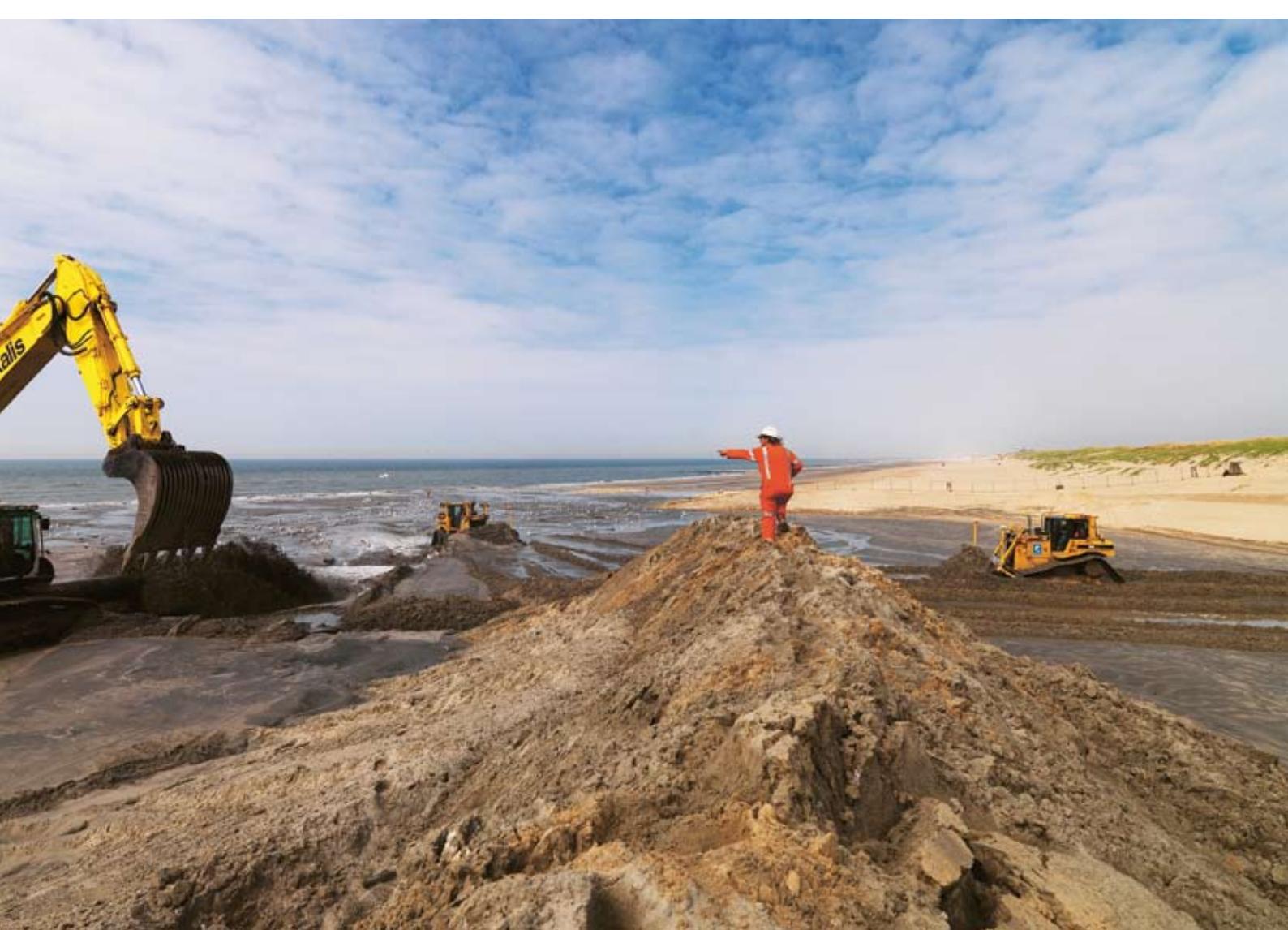




The 2011 Delta Programme

Working on the delta

Investing in a safe and attractive Netherlands,
now and in the future



The Delta Programme is a national collaborative programme of the national government, provinces, municipalities and water boards, with contributions from social organisations. The aim is to protect the Netherlands and its future generations against flooding and to safeguard a sufficient freshwater supply.

Three generic sub-programmes that apply to the Netherlands as a whole:

Safety

Freshwater

New Urban Developments and Restructuring

Six area-based sub-programmes:

- Rhine Estuary-Drechtsteden
 - South-western Delta
 - IJsselmeer Region
 - Rivers
 - Coast
 - Wadden Region



This map indicates the places, waterways and bodies of water, engineering structures and projects referred to in the Delta Programme.

Working on the delta

The 2011 Delta Programme

Investing in a safe and attractive Netherlands,
now and in the future

Summary

Aim and approach

The Delta Programme (*Deltaprogramma*) is aimed at creating a safe and attractive Netherlands, now and in the future. By way of the Delta Programme, which has come about following a proposal from the Delta Commissioner (*deltacommissaris*), the Cabinet seeks to ensure that there is certainty about flood risk management and the supply of sufficient freshwater in the long term. Apart from protecting people, animals and goods, this is also a purely economic necessity. After all, nearly 60% of our country is liable to flooding, including our economic centre. The damage and suffering caused by a flood would be incalculable, which is why the Cabinet wants to forestall a future disaster. Conversely, water shortages are also damaging.

The Delta Programme is a national programme in which the national government, provinces, water boards and municipalities are working together. Social organisations, knowledge institutes and the business community are actively involved as well. The Delta Programme is directed by the Delta Commissioner, the Government Commissioner (*regeringscommissaris*) appointed to this programme by the Cabinet.

Based on the Delta Commissioner's proposal, the Cabinet has opted for a realistic approach, starting from the "here and now" and using our Dutch common sense, in the knowledge that we have an important duty to fulfil safeguarding our country's future safety and our prosperity.

The shared values of the Delta Programme inter-connect the parties. They can serve as beacons for the many decisions that need to be made. These shared values are *solidarity, flexibility and sustainability*.

Working on the delta is of importance to the economic, ecological and social developments and opportunities in our country. That is why the Delta Programme employs an integrated approach. This means an approach that actively searches for opportunities to connect Delta Programme measures with tasks in other policy areas such as nature, the environment, spatial quality, water quality and recreation.

The Delta Programme can be divided into two parts:

1. First and foremost, it is essential to organise current safety. This can be achieved by way of ongoing implementation programmes, such as the Flood Protection Programme (*Hoogwaterbeschermingsprogramma*), Room for the River (*Ruimte voor de Rivier*), the Meuse Projects (*Maaswerken*) and Weak Links on the Coast (*Zwakke Schakels Kust*).
2. Secondly, it is about preparing for the future. What changes can the Netherlands expect and how can we best prepare ourselves for them? It is important that decisions be made in a timely fashion so that we can effectively plan investments and be ready when we need to be. We will also have to verify whether existing standards, rules and agreements relating to flood risk management, freshwater supply and spatial planning need to be revised to suit the current situation in the Netherlands.

The coordinating Minister for the Delta Programme is the Minister for Transport, Public Works and Water Management (*Verkeer en Waterstaat*). The Minister for Housing, Spatial Planning and the Environment (*VROM*) and the Minister for Agriculture, Nature and Food Quality (*LNV*) are co-responsible for the Delta Programme as a whole as well as the nine individual sub-programmes.

Preparing for the future

Starting with the 2006 scenarios from the Royal Netherlands Meteorological Institute (KNMI), the second Delta Committee (2008) had supplementary research carried out to get an idea of the plausible upper limit of the possible rise in sea level. One aim of this supplementary research was, assuming the most extreme scenario, to find out whether the Netherlands would remain inhabitable in the future (2100 and beyond). The answer to that question was yes, it would, but only on condition that we start preparing for the future in time.

This Delta Programme (2011) is starting off with the here and now and heading towards the future, which is why, at the Delta Commissioner's suggestion, the Cabinet is basing its Delta Programme on measurements and the KNMI 2006 scenarios. It will become warmer and wetter; sea levels will rise and the soil will subside. The scenarios are used to map out how much longer current policy and management are

expected to suffice and when adjustments will be required. In other words, when will we reach the *tipping points* for our water system? These tipping points are of significant importance for the Delta Programme.

Preparation for the decisions due on our delta's future is central to the Delta Programme. The Delta Commissioner will submit these guiding "Delta Decisions" on flood risk management and freshwater supply in this century to the Cabinet in 2014 so that they can be embedded into the next National Water Plan (2015). These five decisions concern:

1. Updating safety standards for primary flood defence systems;
2. A freshwater strategy that should guarantee a sufficient long-term water supply in the Netherlands;
3. Long-term water level management of the IJsselmeer with a focus on water supply in the Netherlands and the safety task in the area;
4. Protection of the Rhine-Meuse Delta;
5. A national policy framework for the (re)development of built-up areas.

Short term – long term

Effective preparations for the future require short-term measures that are also appropriate for the long term. These are short-term measures that increase adaptability (flexibility) and resistance to extreme events (robustness). This will make it possible to delay reaching the tipping points for our water system and thereby responsibly defer any extensive measures related to these tipping points. Meanwhile, greater understanding of changing climate can be gained and new innovative solutions developed further, which is both effective and efficient. In the Delta Programme, this is called "*adaptive delta management*".

Knowledge and innovation

As part of the Delta Programme, we will be jointly developing knowledge over the next few years to prepare for decision-making. As uniformity is of great importance to develop a cohesive set of solutions, the following are being developed:

- A set of scenarios that will be used for all research in the Delta Programme;
- A evaluation system that will enable comparison of all possible solution strategies;
- A Delta model with which to carry out (some) of the underlying calculations.

The Delta Programme is committed to strengthening the relationship between knowledge and innovation. Along with water technology and maritime technology, delta technology is part of the Key Area Water, in which the Netherlands plays a leading international role. Innovation is, therefore, doubly beneficial given that it not only serves the needs of the Delta Programme, but also stimulates the Dutch economy. Innovation is in line with the Delta Programme's shared values and can benefit working more efficiently and cost-effectively.

Implementation

The Delta Programme is already being carried out as part of ongoing implementation programmes such as the projects to reinforce the dykes and coastal areas and creating room for rivers, and also in the nine sub-programmes that are reviewing what is required in the long term:

- *Safety*

Important activities include updating standards for flood protection and advising on the delta dykes.

- *Freshwater*

This sub-programme is intended to answer the question of how we can deal with future freshwater supply and demand in the Netherlands.

- *New Urban Developments and Restructuring*

This sub-programme is working on a national policy framework for the development of built-up areas.

- *South-western Delta*

The development of a long-term strategy for the South-western Delta is central to this sub-programme, the aim of which is to continue developing a safe, resilient and vital area.

- *Rhine Estuary-Drechtsteden*

Selecting a solution strategy for flood risk management and freshwater supply in the Rhine-Meuse Delta.

- *Rivers*

Establishing a long-term plan to maintain the safety of the areas around the Rhine and Meuse, which builds on the "Room for the River" and Meuse Projects.

- *IJsselmeer Region*

Devising a strategy for the long-term water level management of the IJsselmeer. Long-term changes in freshwater supply and demand and amendments to the standardisation of the primary flood defence systems are crucial to the IJsselmeer region, in which water level management plays an important role.

- *Coast*

Establishing a sustainable strategy for the safety of the coast and research into the possibility and desirability of coastal expansion.

- *Wadden Region*

Researching how the long-term safety of the Wadden region can be guaranteed and setting up a monitoring plan for this special nature conservation area.

Elaboration

Over the coming year, the Delta Commissioner will be elaborating three aspects, on which he will report in his proposal for the second Delta Programme.

1. *Logistics of Delta Decisions*

Over the coming year, the Delta Commissioner will devise a roadmap for the logistics and concrete implementation of the five Delta Decisions.

2. *Linking the short and the long term*

The Delta Commissioner will develop the strategy for efficiently linking the long and the short term ("adaptive delta management"), looking at the policy-related, legal and financial consequences.

3. *Evaluation*

On behalf of the new Cabinet, the Delta Commissioner will evaluate the organisation of the Delta Programme to see whether it can be made more straightforward.

Points of attention

In addition, there are a number of matters to which the Delta Commissioners has drawn attention in his proposal:

- Combined scenarios (Royal Netherlands Meteorological Institute - KNMI, The Netherlands Environmental Assessment Agency - PBL, The Netherlands Bureau for Economic Policy Analysis - CPB) in 2013 (page 35)
- More effective way of granting permits in the programmes (page 23)
- Safety standards decision in 2014 (page 43)
- Noord-Holland Weak Links preferably sandy/hybrid (page 54)
- Multifunctional use of flood defence systems (page 57)
- Study convergence with European regulations regarding the effect on safety (page 48)
- Directing the National Knowledge and Innovation Agenda (*Kennis- en Innovatieagenda*) and programming (page 45)
- Exploring the utilisation of a Delta Fund experimentation clause (page 72)

In general, the Cabinet has reacted positively to this and will work out these points of attention in more detail.





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Introduction

The Delta Programme (*Deltaprogramma*) is aimed at creating a safe and attractive Netherlands, now and in the future. By way of the Delta Programme, which has come about following a proposal from the Delta Commissioner (*deltacommissaris*), the Cabinet seeks to ensure that there is certainty about flood risk management and the supply of sufficient freshwater in the long term. Apart from protecting people, animals and goods, this is also a purely economic necessity. After all, nearly 60% of our country is liable to flooding, including our economic centre. The damage and suffering caused by a flood would be incalculable, which is why the Cabinet wants to forestall a future disaster. Conversely, water shortages are also damaging.

“It shall be the concern of the authorities to keep the country habitable and to protect and improve the environment”

Article 21 of the Constitution

We measure and know that both temperature and sea water levels are rising and that the soil is subsiding more. We expect that wet and dry extremes will increase further. We can already measure that this is the case for precipitation in the Netherlands. That means that we have to improve the defences the Netherlands has against water, especially if we want to be pre-empt a disaster. In addition, current defences are still not entirely up to par.

It was with these objectives in mind that a Delta Programme was established, by means of which, under the direction of the Delta Commissioner, concrete measures and provisions will be prepared. The Cabinet wants the Delta Programme to ensure that the Netherlands remains economically and spatially attractive, to prevent disasters and damage, and to secure the supply of freshwater.

The Delta Programme consists of two parts: realigning current safety and preparing for the future. This way, the Delta Programme links past, present and future. Measures are as flexible as possible, so that changing situations can be optimally anticipated. The integrated approach considers the relationship between water management, the economy, space and nature, ensuring that the Netherlands will remain not only a safe, but also an attractive country. The shared values of solidarity, flexibility and sustainability will guide and unify.

Central to the Delta Programme are the decisions due on our delta's future. These guiding Delta Decisions on flood risk management and freshwater supply in this century should be prepared by 2014. With a view to the interconnectivity of our water system, there are five leading decisions:

1. the standards for flood protection that we have to reassess and bring up-to-date;
2. the freshwater strategy that has to guarantee a sufficient water supply;
3. the long-term water level management of the IJsselmeer;
4. the protection of the Rhine-Meuse Delta;
5. preconditions for the (re)development of built-up areas.

Under the direction of the Delta Commissioner, a large number of stakeholders will prepare these decisions in the Delta Programme. Based on the Delta Commissioner's proposal, the Cabinet has opted for a realistic approach, starting from the "here and now" and using our Dutch common sense, in the knowledge that we have an important duty to fulfil safeguarding our country's future safety and our prosperity.

Status of the Delta Programme

The Delta Programme is a supplement to the national budget. On behalf of the Minister for Agriculture, Nature and Food Quality (*LNV*) and the Minister for Housing, Spatial Planning and the Environment (*VROM*), the coordinating minister, the Minister for Transport, Public Works and Water Management (*VenW*), submits the Delta Programme at the same time as the budgets for the Ministry of Transport, Public Works and Water Management.

The Delta Programme is based on a proposal by the Delta Commissioner, supplemented with the Cabinet's response to it. In the case of this first Delta Programme, this response is focused on the issues to which the Delta Commissioner drew attention in relation to the Delta Programme's progress.

The Delta Programme will be updated annually. Its form will be adjusted to the current situation.

The legal foundation for the Delta Programme is outlined in the draft Delta Act, which also describes the duties and powers of the Delta Commissioner, along with the creation of the Delta Fund. This statutory embedding is essential for a steadfast approach to the long-term tasks that the Netherlands is facing. This act has not been discussed by the Lower House yet. This first Delta Programme is anchored in the decision establishing the Delta Commissioner's tasks and responsibilities, which precedes the act.¹

The National Water Plan (*NWP*) forms the integrated and balanced policy framework for the Delta Programme. The measures taken in the Delta Programme contribute to the implementation of NWP policy in the fields of flood risk management and freshwater supply. The Delta Programme can timetable and prepare policy changes for the next NWP, by way of such measures as the Delta Decisions.

Just like the projects book of the Multi-Year Programme for Infrastructure, Space and Transport (*MIRT*), the Delta Programme is a supplement to the national budget. It comprises measures relating to the physical spatial domain. All implementation-related activities that need to be initiated within the Delta Programme take the MIRT ground rules as their starting point and will be incorporated into the MIRT projects book.

The Delta Programme is about our country's physical safety and freshwater supply. Disaster mitigation is not one of the Delta Commissioner's duties. In the case of a disaster like a dyke breach, national coordination is and remains the responsibility of the Minister for the Interior and Kingdom Relations. It is vital that the Netherlands be well prepared for possible disasters, which the Delta Programme is working on by establishing preventative measures. (See also the concept of multi-layer safety on page 21).

