodies with a healthy fish stock has increased considerably, the oxygen content of the water is up to par almost everywhere and the water has become clearer in many places. Surface water quality is adequate in most places for almost all uses, including swimming, agriculture and leisure activities. Nevertheless, water quality is almost nowhere adequate in all respects. This sets a task for realizing a better hydromorphology of water bodies and reducing harmful substances, both for familiar substances such as nutrients and plant protection products and for new substances such as medicines and (micro)plastics.

### Hydromorphology

In the previous period, considerable investments were made in landscaping and hydromorphological measures, such as eco-friendly river banks and stream recovery, but the spatial organisation of many water bodies still needs to be made more natural. There are too many barriers for fish, preventing them from reaching their spawning and feeding grounds. Many Natura 2000 areas are facing problems with groundwater depletion due to a combination of accelerated discharge, extraction, other land use and spatial organisation. Climate change may exacerbate these problems.

Groundwater depletion will, therefore, require extra attention over the next few years.

### Nutrients: further reduction required

In many water bodies, the phosphor and nitrogen content are limiting the recovery of biodiversity, particularly of water plants. This also reduces the effectiveness of landscaping and hydromorphological measures such as eco-friendly river banks. The presence of excessive nutrients is also the cause of algal blooms. It has adverse effects on the diversity and quality of nature. Nutrient loads in surface water have hardly decreased since 2005.

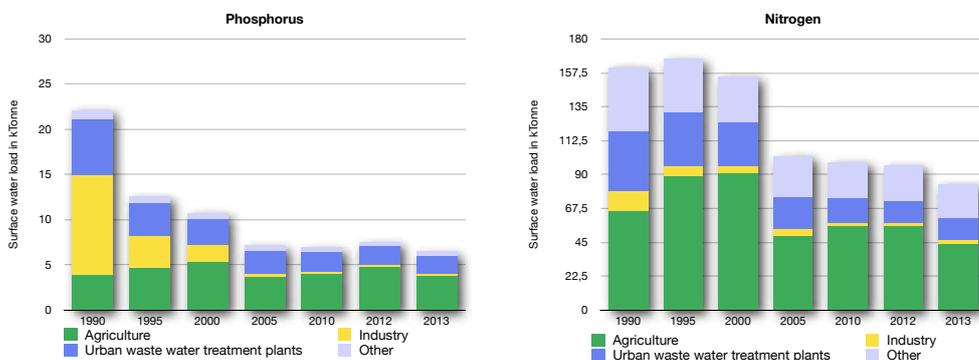


Diagram 1: sources and trends of surface water load for phosphorus and nitrogen, total load for the 4 river basins



Photo: Schone Maas

### Clean Meuse

The Clean Meuse (“Schone Maas”) project sees the provinces of Brabant and Limburg, Rijkswaterstaat Zuid-Nederland, various water boards, site managers, nature organisations, municipal councils, other local parties, the business community and a host of clubs and volunteers working together on collecting litter to clean the Brabant and Limburg Meuse and streams. Through the network of municipal councils, groups of volunteers such as associations, sport clubs, village councils and rehabilitation groups are asked to adopt a specific section along the Meuse. The volunteers keep that section clean for a longer period of time. Rijkswaterstaat Zuid-Nederland has set up a collection scheme for the collected litter and is responsible for placing containers, collecting litter by means of tipper trucks, removal and processing. In 2015, 93 sections were cleaned by some 2,325 volunteers.

**For more information, go to:**  
[www.schonemaas.nl](http://www.schonemaas.nl)

Half of the groundwater bodies is affected by significant nitrogen and/or phosphorus loads. Nutrients are or threaten to become a problem over the next few years in some 40 drinking water extraction areas.

55% of the nitrogen load and 65% of the phosphorus load is caused by agriculture. Other key sources of nitrogen are atmospheric deposition (24%) and wastewater treatment plants (14%). Wastewater treatment plants also account for 28% of the phosphorus load.

**Decrease in environmental impact of plant protection products stagnates**

The environmental impact of plant protection products fell sharply until 2005, but the decrease has stagnated since. At about half of the measuring locations in the national measuring network, concentrations of at least one substance were too high in 2013 (see also: [www.bestrijdingsmiddelenatlas.nl](http://www.bestrijdingsmiddelenatlas.nl)). This applies in particular to imidacloprid. Most excessive concentrations occur in areas with greenhouses, flower and bulb growing, although

use in private gardens and in public spaces also has an important impact. Smaller waters and drinking water extraction areas are facing more problems with plant protection products than the water bodies covered by the Water Framework Directive.

**New substances: looking for effective measures**

A number of ‘new’ substances are increasingly found in groundwater and surface water. While the issues are listed in the river basin management plans, no structural information is given on the condition, loads, assignment and measures for (residues of) animal and human medicines, (micro)



plastics, nano particles and other new substances. There are no standards for these substances and they are not structurally measured yet. Attention is being paid to preventive measures, in which the agreements under the Delta-approach play a key role. Studies indicate that (animal) medicines have a negative impact on water quality, particularly on ecology. Increasing resistance to antibiotics is also a cause for concern, while new substances may result in problems with drinking water provision. Litter requires increasing attention. Plastic particles, such as macro- and microplastics, pose a risk for the ecology of both the sea and freshwater bodies. This comprises litter, balloons and microplastics in cosmetics, paints and dyes. A lot of the plastic enters the sea from the land through streams and rivers; other key sources are shipping, fisheries, and beach recreation. A study shows that microplastics come from domestic waste water and the degradation and wear of plastic litter, fibres from clothing, and car tyres. International studies provide a clear overview of the risks. More detailed insight is needed into the sources, effects and effective measures.

**Drinking water: concerns about increasing costs**

Many drinking water companies will face problems caused by plant protection products, medicines, hormones, fertilisers and other pollutants. The drinking water industry estimates that during the 2015 - 2021 period an additional € 35 million will have to be spent each year throughout the Netherlands to maintain the drinking water supplies. This is contrary to the starting point that the purification effort to prepare drinking water must not increase.

**Groundwater depletion: attention for water level management**

A significant part of the Natura 2000 areas are depleted. Maintaining the natural values in these areas requires modified water level management. In the elevated sandy soils in the east and south of the country, insufficient groundwater is flowing to several streams, so that these do not have sufficient flowing water under all circumstances.

**Clear water: condition not stable yet**

Many waters have become clearer in recent years

due to a decrease in the supply of nutrients and other factors. Most coastal waters now meet the water quality criteria for algae. Exotic quagga mussels play a role in making the waters clearer, as they filter the algae from the water. The clearer water and reduced quantity of nutrients also changes the fish stock: some species, such as breams, become smaller, while other species increase in number, but not always in the same locations. In some waters, the changed conditions cause a profuse growth of water plants, for instance in the Randmeren lakes. These developments also have consequences for leisure activities such as water sports and angling. Conditions are not yet stable everywhere and for some waters it is impossible to predict the final condition and when this will be reached. Research has been started to fill these knowledge gaps.

<http://watermozaiek.stowa.nl/Sleutelfactoren/index.aspx?pld=2588>

**Impact from other countries**

Upstream areas in other countries contribute to the environmental impact of the North Sea because the major rivers carry nutrients and harmful substances. For some substances, the impact from the Netherlands is comparatively high if we look at surface area or population. Per square kilometre, the Netherlands is responsible for more phosphorus and nitrogen in the water than other countries. The same applies to copper and zinc and certain PAHs. The large majority of the substances coming in from other countries are carried from the border to the sea without having any impact on regional water bodies.

**Dutch share in environmental impact for a number of substances<sup>1</sup> (% compared to impact on international river basin)**

	Rhine	Meuse	Scheldt
Surface area	17%	22%	14%
N	19 %	36%	37%
P	35%	46%	39%
Zinc	19%	40%	18%
Copper	23%	30%	26%

<sup>1</sup> No data available for the Ems river basin

### Climate change

Climate change, socio-economic developments and new technologies will also have consequences for water quality and freshwater supplies. There will be more dry periods that could cause problems with water supply. Low discharges also have a negative effect on quality. At the same time, extreme rainfall may lead to more sewer overflows, with the accompanying problems for quality. That is why the river basin management plans also consider the longer term. The Delta Programme drafted flexible strategies for safety and freshwater supplies that may be modified or detailed depending upon new insights and circumstances. The Dutch government is working on a National Adaptation Strategy for climate change, which is due to be completed in 2016. This not only addresses water management, but also charts risks and opportunities in terms of health, energy, ICT, agriculture and horticulture, fisheries, nature and transport. The measures in the river basin management plans have been tested as to how climate-proof they are.