¹ See Netherlands Government Gazette 2010 no. 1574 – 1 February 2010







Our delta

Working on the delta is firstly about flood risk management and freshwater supply. It is, however, also more than that, as it also has vital links with our country's economic, ecological and social developments and opportunities. For this reason, the Delta Programme employs an integrated approach.

The water system: an interconnected whole

Developments in one area influence those in other areas in the Netherlands. The following section describes these interconnections.

Flood risk management

The Netherlands has tens of dyke rings, i.e. areas surrounded by a closed system of primary flood defence systems and high grounds. Depending on the flood risk and potential effects of a flood, particular safety standards apply to the flood defence systems. Updating these safety standards establishes new quality requirements for safety, which then sets the framework for spatial developments in large parts of the Netherlands.

Freshwater supply and water distribution

Along with rainwater, the Meuse and Rhine rivers are the most important freshwater providers. Freshwater supply is a national issue. The water that comes into our country at Lobith and Eijsden can be led to the South-western Delta and the Rhine Estuary via the area around our major rivers, or to the upper part of Noord-Holland or Northeast Groningen via the IJsselmeer, and then flows to the sea via the Nieuwe Waterweg and Haringvliet sluices. There are a range of issues at play in relation to the question of how we want to continue providing our country with sufficient freshwater. For example: to what extent and in what way should we satisfy the needs and requirements of the different uses?

Southwest of the Netherlands, the Rhine estuary and rivers

A large amount of river water is discharged by way of the Rhine estuary. This freshwater current keeps the salt water at bay. Changing river discharges and a rising sea level, however, require long-term measures for the Rhine estuary. These measures are closely linked to the desired developments in the region, the possibilities for the area around the major rivers, and the possibilities for water storage in the southwest of the Netherlands.

IJsselmeer, freshwater and rivers

The IJsselmeer is fed by the IJssel river and is the biggest freshwater basin in the Netherlands. One million people are dependent on the IJsselmeer for their drinking water. There are a total of 3.5 million people living behind the IJsselmeer dykes, who are to be protected against flooding. The question is whether the IJsselmeer should form a bigger freshwater buffer for the Netherlands or whether there are alternative options. As a bigger freshwater buffer, there could be effects on the water level of the IJsselmeer, which would then need to be raised. Safety considerations may also require an increased water level. At higher water levels, gravity drainage to the Wadden Sea is in fact still possible despite rising sea levels. At the end of the day, with no change in water levels, pumping is unavoidable. Choices made regarding the IJsselmeer could have an effect on the water levels in the IJssel Delta and the IJssel river itself.

Coast and Wadden Region

The coastal sand system is connected to that of the South-western Delta and that of the Wadden Sea. Thus, adjustments to the delta have an effect on the system as a whole. Sand replenished on the Noord-Holland coast partially disappears into the Wadden Sea due to the sand demand from large channels and other factors. The future water drainage regime for the IJsselmeer is important to the Wadden region given its influence on the salinity of the Wadden Sea.

Spatial developments

Over the next decade, the Netherlands will see more wide-scale building and restructuring. Regional authorities in the Netherlands are being increasingly confronted with issues about flood risk management and waterlogging, drought, salinisation and subsidence. There is a lack of a cohesive vision concerning the conditions to be used in the development of urban uses in areas with unfavourable physical characteristics. This applies in particular to construction in areas outside the dykes, on or next to flood defence systems or in specific risk areas. This is the second layer of "multi-layer safety", i.e. sustainable spatial planning (see the National Water Plan). A broadly supported vision on a sustainable and future-proof (re)development of built-up areas in conjunction with the water tasks is important for regional development.

Connection of the water systems

Flood risk management and water supply in the Netherlands are not just about measures for the main water system, but also about organising regional water systems. Consequently, the Directorate-General for Public Works and Water Management (*Rijkswaterstaat*) and the water boards are important for the Delta Programme. Regional waters are important for water level management in the polders, storage basins and lakes, the collection and drainage of excess (rain)water in urban and rural areas, the supply and transport of water and the fight against salinisation. It is for this reason that the interaction between the main waters (the major rivers and the IJsselmeer) and the regional ones (the polders, lakes and ditches) is vital for keeping our feet dry, providing water and fighting salinisation. Given this interaction, it is imperative that, in the Delta Programme, decisions on the main water system and the regional water systems always be considered in conjunction. This is done by linking activities from the National Administrative Agreement on Water (*Nationaal Bestuursakkoord Water*) to the Delta Programme's area-based approach.

Interconnectivity

Considering the aforementioned relationships, it is essential that all measures and provisions for safety and availability of water be examined together. The Delta Programme does this in a number of ways, such as with its Delta Decisions and the consistent direction from the Delta Commissioner.

Water and the economy

Water management in our country is primarily about the control and regulation of water to serve the water-related interests of all parties. These include agriculture, industry, the shipping industry, the fishing industry, energy and water supply, water for nature, water to fight against soil settlement, salinisation, etc. The way in which we regulate water management has, however, also influenced the way in which our towns, villages, roads and railways have been built and developed. As a result, the Netherlands' spatial planning and economy are based on this ever-present objectives to keep the country safe and to supply sufficient freshwater.

The Delta Programme is, therefore, particularly relevant to the economic development of our country. It claims that, despite the fact that nearly 60% of this country is liable to flooding, it is still the safest delta in the world, both now and in the future; a message that is as important for domestic investors as it is for foreign ones.

It is also important for regional business owners, primarily medium to small-sized businesses, farmers and the (processing) industry, to know what strategic long-term choices are being made about our country's flood risk management and water supply. They can then attune their strategic business plans to this, a point that is also valid for project developers and the construction business in relevant areas.

The Delta Programme is, however, not only important for business owners, but also for hydraulic engineers, knowledge institutes and engineers represented in the Delta Technology Steering Committee (*stuurgroep deltatechnologie*). They can contribute their expertise to projects and programmes, win commissions by tender and promote innovation. There are also potential benefits for our export position. Water is one of six innovative key areas where the Netherlands plays a leading international role. Overseas governments have already shown great interest in the Delta Programme.

Water, space and nature

There is a close relationship between working on the delta, spatial quality and nature, an important tool for which is integrated area development. This means that we proactively aim to link both the planning and implementation of the Delta Programme's physical measures to tasks in other policy areas. This can be done at a national level, e.g. in the policy document on A Culture of Design, Vision on Architecture and Spatial Design (*Een cultuur van ontwerpen, Visie Architectuur en Ruimtelijk Ontwerp - VROM, OCW, VenW, LNV, 2008*), the collaborative agenda Beautiful Netherlands (*Mooi Nederland - VROM, 2007*), the strategic policy document on Cultural Heritage (*VROM, LNV and OCW 2009*), the Landscape Agenda (*Agenda Landschap - LNV, 2008*) and Peaks in the Delta (*Pieken in de Delta - EZ 2006*), as well as in an area-based manner. What is important here is the social added value that can, for example, take the form of an improvement to spatial quality or a decrease in collective costs by the joint implementation of measures. Key initiatives such as the natural climate buffers coalition (*coalitie voor de natuurlijke klimaatbuffers*) can be helpful in linking safety tasks to the creation of new nature areas.

The Netherlands Environmental Assessment Agency (*Planbureau voor de Leefomgeving*) is currently working on a long-term spatial adaptation strategy for nature and also on a study of more integrated spatial adaptation strategies for the Netherlands that includes an initial overview of the possible directions and consequences of the various Delta Decisions.

This means that the Delta Programme can also include measures and provisions regarding nature, the environment, spatial quality and water quality, as long as they are related to the measures and provisions for water included in the Delta Programme. Furthermore, area-based implementation enables the use of links with regional spatial-economic developments.

Time has already been allocated within the Delta Programme for this integrated approach. Given that we do not need to react to a disaster now, but want to proactively adapt our country to changing circumstances, we can seize the opportunity to optimally link the different interests without losing momentum. Authorities involved can do so by implementing existing spatial policy tools.

It is essential that a combination of various measures in an area lead to a solution that guarantees water supply and safety and is attractive and cost-effective at the same time. In practice, this means that the resources for flood risk management in the forthcoming Delta Fund can be combined with those of other authorities and private parties to achieve the desired integrated developments.

Point of attention Delta Commissioner

In relation to the integrated implementation of the Delta Programme, the Delta Commissioner draws attention to the following: granting permits at a project level can limit speed, efficiency and flexibility (for example, in the case of related measures along rivers or working on the coastline). The Delta Commissioner advises verifying this, using two ongoing programmes, namely the sand replenishment programme and Room for the River, and coming up with solutions that increase speed, efficiency and flexibility.

The Cabinet recognises the problems, but at the same time, acknowledges that, based on European regulations, there is no room for adjustments. This has already been studied. The Cabinet wants to consider what is possible for particular cases within a European framework to overcome this problem as much as possible.





History

The Netherlands has literally been shaped by water, and floods have always been a fact of life. From the early Middle Ages we began protecting our houses and farmland by building dykes and we also began to systematically shape the landscape by draining areas and other measures.

In 1932, after the 1916 storm surge, the biggest intervention in our water system that had taken place up until that point was carried out. Completion of the IJsselmeer dam (*Afsluitdijk*), designed to protect us against flooding, formed the IJsselmeer lake and created the opportunity to reclaim land. After the 1953 flood disaster, new standards were established and a series of dams and storm surge defences were built under the Delta Plan. As a result, the Dutch coastline was shortened by 700 km and the south-western part of the Netherlands changed drastically.

In the past few decades, we have seen that the work on our delta is never done. In the 1990s, river water was dangerously high on a number of occasions and parts of Limburg flooded. In 1995, 250,000 people had to be evacuated because of the threat of dyke breaches. We are also reminded regularly of our great need for water; the summers of 1976 and 2003 were so dry that the economy suffered.

Water problems over the last 200 years

- 1809 Large parts of the middle of the Netherlands in the Meuse, Waal, Merwede and IJssel river areas flooded.
Approx. 200 victims.
- 1820 Large parts of Alblasserwaard flooded, the lock at Gorinchem collapsed. 1,300 km² inundated.
- 1825 Groningen, Friesland and Overijssel hit by serious dyke breaches and flooding. More than 800 dead.
- 1855 The entire Betuwe region, large parts of Noord-Brabant and Gelderland and the area from Rhenen and Wageningen up to Amersfoort and the former Zuiderzee flooded.
- 1906 Zeeland and Flanders hit. No victims, but enormous damage. The highest water level in Vlissingen with the exception of 1953.
- 1916 Dyke breaches at tens of places around the Zuiderzee resulting from a combination of storm surges and high river discharges.
- 1926 Flooding in Limburg because of breached Meuse dykes.
- 1953 Flood disaster in Zeeland, western Noord-Brabant and Zuid-Holland. More than 1,800 dead, 100,000 homeless.
A lot of victims in England, Belgium and Germany as well.
- 1976 Dry summer, significant damage to agriculture.
- 1993 Flooding and threat of dyke breaches due to high water levels in the Meuse and Rhine.
- 1995 Evacuation of 250,000 people from the area around the major rivers due to high water levels. Flooding around the Meuse.
- 2003 Dry summer, significant damage to the economy. Dyke breach in Wilnis (Utrecht), residential area flooded.
- 2006 Most severe storm since 1991 in the northern part of the Netherlands and Germany. Delfzijl water level: 4.83 m above Amsterdam Ordnance Level (NAP), the highest water level for Delfzijl ever recorded.



The 1953 flood disaster



High water in the Rhine 1995



Necessity

First and foremost, we need to ensure that the flood defence systems satisfy the standards. This is already being done by ongoing implementation programmes such as the Flood Protection Programme, Room for the River and Weak Links. Secondly, we need to prepare for the future. What changes await the Netherlands and how can we best prepare ourselves for them?



Organising the basics

It is important that decisions be made on time, so that we can plan investments well and be ready when we need to be. The existing standards, rules and agreements relating to safety, freshwater and spatial planning should be considered to see whether they need to be revised to suit the current Dutch situation. For example, there are more people living in the Netherlands and there is a lot more invested capital here than there was in the 1960s, which is when the current safety standards were established. Such preparations for the future will be reflected in three generic sub-programmes (Safety, Freshwater and New Urban Developments and Restructuring) and six area-based sub-programmes (Rhine Estuary-Drechtsteden, South-western Delta, Rivers, IJsselmeer Region, Wadden Region and Coast) (see Section 5.2).

Figures show that one of the most important points of our water management – protection against flooding – is still not entirely up to scratch. The statutory standards are not being met everywhere. In 2006, the second flood defence systems review showed that 24% of dykes did not meet the legal standard and that for 32% of the dykes it could not be verified with certainty whether the standards were met. In some cases, this was a result of progressive technical insight. A few years ago, for example, it became clear that stone cladding on some seawalls was not as strong as we had first thought. It also transpired that the erosive power of waves was greater than previously assumed. The findings of the third defence systems review will become available in 2011. Ongoing programmes are working on organising the basics (see Section 5.1).

Preparing for the future

² The figures given are taken from the 2006 scenarios from the Royal Netherlands Meteorological Institute (KNMI) with supplementary figures from 2009 ("KNMI 2009, Climate change in the Netherlands, additions to the KNMI '06 scenarios") and "State of the Climate" 2008, unless stated otherwise.

In March 2010, the Council of Ministers asked the Delta Commissioner to examine the basic principles in relation to climate change and the scenarios employed by the second Delta Committee. On what facts and future developments will this Delta Programme be based?

Starting with the 2006 scenarios from the Royal Netherlands Meteorological Institute (KNMI), the second Delta Committee (2008) had supplementary research carried out to get an idea of the plausible upper limit of the possible rise in sea level. One aim of this additional research was to find out whether, assuming the most extreme scenario, the Netherlands would remain inhabitable in the future, i.e. from 2100 onwards. The answer to that question was, yes, it would, but only on condition that we start preparing for the future in time.

This Delta Programme (2011) is starting off with the here and now and heading towards the future, which is why, at the Delta Commissioner's suggestion, the Cabinet is basing its Delta Programme on measurements and the KNMI 2006 scenarios. The scenarios are being used to highlight how much longer current policy and management are expected to suffice and when adjustments will be required. In other words, the so-called tipping points (see page 36).

Measurements²

According to observational date, the climate is changing; it has become warmer and wetter, and the sea level has risen.

Warmer:

Between 1900 and 2005, the average annual temperature in our country rose by 1.7°C.

January - December temperature CNT

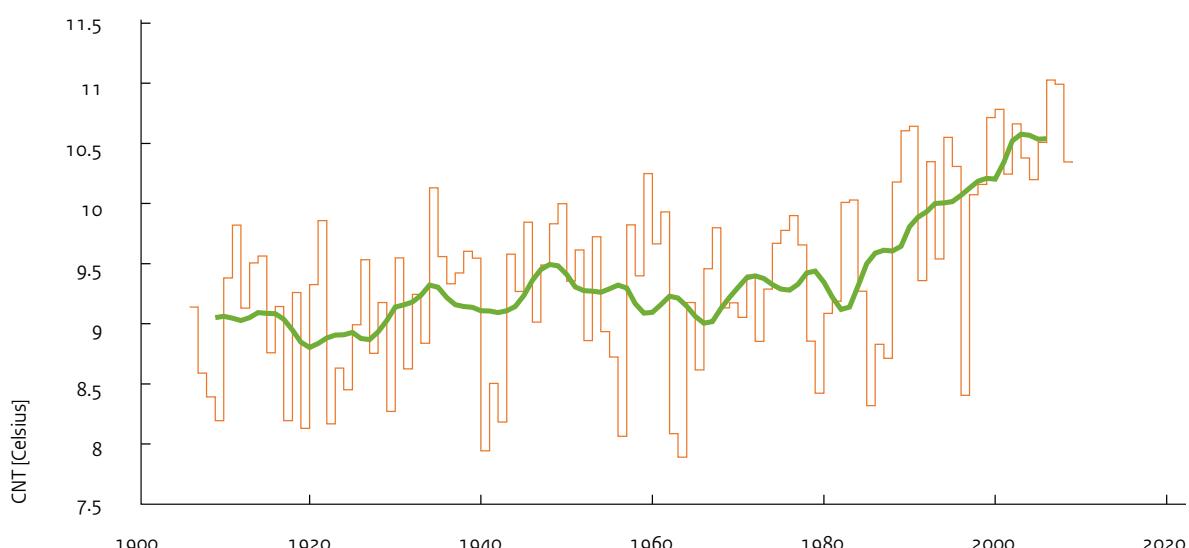


Figure 1: Average annual temperature from De Bilt and surrounding area between 1900 and 2009. The green line indicates a progressive 30-year average.

Drier:

Drought arises when there is insufficient water of a sufficient quality to meet demand. Demand from agriculture increases during a period of high temperature with its related evaporation. In these circumstances, a higher water temperature and a low river discharge can lead to a decreased cooling capacity of power stations. A low river discharge also leads to higher levels of chloride in surface and groundwater, and to a decreasing suitability for use in agriculture and horticulture.

Although the water shortages in 2003 and 2006 were not extreme, they did cause economic damage and social upset. Water shortages in 2003 led to losses in the agricultural sector of about €1 billion, which is approx. €0.5 billion more than normal (and accepted) during a dry summer³. Other sectors such as shipping and industry also experienced losses.

Wetter:

Average precipitation in the Netherlands increased by 18% between 1906 and 2005. Furthermore, what is notable is the increase in precipitation on the coastal belt in the autumn and the hour intensity of summer downpours. The increase in precipitation in the winter over a number of consecutive days is of special importance to the Rhine discharge. The highest 10-day precipitation total between 1906 and 2005 increased by 29%.