### Objectives to be attained by 2027

In 2009, objectives were set for the chemical and ecological water quality of all water bodies. The chemical quality depends on European environmental quality requirements. The ecological objectives were customised for the Netherlands, based on European methods and harmonised with countries with similar water types. Ecology comprises algae, plants, macrofauna and fish, as well as supporting parameters such as nutrients. Moreover, a number of nationally relevant

chemicals are also part of the ecological condition. Under the Water Framework Directive, the objectives must be attained by 2015. In 2009 it turned out that this was not feasible for many water bodies and parameters, and the end date was postponed by a further six years. This was done again in 2015. There were several reasons for doing so:

- natural circumstances, for instance because it can take several years before the effect on the ecology becomes visible;
- disproportionate costs, for instance when simultaneous implementation of all required measures leads to a significant rise in expenditure;
- technical infeasibility, for instance because research must be conducted to determine effective measures.

The ambition now is to achieve the objectives by 2027 at the latest.

Objectives for the 2016-2021 period may differ from those set in 2009 as they will always be subject to the most recent scientific insights. As such, European objectives for chemicals have been tightened in the light of new effects. More certainty about the action of a chemical may also lead to lower safety factors and, consequently, a more lenient standard. As a result of the amendment of the Priority Substances Directive, new substances have to be taken into account as well. Finally, new insights in the effects of background concentration of nitrogen and phosphorus in deep polders in the Rhine river basin still have to be incorporated into the objectives for various water bodies.



Photo: Rijkswaterstaat

## Rammegors tide restoration

The Rammegors (147 hectares) near Tholen in the province of Zeeland is a natural area inside the dykes that was created as a result of execution of the Delta Works. After 40 years, the tidal effect was restored. A closable passage allows the recovery of salt marshes and mud flats, while maintaining safety.

For more information, go to: <http://www.rijkswaterstaat.nl/over-ons/nieuws/nieuwsarchief/p2014/12/Doorlaatmiddel-Rammegors-open.aspx>

# 4 What is the current status of water quality?

The situation assessment of 2015 provides a good image of water quality in the Netherlands. Compared to the 2009 situation assessment, more as well as more accurate measurements are available, while standards have become more specific. As a result of this improvement, however, it has become more difficult to make comparisons with previous assessments on a number of points, including chemical water quality. It appears that the situation for various substances has deteriorated, but this is the result of more stringent standards and improved measurement methods. Lower concentrations may be measured as a result of technical developments, while European requirements have also changed. A number of substances were studied to see whether conditions at the measuring locations have really changed. The concentrations of these chemicals do not appear to have increased. Measuring methods and measuring standards for biological quality have also changed, but the effects are limited. In general, biological quality can be said to have improved or at least not really deteriorated. In one to two per cent of the water bodies, one or more substances or quality elements appear to have deteriorated.

### Ecological condition

The biological quality of each of the four elements has improved since 2009. The percentage of water bodies assessed as good to very good increases for algae from 31% to 42%, for water plants from 19 to 25%, for macrofauna from 19 to 25% and for fish from 25 to 37%. However, there are only some 30 water bodies in the Netherlands that are assessed

as good on all four biological characteristics, and when the physico-chemical quality elements and the specific pollutants are considered, only a handful of water bodies still meet the criteria for all four elements. The diagram below shows the development in biological quality in the four river basins.

For fish stock, a distinction can be made between

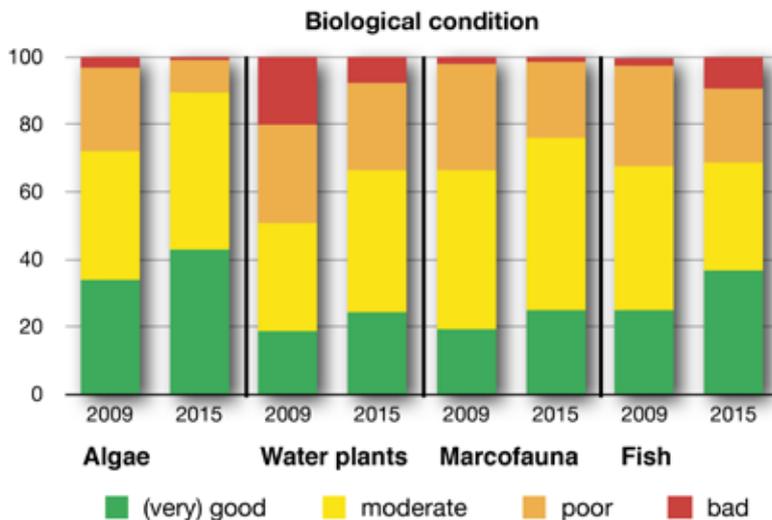


Diagram 2: water bodies with assessment of the four biological quality elements in 2009 and 2015

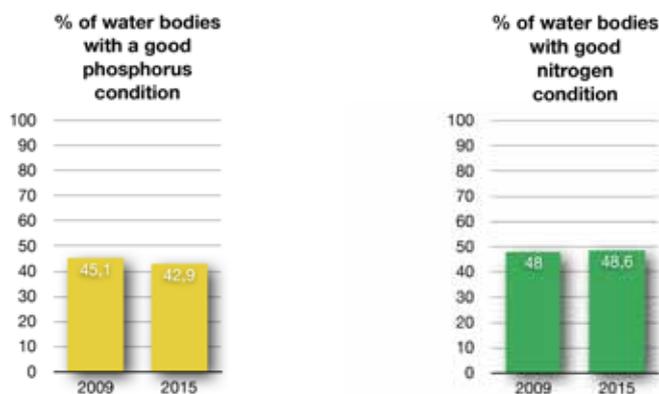


Diagram 3: phosphorus and nitrogen condition as of 1 January 2015

the quantity of fish (measured in biomass) and the variety of species. A Rijkswaterstaat study shows that the biomass of fish in lakes, rivers and canals has hardly changed since 2000, although the fish stock in lakes and rivers has become more varied, one of the factors being an increase in migratory fish such as salmon, houting, allis shad, river lamprey and sea lamprey.

#### Physico-chemical quality elements

Chloride content, acidity (pH), temperature and oxygen content are good to very good in nine out of ten water bodies. The quality element 'transparency' follows the development of algae: the percentage assessed as good increases to over 37% of (unflowing) water bodies. 43% of the water bodies has a good assessment for phosphorus, and 49% for nitrogen. This is about the same as in 2009. Concentrations are falling in most locations, but the standards for nitrogen in flowing waters in particular have been tightened. In the coastal waters, nitrogen almost meets the objectives, in the other main waters, nitrogen and phosphorus generally meet the requirements. In the regional waters, nutrients remain a key cause of a biological condition that does not meet requirements. The cause of the decline in the percentage of water bodies with a good condition in terms of phosphorus is the tightening of the standards for phosphorus and, particularly, nitrogen in flowing waters. This has resulted in a poorer assessment of many water bodies, particularly in the Meuse river basin.

#### Specific pollutants

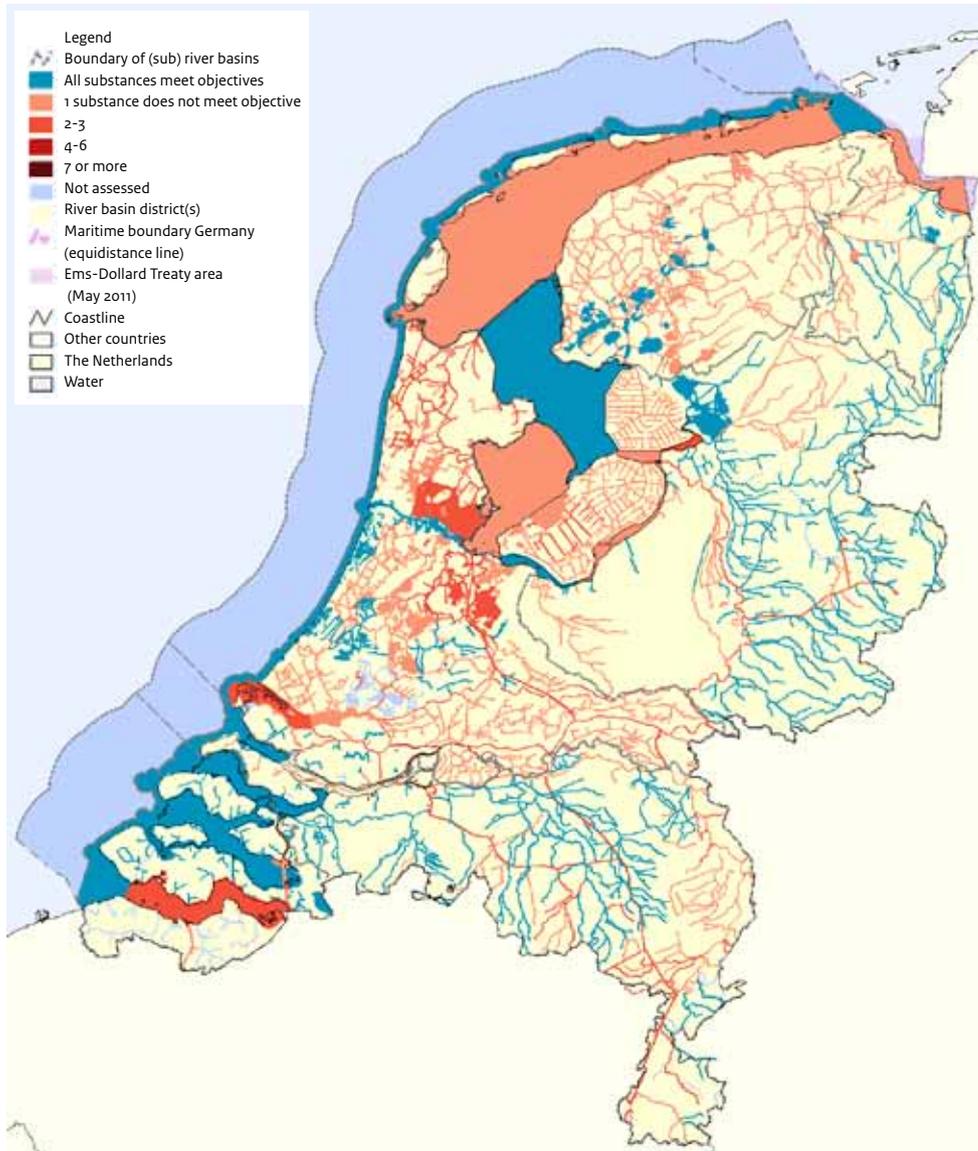
In 2015, almost 15% of the water bodies no longer had a negative assessment for any substance. Pollutants that do exceed the standard in many water bodies are: uranium, selenium, copper, zinc, ammonia, barium, cobalt and plant protection products such as benzo(a)anthracene, propoxur

and imidacloprid. The plant protection product imidacloprid is used mainly in agriculture for sowing-seed disinfection and to control aphids and whitefly. It is found in excessive concentrations in over 200 water bodies. There is, however, a gradually decreasing trend.

### One-out-all-out

Under the Water Framework Directive it is mandatory to base the final assessment on the 'one-out-all-out' principle; in other words, the poorest score for a parameter such as the assessment of a pollutant determines the final assessment. Over the past two years, the Netherlands advocated a different presentation method to the European Commission. According to the Netherlands, one-out-all-out gives an inaccurate projection of the facts. The better and more frequent the measurements, the greater the chance of a poor assessment. The assessment as a whole is insensitive to change: in the long term, there will always be a pollutant that does not meet requirements. Moreover, this assessment method does not show what the remaining issue is: where can and should measures still be taken? The Netherlands therefore made suggestions for alternative methods of presenting the condition of water bodies. This received widespread support from other member states and from the European Commission, and has therefore been applied in the river basin management plans. In doing so, the Netherlands benefited from the work of the Netherlands Environmental Assessment Agency and the Informatiehuis Water. The details of the alternative method were elaborated together with these parties, which contributed to a more solid basis of support.

<sup>2</sup> Development of fish stocks in the Netherlands. Changes in the first Water Framework Directive period? BD2876 report (in Dutch). Royal HaskoningDHV - <http://publicaties.minienm.nl/documenten/ontwikkeling-visstand-in-nederland-veranderingen-in-de-eerste-krw-planperiode>



Map 2: Chemical condition for non-ubiquitous substances

### Chemical condition

The chemical condition of a body of water is determined on the basis of environmental quality criteria for 41 substances. A water body meets the standard if all pollutants do, which is the case for 38% of the water bodies in the Netherlands. A considerable number of pollutants will remain in the environment for a long time to come, even though their production and use have already been banned. These substances are indicated as “ubiquitous” on the EU list of priority substances. Further measures are hardly, if at all, possible for these substances. Ten percent of Dutch water bodies do not meet the standard for these ubiquitous substances, but do for other substances. In 52% of the water bodies, the standard is exceeded for one or more non-ubiquitous substances. A task still remains in this respect.

The key non-ubiquitous chemicals that exceed the standard in more than one water body are fluoranthene, nickel, cadmium, endosulfan and hexachlo-

robutadiene. The standards are most frequently exceeded for the ubiquitous substances PAHs, mercury and tributyltin, an anti-fouling agent that has already been banned. The concentration of tributyltin has, however, demonstrably decreased. The percentages of water bodies that do meet the criteria for chemical condition differ from the figures in the December 2014 draft plans. This is caused by the introduction of new environmental quality requirements. In 2014, many water managers tested in accordance with the old requirements. This is formally correct, as these requirements applied to the 2010-2015 river basin management plan. To gain a proper insight into the remaining task for chemicals, the assessment for the 2016-2021 period was carried out in accordance with the new requirements. This has resulted in different assessments, particularly for the Rhine and Scheldt. Twelve so-called “new” substances, mainly plant protection substances and medicine residues, have been included in the monitoring programme from

2015 onward. These were already measured in a number of locations in the Netherlands between 2011 and 2014. Concentrations of ten of the 12 substances exceed the standard. These will not be included until the 2021 assessment.

**Groundwater**

In general, both the quantity of the groundwater and its chemical quality are good, even though there are some localised problems. Groundwater depletion is a problem in various Natura 2000 areas, such as on the Wadden Islands, the Veluwe, in Twente and on the Brabant Wal. A new assessment based on the Natura 2000 management plans shows that groundwater depletion is slightly more severe than expected in 2009. The quality of groundwater is also subject to localised problems. In the Rhine river basin, the phosphorus content in the Duin and Texel water bodies is too high. In different locations in the river Meuse, the concentrations of nitrogen, phosphorus and plant protection products are too high. The chemical quality in the Scheldt fails in several locations, such as on the Brabant Wal and at Bergen op Zoom. There are also some problems with several drinking water extraction areas, which have resulted in an increase in purification efforts since 2000.

**Protected areas**

There are 156 Natura 2000 areas in the Netherlands; 3 still need to be designated. In most areas, the management plan is still at the procedure stage; as soon as it is completed, it will, where appropriate,



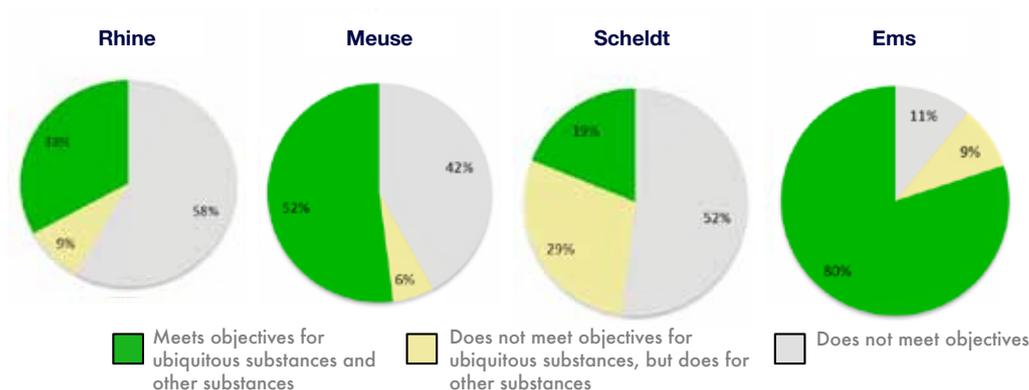
Map 3: groundwater quantity, status 1 January 2015

be coordinated with the Water Framework Directive objectives and measures.

Drinkingwatersource Protection Files have been compiled for all drinking water extraction areas to produce an inventory of potential threats. Programmes of measures have been drawn up for most areas and will be drawn up for the rest in the coming period.

About 90% of swimming waters meet the objectives. Under the Bathing Water Directive all swimming waters must meet the objectives by the end of 2015. A number of measures are still ongoing.