³ Oosterbaan, L. (2004) Report on the Oost Nederland round-table meeting, 10 February 2004; Drought Study, The Netherlands phase 2, Institute for Inland Water Management and Wastewater Treatment (RIZA), Lelystad.

January - December average precipitation from 13 stations

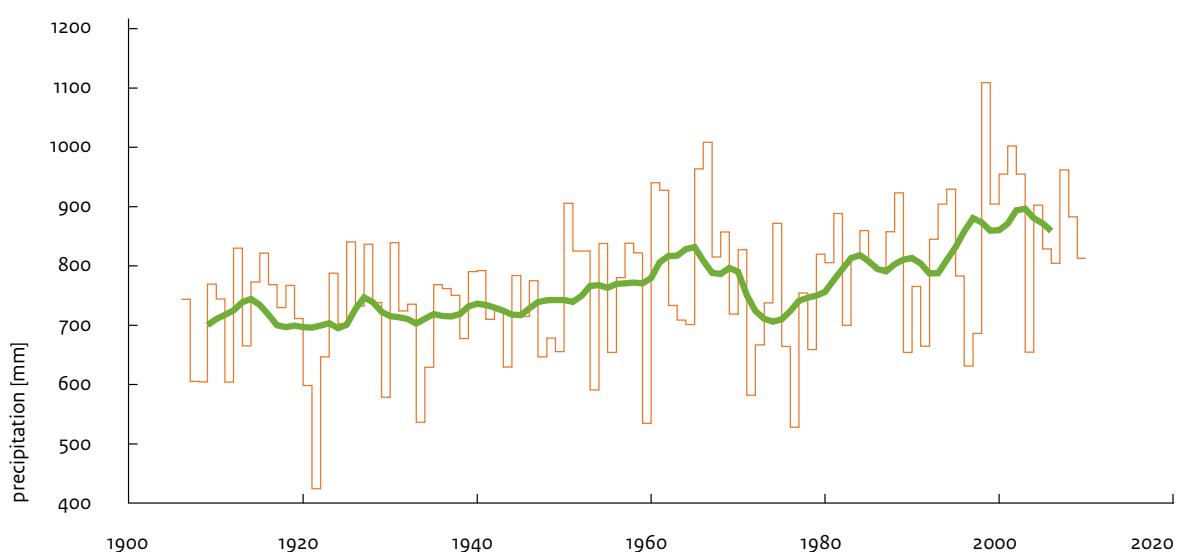


Figure 2: Annual precipitation in the Netherlands (average from 13 stations) between 1906 and 2009.
The green line indicates a progressive 30-year average.

⁴ The changes mentioned are based on the KNMI 2006 scenarios, unless stated otherwise.

Rising sea levels

Since 1900, the sea level of the North Sea has risen by 19 cm, an average of 1.9 mm a year (see figure 3). This is comparable to the global average.

Subsidence

Relative to rising sea levels, the total effect on the Dutch coast is greater because of the subsidence that has occurred. Depending on location, subsidence in the Netherlands in the twentieth century totalled, on average, between 0 and 4 mm per year.

Effective monitoring is vital given the importance of reasoning from the here and now to the future and the need to remain alert to indications that climate change is happening faster or slower than previously expected. The Delta Commissioner assumes that the monitoring network for this is in order.

Future developments

In the future it will become warmer, drier and wetter and sea levels will rise⁴. The amount and rate at which climate change will persist and its consequences are, however, shrouded in uncertainty. How quickly will sea levels and river discharges rise, how much warmer will it become, how much drier will the summers be and how much lower will river discharges be during that season?

To gain some sort of insight into these developments, climate scenarios will be used. In 2006, the KNMI presented four scenarios that together summarised the most likely developments in the Dutch climate. These climate scenarios are regularly updated by the KNMI using the latest information. From the mid-term review carried out in 2009, "Climate change in the Netherlands, additions to the KNMI '06 scenarios" ("Klimaatverandering in Nederland, aanvullingen op de KNMI '06 scenario's") and according to current insights, it appears that even with the related uncertainties, the four KNMI 2006 scenarios together still best describe the most likely changes in the Netherlands.

January - December Sealevel Hoek van Holland (150051)

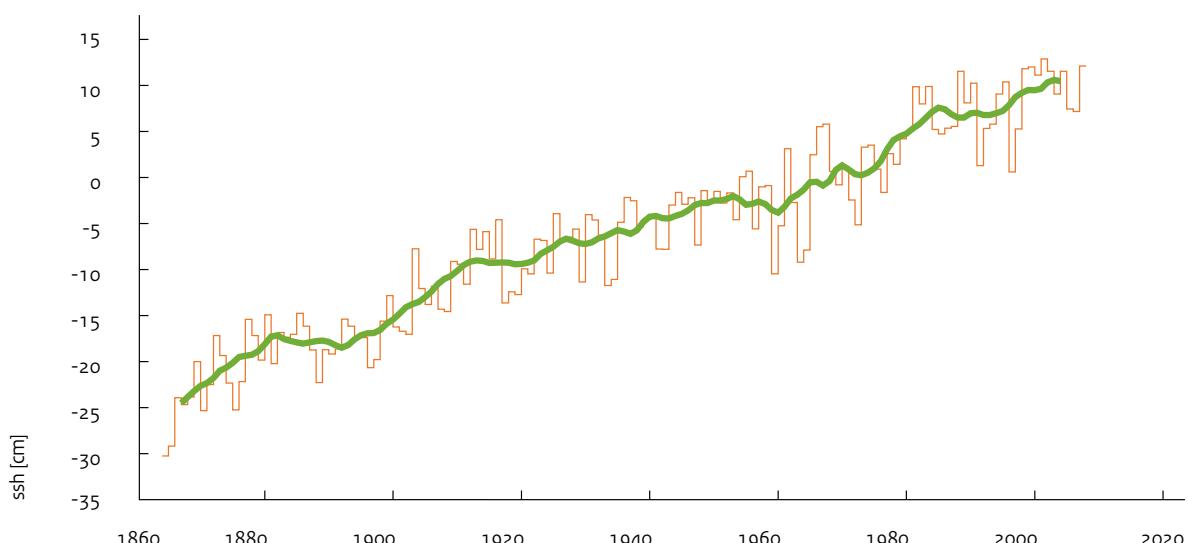


Figure 3: Average sea levels at Hoek van Holland between 1865 and 2007, including subsidence. The green line indicates a progressive 30-year average in the observational data.

- In the long term, the KNMI expects a sea level rise between 35 and 85 cm by 2100 (compared with 1990). This is the most likely range.
- Temperatures will continue to rise. How much exactly is uncertain, but according to the KNMI 2006 scenarios, it will be between 2 and 4°C globally by 2100. The 2009 mid-term review shows that, compared with the global average, temperatures in the Netherlands are rising relatively fast.
- In our region we can also expect sustained periods of heavy precipitation in the winter and more intense peak precipitation from heavy downpours in the summer. Based on the 2009 mid-term review, it is reasonable to say that the regional differences in extreme precipitation in the Netherlands will increase in the future.
- Changes in temperature and precipitation can lead to a different discharge regime for our rivers, with increased discharge during the winter and decreased discharge during the summer. The National Water Plan (2009) assumes a design discharge of 18,000 for the Rhine and 4,600 m³/s for the Meuse for 2100. At the same time, we should take into consideration the possibility of more frequent dry periods resulting from less precipitation and higher temperatures. A combination of rising sea levels and low river discharges can push salty seawater further inland up a river. An increase in saltwater seepage is also expected. According to the most extreme KNMI scenario, by 2100 an average year may experience a drought comparable to that of 1976, the driest year of the last few decades.

In 2013, the KNMI 2006 scenarios will be reassessed, which will be relevant to the Delta Decisions that are due in 2014.

A second group of scenarios is relevant for the Delta Programme: scenarios for the socio-economic and demographic development from the Assessment Agencies (*Planbureaus*), the so-called Prosperity and Quality of the Living Environment (*WLO*) scenarios and their re-evaluation. How quickly will the population grow or decline? Will we enjoy large-scale or small-scale economic growth? The range in these scenarios is very wide, especially when looking ahead more than a few decades.

Point of attention Delta Commissioner

It is important for the Delta Programme that global climate scenarios be considered from a Dutch perspective. For the intended decision-making, it would be advisable if these scenarios were more or less ready by 2012. It is also important that the basic principles behind the climate scenarios be consistent with the scenarios formulated for socio-economic development (CPB, PBL). The Delta Commissioner will encourage institutes involved to harmonise their efforts.

Working with tipping points

Scenarios are not meant to predict the future, but they do make uncertainties visible and provide an idea of possible developments that should be taken into consideration for political decision-making. In addition, scenarios can serve as a way to chart the tenability and relevance of current policy. It is not the exact figures for rising sea levels that matter as much as the question of whether or not our current water management and water policy are still satisfactory for the changing climate and if so, for how long. In other words, when will we reach the tipping points for our water system? These tipping points are of great importance to our Delta Programme. Once the *tipping points* are clear, you can determine how best to anticipate them (see also Section 5.3).

Some tipping points have almost been reached, one example of which is water temperature. According to KNMI findings (2009 State of the Climate), summer temperatures have increased over the last thirty years. This increase in temperature is also reflected in water temperatures, the consequences of which are changing ecosystems and the availability of less cooling capacity. In the meantime, the sector has already reacted to this news by planning new power stations in locations where there is a greater cooling capacity – on the coast.

Another example of a tipping point is the water level management of the IJsselmeer. A strategy of gravity drainage is now being used here, which is a sustainable way of using gravity. Excess water originating from the IJssel and surrounding water boards is drained off into the Wadden Sea during ebb tide, when the sea level is lower than that of the IJsselmeer. The water then flows out freely. As the sea level rises, this will become more difficult. In order to still be able to drain off sufficient water from the IJsselmeer, extra drainage capacity is being created. However, should the sea level rise by a further 25 cm, gravity drainage will be practically impossible at current IJsselmeer level. The water levels of both the IJsselmeer and the Wadden Sea will then be nearly the same and the tipping point for this strategy will have been reached.

At the Nieuwe Waterweg, salty seawater is being pushed further inland due to rising sea levels and reduced river discharge in the summer. This could jeopardise the freshwater supply of a large area between the Rhine Estuary, the Amsterdam-Rijnkanaal and the Noordzeekanaal (in the midwest of the Netherlands) from 2050 onwards. The freshwater inlet at Gouda plays a crucial role in this. The total national distribution of water will be under debate, meaning that another tipping point will have been reached.

One final example of a tipping point can be found in the lower reaches area. Current safety strategies are based on giving the river more room and a movable defence system (the Maeslantkering storm surge barrier). Extreme river discharges in the winter are expected to increase, while the sea level rises. Both developments are present in all climate scenarios, with only a difference in the pace at which they happen. After 2050, the current strategy to keep the lower reaches area safe will probably no longer be effective.

The tipping points for the effects on built-up areas – flooding, heat stress and drought – are of an entirely different nature. These problems are not only worsening because of a changing climate, but also because of a continuous increase in building density. Technical modifications to existing infrastructure, such as sewerage systems, require increasingly more expensive and more complex interventions in a very busy environment. At some point in time, regular modifications will no longer suffice. The tipping point will be different for each area. This means that there are regional and local tipping points, which are also related to the social acceptance of increased waterlogging and damage and the willingness to bear the increasing social costs for these technical solutions.

In conclusion

The ‘tipping points’ are central to the Delta Programme’s research work, from which the so-called Delta Decisions will follow. These decisions will provide structure for the programme, as they will be political choices that determine the future of our delta. In 2014, the Delta Commissioner will make proposals that may shape the future direction.







Approach

The Delta Programme's approach is innovative, down-to-earth and ambitious. It is a national programme involving a collaboration of the national government, provinces, municipalities and water boards, with contributions from social organisations. Guiding principle is the collective interest of long-term flood risk management and sound freshwater supply for the Netherlands achieved in an attractive manner using an integrated approach. The programme puts the concept of multi-level governance into practice, given that it combines national tasks with area-based implementation and links national responsibilities with those of the provinces, water boards and municipalities. These represent the importance and added value of a national programme.

4.1

Shared values and basic principles

The Delta Programme's shared values are values that unite the parties involved. They can serve as beacons for the many choices that need to be made during the process from initial exploration to the implementation of large-scale projects (National Water Plan, 2009). These shared values are *solidarity, flexibility and sustainability*.

As a shared value, *solidarity* is about the distribution of the benefits and drawbacks of the measures selected over:

- Generations: cost distribution over time;
- Areas: a distribution of the effects that choices with a certain area have on neighbouring areas;
- Sectors: a distribution of the effects of choices across sectors.

Flexibility as a shared value is about having the space needed to be able to anticipate climate change and changing socio-economic developments and to implement innovative methods. "Looking ahead is crucial, but it must not be translated into a final scenario that is nailed to the distant horizon." (National Water Plan).

Sustainability as a value applies to both the programme as a whole and its implementation. The Delta Programme itself contributes considerably to the sustainable spatial development of the Netherlands, while its implementation is based on the standard classification of people, planet and profit. The implementation of the people component is focused on active local commitment to the Delta Programme's objectives and activities. The planet component is principally focused on the quality of the physical living environment, while implementation of the profit component is primarily aimed at opportunities for local business communities and the possibilities of showcasing the Netherlands at an international level by facilitating, encouraging and adopting innovative methods.

In addition to these shared values, the Programme has established a uniform set of basic principles: *interconnectivity, consistency and transparency*. Defining and guaranteeing these basic principles forges the activities that are part of the Delta Programme into one logical whole, thus contributing to the efficiency and recognisability of the Delta Programme.

4.2

Delta Decisions

Central to this Delta Programme are the decisions due on our future. Long-term Delta Decisions play a special role in this to determine a long-term direction, on the one hand, and to create the room needed to anticipate future developments, on the other. These are far-reaching interventions, the economic and spatial consequences are great and many citizens, businesses and social groups will be affected by them. Five decisions are leading.

Developments are interconnected, which is why it is important to make strategic political decisions for various areas in conjunction and at the same time. Prior to the Delta Decisions being made, careful research should be carried out on the interdependence and effects of and on other decisions. Under the direction of the Delta Commissioner, the decisions will be prepared in and with the sub-programmes (see Chapter 5). As a result, the Delta Commissioner can advise the Cabinet to introduce these decisions into the National Water Plan, for example. In addition, he can advise provinces and municipalities involved to include them in their framework visions and water boards to include them in their water management plans. This means that the proposal for the Delta Decisions must be ready by 2014 to be introduced into the draft 2015 National Water Plan, which will then be subject to public consultation.

Assignment Delta Commissioner

To be able to present well-prepared proposals for the five Delta Decisions in the 2014 Delta Programme, the state of affairs for each decision will be evaluated annually as part of the Delta Programme. The Delta Commissioner will finalise the logistics and preparation for the Delta Decisions in 2011 bearing in mind the content, time, administrative, legal and financial aspects. This will also be reported on in the second Delta Programme. Section 5.4. contains a concise overview of the preparations for the decisions.

The five Delta Decisions are as follows:

1. Safety standards for primary flood defence systems

In 2011, the Minister for Transport, Public Works and Water Management will propose a decision in principle on updating the safety standards for primary flood defence systems. These standards determine safety levels in the Netherlands and create a framework for the measures within the sub-programmes. It is important, therefore, that a decision in principle be made in 2011 so that plans for measures in the various sub-programmes can be based on this. What effects the basic standards will have on the regions will be worked out after 2011.

Point of attention Delta Commissioner

Under the terms of the National Water Plan, the safety standards will be legally embedded in 2017. To ensure cohesion in the decision-making about the Delta Programme as a whole, the Delta Commissioner draws attention to the fact that it is important that a final decision on the new standards already be made in 2014 – not in 2017 – in conjunction with other decisions. The Cabinet endorses the importance of establishing for flood protection standards earlier, but its final point of view on the matter is dependent on the mid-term results from the Safety sub-programme, in which the carefulness and feasibility of this accelerated adoption of standards are central.

2. Preferred water supply strategy

In 2014, a proposal will be made for a decision on a preferred strategy for the long-term water supply in the Netherlands, including infrastructure measures. Possible questions related to this are: whether regions can be expected to be self-sufficient and if so, to what extent; whether more resistance will be offered to the advancing salt water; whether different land use or some form of pricing water introduced to regulate freshwater supply will be accepted. Water level management of the IJsselmeer is relevant to this.

3. Long-term water level management of the IJsselmeer.

In 2014, a proposal will be made for a decision on the long-term water level management in the IJsselmeer in relation to water supply in the Netherlands and the safety tasks in the area. Water level management is linked to the Zwarde Water and IJssel rivers and the Wadden Sea, and to a large area that depends on the IJsselmeer for its freshwater. Therefore, it is directly related to the Freshwater sub-programme.

4. Protecting the Rhine-Meuse Delta

In 2014, a proposal will be made for a decision regarding the long-term protection of the Rhine-Meuse Delta. This area is characterised by its large population and sizeable invested capital. Based on the expected rise in sea levels and increased extreme river discharges, long-term solutions for flood risk management and freshwater supply will be developed in synergy with the sustainable and vital spatial development of the area. Interaction with the other sub-programmes will be significant, especially with the South-western Delta, Rivers, Safety and Freshwater ones. There is also a need for clarity regarding the spatial developments and investments in the area itself.

5. Policy-changing tools for New Urban Developments and Restructuring

At the end of 2013, a national policy framework will present proposals for generic and area-based pre-conditions and tools for (re)developing built-up areas. The proposals will relate to controlling the risks of flooding, drought and salinisation that accompany the new construction and restructuring of built-up areas. In addition, the following issues will be addressed: dealing with the effects of subsidence, the particular characteristics of peat and clay areas, and preventing heat stress. The relationship with other sub-programmes emerges primarily in the aspects of building safely and “damage-free” in areas inside and outside the dykes, building in and around flood defence systems and within spatial reservations for river widening or (fresh) water storage, for example.