Diagram 4 shows the chemical condition of each river basin on 31 December 2014, in percentages of the number of water bodies



# 5 What we are doing: measures

## 5.1 Progress of implementation of river basin management plans 2010-2015

Implementation of the plans for 2010-2015 has nearly been completed. National and area specific measures are generally on schedule. The approach to point sources in particular is doing well: 37 wastewater treatment plants have been modified (in addition to the requirements under the Urban Wastewater Treatment Directive) and more than 360 non-purified discharges and 84 stormwater overflows have been discontinued. Unlinking paved surface is going faster than scheduled. As expected, the implementation of many landscaping and hydromorphological measures got off to a slow start, because procedures and land acquisition

required time. Nevertheless, more than 2,200 km of eco-friendly river banks has been realised and over 550 obstacles for fish migration have been removed. In the Brabant part of the Meuse river basin, measures to counter groundwater depletion have been implemented ahead of time to attain the desired groundwater and surface water regime (“GGOR” in Dutch). Some drinking water extraction areas were modified in order to limit the groundwater depletion effects on Natura 2000 areas. GGOR measures were also implemented earlier than scheduled on the Brabant Wal in the Schelde. While additional measures were taken, some 10% of the measures from the 2009 plans were postponed to the next phase, mostly due to cutbacks or problems with implementation (land acquisition). Implementation of a limited number of categories is behind schedule due to such factors as the modification of wastewater treatment plants, shoaling of water systems and adjusting the water



Photo: Groot-Salland water board

## Grip on medicine residues in our water

The Salland water board and Deventer Hospital together conducted the study “Grip on medicine residues in our water”. From January until June 2015, some 1,250 Deventer Hospital patients were (with their consent) given a CT scan with an X-ray contrast medium. On the basis of this random sample both parties together with Wageningen University conducted a study whether and when patients are willing to contribute to a decrease in pharmaceutical residue in the water. The provisional results are surprising - in a positive sense. The idea that patients are not aware of the issue of medicine residues in water or would be unwilling to prevent such residues from entering our water is incorrect. This explains the largely positive results of the study.

The final results were discussed during the symposium on source-point approach to medicine residues in our water held on 16 December 2015 and simultaneously published on the water board’s website: <http://www.wdodelta.nl/projecten-o/grip-medicijnresten/>. Other initiatives from the medicine supply chain were also presented during the symposium, which also addressed behavioural change and helped parties to contact one another in order to encourage follow-up studies.

## Measures being implemented or completed, the Netherlands (%)

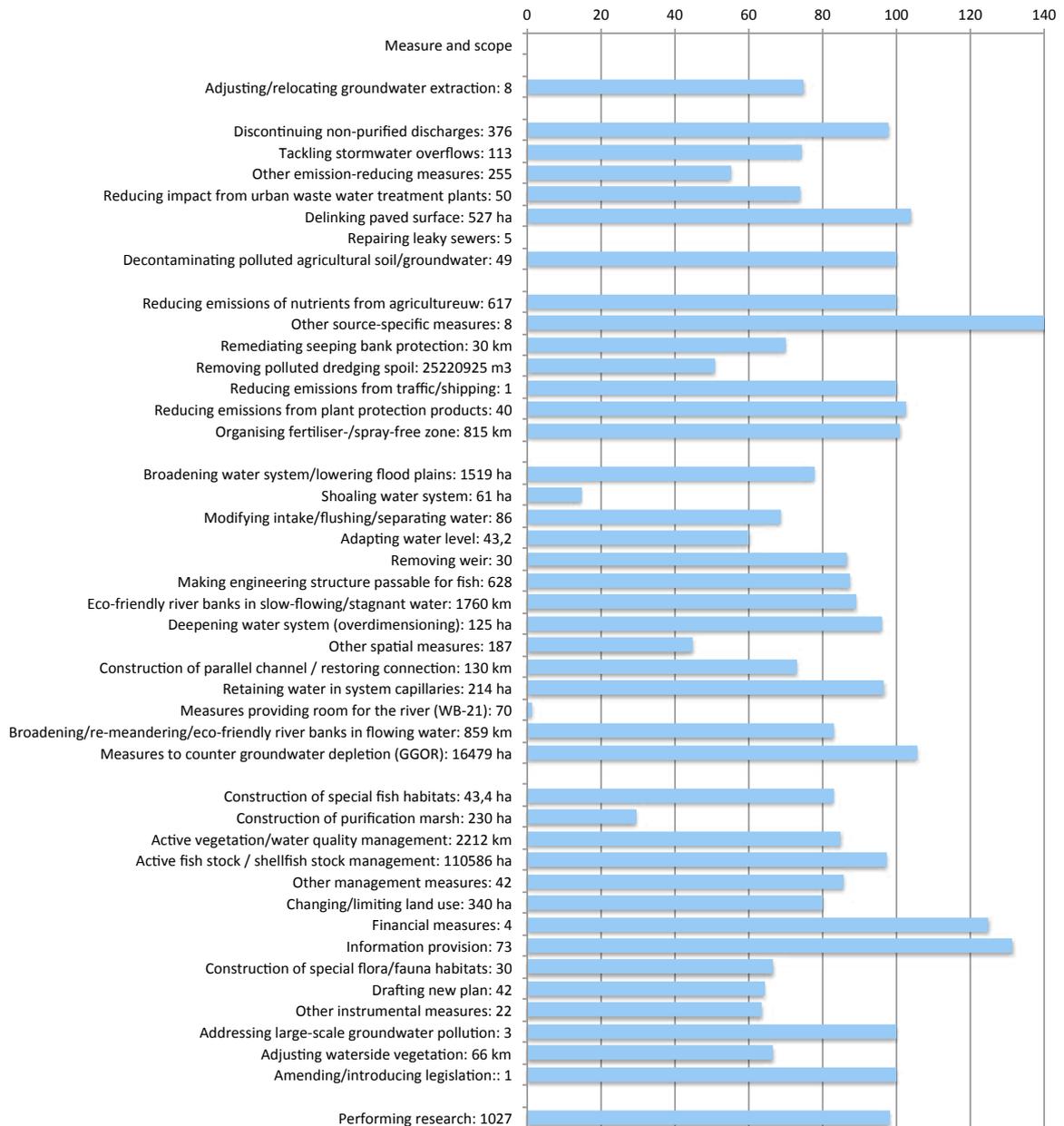


Diagram 5 Progress of implementation of River basin management plan 2010-2015, prognosis July 2015 of measures finished on 31 December 2015<sup>3</sup>

<sup>3</sup> The totals for the categories of measures and, in a number of cases, the measures that have been realised may deviate from the figures in the draft river basin management plans. These were based on prognoses from Q4 2014. Insight into the actual status of implementation prompted the conclusion that a small part of the measures will not be completed until the start of the 2016-2021 period. These have therefore been included in the 2016-2021 period. This concerns some 20 categories, mainly in the Rhine river basin.

level (both mainly in the Rhine river basin) and the construction of special habitats and purification marshes (in Rhine and Meuse). In the Meuse, dredging was needed less frequently as a result of, for instance, amended regulations. For several other categories in various river basins, however, more has been realised than initially forecasted, for instance because of GGOR measures and, in the Meuse, the construction of eco-friendly banks. The Synergy programme successfully contributed to linking the various objectives during the implementation of the measures.

Almost all research measures have been implemented. Studies and the experience gained with the implementation of measures and monitoring have provided a lot of new insights into the water system and the effectiveness of measures. A key part was the Water Framework Directive Innovation Programme, which financed 63 studies. The results of the studies have been made available at meetings and on websites such as those of the Watermozaïek knowledge centre ([watermozaiek.stowa.nl](http://watermozaiek.stowa.nl)), the Kennis moet stromen web tool for agriculture ([www.kennismoetstromenwebtool.nl](http://www.kennismoetstromenwebtool.nl)) and the RVO Netherlands Enterprise Agency (<http://www.rvo.nl/subsidies-regelingen/projectresultaten-kaderrichtlijn-water>).

Hydrological measures in Natura 2000 areas are closely linked to the nature objectives and management plans for these areas. To date, management plans for a limited number of Natura 2000 areas have been administratively adopted. In the “sense of urgency” and TOP areas, measures have been initiated to counter groundwater depletion, for instance in the Alde Faenen land-use project and the Ulvenhoutse Bos forest. In the context of the Programmatic Approach to Nitrogen (“PAS” in Dutch), programmes of hydrological measures in and around the Natura 2000 areas have been drawn up for each area. Administrative decisions were adopted for this in 2014. While most of these measures have not been included in the river basin management plans for 2016-2021, they will be implemented over the next few years. Implementation in some areas has already started, such as in the Gelderse Poort nature area.

## 5.2

### Package of measures 2016-2021

The river basin management plan 2016-2021 distinguishes between four types of measures:

- Measures resulting from EU legislation, such as the Nitrates Directive and the Urban Wastewater Treatment Directive.
- Other basic measures imposed by national government that do not result directly from European directives.
- Area specific measures by Rijkswaterstaat, water boards, provinces, municipal councils and others.
- Additional measures, such as initiatives from social sectors and measures aimed at new problems such as microplastics.

#### Measures resulting from EU directives

Twelve European directives have a direct or indirect impact on the quality of groundwater or surface water. These have been translated into Dutch legislation and regulations and are part of current policy. In recent years, a number of amendments have been made:

- Regulation on Plant Protection Products: The “Healthy Growth, Healthy Harvest” policy document (2013) formulates a number of additional measures to prevent the standards for plant protection products in groundwater and surface water from being exceeded. The final goal is to ensure that the environmental quality will no longer be exceeded by 2023. The placing of plant protection products onto the market has been regulated at a European level. See also page 23.
- Nitrates Directive: The 5th Nitrate Action Programme for the 2014-2017 period was adopted in 2014. See also page 22.
- Priority Substances Directive: a number of “new” substances was added in 2013. These are subject to mandatory monitoring and drafting of a provisional programme of measures to be completed by 2018.
- During the past period, Drinkingwater source Protection Files have been compiled that identified the vulnerability of and threats to drinking water extraction areas. Evaluation of these files has resulted in recommendations for improved monitoring, improved embedding of measures and greater insight into the effectiveness of measures.

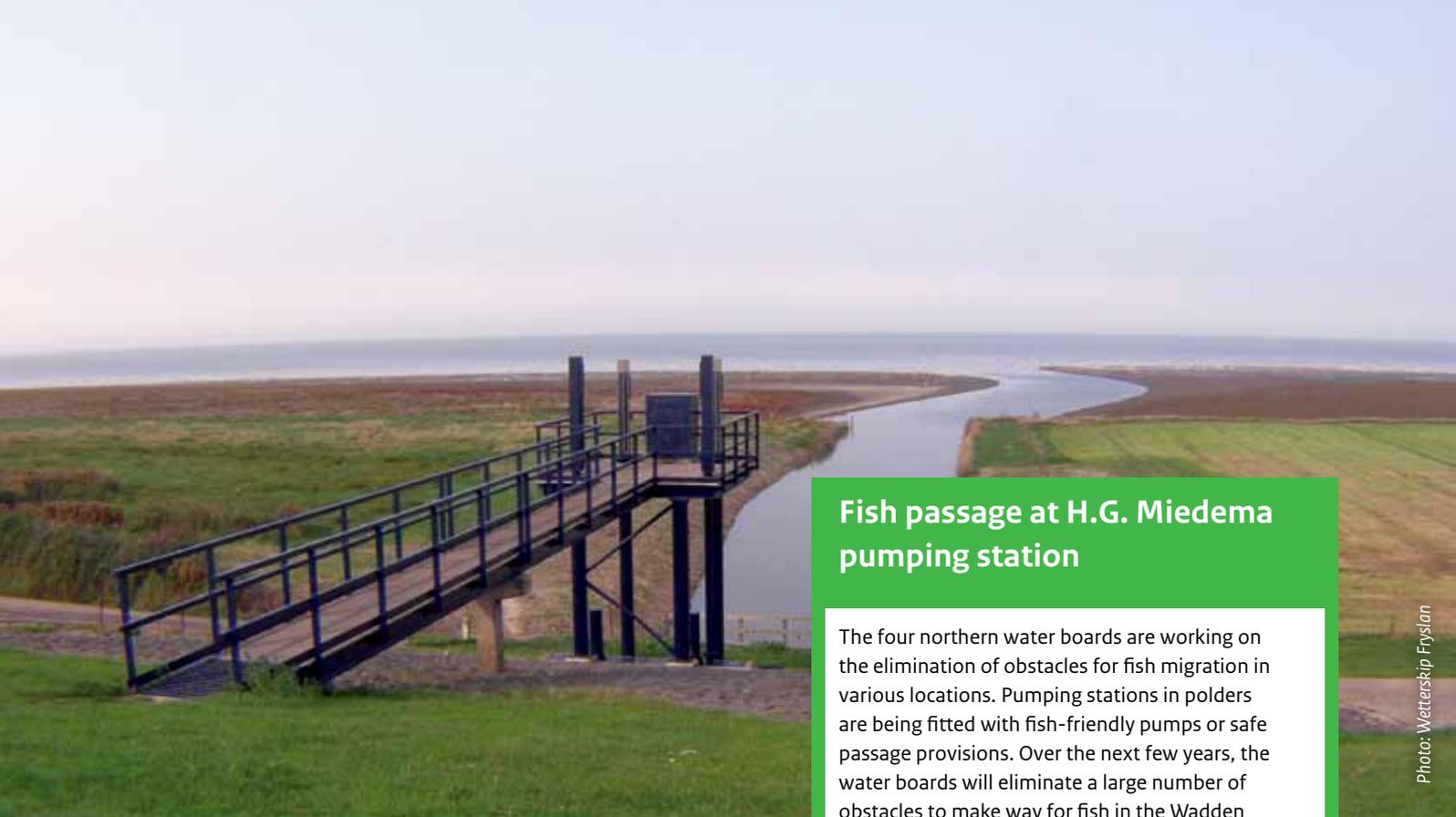


Photo: Wetterskip Fryslân

## Fish passage at H.G. Miedema pumping station

The four northern water boards are working on the elimination of obstacles for fish migration in various locations. Pumping stations in polders are being fitted with fish-friendly pumps or safe passage provisions. Over the next few years, the water boards will eliminate a large number of obstacles to make way for fish in the Wadden Region. With its many lakes, pools, streams and extensive storage reservoir, the area is an important breeding ground for fish from the Wadden Sea and the IJsselmeer Region. The management area is also an important habitat of eels, which grow up in freshwater only to migrate to sea to reproduce. H.G. Miedema pumping station of Wetterskip Fryslân comprised one of the obstacles to migrating eel until recently. A fish passage was completed here in December 2015.

**For more information, go to:**  
<http://www.ruimbaanvoorvissen.nl>

### Other basic measures

Most basic measures concern current policy. The implementation programme of the Delta Programme Freshwater programmes a number of measures for the 2016-2028 period regarding freshwater storage, countering salinisation, and saving on water use. These also look at the effects on the objectives for water quality.

In general, the objectives are not contradictory, with possibilities for linkage in many cases. The 'Water Assessment' tool guarantees that all hydrological aspects, including water movement and morphology, are considered properly in spatial plans. In the coming period, research measures will again be implemented to further improve the cost effectiveness of wastewater treatment plants. New substances and options for making purification more sustainable, e.g. by recovering phosphates and other chemicals, will also be addressed.

### Area specific measures

Experience with the implementation of area specific measures has led to shifts in emphasis in the package of measures for the 2016-2021 period:

- A better insight has been gained into the effectiveness of measures, such as the effectiveness of eco-friendly banks and its interconnectivity with other measures, such as hydrological measures.
- The package of measures is more specific by focusing on the most effective measures or on promising areas.
- More attention for the water system as a whole.

This may mean inclusion of measures outside our water bodies if they affect the quality of a water body.

- More attention for management and maintenance and explicitly embedding this.
- More flexibility in implementation by laying down fewer details, while retaining the obligation to perform and with transparent responsibility and accountability.
- Even more attention for linkage of Water Framework Directive measures with other projects, such as peak water storage, freshwater supplies and nature policy.

The table below provides an overview of the key measures in the four river basins. The difference in the size of a river basin in part explains the difference in the scope of a set of measures. For a

complete overview, see the summary of the programmes of measures of the river basin management plans.

### Overview of key area specific measures 2016-2021

Rhine	Meuse	Scheldt	Ems
Cleaning up polluted soil / groundwater (693)	GGOR measures (groundwater depletion) (10,481 hectares)	GGOR measures (groundwater depletion) (11 hectares)	Reducing emission of plant protection products (8 measures)
Reducing emission of plant protection products (59 measures)	Emission-reducing measures (31)	Implementing active vegetation / water quality management (38 hectares)	Reducing emission of nutrients by agriculture (4 measures)
Construction of eco-friendly banks and stream design (over 1,200 km)	Construction of eco-friendly banks and stream design (over 535 km)	Construction of eco-friendly banks and stream design (over 80 km)	Construction of eco-friendly banks and stream design (82 km)
Construction of fish passages <sup>5</sup> (319)	Construction of fish passages (190)	Construction of fish passages (18)	Construction of fish passages (21)
Implementing active fish stock or shellfish stock management (almost 200,000 hectares, mainly in the Wadden Sea and coastal waters)	Adjusting water level (47)	Implementing active fish stock or shellfish management (121 hectares)	
Implementing active vegetation / water quality management (9,464 hectares)	Implementing active vegetation / water quality management (1,018 hectares)		
Broadening water system and/or lowering flood plains (471 hectares)	Broadening water system and/or lowering flood plains (286 hectares)		
Removing polluted dredge spoil (approx. 5.7 million m <sup>3</sup> )	Delinking rainwater discharge from sewers (94 hectares)		
Reducing emission of nutrients by agriculture (33 measures)	Addressing stormwater overflows (50)		
Modifying wastewater treatment plant (16)	Modifying wastewater treatment plant (7)		

<sup>5</sup> The number of fish passages in the four river basins may be somewhat lower because Rijkswaterstaat and the water boards have both included joint fish passages.