4.3

Collaborating on knowledge and innovation

The Delta Programme provides for the joint development of knowledge over the next few years to prepare for decision-making. As part of this, alternative and innovative solutions will also be explored. A collective approach to developing knowledge increases the quality and the support base of the solutions, which is why, in the Delta Programme, considerable importance is attached to such methods as joint fact-finding. The aim of joint fact-finding is to optimise the collection and use of knowledge from all stakeholders and to create a broad support base for newly generated knowledge.

The knowledge needed for decision-making should be ready on time, which is why, in close consultation with the departments involved, clear agreements will be made regarding contributions from the most important knowledge institutes (e.g. Deltares, Alterra, the Netherlands Environmental Assessment Agency, KNMI, StoWa, the Water department of the Directorate-General for Public Works and Water Management) to generating that knowledge.

As part of the Economic Structure Enhancement Fund programme (FES-programma) “Knowledge for Climate” (“Kennis voor Klimaat”) agreements are being prepared for harmonisation of the supply and demand of knowledge in the Delta Programme. A link is established with implementation of the Social Innovation Agenda for Water (Maatschappelijke Innovatie Agenda Water, MIAW). A joint venture of the most involved knowledge institutes and programmes will highlight what part of the required knowledge is already available. In addition, methods will be developed to greatly improve access to the knowledge developed.

Uniformity in generating and comparing possible sets of measures is key to developing a coherent set of solutions. It is for this reason that a set of scenarios is being developed that will be used for all research in the Delta Programme, along with a consideration system to be able to compare all the solutions and a “Delta model” to carry out (some of) the underlying calculations. A short explanation is included in appendix 1.

Specific characteristics of the Delta Programme include its focus on the long term, the resultant uncertainties, the pursuit of integrated solutions, and interconnectivity. In uncertain situations, “guiding principles” and clear starting points are of particular importance (see Section 4.1), which is why further development of the shared values and basic principles is high on the knowledge agenda.

Existing economic analyses are not very helpful for a long-term focus because the “benefits” of these measures tend to evaporate over time. Capturing the added value of an integrated approach and an evaluation of measures in their interconnectivity is also not easy to do because of this. For this reason, a study involving renowned institutes is being carried out into existing and potential economic analysis methods that do justice to these characteristics during the preparations for decision-making. How the Delta Programme’s desired integrated approach can be worked out in more detail will also be addressed. The next Delta Programme will report on the findings of these exploratory studies.

As announced in the National Water Plan, authorities, knowledge institutes and the business sector are working on a proposal to improve the way in which knowledge development and innovation are managed. This can further increase the utilisation rate of the knowledge developed and the success rate of the innovations. The Delta Programme is also committed to strengthening the relationship between knowledge and innovation. Along with water technology and maritime technology, delta technology belongs to the Key Area Water, one of the six innovative key areas in which the Netherlands plays a leading international role. Innovation is, therefore, doubly beneficial given that it not only serves the needs of the Delta Programme, but also stimulates the Dutch economy. Innovation is in line with the Delta Programme's shared values and can benefit working more efficiently and cost-effectively. The sub-programmes pay attention to various innovative projects, such as the air-bubble screen to separate salt water and freshwater or the development of electronic dyke monitoring and inspection.

In the interest of sound collaboration, the Delta Commissioner has taken great interest in the Rotterdam National Water Centre (NWC) initiative and is curious about its further development.

When tendering research questions and projects, there will be active interest in innovative solutions, related methods employed by the authorities and knowledge institutes, and the right incentives for market parties. Businesses are, after all, important suppliers of the innovative solutions that are needed, and should, therefore, be involved at the earliest possible stage. The aim is to maximise the exchange of knowledge and experience and employ a uniform way of working in relation to public-private partnerships.

Point of attention Delta Commissioner

The Delta Commissioner draws attention to the fact that many knowledge questions have been formulated when developing the Delta Programme's sub-programmes that need to be tackled together. Knowledge that is already available or being developed should be used as much as possible. Together with the parties involved, the Delta Commissioner wants to actively draw up and maintain this knowledge agenda and programming, thereby stimulating collaboration in the management of existing research budgets. Furthermore, it is crucial that innovative solutions be developed that are socially acceptable. It is essential to create room for experimentation. The Delta Programme will therefore connect fundamental and strategic research, as well as applying it in trials. The business sector will be closely involved in this. The resulting K&I programme will, therefore, not only yield knowledge and innovation to tackle the Dutch Delta, but it will also showcase the Netherlands to the world. The Cabinet supports the ambitions formulated.

4.4 Direction, organisation and social participation

Five Ds

⁵ Until that time, these means fall under the Infrastructure Fund and the budgets from the LNV and VROM ministries.

Under the terms of the draft Delta Act, the Cabinet will submit, on the Delta Commissioner's proposal, the Delta Programme to Parliament every year as part of the national budget. It gives prominence to the so-called Delta Decisions that provide the interconnectivity of and link with the Delta Programme. After the Delta Act has been adopted and comes into effect, the Delta Fund will provide the means to implement the Delta Programme, together with the budgets of the Ministry of Agriculture, Nature and Food Quality and the Ministry of Housing, Spatial Planning and the Environment and those of other authorities.⁵ Using these five Ds, the Cabinet is providing proactive direction in the long term.

Collaboration between the national government, provinces, water boards and municipalities

The Minister for Transport, Public Works and Water Management is the coordinating member of the administration for the Delta Programme. The Minister for Housing, Spatial Planning and the Environment and the Minister for Agriculture, Nature and Food Quality are co-responsible for the Delta Programme as a whole and the nine separate sub-programmes. Provinces, water boards and municipalities can act as joint patrons for the area-based sub-programmes. The direction of and responsibility for area-based developments, with special emphasis on spatial planning, rests with the provinces together with other authorities in that area.

A harmonious collaboration between the national government, the provinces, water boards and municipalities is essential for the success of the Delta Programme, as it will significantly increase quality and feasibility. The same applies to linking tasks relating to flood risk management and freshwater supply with those in other policy areas. The essence of programme direction is, therefore, about joining forces, collecting facts together, working out options and reaching clear agreements about who does what. Leading in this respect are the responsibilities of the various administrative layers, as described in the National Water Plan.

Area-based

Previously adopted national and regional policy documents have been translated into agendas specific to each area. Serving to highlight the opportunities for integration, they are important for the Delta Programme.

The interaction between the national government and the region is clearly reflected in the organisation, both at the operational and at the administrative level. Programme organisations in the region are staffed by employees from various stakeholder organisations. The area-based sub-programmes have a regional steering committee representing the water boards, provinces, municipalities and the national government. The regional contribution to the generic sub-programmes is organised by way of customisation. This area-based approach enables the review of national objectives for safety and water supply in an area-based and customised way, as well as highlighting the opportunities for an integrated approach that can be implemented now or in the future. Existing consultative frameworks will be used as much as possible. In due course, the MIRT Administrative Consultation Committees will be used for the administrative consultations of the area-based sub-programmes within the Delta Programme.

The Delta Commissioner's role

Interconnectivity is key to this programme and an important role has been set aside for the Delta Programme's Government Commissioner. He plays a central role in the trinity of politics, administration and society. He encourages consultation with stakeholders and safeguards the progress of implementing the Delta Programme. If he comes across certain issues in his work on the delta, he can timetable these and draw attention to them. Two separate consultation committees have been established for the Delta Programme as a whole, which will form a balanced representation of the national government, provinces, water boards and municipalities. These committees are the Delta Programme Steering Committee for agreement on content, which is chaired by the Delta Commissioner, and the National Water Consultation Committee, chaired by the Minister for Transport, Public Works and Water Management and comprising the Delta Commissioner and the Minister for Agriculture, Nature and Food Quality and the Minister for Housing, Spatial Planning and the Environment. These committees align the administrative decision-making on the Delta Programme.

Assignment Delta Commissioner

On behalf of the new Cabinet, the Delta Commissioner evaluates the organisation of the Delta Programme on the basis of his first year and considers whether the Delta Programme can be organised more efficiently, and if so, how. This will be part of his May 2011 report on the progress of the Delta Programme and the second Delta Programme.

Social participation

Contributions from social organisations will clarify at an early stage whether and how objectives relating to flood risk management and freshwater supply can be linked to ambitions in the areas of nature, the environment, spatial development and quality, and regional economic developments. Furthermore, knowledge, experience and views from these organisations are highlighted in a timely fashion and there is room for alternative and innovative approaches to selecting and developing measures. For this reason, "the environment" will be involved in Delta Programme proceedings from a very early stage. Social participation will be customised and both citizens and businesses can be involved. In addition to the statutory (public consultation) procedures, participation has been formalised in the OVW, a consultative body for transport and water management, and in regional consultation platforms. There is ample room for ad-hoc meetings, e.g. sessions focused on joint design, in which there is full potential for finding common ground and bridging gaps.

External advice

External advice that offers an independent view from outside the Delta Programme is also important. The Council for the Environment and Infrastructure (in the process of being established) (*Raad voor de Leefomgeving en Infrastructuur in oprichting*) advises on medium-term policy for a wide range of subjects such as space, nature, mobility and water. A specific advisory role for the Delta Programme will be discussed with the Advisory Committee on Water (*Adviescommissie Water - AcW*). Updating policy, implementation and innovation, along with knowledge and science are all relevant fields for external advice.

Faster & Better

In spring 2008, the Elverding Committee (Faster & Better) advised the Minister for Housing, Spatial Planning and the Environment and the Minister for Transport, Public Works and Water Management on how infrastructure projects could be completed faster as a result of a better decision-making process. There is widespread agreement that Faster & Better will be used for the Delta Programme as a whole. The Delta Programme administration, organisation and method have been established in such a way that issues can be examined broadly and in an integrated way without having predetermined choices. Overall analyses and broad participation from immediate stakeholders are essential from the outset. Using joint fact-finding as a way of working, the Delta Programme's knowledge process will be organised in such a way that it facilitates Faster & Better.

Relationship with the Multi-Year Programme for Infrastructure, Space and Transport (MIRT)

The Delta Programme will contain measures relating to the spatial physical domain. All implementation-related activities that are due to be launched as part of the Delta Programme will use the MIRT ground rules as their starting point. This means transparent staging with clear decision moments. As regards the preparations for long-term decisions, this primarily concerns the element MIRT Study. A MIRT Study does not lead directly to a concrete decision to invest, but will usually lead to a more comprehensive elaboration of the agenda for an area or to fine-tuning or revising policy, legislation or standards. After decision-making, a MIRT Study, or parts thereof, can also lead to an initial decision for a study per sector or across the board. The MIRT administrative consultation committee and the National Water Consultation Committee (NBO) will discuss the MIRT Studies that will be initiated as part of the Delta Programme.

International

It goes without saying that there will be close collaboration with our neighbouring countries in the river basins of the Scheldt, Meuse, Rhine and Eems, along with the European Directive on the assessment and management of flood risks (EU ROR). This will happen in the programme organisations and in the regular international consultations and committees. Where necessary, the Delta Commissioner will keep in touch with these consultations via the Ministry of Transport, Public Works and Water Management. The importance of European legislation and regulations is evident to the Delta Programme. Relevant recommendations by the Delta Commissioner will be prepared together with the departments involved and through the department responsible in Brussels.

The recent past has shown that the Netherlands is no exception where flooding is concerned. Countries close to ours have seen floods even in this year: France in March and June, Poland in May, Slovakia and Hungary in June.

Point of attention Delta Commissioner

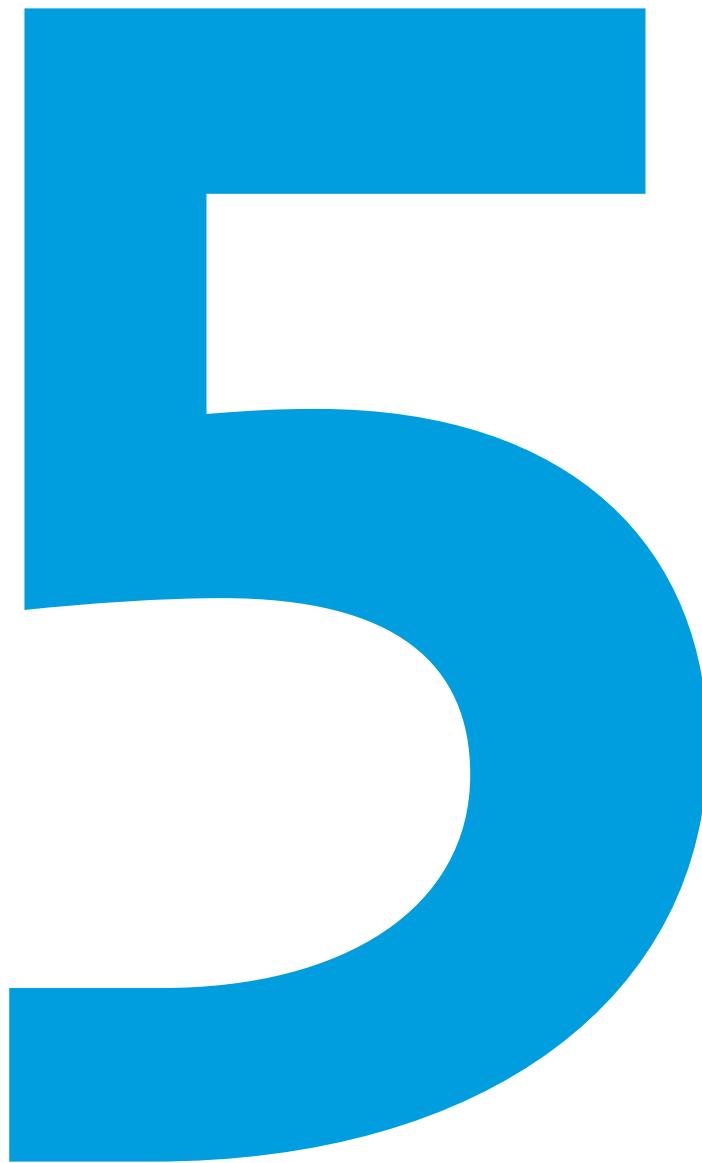
The Delta Commissioner advises the next Cabinet to keep in mind the dynamics of the climate and the effects thereof on flood risk management and freshwater supply when re-evaluating the objectives of European guidelines in the European Commission's White Paper on adapting to climate change. There is already European agreement on this in the Water Framework Directive (KRW) and this may be considered for Natura 2000 in 2015. In addition, the Delta Commissioner draws attention to the fact that European directives on habitat, water quality (KRW) and flood risk management (EU ROR) were drawn up independently. The Delta Commissioner proposes that it be investigated to what extent this juxtaposition could result in difficulties in achieving flood risk management objectives.

The Cabinet recognises the problem that is indicated in the first part and will endeavour to attend to the indicated problem when re-evaluating European directives, in conformance with the White Paper on adapting to climate change. A re-evaluation of Natura 2000 is, however, not expected before 2015. In addition, the Cabinet will take into consideration the Delta Commissioner's proposal in relation to the juxtaposition of directives as pointed out in the second part.









Implementation

The Delta Programme is about now and the future. The now is about organising safety, the future relates to verifying whether and how existing agreements on flood risk management, freshwater supply and spatial developments should be updated, while ensuring a liveable and attractive Netherlands in the long run and considering the effects of climate change.

5.1

Ongoing implementation programmes and projects – short term

These two parts have been translated into ongoing short-term implementation programmes and nine sub-programmes to prepare for the future.

Ongoing implementation programmes should be carried out energetically. Although part of the Delta Programme, they are separately managed, organised and financed. The Delta Commissioner will advise whenever there are issues that could have a long-term effect or whenever this is explicitly requested by members of the Cabinet or stakeholders, such as the request for advice regarding the Kierbesluit Haringvliet (decision to leave the Haringvliet sluices ajar). Section 5.1 contains a brief overview of the ongoing programmes.

Over the next 4 years, the Delta Programme's sub-programmes will focus on research and preparation for decision-making in the context of broad administrative and social participation. Section 5.2 gives an outline of each sub-programme.

Linking the Delta Programme's short- and long-term aspects is both essential and new. It is facilitated by the development of an adaptation strategy under the leadership of the Delta Commissioner. Section 5.3 addresses this.

Flood Protection Programme:

This programme consists of 92 improvement measures. Thirty-one projects have already been completed, 18 are being implemented, 40 are at the plan study stage, 2 are at the pre-plan study stage and 1 has been deferred. As things stand, it appears that the majority of the projects will be completed before 2015. Five projects will be completed after 2015.

IJsselmeer dam (Afsluitdijk)

The IJsselmeer dam was condemned in 2006 based on current statutory safety standards. The Cabinet intends to make a decision in 2011 about the future reinforcement and multi-functional organisation of the IJsselmeer dam. In compliance with the MIRT ground rules, this will be done by way of a preferred decision in the form of a strategic policy document. The IJsselmeer dam is part of the Flood Protection Programme and the project will be aligned with the Delta Programme's IJsselmeer Region and Wadden Region sub-programmes.

Weak Links

Six of the eight priority weak links are already being implemented or have been completed.

Point of attention Delta Commissioner

The Delta Commissioner draws attention to the fact that no start has been made with reinforcement of the last two priority weak links on the coast (Hondsbossche and Pettemer seawall and the Kop van Noord-Holland). He advises doing so quickly. He advises the relevant ministers to opt for a (modest) sandy/hybrid solution for the weak links, if possible using the (remaining) budget. This complies with current coastal reinforcement policy and the intended adaptive approach within the Delta Programme, which is based on the retention of sand and its unhindered transport, the use of as many sand measures as possible, and the use of solid constructions only when absolutely necessary.

The Cabinet underlines that improvements to the primary flood defence systems should be tackled dynamically so that they are organised by 2015. This also applies to the reinforcement of the two priority weak links in Noord-Holland. The sandy/hybrid solution suggested by the water board and the province is a sustainable and robust solution to improve safety. There is a lot of support for this solution in the region, which also contributes to improving the spatial quality of the area. A sandy solution is, therefore, the obvious choice. However, reinforcement using sand is also an expensive solution. There are distinct opportunities to make cutbacks in the plan, which are also necessary to remain within the task-specific budget. In these financially challenging times, the Cabinet wants these cutbacks to be thoroughly investigated before it makes a decision on the proposed solution.

Room for the River

The Room for the River key planning decision for the Rhine tributaries comprises a cohesive set of 39 measures necessary to ensure that they meet the legally established protection level of a 16,000 m³/s river discharge at Lobith in 2015. Its second objective is to improve the spatial quality of the area around the major rivers. When required, this will be aligned with the Delta Programme's Rivers sub-programme.

Meuse Projects

"The Meuse Projects" were initiated as a result of the flooding in the Meuse Valley in 1993 and 1995. They consist of 52 projects in the Zandmaas and the Grensmaas areas and have the following objectives: flood protection, fulfilling nature objectives and extracting minerals. In addition, the "Maasroute" project aims to make improvements for the shipping industry. Once the Meuse Projects have been completed, a supplementary task remains that aims to bring the entire Meuse Valley region up to the agreed safety levels, for which a supplementary programme will be drafted. Long-term tasks in the Meuse Valley will be devised within the framework of the Delta Programme.

Sand replenishment and the sand motor

Sand replenishment volumes will need to be increased to keep up with current rising sea levels. This will be done by way of an innovative strategy with a different programming approach, namely the sand motor. The sand motor is a pilot programme that is experimenting with a new way of depositing a large surplus of sand that maximises the use of a natural distribution of sediment, which in turn works out as being more ecologically beneficial. Furthermore, the opportunities to develop nature and recreational areas are also being utilised. The aim is to start implementation in December 2010.

South-western Delta implementation programme

The South-western Delta implementation programme includes a number of measures for the short and medium term designed to fulfil the objective of creating a safe, resilient and vital delta. The short-term projects include Haringvliet - De Kier, restoring nature in and widening the shipping channel of the Westerschelde, improving the quality of the Volkerak-Zoommeer lake, and the sand demand of the Oosterschelde.

5.2 Delta Programme sub-programmes – long term

The main features of the generic and the area-based sub-programmes outlined here are based on the action plans. A summary of these plans can be found on www.deltacommissaris.nl.

The draft Delta Act requests measures and provisions for the next six years and the subsequent 12 years. These are outlined under “(sub) products and decisions” and included in the main text of the Delta Programme. In a number of cases, measures for the coming 6-year period can be fleshed out, but the measures for the subsequent 12 years depend on the research carried out and proposals made over the next six years and the decisions on those in the second National Water Plan. More detailed information on the sub-programmes can be found in appendix 2.

Three generic sub-programmes:

5.2.1 Safety

(Sub) products and decisions

In the National Water Plan, the Cabinet indicated that the system of standards for flood protection will be updated. A decision in principle on these standards will be made in 2011. To ensure cohesion in decision-making on the Delta Programme as a whole, it has been pointed out in section 4.2 that it is important that the guiding decision on the new standards can be made in 2014 in conjunction with the other Delta Decisions. The primary defence systems will be reviewed every six years. The fourth review will be completed in 2017.

There are still some questions about the risks, roles and responsibilities associated with land outside dykes. In accordance with the National Water Plan, knowledge gaps relating to the risks, roles and responsibilities associated with land outside dykes, will be filled in based on an assessment of the pressure points in the area outside the dykes. At the same time, research will be carried out to see whether a level of basic safety could be applied to land outside the dykes and if so, how. This is based in part on the results of applying basic safety for the land inside the dykes (as part of the standardisation process). That could lead to a re-evaluation of policy.

In addition to proven concepts for flood prevention, room will be created for exploring new concepts in flood risk management, including delta dykes (as announced in the National Water Plan). A recommendation on the delta dykes will be made in 2011. If it is positive, proposals for the follow-up process will be made in close cooperation with the Delta Programme's area-based sub-programmes. These proposals will examine the way in which the delta dykes can be developed and implemented.

Point of attention Delta Commissioner

The Delta Commissioner draws attention to the fact that current policy and the set of tools relating to flood defence systems do not permit joint multi-functional use. Comparable to the research into the delta dykes, the Delta Commissioner suggests that it be verified in what way obstacles can be removed whilst maintaining the damming functionality of existing defence systems. The Cabinet endorses this recommendation.

5.2.2 Freshwater

(Sub) products and decisions

The task at hand is to research strategies for a sustainable freshwater supply in the Netherlands, including the (infrastructure) measures required for this. This MIRT Study will be ready in 2014 and should lead to a new long-term strategy for freshwater supply in the Netherlands that can be included in the second National Water Plan. The main points of this strategy are increased regional self-sufficiency and an optimisation of freshwater distribution in the main water system and the regional systems. In the run-up to 2014, possible strategies will be devised and research will be carried out into the possibility of pricing water.

In addition, the Freshwater sub-programme is also focusing on the short term:

- An assessment framework will be devised to test “no-regrets measures”. Assessments based on this will at any rate concern the decision to saline the Volkerak-Zoommeer lake and the decision on the short-term water level of the IJsselmeer.
- “No-regrets” measures will be identified between 2010 and 2015. These will be promising and innovative measures that already positively contribute to a sustainable freshwater supply.

MIRT Study “Freshwater Delta Programme”

Name	Reason and objective	Scheduling	Stakeholders
Freshwater Delta Programme	To devise a long-term strategy for the availability of freshwater in conjunction with climate change and the increase in freshwater demand.	Proposal ready in 2014; decision-making in second National Water Plan.	VenW, VROM, LNV, EZ (Ministry of Economic Affairs) provinces, municipalities and water boards, social organisations, Delta Commissioner.

5.2.3 New Urban Developments and Restructuring

The aim of the Delta Programme's New Urban Developments and Restructuring sub-programme is to devise a broadly supported and development-driven strategy for new urban development locations and redevelopment. This will be specifically translated into a set of preconditions, resources and tools, if necessary within a national policy framework. Where required these will be supplemented for particular types of areas, such as peat grassland areas or areas outside dykes.

In addition to developing new tools such as Flood Risk Zoning (multi-layer safety) as announced in the National Water Plan, the policy framework will also build on existing developments and ongoing policy updates. In this way, the programme can contribute to aligning the different initiatives for a future-proof (re)development of the built-up area. A re-evaluation of the use of current legislation and tools will play an important role in this, such as the Spatial Planning Act (*Wet Ruimtelijke Ordening*), the General Administrative Order on Space (*de AMvB Ruimte*), the Water Act (*de Waterwet*) and the Water Decree (*het Waterbesluit*), the Buildings Decree (*het Bouwbesluit*), environmental assessment (MER) and the Water Test (*watertoets*). Stakeholders in the sustainable development of the built-up area will be included in this process by way of a social contact group to be established. The sub-programme is also building on the basic principles and expertise gathered from ARK, the National Programme for Spatial Adaptation to Climate Change. The sub-programme will result in a proposal for a Delta Decision in 2014, in which the preconditions from the strategy will be determined.

(Sub) products and decisions

The sub-programme will be carried out in two stages. In the period up to and including 2011, a long-term vision and draft policy framework will be prepared. For this purpose, an analysis of the current situation regarding spatial planning, direction opportunities and the practices and roles of the various joint authorities will first be carried out. This step will be followed by an elaboration of the options and incorporating them into a cohesive strategy. A report will be made for each step that can be used for consultation and support across the board. The same approach will be used during the second stage up to and including 2013, so that a more detailed final proposal can be made by the end of 2013. The Delta Programme's structuring elements together form a Delta Decision. In the meantime, where possible endeavours will be made to provide insight and guidelines to those out in the field. The Climate Indicator (*Klimaatwijzer*) communication tool will play a central role in this.

MIRT Study “New Urban Developments and Restructuring Delta Programme”

Name	Reason and objective	Scheduling	Stakeholders
New Urban Developments and Restructuring Delta Programme	To develop a long-term vision and a national policy framework for the development of urban uses relating to water risks and subsoil characteristics, in conjunction with the expected consequences of climate change.	Proposal ready in 2014.	VROM, provinces, municipalities and water boards, social organisations, Delta Commissioner.





Six area-based sub-programmes:

5.2.4 IJsselmeer Region

(Sub) products and decisions

In the IJsselmeer region, the emphasis is on two national tasks: flood risk management and freshwater supply. Adjustments to the standardisation of the primary flood defence systems and changes to freshwater supply and demand in the long term are crucial for the IJsselmeer region.

By 2014 at the latest, a recommendation from the region will be available with a preferred strategy for the long-term water level management of the IJsselmeer. In 2011 and 2012, possible strategies will have been devised, partly with the assistance of regional processes, which, after further research, should lead to a preferred strategy in 2014. A broad approach will be used that can sufficiently support the decision-making, followed by further revisions at a later stage, if required.

On the basis of the preferred strategy and in conjunction with results from other sub-programmes, a Delta Decision regarding the long-term water level management of the IJsselmeer will be proposed in 2014.

In 2011, a guideline will be drafted to support the quality of spatial developments in the area. A short-term water level decision will be prepared for the period up to 2035. This can be adopted in 2014 as well, so that cohesion between the short and long term is safeguarded. A decision on the strategy after 2035 will be made in the second National Water Plan.

MIRT Study “IJsselmeer Region Delta Programme”

Name	Reasoning and objective	Scheduling	Stakeholders
IJsselmeer Region Delta Programme	To develop a long-term strategy for water level management of the IJsselmeer in relation to climate change and changing freshwater demand, and a short-term water level decision up to 2035 in accordance with the National Water Plan.	Proposal ready in 2014; short-term water level decision up to 2035 in 2014.	VenW, VROM, LNV, provinces, municipalities and water boards, social organisations, Delta Commissioner.

5.2.5 Rhine Estuary-Drechtsteden

(Sub) products and decisions

The Rhine Estuary-Drechtsteden sub-programme is an opportunity for this region to strengthen its international competitive position and its national and international image. This programme's success will be determined by the extent to which the region is able to combine its water tasks, in light of climate change, with its spatial and economic ambitions. The nature of this task requires that the main development approach be chosen now, while still leaving room for new insights.

In 2014, a proposal will be made for a Delta Decision regarding the protection of the Rhine-Meuse Delta. Prior to this, decision-making regarding a problem analysis and urgency will take place in mid-2011, an optimisation of the second-generation solution strategies will be carried out at the end of 2012, while the main solution strategy (the Delta Decision) will be reviewed and selected in mid-2013. The period between 2013 and 2014 has been set aside for "contingencies".

MIRT Study “Rhine Estuary-Drechtsteden Delta Programme”

Name	Reason and objective	Scheduling	Stakeholder
Rhine Estuary-Drechtsteden Delta Programme	To develop long-term possible solution strategies for flood risk management and freshwater supply in relation to the expected higher sea levels and increased extreme river discharges, in synergy with a sustainable and vital spatial development of the area.	Proposal ready in 2014, decision-making in second National Water Plan.	VenW, VROM, LNV, EZ, provinces, municipalities and water boards, Delta Commissioner, business community, social organisations, citizens and academic institutes.

5.2.6 South-western Delta

(Sub) products and decisions

The long-term South-western Delta study is examining the effects of climate change on safety, freshwater, nature and regional economic and spatial developments from 2050 onwards. These concern issues specific to the region, such as how to manage the Delta Projects, water quality, salt intrusion, ecological and regional developments.

The long-term study will result in a medium-term (2025-2050) and a long-term (from 2050 onwards) shared development outline for the South-western Delta supported by the region and the national government. This development outline will include the most promising future perspectives for flood risk management and freshwater supply that contribute to ecological and economic improvement. The study will also result in a number of interconnected decisions that will build on the Implementation programme (2010-2015 onwards).

MIRT Study “South-western Delta Delta Programme”

Name	Reason and objective	Scheduling	Stakeholders
South-western Delta Delta Programme	To devise a long-term strategy for the South-western Delta in conjunction with expected higher sea levels and increasing river discharge extremes (high and low) to continue developing a safe, resilient and vital area.	Proposal ready in 2014, decision-making in second National Water Plan.	VenW, VROM, LNV, provinces, municipalities and water boards, social organisations, Delta Commissioner.

5.2.7 Rivers

(Sub) products and decisions

In the long-term, a discharge of 4,600 m³/s for the Meuse and 18,000 m³/s for the Rhine should be taken into account. The National Water Plan's target situation recognises that a new safety task is required for the Rhine and the Meuse for the period after completion of the Meuse Projects and Room for the River, which can only be achieved using an integrated regional approach. Therefore, in 2010 a start has been made on charting the integrated regional tasks, which will be completed in 2012. Based on this integrated task, indicative strategies will be developed that will be used to prepare a decision on the strategy to be employed for the Meuse and the Rhine in 2014. The long-term strategy will be included in the second National Water Plan in 2015. After the strategy has been determined, it will be worked out in more detail.

The Rivers sub-programme primarily focuses on long-term flood risk management and regards the area around the major rivers as an attractive one that should be maintained as such to live and work in and for recreation and investment. This sub-programme is being carried out in conjunction with tasks concerning freshwater supply, the shipping industry, nature and regional area development.

The cohesion of both the short and the long term is mapped out. The existing organisation and budget will be maintained to implement the short-term tasks from the Room for the River and Meuse Projects. The projects under the key planning decision Room for the River and Meuse Projects will be executed in conformance with the decision. Any supplementary new initiatives or any short- and long-term measures will be subject to a robustness test.

MIRT Study “Rivers Delta Programme”

Name	Reason and objective	Scheduling	Stakeholders
Rivers Delta Programme	In relation to the expected higher river discharges in the Meuse and Rhine tributaries, an integrated long-term task will be formulated for the area around the major rivers and a strategy worked out in the context of safety, nature objectives, spatial quality and spatial developments.	Proposal ready in 2014, decision-making in second National Water Plan.	VenW, VROM, LNV, provinces, municipalities and water boards, social organisations, Delta Commissioner.

5.2.8 Coast

(Sub) products and decisions

In order to establish a framework in which safety and spatial development can be combined, a proposal for a national framework on coastal expansion was drawn up in 2010. The provinces concerned will use this to providing a vision for the coast per province or a strategic agenda in 2011. Based on this, a proposal for a national vision for the coast will be drawn up in 2012. From 2012 onwards, further studies will be carried out into tangible projects ensuing from the national vision. The Flood Protection Programme and the Weak Links Programme will continue over the next 6-12 years and the fourth review will take place from 2011.

MIRT Study “Coast Delta Programme”

Name	Reason and objective	Scheduling	Stakeholders
Coast Delta Programme	To investigate a sustainable safety strategy for the coast and the possibilities and desirability of coastal expansion.	A proposal for an integrated vision for the coast will be delivered in 2012.	VenW, VROM, LNV, provinces, municipalities and water boards, social organisations, Delta Commissioner.

5.2.9 Wadden Region

(Sub) products and decisions

To safeguard the long-term safety of the Wadden region and to chart the effects of climate change on the Wadden Sea, a research phase will be organised from which a strategy for safety and monitoring will be delivered.

To that end, research into the following will be initiated:

1. the impact of the new safety standardisation,
2. the improvement of monitoring the effects of climate change,
3. the climate-proof nature of the land outside the dykes,
4. governance and integration,
5. integrated coast and island management (in conjunction with the Coast sub-programme),
6. innovative dyke concepts, both for the islands and along the mainland coast (in conjunction with various sub-programmes),
7. safety aspects regarding sediment balance and climate change,
8. the reduction of wave impact due to tidal marshes and mud flats,
9. the effects of changing hydrology and sediment balance of the Eems on safety.

MIRT Study “Wadden Region Delta Programme”

Name	Reason and objective	Scheduling	Stakeholders
Wadden Region Delta Programme	To research the long-term safety of the Wadden region and draft a monitoring plan to determine the effects of climate change on the Wadden Sea.	The safety research and monitoring proposal should be ready in 2014, decision-making in second National Water Plan.	LNV, VROM, VenW, provinces, municipalities and water boards, social organisations, Delta Commissioner.

5.3

Linking the short and the long term

The Delta Programme consists of two parts:

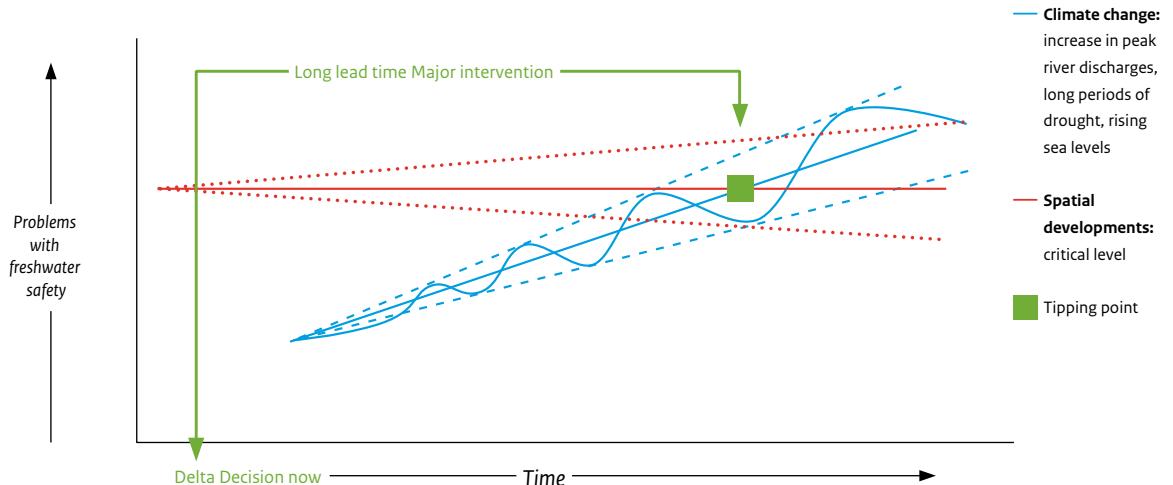
- Organising the basics;
- Preparing for the future and examining the agreements made regarding flood risk management, the availability of water and spatial developments.