More is being done than is apparent from the programmes of measures. An important result of the Water Framework Directive is that some measures are no longer named in each instance because they have become common practice. This applies, for instance, to delinking rainwater discharge from sewers and the use of fish-friendly turbines when replacing or building new pumping stations.

#### **Some special area specific measures**

- Nutrients in the Rhine-West peat grassland: administrative agreement in which water managers, provinces and the agricultural sector have agreed to jointly work on 13 promising measures. Companies in the bulb-growing area have also reached agreement on the approach to nutrients.
- Spaarwater: Five pilot projects in the Northern Netherlands to study how freshwater can be used more efficiently while at the same time reducing salinisation and emissions of nutrients and plant protection products.
- Future-oriented farming with soil and water in the Vechtdal valley (Overijssel): supporting farmers to take soil and water measures in terms of both water quality and quantity.
- Clean grounds - Clean ditch Noord-Holland: reducing emissions of plant protection products in bulb farming in a joint venture between water manager, bulb growers and manufacturers of plant protection products.
- Fish migration project Rhine-West: addressing such subjects as joint monitoring and prioritisation. To this end, accessibility maps have been drawn up, indicating the 'migratability' of different water bodies for fish. There are maps for the current situation and the ambition for 2021.
- In 2018, the "Haringvliet" storm surge barrier will be partially opened to allow fish migration ("Kierbesluit"). This will open up the main routes for migrating fish species such as salmon and sea trout.
- Delta Plan Elevated sandy soils: aimed at the availability of sufficient clean water, also in view of climate change. Government authorities, the business community and knowledge institutes in the South and Eastern Netherlands regions work together to tackle bottlenecks and make use of

opportunities. The tasks for freshwater supplies and for water quality are interrelated and are addressed together. The implementation programme extends until 2050, with a specific set of measures for the short term (2016-2021). The Regional Administrative Consultation Committees of Rhine-East and Meuse coordinate the approach to water quality and freshwater supplies in the regions.

- Possible follow-up from 2016 onward of the successful Clean water for Brabant programme for the reduction of emissions of plant protection products combined with water supplies.
- Schoon Water Zeeland <http://www.schoon-water.nl/categorie/schoonwater-zeeland/>

#### **Approach to nutrients**

The approach comprises a combination of national and area specific measures. National measures of the 5th Nitrate Action Programme for 2014-2017 are based on the Nitrates Directive. Compared to previous programmes, a number of standards have been tightened, while the system of animal production rights is maintained and an obligation to process manure has been included. The Programmatic Approach to Nitrogen (PAS) aims at reducing the environmental impact caused by nitrogen in the Natura 2000 areas.

When the milk quota was abandoned in 2015, it became clear that it is desirable to limit production by means of a system of animal production rights or phosphate rights. Relevant legislation is being prepared. Manure legislation will be evaluated in 2016. This will take into account the objectives of the Nitrates Directive as well as those of the Water Framework Directive for drinking water extraction areas. This may prompt adjustment of national measures for certain areas. Area specific measures to reduce the environmental impact of nutrients include buffer zones, level-directed drainage and low external input sustainable agriculture. Moreover, attention is being paid to compliance with the rules and extension of manure processing. In the short term, extension of manure processing requires that attention be paid to discharge requirements. Some local modifications must be made to wastewater treatment plants. The agricultural industry has started drafting a Delta Plan on Agricultural Water Management that seeks to make



## The Berkel experience

The Berkel has been restored to the dynamic river it once was, meandering through the landscape. Challenging and inviting for animals and plants and for people to live, work and recreate there. The Berkel meanders between Almen and Zutphen, with the Besselink weir being passable for fish. The water is becoming cleaner and the Berkel valley more natural. There is also more room for leisure activities. This project of the Rhine and IJssel water board was completed in 2014.

**For more information, go to:** <http://www.wrij.nl/thema/actueel/projecten/beleef-berkel/>

the agricultural sector more sustainable by introducing specific measures while realising the water assignments from various water files, including the nutrients issue.

Innovative techniques for manure processing and at agricultural companies may contribute to a further reduction of nutrients in groundwater and surface water.

### Approach to plant protection products

Some plant protection products exceed the objectives in water bodies and drinking water extraction areas (see page 10). Policy from the Healthy Growth, Healthy Harvest policy document must be adhered to, the promised measures must be properly performed and their effects monitored and adjusted where necessary. These include application of more stringent drift reduction technology on the entire premises, a limited widening of cultivation-free zones for certain crops, and the development and implementation of purification techniques in glasshouse horticulture. If a substance exceeds the standard, it is up to the permission authorities to draft an emission reduction plan for the active substance in question to limit the extent to which the standard is exceeded. The professional use of chemical

pesticides outside agriculture, as still applied by many municipalities, will be prohibited from 2016/2017 onward. The use on paved areas by private parties will also be prohibited in 2016.

As from 1 January 2018, glasshouse horticulture companies that discharge waste water containing plant protection products onto the surface water or sewer must have a functioning purification plant with a sufficient output. Agreements on this have been laid down in an administrative agreement on purification in glasshouse horticulture. The Delta Programme on Agricultural Water Management also seeks to reduce the emissions of plant protection products at a regional level. There also are initiatives by manufacturers of and dealers in plant protection products to reduce farmyard emissions, such as the project Train Operators to Promote management Practices & Sustainability (<http://www.nefyto.nl/Publicaties/TOPPS-Water>). Where possible, agreements are laid down in Green Deals. An

<sup>5</sup> [www.nefyto.nl/Publicaties/TOPPS-Water](http://www.nefyto.nl/Publicaties/TOPPS-Water)

interim evaluation has been scheduled for 2018. If necessary, a decision will be made to supplement or tighten policy in order to achieve the ambition for 2023.

#### Approach to medicines

For a proper approach to medicines in groundwater and surface water it is necessary to look at the chain as a whole. This can be done along three tracks:

1. Joint fact-finding: working together to identify the tasks and the effectiveness of measures.
2. No regret measures: accelerating, in the short term, the implementation of measures that are in any case effective in reducing emissions. An example is the collection of unused medicines, measures in the area of water purification and degradability of x-ray contrast media.
3. International collaboration: for instance on admission procedures determined at a European level.

Moreover, monitoring of these substances in surface and groundwater is improved, particularly in drinking water extraction areas. To ensure the success of the chain approach, parties from every link of the chain must contribute (from pharmaceutical industry to the health care industry to the water sector). It will be studied in the period until 2017 which measures are most effective. The approach should result in an implementation programme in 2018.

## Freshwater tidal area in Sophia polder

The Sophia polder is an island in the river Noord between Dordrecht and Alblasterdam. The polder was created by the 1856 reclamation of a number of sandbanks and was used as agricultural land for a long time. In 2007 it was decided to transform the island into a marshy area, as a link in the Ecological Main Structure. The Noord is a Water Framework Directive water body which, at the moment, has an inadequate ecological score. Execution commenced in 2010. The new nature island was officially opened in June 2012.

For more information, go to: <http://www.zuidhollandslandschap.nl/tag/sophiapolder/>



### Litter and microplastics

Litter at sea (“plastic soup”) has negative effects on the marine ecosystem, but also affects the way in which people perceive inland waters and may, after degradation, be a potential source of microplastics. Measures are aimed primarily at prevention at the various sources, awareness, and closing product chains. A successful example is the systematic collaboration of over 20 parties (municipal councils, province, water boards, site managers, non-governmental organisations and volunteers) along the banks of the Meuse ([www.schonemaas.nl](http://www.schonemaas.nl)). This collaboration has been extended to the municipalities along the river Meuse in Brabant. Application in other areas is being examined. A key part of the approach is a collection arrangement for litter. The programme of measures for the Marine Strategy Framework Directive includes litter and microplastics. Here, too, the ambition is to conclude Green Deals, for instance on the supply and processing of waste, the reduction of the use of balloons and a European approach to reducing microplastics.