To be well prepared for the future, it is essential to start with the long term and work back to the short term. By outlining a strategy now, we can be prepared in time for protecting the Rhine-Meuse Delta, for example. Furthermore, it will allow sufficient time for innovative solutions and an integrated approach. But just as important is that a strategy provides certainty: a perspective from which private parties and authorities can anticipate developments and which they can use for their investment decisions.

Linking the long and short term means looking far ahead into the future, with all the concomitant uncertainties (see Chapter 3). It would appear logical to defer decision-making until any uncertainties have been greatly reduced, and a lot of research effort is rightly focused on this. However, the system is complex and knowledge of many parts is, by definition, incomplete. Waiting until the uncertainties have been resolved is not an option; uncertainty is unavoidable, but can be made manageable.

How long current policy will suffice and when the tipping point (see Chapter 3) at which policy is no longer tenable will be reached can be illustrated by using scenarios. Considering that we do not know at what rate the climate will change, there is a range of times at which a tipping point could be reached. This range will increase further as the critical level is not constant (see graph below). The horizontal line denotes an unchanging spatial planning. However, an urban metropolis with an increasing building density will also have more frequent problems even if the climate does not change. In addition, the demands we make on the water system increase and what is seen as socially acceptable also varies over time:

Line of approach: climate change/spatial developments

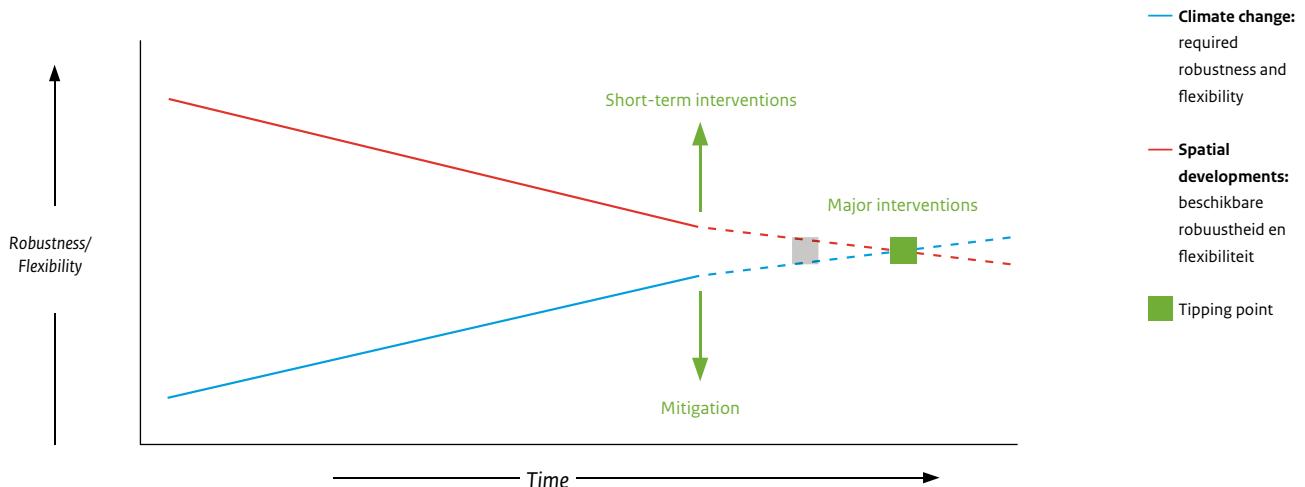


In the future, more flexibility and robustness are required and if spatial developments continue unchanged and long-term water tasks are not integrated into spatial developments, the available flexibility will in fact decrease. For this reason, the Delta Programme will focus on short-term measures that are appropriate for the long term, for example by maintaining or increasing the robustness and flexibility of water systems or the spatial planning so that they are suitable for different scenarios. A robust system is one that can withstand extreme events and accommodates different future developments. A flexible system is one that can easily adapt or be adapted to changing circumstances. Giving rivers more room again is a good example of increasing robustness, while sand replenishment as a means of coastal reinforcement is a good example of maintaining flexibility.

The following graph shows that over time problems will arise when a decrease in the available flexibility continues undiminished due to unchanging spatial developments (red/descending line), while climate change demands more flexibility and robustness (blue/ascending line).

The graph also shows how you can delay the point in time at which these lines cross by adjusting the tail-end of the ascending line downwards – e.g. by taking mitigation measures.

System approach



⁶ Innovative adaptive measures can significantly contribute to the mitigation task approach, as was evident in the IJsselmeer dam competition, for example.

The Delta Programme is not about mitigation⁶, but about adaptive measures. The descending line can be adjusted upwards by spatial developments, thereby gaining time. The time gained can then be allocated to further increasing insight into the changing climate and further development of new innovative solutions. In this way, the tasks for flood risk management and freshwater supply in an area can be linked to other tasks in the fields of nature, the environment, spatial quality and water quality. This will balance out the risk of underinvestment – setting insufficient measures and all the related disastrous consequences – with that of overinvestment – interventions that, in retrospect, were not required.

It is possible to responsibly defer the scheduling of extensive, major interventions that are linked with the tipping points, provided that this is accompanied by a sound monitoring programme. This can be done by embedding extensive interventions in relatively small measures that increase robustness and flexibility. In concrete terms, this means that, as part of what was previously outlined in Sections 5.1 and 5.2, the Delta Programme also focuses on:

- “linking” up with ongoing and planned developments in the use of space (urban areas, rural areas, networks) and other tasks such as nature and spatial quality, where possible and useful;
- searching specifically for measures that can be relatively easily accelerated or decelerated up to the implementation stage;
- allocating land that will probably be needed for measures in the long term, or setting aside this land for long-term spatial objectives or temporary usage;
- developing and reviewing innovative methods that lead to a cost reduction of the measures, better opportunities for combining uses and a reduction of the lead time for completing measures;
- evaluating spatial developments in relation to possible obstacles to any future interventions.

This strategy links the Delta programme’s long-term tasks with short-term spatial developments. This should benefit the cost-efficiency of expenditure under the Delta Fund. The Delta Commissioner will examine whether it will be possible, based on the Delta Programme, for area developments to specifically anticipate potential major water tasks.

Assignment Delta Commissioner

The Delta Commissioner will work out the adaptive delta management concept. In 2011, in consultation with the relevant ministries and other stakeholders, he will make a more detailed and concrete proposal detailing the legal, administrative and financial consequences. Based on the Delta Commissioner’s proposal, the new Cabinet will report on this in the 2012 Delta Programme.

5.4 Scheduling

Below is an overview of the preparations for decisions that will be made annually from 2011 onwards. Scheduling for ongoing implementation programmes has not been included (see MIRT projects book for this).

Over the coming year, the Delta Commissioner will be working out the logistics and concrete development of the five Delta Decisions in terms of time, administration, legal aspects and finances, and he will report on this in the second Delta Programme.

2011	
Safety	<ul style="list-style-type: none">• Proposal for decision in principle on safety standards for primary flood defence systems
Freshwater	<ul style="list-style-type: none">• The detailed problem analysis Freshwater Supply in the Netherlands will be ready in May 2011. This is the basis for the inventory of possible solution strategies.
Rijnmond-Drechtsteden	<ul style="list-style-type: none">• Problem analysis and urgency in the region.• Proposal for the possible solution strategies yet to be worked out.
New Construction and Reorganisation	<ul style="list-style-type: none">• Detailed problem analysis of spatial organisation and existing control tools.• Draft policy framework• Study of objective options, organisation principles and application of (existing) tools.
IJsselmeer Area	<ul style="list-style-type: none">• First selection of promising strategies based on existing knowledge and regional processes.• Initial policy document for the short-term water level management of the IJsselmeer.• Guidelines to support the quality of spatial developments in the IJsselmeer region.
Rivers	<ul style="list-style-type: none">• Proposal for integrated area task.
Wadden Area	<ul style="list-style-type: none">• Delivery of quickscans in 2011.
2012	
Freshwater	<ul style="list-style-type: none">• Selection of promising strategies.• Evaluation of proposed decision on the short-term water level management of the IJsselmeer and the proposed decision on the salinisation of Volkerak-Zoommeer lake.
IJsselmeer Area	<ul style="list-style-type: none">• Further selection of possible strategies for long-term water level management.
Rivers	<ul style="list-style-type: none">• Inventory of indicative possible solution strategies, including provisional assessment.• Adoption of integrated regional task.
Coast	<ul style="list-style-type: none">• Proposal for a vision for the coast.
Wadden Area	<ul style="list-style-type: none">• Research evaluation and go/no go decision on follow-up research in 2012.
2013	
Freshwater	<ul style="list-style-type: none">• Development of promising strategies for water supply.
New Construction and Reorganisation	<ul style="list-style-type: none">• Long-term vision on 'climate-conscious urban development'.• Policy framework proposal.
Rijnmond-Drechtsteden	<ul style="list-style-type: none">• Proposal for determining the main development approaches in the fields of flood risk management, freshwater supply and related spatial development.
Rivers	<ul style="list-style-type: none">• Preferred possible solution strategy with requisite long-term strategy.
Southwest Delta	<ul style="list-style-type: none">• Development scenario.
2014	
Based on the decisions prepared in 2011-2013, the following proposals for cohesive Delta Decisions will be made in 2014:	
<ol style="list-style-type: none">1 Safety standards for primary flood defence systems2 A preferred strategy for water supply3 Long-term water level management of the IJsselmeer4 Protection of the Rhine-Meuse Delta5 Legislation and regulations for new construction and reorganisation	

5.5 Resources

Resources for the ongoing implementation programmes and projects (see Section 5.1) are provided by the Infrafonds and/or H 12. For more detailed information, please refer to the MIRT projects book.

The national government and the regions (provinces, municipalities, and water boards) are jointly responsible for financing the implementation of the action plans for the Delta Programme's sub-programmes. Financing can be considered in monetary terms, but also in terms of manpower. Funding for the sub-programmes' MIRT Research (approx. 1.5 million per sub-programme annually) will be covered by the contracting Ministries for Housing, Spatial Planning and the Environment, Agriculture, Nature and Food Quality, and Transport, Public Works and Water Management for the various sub-programmes and included in the related 2011-2014 budgets.

The following will be used as a guideline for dividing costs for the MIRT Research period between now and 2015:

- The national government will finance MIRT Studies and the costs of proceedings related to the national task.
- Research and the costs of proceedings that result from linking regional issues and/or regional proceedings will be covered by regional administrations.
- The material costs of the programme office will be covered by the national government. This includes everything except salaries.
- Mutual consultation between the national government and the regions will be required when employing manpower (FTEs). The starting point will be 50/50. The national government and the regions will finance their own people. Communications resources for the sub-programmes will also be divided in this way.

After the Delta Act comes into effect, a Delta Programme budgetary fund will be available, namely the Delta Fund. The fund is essential for implementing the tasks under the Delta Programme and for the long-term success of safety and water availability in the Netherlands.

As the supplementary policy agreement (March 2010) says: A solid Delta Fund will be established to ensure a dynamic implementation of the Delta Programme by providing a permanent, stable and substantial supply of at least 1 billion euros every year from 2020 onwards from the Infrafonds (infrastructure fund).

Up to and including 2020, the Delta Fund will be supplied from the Infrafonds' existing budgets and programmes for flood risk management and freshwater supply to be able to carry out the Delta Programme. It is important that there is clarity on the Delta Fund and the annual supply from 2020 onwards, in part because of the organisation of all the preparatory work. The fund also allows planning for major long-term investments over the years.

Point of attention Delta Commissioner

Over the next few years (2011-2014), the emphasis of the Delta Programme's sub-programmes will be on MIRT Studies. After this phase, emphasis will increasingly shift to area-based development and implementation. In relation to the Delta Programme's co-financing by the Ministry of Transport, Public Works and Water Management, the Ministry of Agriculture, Nature and Food Quality, and the Ministry of Housing, Spatial Planning and the Environment in this phase, the Delta Commissioner draws attention to the importance of equal State financing based on the same underlying principles to give the different approaches their due. While the Ministry of Transport, Public Works and Water Management has an Infrafonds for providing long-term finance, the Ministry of Housing, Spatial Planning and the Environment and the Ministry of Agriculture, Nature and Food Quality do not have this option. As included in the draft Delta Act, there is an experimentation clause in the Delta Fund to facilitate a synergy of resources.

The Cabinet has asked the Delta Commissioner to study how the experimentation clause can be used to optimal effect.

The ballad of the IJsselmeer

*For years my house has stood in Almere
Bordered by the lakes of Marker, IJ and Gooi.
To us, that threesome represents the periphery,
Hardly interesting for us residents of Almere city.
Sometimes you read about it in the paper,
Sometimes there are ripples in the ether.
News about the IJsselmeer's water level.
Because what about that one and half metre?*

*The IJsselmeer Dam is – no matter what they say –
The cornerstone of the province of Flevoland
But in good time this dyke, too, will start to sway;
Will it stand strong when push comes to shove?
As a super bus highway it will impress,
Or would a stagnant swamp be neater?
Whatever happens, I'm intrigued, no more and no less
Because what about that one and half metre?*

*We hold our inland sea in great esteem:
The grand view, the green and blue band.
Where every wader warbles free and easy,
Where water flows away from land,
That's what the expert likes to see.
Those living on the coast still want it concreter:
"What about my jetty and the beach?
What about that one and half metre?"*

*Oh, keepers of the diamond blue,
I ask you now, please make my picture completer.
You know my only question to you:
What about that one and half metre?*

Niels Blomberg - Waterpoët
The Zuiderzeeland Regional Water Authority, May 2010
Recited on the occasion of the Delta Commissioner's visit to the IJsselmeer region on 25 May 2010

The original Dutch poem was written by Niels Bloemberg. The English version is an interpretation approved by the author.

IJsselmeerballade

*Mijn woning staat al jaren in Almere
Met Marker-, IJ- en Gooimeer aan de rand.
Dat drietal vinden wij het perifere,
Voor ons Almeerders nauwelijks interessant.
Soms lees je van die dingen in de krant,
Soms hoor je van die dingen in de ether
Omtrent de IJsselmeerse waterstand.
Hoe zit het met die anderhalve meter?*

*De afsluitdijk is – wat men ook bewere –
De hoeksteen van de provincie Flevoland.
Maar mettertijd wordt deze dijk een tere;
Gaat hij het houden als het erom spant?
Als superbusbaan wordt hij imposant,
Of past een brak moeras hem toch wat beter?
Wat het ook wordt, het lijkt me spannend, want
Hoe zit het met die anderhalve meter?*

*We houden onze binnenzee in ere:
Het weidse zicht, de groen -met- blauwe band.
Dat elke oevervogel kwinkelere,
Dat water strome naar de juiste kant,
Daarop is de deskundige gebrand.
De kustbewoner wil het nog concreter:
"Hoe zit het met mijn steiger en mijn strand?
Hoe zit het met die anderhalve meter?"*

*O hoeders van de blauwe diamant,
Ik vraag nu u, maak toch mijn beeld completer.
U kent mijn ene vraag wel onderhand:
Hoe zit het met die anderhalve meter?*







Conclusion

This first Delta Programme represents a new phase in the protection and modification of our delta. What is unique about the approach is that the measures that will be taken should not only prevent the next disaster – considering climate change and its effects as we measure them – but also increase the attractiveness of our delta.

**“working
on the
delta”**

Ongoing implementation programmes will be finalised over the next few years (approx. 2015), which will also see the long-term Delta Decisions being prepared (2014). Past, present and future will be united in the Delta Programme.

The Delta Programme is of significant economic importance for now and the future. Dutch and overseas businesses can continue to invest in a safe delta where water supply is in good shape. The Netherlands is also attracting international attention with this approach. There is a keen interest in our proactive approach and institutional modernisation from both within Europe and the rest of the world. Our country, which is already known for its first-rate knowledge and innovation in the field of water and delta technology, has a new product to export, namely the Delta Programme, which provides opportunities for the Dutch business sector.

Within our country itself, the national government, provinces, water boards and municipalities are united in fulfilling the safety tasks and achieving integrated area development and a sound freshwater supply. From the very beginning, social organisations have been fully involved with joint fact-finding and developing options for measures.

The Netherlands should remain the best protected delta and the work on that is never finished. Solidarity (between regions and generations), flexibility (as much flexible and adaptive delta management as possible) and sustainability (natural and spatial measures that have a sustainable character) are key.

Many people are working on the future of our delta and our country with passion, enthusiasm and energy; there is work to be done on the delta!





Appendix 1

Knowledge and innovation

There are many knowledge- and innovation-related activities within the framework of the Delta Programme. Below is a concise outline of a few of these activities.

Knowledge agenda

As part of their Plan of Action, the nine sub-programmes have established a knowledge agenda containing approximately 350 knowledge questions that cover a wide range of topics, from strategic to operational and from finding quick answers to setting up long-term research projects. The knowledge agendas are the basis for the research programme that will be adopted at the end of 2010. The 8 MIRT Study projects that are part of the first Delta Programme will be among the things outlined. The knowledge questions in the sub-programmes often include a more detailed elaboration on or supplement to knowledge questions designated earlier in the National Water Knowledge and Innovation Agenda (NKIAW - *Nationale Kennis en Innovatie Agenda Water*).

Scenarios

There are four climate scenarios available for the Netherlands (KNMI, 2006) and four socio-economic ones (WLO, 2006). Computing all the possible sets of measures for the 16 possible combinations of climate and socio-economic scenarios is technically unfeasible and unnecessary for decision-making. For this reason, a decision has been made to work with a limited set of four 'delta scenarios' in the Delta Programme. These will be developed in 2010 and 2011 and will comprise existing sets of climate and socio-economic scenarios. For the sake of consistency within the Delta Programme, these scenarios will be used by all sub-programmes.

Delta model

The Delta model project aims to provide a reliable and accepted water management basis for preparing and implementing the Delta Programme. Particular attention is being given to the interconnectivity between the sub-programmes. The Delta model can be described as a toolbox for established decisions supporting the preparation and implementation of the Delta Programme. From the planned completion date at the end of 2012, the Delta model will serve as the new model for preparing policy for the main water system.

Evaluation support system

Information supply and demand

In the Delta Programme, continuous administrative comparative assessments will be required. Over the next four years, these assessments will focus on the Delta Decisions that should be made in the second National Water Plan. A consideration system is being developed to ensure that this assessment process can be carried out in a structured and transparent way.

Comparative assessments at three levels

The integrated and energetic approach to the tasks in the fields of flood risk management and freshwater supply requires comparative assessments at a national level. The decisions made result in tasks at both regional and local levels, where the measures will acquire both form and content. The Delta Decisions serve to structure the Delta Programme as a whole. Within the area-based sub-programmes, decision-making will be carried out regarding the area-specific elaboration on these decisions made at a national level and regarding the way in which they can be linked to regional tasks and developments. At a local or project level, it is ultimately about development into tangible implementation projects.

Alternatives will be developed and reviewed at all three levels and assessments and decisions will be made in relation to those alternatives. In the autumn of 2010, an outline of the consideration system will be determined, after which it will be worked out in more detail for the decision-making stage and modified to suit the level for which it will be adopted.

Appendix 2

Delta Programme sub-programmes

Safety

The area and the players

The Safety sub-programme aims to bring about and maintain protection against flooding at a socio-politically acceptable risk level. The sub-programme's scope extends to developing policy focused on protecting the entire country in conjunction with other countries in the river basins of the Rhine, Meuse, Scheldt and Eems. The Safety sub-programme is, therefore, a generic one within the Delta Programme, as well as being policy-making in nature, which means that it creates a framework, makes assessments and establishes both programmes and agendas. The Safety sub-programme is primarily devoted to creating measures to prevent a flood disaster as much as possible. Prevention is and will remain the key to flood risk management policy.

At present, the Netherlands has about 3,500 kilometres of primary flood defence systems: dykes, dunes and dams. The Water Act contains standards for flood protection that are applicable to these primary flood defence systems. The safety that the flood defence systems should offer is based on safety standards that were determined after the disastrous flooding in 1953. These standards are expressed in the average annual probability value of the highest flood level the primary flood defence systems should be able to withstand. This probability varies from 1/10,000 a year for Central Holland, 1/4,500 for the north and southwest of the Netherlands, 1/2,000 for the inland lake area and 1/1,250 a year along the main rivers to 1/250 a year for the dyke rings around the Meuse in Limburg. Every six years, the management of the flood defence system, i.e. the water boards and the Directorate-General for Public Works and Water Management, tests the primary flood defence systems to see that they meet (statutory) standards, thus clarifying whether they offer sufficient protection. If that is not the case, improvement to the flood defence system is essential.

In contrast to the areas inside the dykes, there are no government standards regarding flood protection for areas outside the dykes. The national government wants to ensure that protection of the continuous development in 13 coastal locations outside the dykes does not deteriorate as a consequence of rising sea levels, principally by using sand replenishment. Other than that, the national government bears no responsibility for maintaining safety levels in areas outside the dykes.

In accordance with the National Water Plan, assessing the actual safety situation, communicating about it and considering the usefulness and necessity of supplementary protective measures are tasks for regional authorities. In the province of Flevoland, for example, standards have been established for areas outside the dykes yet to be created, while the province of Zuid-Holland is in an ongoing trial year of standards for casualty risks and social disruption resulting from new initiatives in the areas outside the dykes.

Where are we now

The Netherlands is well protected, but our safety is not yet fully assured. A second review of our flood defence systems in 2006 proved this. The Flood Protection Programme is working hard on this (see Section 5.1). The results from the third review will be available in 2011. Work is also currently being carried out on safety in the Rhine tributary areas and lower reaches area as part of the Room for the River programme, and in the Meuse Valley area with the Meuse Projects programme.

Developments

In the year 2010, the protection of our dykes and dunes is based on standards from the 1960s (after the 1953 disaster). According to the second Delta Committee, we are under-insured with our current standards. The question that will be answered in the Delta Programme is to what extent these safety standards still tally with the risk we are prepared to accept.

Some people in the Netherlands live and work in areas that are not protected by a primary dyke, i.e. in areas outside the dykes. When implementing policy for the areas outside the dykes, bottlenecks were established. There have also been developments in the way of thinking about flood risk management that require that policy for areas outside the dykes be re-evaluated.

Finally, there is more and more knowledge and experience resulting from examples (also overseas) where protection is achieved in other ways than the traditional dyke heightening, such as by means of delta dykes. These may offer a solution for the effects of climate change and are, therefore, a realistic alternative.

Freshwater

The area and the players

The Netherlands owes much of its prosperity to a sound water supply. The country has a large variety of unique water-rich nature areas that are dependent on the availability of good quality freshwater. A large part of the business sector depends on the availability of freshwater, particularly agriculture and horticulture, the food industry, the chemical industry, the energy sector, the recreation sector, freshwater fisheries and the shipping industry. Freshwater also plays an important role in the life of citizens and not only in relation to the drinking water supply. In urban areas, water adds to the quality of life of the surrounding area. Furthermore, with its many ditches, the Dutch polder landscape is unique in the world.

Thanks to our moderate climate, there is currently sufficient precipitation. River discharges also ensure that there is a continuous flow of freshwater. Closure of the Zuiderzee with the IJsselmeer dam created a large freshwater basin, the IJsselmeer. There are also large freshwater supplies elsewhere in the Netherlands, such as areas around man-made lakes, dammed inlets and, of course, groundwater in the soil.

Where are we now

With a view to the future, the national government, the provinces and water boards, as well as agricultural and nature organisations are carrying out research into the risks of falling water tables. Consultation and collaboration with the regions is of key importance. Examples are the study of Drenthe's high ground, of the freshwater problem of elevated sandy areas in the south of the Netherlands, the drought study by LTO Nederland (Land- en Tuinbouw Organisatie - the Dutch Federation of Agriculture and Horticulture) and the research into the freshwater supply of the South-western Delta. These studies will be included in the Freshwater sub-programme. The Netherlands Drought Study (Droogtestudie Nederland), which was jointly carried out by the national government, provinces and water boards, mapped out the problem of drought. The result of this study will also be included in the Freshwater sub-programme.

Developments

Freshwater supply as it is now cannot be taken for granted in the long run. It is expected that, on average, winters will become wetter and milder and summers will become warmer and drier, and that water in the west and the north of the Netherlands will become more salty due to rising sea levels.

Water shortages are already occurring occasionally in the summer during prolonged dry spells, damaging certain sectors. In the dry summer of 2003, the west of the Netherlands temporarily needed its freshwater to be provided from the IJsselmeer because the polders could no longer be flushed with freshwater from the Lek/Nieuwe Maas. According to the most extreme KNMI scenario, by 2100 an average year could see a water shortage comparable to the shortage in the driest year of the last decade, i.e. 1976. It is essential that strategies be formulated now to be prepared for an increase in water shortages and salinisation.

EU agriculture policy reforms in 2013 could have consequences for freshwater supply for agriculture in the future. This will be kept in mind in the Freshwater sub-programme.

New Urban Developments and Restructuring

The area and the players

The Netherlands is situated in a delta that offers unique conditions for building homes and establishing businesses. We have already taken advantage of that in the past and, looking ahead to the future, this also appears attractive. At the same time, however, large parts of the Netherlands are susceptible to flooding, waterlogging, drought, salinisation and subsidence. It is primarily the low-lying peat and clay areas in the north and the west of the Netherlands that are physically unsuitable for urban development uses. As a result, problems could arise in the urban development and reorganisation of built-up areas there.

In addition, the Netherlands is a particularly densely populated and intensively used country. There is increasingly more development in locations that are less naturally suitable for it. Furthermore, there is increasing pressure on the water system due to building up and drainage needs. The consequences of a possible flood, the costs of urban or regional water management or the damage that could arise as a result of subsidence or salinisation are becoming increasingly bigger, the reason being that the economic value of the activities in vulnerable or high-risk areas is increasing significantly.

To prevent the transferral of costs and damaging consequences, it is important to keep in mind the pros and cons of (re)developing built-up areas so as not to disadvantage third parties or future generations. It is important to prevent undesirable developments and to encourage parties to opt for an integrated and area-based approach that leads to a sustainable and future-proof organisation. This also provides win-win situations for improving the quality of built-up areas.

Where are we now

Over the last few years, more attention has been given to this issue. Meanwhile, water, the subsoil and the climate are high up on the political agenda. New insights and innovative technologies have been developed. Assessment tools, such as the Water Test (Watertoets), social cost-benefit analyses (MKBA) and environmental assessment (MER) have been introduced. Despite this, however, there is still no common approach to urban development or uses that is both sustainable and forward-looking. Often parties involved do not yet have the right knowledge, tools, ambitions or power of persuasion to sufficiently guarantee that the problems associated with urban (re)development

are not shifted to other areas or future generations. There is also usually a lack of a shared view about how to deal with uncertainties, what risks – now and in the future – are plausible and in what way the costs and benefits of investments can be apportioned fairly.

Developments

The development and growth of built-up areas and the change in climate are both long-term processes. At the same time, however, the need for modifications to built-up areas to be able address risks actually requires short-term action. Now and over the next few years several new expansion areas will be created and old neighbourhoods restructured. This will create space for a structural and cost-effective approach to such modifications; an opportunity that in all likelihood will not be available again for another 50 to 100 years. Large-scale examples are Rijnenburg near Utrecht, Stadshavens Rotterdam and the plans for Almere. But much smaller-scale examples, such as the delta dykes concept, also have to consider the water system, the subsoil and the climate in relation to spatial developments.

Built-up areas will continue to be developed further over the next few years. There is certainly a substantial house-building task for the Randstad that has to be met in part inside existing towns and cities. This requires such measures as increasing building density, which can lead to bigger problems with flooding/waterlogging and heat, for example. In the case of city expansion, there will also be an increasing prevalence of building on less straightforward locations, such as deep polders or clay/peat areas. The need to regulate and consider water, the subsoil and the climate in spatial development increases accordingly.

Besides urban development, the modifications and development of the water system over the next few years will also require interventions that will have spatial consequences. Examples are moving or heightening dykes, creating reserve buffers, modifying watercourses and constructing areas for water storage. These developments could have effects on built-up areas. Therefore, an integrated approach that looks for sustainable and flexible solutions and a smart combination of uses is required.

IJsselmeer Region

The area and the players

The IJsselmeer region consists of the IJsselmeer (approx. 1,200 km²), the Markermeer-IJmeer lake (approx. 750 km²) and the Veluwerandmeren lakes (approx. 75 km²). In these lakes, there are a number of areas outside the dykes, such as the Makkumerwaarden, the Kampereiland, the Eempolders (to the north of Amersfoort) and various marinas. The IJsselmeer region covers 43 municipalities, 8 water boards and 6 provinces.

The IJsselmeer region is characterised by key qualities such as nature, cultural history and the quality of the landscape. The area is of significant value because of its landscape and cultural history and it has been designated a "Natura 2000" area because its ecological features are also of significant importance internationally. The scale, panoramic views and open horizon of the landscape are all part of its character. Its cultural history relates to the Zuiderzee dykes, the new modern dykes and the former Zuiderzee towns. Policy is focused on maintaining and strengthening these key qualities. Water-related industry (fishing, shipping, recreation) is an important source of income for local communities. There is also a multitude of developments for waterfront living. Almere, Amsterdam and Lelystad are drawing up large-scale plans for developments in areas outside the dykes.

The Markermeer-IJmeer lake provides freshwater from an IJsselmeer supply and it is also used for water storage during periods of heavy rainfall. This is also the case for the Randmeren (Border Lakes in the Veluwe Region). Any excess of water in the IJsselmeer finds its way to the Wadden Sea via the sluices in the IJsselmeer dam. Water from the IJsselmeer is also used to flush Amsterdam's canals and to regulate water in the Noordzeekanaal canal.

Four national tasks have been formulated for the IJsselmeer region: flood risk management, freshwater supply, ecology and spatial quality. While emphasis is on the first two, the value of nature and spatial quality are part of the task because they are regarded highly. Ecology and spatial development are central to the Markermeer-IJmeer tasks; for the Randmeren it is about the challenge of maintaining the balance achieved between ecology and recreation. In the National Water Plan, the Cabinet chose to unlink the Markermeer and the Veluwerandmeren from the IJsselmeer. This is important in relation to the urban development of Almere and Amsterdam, amongst other things.

There are over 200 parties involved in the use and development of the IJsselmeer region. Regional authorities and regional social organisations are involved in developing a long-term strategy for the IJsselmeer region, which includes regional processes.

Where are we now

There are a number of plan studies and implementation projects currently being carried out in the IJsselmeer region, in part (IJsselmeer dam and the Markermeer dyke) within the framework of the Flood Protection Programme.

See Section 5.1.

The Delta Commissioner took great interest in an example of innovation in the IJsselmeer region, namely an air-bubble screen that pushes back the saltwater leakage at the Stevinsluis in the IJsselmeer dam. Fresh- and saltwater are separated by an improved distribution of more air across the width of the chamber. If the trial succeeds, this air-bubble screen could also be adopted for the Volkerak-Zoommeer lake.

Another example of innovation that the Delta Commissioner visited is the coastal sand motor with biological resources. The Frisian coast of the IJsselmeer is exposed to waves that transport sand to the coast. By repeatedly building sufficient shell and sand banks and continuously transporting sand to the coast, the wave screens gradually increase in size and height in proportion to and in balance with likely rising water levels. This brings about new development opportunities for nature and recreation.

Developments

Changes in the long-term supply and demand of freshwater and revisions to the standardisation of the primary flood defence systems are crucial for the IJsselmeer region. The scope of the tasks will be determined in part by the spatial developments in the region itself and the requirements for protecting nature from the development possibilities. Rising sea levels and the rate at which that happens are also important for this region. Another important issue of study is whether gravity drainage will remain possible.

Rhine Estuary-Drechtsteden

The area and the players

The Rhine Estuary-Drechtsteden area owes its development largely to its location in the delta of the major rivers. The port and industrial complex is the clearest exponent of this. Several well-used main road, water and rail connections are also part of this. The area is heavily urbanised and approximately 1.5 million people now live there. The quality of the living environment and the open and green areas are under pressure because of this urbanisation. The ports' locations in relation to the hinterland, the sound accessibility from the sea and the quality of connections to the hinterland have made the port and industrial complex pivotal in the (inter)national logistics network. Thanks to its strategic location and good connection, Rotterdam's port is the biggest in Europe. The port and industrial complex, the Westland Greenport, the knowledge economy, business services and the international business centre all make a significant contribution to the international competitive position of the Southern Wing, and, therefore, that of the Randstad area as a whole. In light of the above, water is not only a threat, but also crucial for the ports and freshwater supply for industry, agriculture and horticulture. Water also fulfils a recreational and ecological role.

There are many parties involved in the organisation, management and development of the area, such as the national government, regional authorities, water boards, the business sector and (regional) social organisations. At a local level in particular, citizens are also actively involved in the organisation of their living environment.

Where are we now

The short-term projects and ongoing implementation programmes at play in the area originate from the implementation of the Flood Protection Programme, Room for the River and various freshwater studies that are part of the integrated Green Heart (Groene Hart) task (water inlet point Gouda): subsidence, safety, salinisation.

The next few decades will be dominated by further urbanisation (living and working), strengthening ecological values and improving accessibility. According to the Randstad 2040 Strategic Agenda, approximately 40% of the urbanisation task should take place in the inner city areas in order to minimise the pressure on green areas and open spaces. In the Rhine Estuary-Drechtsteden area, these inner city areas are primarily located in dilapidated ports and industrial areas. Their waterfront location means that attractive living

and working environments could be created. The majority of these areas is located outside the dykes. It is partly because of this that present urban development requires certainty about the long-term flood risk management strategy.

The Delta Commissioner has taken cognisance of the urban development in this area (e.g. in Dordrecht) in relation to safety and building outside the dykes. This is well developed and a good example for other cities and towns.

Developments

As a starting point for the development of the Rhine Estuary-Drechtsteden programme, five ambitions have been formulated, e.g. in the agenda for the Southern Wing:

- promoting a strong (innovative) economy;
- improving accessibility;
- urban intensification;
- making the "landscape" more appealing and bringing it closer to home;
- utilising energy and water opportunities.