### Collaborating on implementation

The ambition during implementation is to work together more with non-governmental organisations, such as agricultural organisations, site managers or leisure organisations. Initiatives by these organisations are supported where possible. Where possible, specific agreements are made on collaboration with non-governmental organisations, for instance in Green Deals. There are Green Deals in preparation on Green Plant Protection Products and on the use of Plant Protection Products for Recreation, Sport Fields and Private Parties. Agreements are also being prepared or have already been reached with HISWA (use of anti-fouling paint) and with the angling sector (lead use).

The leisure sector (in its Future Vision on Water Recreation 2025), the angling sector and industry (Sustainable Water Use) are also starting initiatives. Rotterdam Port Authority and the World Wildlife Fund are working together on a healthy delta where a dynamic ecosystem and a flourishing port co-exist. A coalition of six nature organisations is working with government authorities in the area to restore the Haringvliet to again become a dynamic area where nature as well as the regional economy

flourishes. The Markermeer lake sees the realisation of the Markerwadden nature project, an initiative of Natuurmonumenten (Society for preservation of nature monuments in the Netherlands) together with the national government and the provinces.

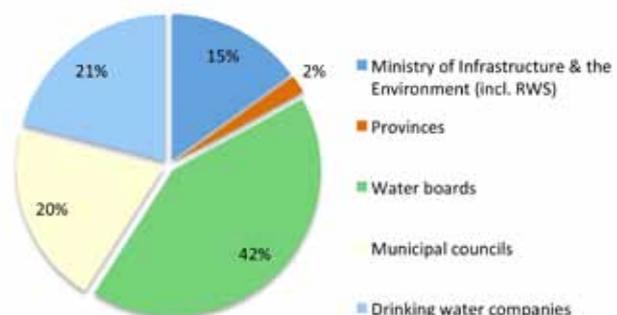
The objective of the Delta Plan on Agricultural Water Management is to implement specific measures to make the agricultural system more sustainable while at the same time achieving the water tasks. The concrete aim is to solve 80% of the remaining water quality problems in a stimulating and encouraging manner by 2021, and solve 100% by 2027. This will be achieved by encouraging agricultural businesses, promoting collaboration with water managers and developing a method with which the water tasks in rural areas can be translated into measures to be implemented at individual agricultural businesses. In some 40 areas, regional projects have been launched or initiatives for doing so have been set up. See [www.agrarischwaterbeheer.nl](http://www.agrarischwaterbeheer.nl).

The Phosphate Recycling Chain Agreement entered into force in 2011 by 20 parties from the Dutch business community, scientific community, social institutions and the government. Objectives are the economical use of the raw material phosphate, set to become more scarce in future, and to achieve a closed phosphate cycle where possible, thus also limiting the emission of phosphates into groundwater and surface water. <https://zoek.officielebekendmakingen.nl/kst-32852-28.html>

### Costs and division of costs

The costs of area specific measures (see page 21) total some EUR 1,370 million for the 6-year implementation period.

Diagram 7: Division of costs of water management in the Netherlands

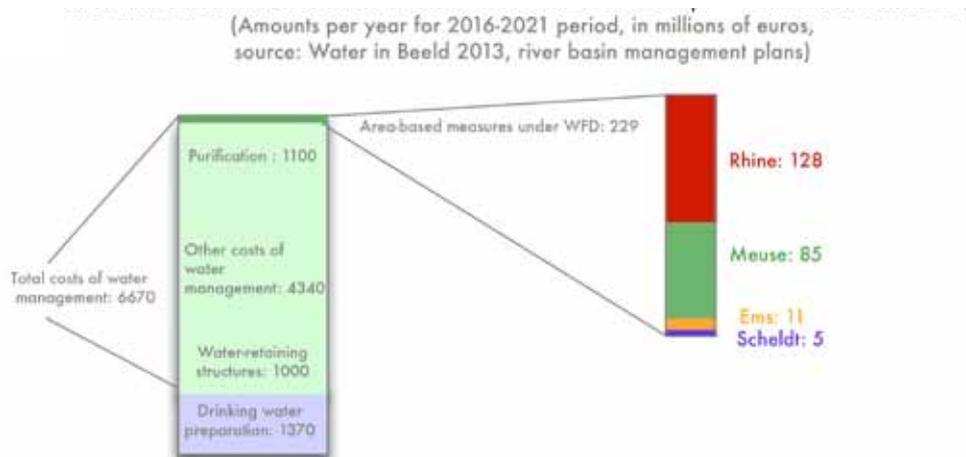


Measures for Natura 2000 areas and other additional measures also entail costs. Diagram 8 presents a comparison of the costs for area specific measures related to the total costs for water management in the Netherlands.

Financing has been laid down in the water management plans and multi-year budgets of various government authorities. Because many projects serve multiple objectives, use multiple sources and are marketed as 'area development', it is often difficult to specify the exact amount for each measure and each party. The division of total costs, however, is known. This is presented in diagram 7. The division of costs for Water Framework Directive measures is comparable if we disregard the contribution by drinking water companies. Most of these costs are financed by means of levies by water boards and municipal councils and the national contribution for Rijkswaterstaat. Other financing sources include European subsidies such as POP, LIFE, Interreg and Horizon 2000. A special form of financing is management fees. These concern agreements made between water

boards and agricultural companies under which the latter agree not to use the strip of land directly adjoining a water body for production, for which the water board pays a management fee, and which they are allowed to reorganise, for instance by constructing an eco-friendly embankment. Financing can also be used as incentives for sustainable use of water. However, financial incentives are not always effective. The costs of drinking water, for instance (approx. EUR 1.5 per m<sup>3</sup>) are not sufficient to prevent the use of tap water for garden irrigation. Following the OECD recommendation (<https://www.rijksoverheid.nl/documenten/rapporten/2014/03/17/oecd-studies-on-water-water-governance-in-the-netherlands-fit-for-the-future>) a study will be carried out in the coming period to gain a broader understanding of the possibilities of cost recovery and financial incentives. This will explore how the 'the polluter pays' principle can be used to even greater effect, what financial tools can be useful and effective and whether and how financial incentives can play a role. The initial exploration will be finished in mid-2016.

Diagram 8: Cost of area specific measures under Water Framework Directive compared with total costs of water management



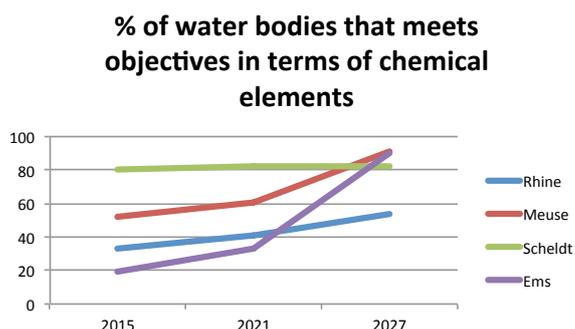
# Where are we at in 2027?

What is the water quality like in 2027 if all measures from the 2016-2021 river basin management plans and those for 2022-2027 have been implemented? Forecasts show a mixed image. A forecast always has its uncertainties and also depends on the starting points opted for. A forecast by the Netherlands Environmental Assessment Agency is based on the measures as currently included in the plans. It does not take into account the additional measures such as those in the Delta Plan on Agricultural Water Management, innovations, or additional measures added in the third river basin management plan or in the next Nitrate Action Programme. As a result, the objectives for biological quality are only attained in a little over a quarter of all surface water bodies.

## Chemical quality of surface waters

Diagram 9 shows that the Meuse, Scheldt and Ems meet 80% to 90% of the requirements for chemical condition. At 54%, this is lower for the Rhine. Nationally speaking, the chemical quality for all substances is to meet the requirements in two out of three water bodies. Remaining problems mainly concern ubiquitous substances such as PAHs, mercury and tributyltin. There appear to be no additional measures. As regards mercury, global agreements are being made to reduce emissions. It is difficult to assess for how long the substances will remain in the water.