The long-term water management issue in the region concerns the (reduced) protection against flooding as a result of rising sea levels, higher river discharges and increasing salinisation, which puts freshwater supply under pressure. The task for the Rhine Estuary-Drechtsteden programme is to establish the main approach for the main water system at a strategic level, in synergy with decisions regarding the spatial development of an economically strong, social, sustainable and attractive region.

South-western Delta

The area and the players

The South-western Delta sub-programme is focused on the area that is bordered by Haringvliet/Hollandsch Diep, the A16 motorway, the transition in West Brabant from clay to sandy ground, the Dutch part of the Scheldt estuary and the coastal strip. The area is characterised by various national waters, both freshwater and saltwater, as well as flowing and stagnant water including the islands in between. Many national waters are nature reserves and designated Natura 2000 areas. The islands are low-lying, inhabited areas, mostly with plenty of fertile agricultural land.

The economy in the area is closely related to water, with on its outskirts the international ports of Rotterdam and Antwerp, connected by the Rhine-Scheldt corridor. Ports such as Moerdijk, Ghent, Terneuzen and Vlissingen also benefit from this water infrastructure. Shipping traffic between the ports makes the North to South route the busiest in Europe. All ships have to pass the Volkerak sluices and the sluices' capacity is therefore significant for the speedy transfer of ships. For pleasure sailing, the Volkerak-Zoommeer lake is the most important entrance to the delta waters in Zeeland; it is also part of the Rhine-Scheldt connection.

The economic importance of (water) recreation and tourism is huge and in the future it is likely to grow even bigger than inland shipping. Aquaculture in the Oosterschelde and the Grevelingen is a sector that has put the region on the map of an (inter)national market. The majority of land in the South-western Delta is used for agriculture. With their high-quality cultivation of fruit and vegetables, the Zuid-Holland (Greenport) and Zeeland polders benefit from the good logistics connections to the surrounding urban areas and further into northwest Europe, and they have a strong competitive position on the international market. There are several power stations in the area along with businesses using process water and cooling water. The reservoirs in the Biesbosch provide Rotterdam, the Drechtsteden and Zeeland with drinking water. Drinking water for Goeree-Overflakkee and Schouwen-Duiveland is taken from the Haringvliet, while the Brabantse Wal groundwater is the drinking water source for Zeeland and West Brabant.

There are numerous parties involved in the development of the area, such as the national government, regional authorities and regional social organisations.

Where are we now

In the short term (until approximately 2015-2020) the South-western Delta implementation programme provides a large number of measures that will ensure the objectives of a safe, resilient and vital area. Depending on long-term studies, a review will be carried out in early 2011 to see to what extent these measures could be useful for the long term and, as such, to what extent they are robust or have been written off so that investments can counterbalance social benefits.

Many of the parties involved, including the knowledge institutes, are working hard on effective solutions for the freshwater supply should the Volkerak-Zoommeer lake become salinized.

Developments

The key question for the long-term study is to what extent the target situation for the South-western Delta in the National Water Plan will come under pressure from climate change (rising sea levels and higher river discharges), new (and refined) safety standards, the salinisation of ground- and surface water and the significance of all of this in dealing with freshwater.

Rivers

The area and the players

The flood risk management tasks and its integrated approach are central to the Rhine and Meuse river area. The water level of the Meuse River is very dependent on rain, which is why it has a high discharge in winter and a low one in summer.

The Rhine is a typically mixed river, fed by meltwater as well as rainwater, which results in a more constant discharge that is high in spring, accompanied by high water levels.

Thanks in part to weirs that have been built, the river can still be used for shipping in the summer. There are a total of 3 million people protected from flooding living behind the dykes along the Meuse and Rhine tributaries. The area around the Meuse and the Rhine covers 173 municipalities (including those that could be affected by measures in the area around the major rivers), 14 water boards and six provinces.

In December 1993 and January 1995 , the undyked Meuse broke its banks, resulting in flooding. In the same years, the high water in various places along the Rhine tributaries caused serious disturbance, although there were no dyke breaches.

The area around the major rivers has significant cultural-historical and ecological value. Water-related sectors, such as shipping and recreation, are of economic importance as well.

Where are we now

The Meuse Projects, the Room for the River programme and the NURG (Nadere Uitwerking Rivieren Gebied) programme are ongoing. The Delta Commissioner has visited various interesting examples of integrated area development in which safety is linked to other interests and a connection between the short and the long term is sought, such as area development around Ooijen Wansum along the Meuse.

An area development plan called IJsselsprong has been put together by the province of Gelderland along with the Brummen-Zutphen-Voorst municipalities, the water board and the national government, in which the flood risk management measures from the key planning decision have been extended to include a long-term measure, and in which the flood risk management task is linked to tasks relating to housing construction, infrastructure and nature. Other examples of note are Waalweelde, involving private initiatives, and the development around Ravenstein/Oss, where social organisations are playing an active role. Further details on ongoing implementation projects can be found in Section 5.1.

Developments

It is expected that both the Meuse and the Rhine will have to convey more water as a result of climate change. However, at the same time, we have to consider the possibility of periods of extreme drought and, thus, seriously lower water discharges. The area around the major rivers has a widely varied landscape and there is a particular diversity in economic activity, rest and desolation, unspoilt nature and agricultural land. To maintain these qualities, different spatial developments are being devised, for which certainty about how to handle higher discharges in the long run is crucial.

Coast

The area and the players

The Coast sub-programme's field of activity consists of the coastal foundation zone, comprising the entire nearshore, beaches, seawalls, dams and dunes that are bordered on the seaward side by the -20m NAP (Amsterdam Ordnance Datum) line and towards the land by the inner dune edge and the solid defence systems, including the space set aside for rising sea levels in the next 200 years. The mainland coast of the Wadden Sea, the Eems-Dollard and the Zeeland and Zuid-Holland Delta inlets are not within the scope of the Coast sub-programme.

The coast is dotted with (parts of) coastal towns, ports, industrial and business terrains, nature and recreational reserves and valuable cultural landscape. This means that the coastal foundation zone is of significant economic importance and has great social value as a recreation and nature area for the Netherlands as a whole. Besides the coastal foundation zone's role as a primary flood defence system, there are a number of tasks in this field of work that need attention, such as the spatial development issues of the seaside towns of Scheveningen and Zandvoort, maintaining ecological values and objectives, and developing recreational opportunities. The regional steering committee for the Coast sub-programme consists of representatives from the four coastal provinces involved – Zeeland, Zuid-Holland, Noord-Holland, Fryslân – as well as the seven water boards concerned, representatives from coastal municipalities, the Ministry of Housing, Spatial Planning and the Environment and the Ministry of Transport, Public Works and Water Management.

Where are we now

Current policy aims to maintain safety. Under the motto "soft where possible, solid where necessary", this is achieved through sand replenishments, ensuring that the coastal foundation zone will grow at relatively the same rate as rising sea levels. Ongoing short-term programmes are the Flood Protection Programme and Weak Links (see Section 5.1). Finally, there is the issue of the protection levels for the parts of those areas outside the dykes, namely 13 coastal towns, a decision on which is due in 2011.

Developments

The development approach for the coast is primarily focused on the sandy coastal foundation zone growing in line with rising sea levels and maintaining the strength of the sea defence structures. In addition, the maintenance

and reinforcement of the existing diversity of the vast dune areas with their valuable nature, the much visited seaside towns and the incorporation of spatial developments all play an important role. First and foremost, the results of the standardisation study are relevant in conjunction with maintaining safety levels. Independent of the possible effects of an accelerated warming up of the planet as a result of climate change, an increase in sea levels is already taking place (see Chapter 3) and, as a result, continuous maintenance is required to continue to be able to guarantee safety.

The Coast sub-programme is tasked with researching 1) a sustainable and efficient maintenance of the safety of the hinterland against flooding from the sea, and 2) the feasibility of coastal expansion. In addition, working on maintaining safety offers opportunities for the integrated approach of a number of spatial development issues. The task to establish sustainable safety primarily offers parts of the coast that have solid elements an opportunity to look at coastal development as a whole, of which improving spatial quality is an important aspect. The provinces would be responsible for this.

To this end, a proposal will first be made for a national framework for coastal expansion (2010). Provinces will be invited to draft a provincial vision or a strategic agenda within that jointly formulated national framework. These provincial visions and agendas will be included in the sub-programme's second product, a national spatial vision for the coast (2012) (integrated vision for the coast). To fuel this framework and this vision, a research phase has been initiated. This research phase comprises at least the studies of a sustainable and safe development of the soft coast and the solid elements in it, as formulated in the task, including the effects of the new standardisation as well as all the knowledge questions that arise during the process.

The Delta Commissioner has noted that there are good plans in place, for example the redevelopment of Scheveningen Pool and Port and Zandvoort (urban development), where safety measures and spatial development will be reviewed and addressed in an integrated manner. When necessary, the Delta Commissioner will be able to provide encouragement to similar projects, also in the interest of the economic development of the coast.

Wadden Region

The area and the players

The Wadden Region sub-programme is focused on the Wadden Sea, the Wadden islands, the Eems-Dollard and the mainland coast of Noord-Holland, Fryslân and Groningen, which border the Wadden Sea/Eems. Approximately a quarter of a million people live in this area and its beauty and tranquillity attract hundreds of thousands of tourists and holidaymakers every year. The Wadden region is also an important link in the Netherlands's energy security, for example as a result of the Eemshaven power stations, and it has an important chemical industry. Together, the Wadden islands and the sandbanks of the Wadden Sea form an important link in the safety of the north of the Netherlands, given that they act as a breaker for waves that can be pushed up by storms in the North Sea area. In addition, the Wadden Sea is a natural system of world fame, renowned for being one of the biggest tidal areas in the world. For these reasons, the Dutch and the German Wadden Sea have been given world heritage status by UNESCO.

There are two parts to the issue with the Wadden Sea. Firstly, there is the issue of safety. The rising sea level, on the one hand, and subsidence resulting from mineral extraction, on the other, necessitate the maintenance or reinforcement of sea defences according to the established standards. The second issue is the risk that the sandbanks of the Wadden Sea will drown over time as a result of accelerated climate change, which will have major consequences for the ecosystem and safety, especially from increased wind surge due to the greater volume of water in the Wadden Sea.

The regional steering committee of the Wadden Region sub-programme consists of the provinces of Noord-Holland, Fryslân and Groningen, the Hollands Noorderkwartier, Fryslân, Noorderzijlvest and Hunze en Aa's water boards, the municipalities involved and the Ministry of Agriculture, Nature and Food Quality.

Where are we now

At present, the Flood Protection Programme is being carried out in the Wadden region. In 2011, the results of the third review will provide a definitive answer to the further course of this programme. There are appealing examples of an integrated approach to spatial quality and safety in this programme, such as the reorganisation and reinforcement of the sea defence in Harlingen and the reinforcement of Ameland's Wadden dyke.

Developments

Accelerated or not, rising sea levels mean that maintaining the basic coast line is essential. The current Wadden islands must not noticeably shift or erode. This means that there has to be sufficient sand in the system to facilitate the growth of the islands along with the rising sea levels. This requires sand replenishment. In addition, it is expected that the Wadden Sea's demand for sand will increase in line with rising sea levels, resulting in sand being pulled away from the coastal foundation zone of these same Wadden islands.

A decision in principle regarding the standards for flood protection is expected in 2011. In the future, the desired safety level of each dyke ring must be attained on the basis of this standardisation. Although it is currently unclear what this means for the Wadden region, the safety task of the Wadden Region sub-programme will have to keep this decision in principle in mind.

The combination of subsidence and rising sea levels can, in due course, lead to the sandbanks of the Wadden Sea drowning. To a certain degree, the Wadden Sea can grow along with the relative rise in sea levels, but without any countermeasures, the sandbanks will drown with an accelerated rise in sea level, resulting in an array of consequences for the ecological values of the region and the safety of the northern part of the Netherlands.

The Wadden Region Delta Programme has a dual task. The safety of the coast of the Wadden islands and the mainland should be guaranteed by way of an integrated approach. In addition, monitoring is required of the consequences of and developments resulting from climate change in the Wadden region and the ecosystem. This can facilitate determining, at the earliest possible stage, what effects of climate change really are appearing.

The cohesion between short term and long term is not very problematic given that, with a view to the natural Wadden Sea, any improvements made to the sea defence structure will be carried out in the most integrated manner possible. This could, for example, lead to safer, yet softer transitions between the sand flats and the sea defence structures. Sand replenishment that benefits maintaining the basic coastline also fits well in the long-term strategy.

Colophon

Photography:

Tineke Dijkstra

- Cover: Sand replenishment north of Ter Heijde, Delflandse Kust project. The dunes will be expanded seawards, as will the beach.
- 'Stad van de Zon', a new, water-rich and energy-neutral housing estate.
- Coast: New dune at Nieuwesluis, in the Dutch province of Zeeuws-Vlaanderen.
- Rivers: At this point, the Pannerdensch canal divides into the (Geldersche) IJssel and the Lower Rhine.

Marcel Kentin

- Safety: Dyke improvement, Lekkerkerk
- Southwestern Delta: Oosterschelde flood barrier
- Wadden Region

Theo Bos

- Rhine Estuary-Drechtsteden: Wilhelminakade, Rotterdam
- Freshwater: Irrigation (strawberry cultivation), Erp
- IJsselmeer Region: Monument on the IJsselmeer dam (Afsluitdijk)

HollandseHoogte

- History (page 27)

HollandseHoogte/Siebe Swart

- Maeslantkering (page 30)

Beeldarchief VenW/Your Captain Luchtfotografie

- Coast Petten (page 49)

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Safety



Freshwater



New Urban Developments and Restructuring



Coast



Rhine Estuary—Drechtsteden



South-western Delta



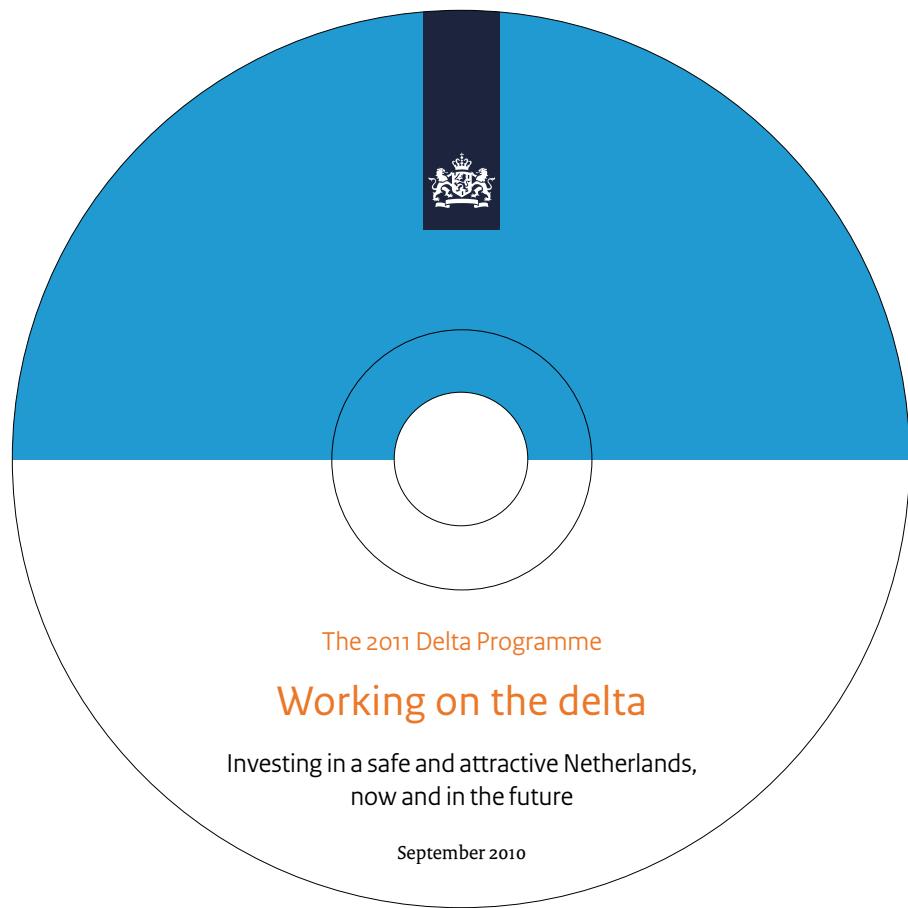
Rivers



IJsselmeer Region



Wadden Region



The video concerning the need for the Delta Programme can be downloaded from www.deltacommissaris.nl and www.rijksoverheid.nl/deltaprogramma from 21 September. It can also be viewed at www.youtube.com/deltacommissaris. The DVD can be ordered free of charge via info@deltacommissaris.nl.

The Delta Programme

The Delta Programme is a national collaborative programme of the national government, provinces, municipalities and water boards, with contributions from social organisations. The aim is to protect the Netherlands and its future generations against flooding and to safeguard a sufficient freshwater supply.

The Delta Commissioner furthers the development and implementation of the Delta Programme by making an annual proposal for the Programme to the Ministers for Transport, Public Works and Water Management (Verkeer en Waterstaat), Housing, Spatial Planning and the Environment (VROM), and Agriculture, Nature and Food Quality (LNV). This proposal contains measures and provisions to limit flooding and water scarcity. The coordinating Minister for Transport, Public Works and Water Management presents the Delta Programme to Parliament every year on Prinsjesdag (Dutch budget day).

There are nine sub-programmes in the Delta Programme:

- Safety
- Freshwater
- New Urban Developments and Restructuring
- IJsselmeer Region
- Rhine Estuary–Drechtsteden
- South-western Delta
- Rivers
- Coast
- Wadden Region

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An extra copy of the 2011 Delta Programme
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The 2011 Delta Programme is also available on line at:
www.deltacommissaris.nl