Diagram 9



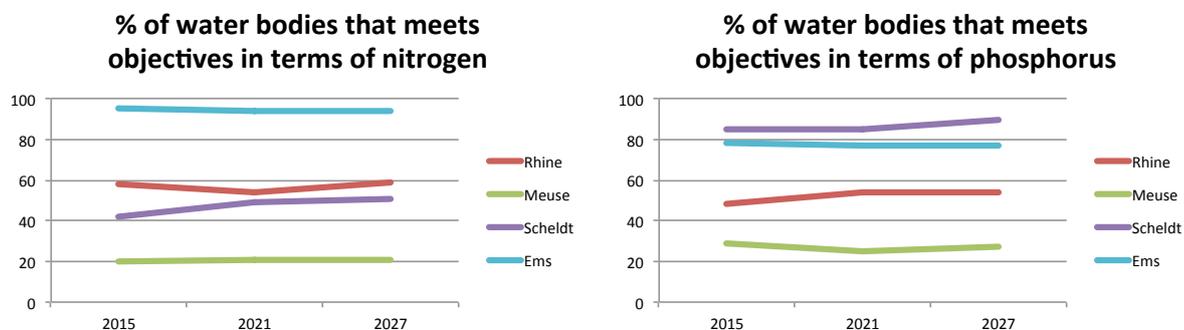
## Hydromorphology

It is expected that the hydromorphology of water bodies will be largely in good status by 2027. The obstacles for fish migration will then also have been removed. Groundwater depletion may still be a localised problem. How long it will take for the effects on the ecology to become visible is difficult to say. Other uncertain factors are the results of climate change and the impact of exotic species such as the quagga mussel.

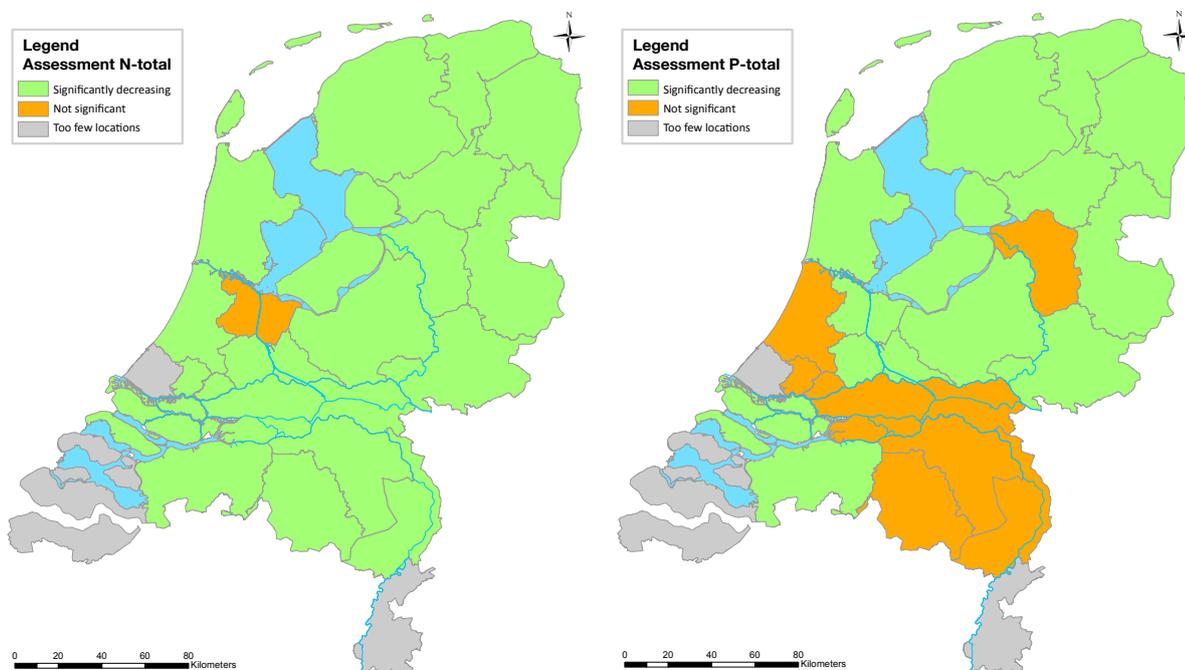
## Nutrients

The nitrogen and phosphorus surplus on agricultural land will decrease, but the effect of current policy on surface water remains limited until 2027. On average, the environmental impact of nitrogen and phosphorus will have decreased by 5%, but it will increase slightly in the western clay and peat area. According to model calculations of the Netherlands Environmental Assessment Agency, there will be a limited increase in the number of water bodies that meet the criteria for nitrogen and phosphorus (see diagram 10). These calculations are based on continuation of current national policy and do not take all area specific measures into account. An analysis of the measuring data yields a more positive conclusion: for nitrogen, the measurements of almost all water boards with sufficient measuring locations to be able to pronounce upon this show a clear downward trend. For phosphorus, this is the

Diagram 10a en 10b



Map 4a and 4b



Assessment for each of the water board areas of the significance of the trend for N-total (left) and P-total (right) (result of Theil-Sen slope estimator)

case for more than half of the water boards (See map 4, source: report on the situation and trend analysis for nutrients at Water Framework Directive measurement locations, Deltares). Based on these trends and the principle that additional measures will be taken where necessary (for instance in a follow-up to the 5th Nitrate Action Programme),

water managers forecast a little over 95% of the target objective in 2027.

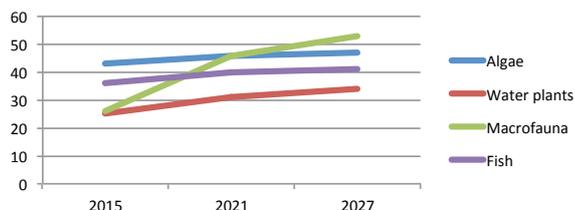
**Biology**

The biological quality elements are influenced by various factors. Nutrients and the spatial organisation of water systems are particularly important. It is



Diagram 11

### % of water bodies that meets objectives in terms of biological elements



expected that chemicals will have a limited effect on the objectives for biology now and in the future, but data on this are scarce. Here, too, there is a difference between the national model calculation and the water managers' forecast. Diagram 11 shows a forecast for the Netherlands as a whole based on the national model calculation. Moreover, these calculations show that even if all objectives for nutrients are achieved everywhere, the objectives for biology would not be achieved in a little under half of the water bodies.

In their forecast, water managers assume that additional measures will be taken, so that the end result will be almost 100% in 2027. Again, observations appear to be more positive than the model outcomes. A World Wildlife Fund report (<https://www.wnf.nl/nieuws/nieuws-en-resultaten/bericht/diersoorten-in-nederland-laten-voorzichtig-herstel-zien.htm>) confirms the positive trend. From 2016 onward, more effort will be devoted to substantiating the forecasts, so that a decision can be taken in 2021 whether and where additional measures are worthwhile or whether objectives must be adjusted.

#### Groundwater

Expectations are that all groundwater bodies will meet both quantitative and qualitative requirements by 2027, except for the assessment of the quantity of groundwater in nature areas: this will not be sufficient in one third to half of the groundwater bodies. This is a result of the fact that the Natura 2000 process is not synchronous with the Water Framework Directive.



Photo: Otto Cox

## Eco-friendly Kromme Rijn banks

Large sections of the stretch from the Rhine island in Odijk to the Rumpst industrial estate in Bunnik have been designed in an eco-friendly manner. This is part of the Kromme Rijn Synergy project of the De Stichtse Rijnlanden District Water Board. Along various stretches the water board increases the variation in flow, organises banks in a more natural manner, and constructs parallel channels, stepping stones and fish passages. The banks are also eco-friendly at the Wetstein Pfister park in Bunnik. All in all, a section of over 5 kilometres has been reorganised to improve the water quality in the Kromme Rijn and give the river a more natural character. There are walking and cycling paths along large parts of this stretch of the river. The eco-friendly banks were officially opened in September 2015.

### For more information, go to:

<http://www.hdsr.nl/actueel/nieuws-tbv-verkorte/bomenkap-opknappen/>

### For more information, go to:

- Download river basin management plans [www.helpdeskwater.nl/sGBP](http://www.helpdeskwater.nl/sGBP)
- National Waterplan [www.platformparticipatie.nl/nwp](http://www.platformparticipatie.nl/nwp)
- Water Helpdesk [www.helpdeskwater.nl/onderwerpen/wetgeving-beleid/kaderrichtlijn-water/](http://www.helpdeskwater.nl/onderwerpen/wetgeving-beleid/kaderrichtlijn-water/)
- Essay Blue Economy <http://tinyurl.com/jvrwv42>
- Healthy Growth, Healthy Harvest policy document <https://www.rijksoverheid.nl/documenten/rapporten/2013/05/14/gezonde-groei-duurzame-oogst-tweede-nota-duurzame-gewasbescherming>
- Policy Document on Drinking Water <https://www.rijksoverheid.nl/documenten/beleidsnotas/2014/04/25/beleidsnota-drinkwater>

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