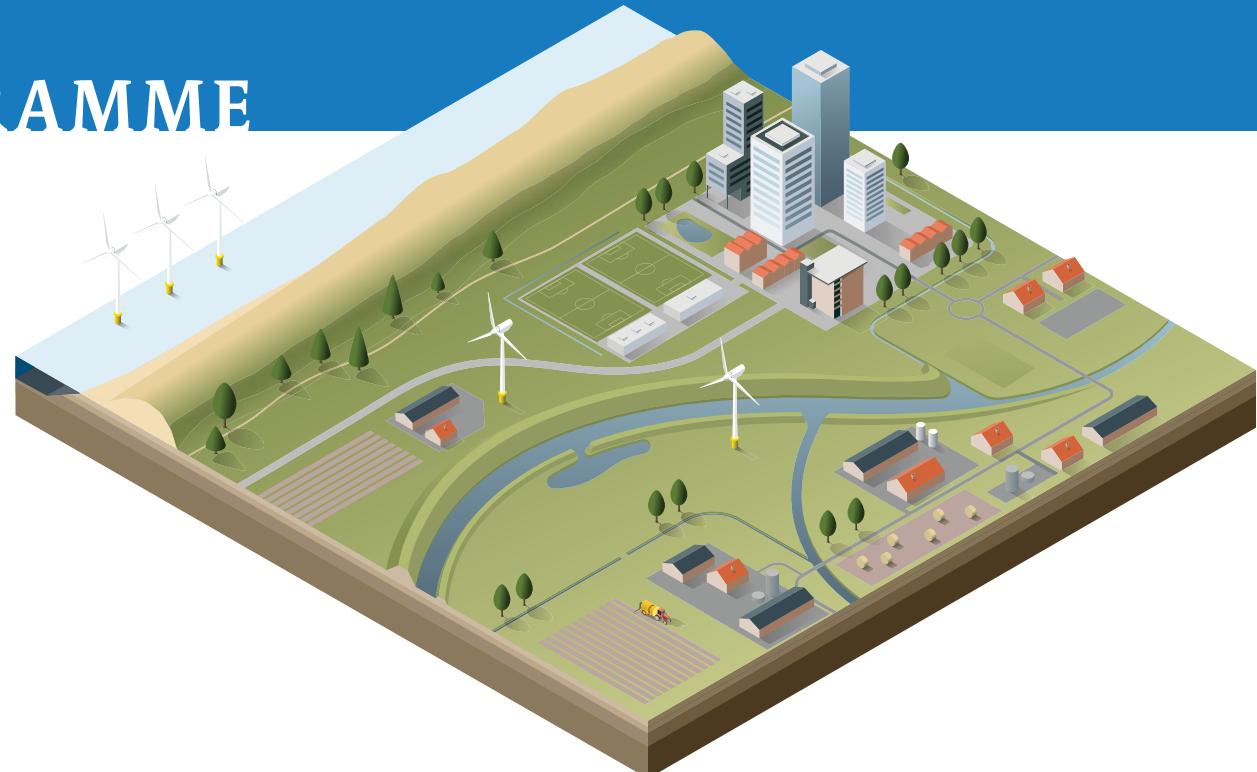




SPEED UP, CONNECT AND RECONSTRUCT

NATIONAL  
DELTA PROGRAMME

2023



OUTLINES



Delta Commissioner Peter Glas

**“The time for freedom of action is over: we need to speed up to keep our delta safe and liveable.”**

## About the Delta Programme

Wet is getting wetter, dry is getting drier, hot is getting hotter, extreme is getting extremer. The low-lying Netherlands is vulnerable to climate change. In the Delta Programme, we are working on a safe and liveable delta:

- proper protection against flooding
- adequate supplies of fresh water
- climate-resilient spatial planning

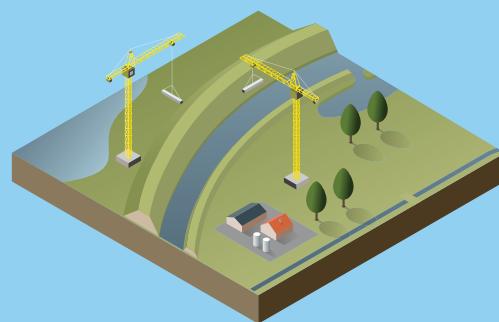
What is the current status of the Delta Programme?  
Are the goals achievable? What do we need to focus on?

This brochure provides a concise overview of progress for the relevant authorities in The Hague and in the regions. As a basis for a healthy discussion.

The Delta Commissioner provides a detailed annual report of progress. The latest progress report is the 2023 Delta Programme. See [www.deltaprogramma.nl](http://www.deltaprogramma.nl).

The Delta Programme brings together the national government, provincial and municipal authorities, and water authorities. Knowledge institutes and stakeholder organisations are also actively involved.

## CONTENTS



## Core Message

# The Delta Programme has to speed up



## Recommendations from the Delta Commissioner

## Speed up, connect and reconstruct



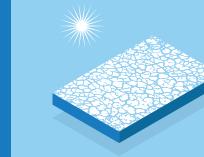
## Agendas

- Flood risk management
- Fresh water
- Spatial adaptation



## Areas

- Area-specific approach
- Key issues for implementation



## Climate + Locality

- Climate change
- Locality



## Credits



## CORE MESSAGE

## The challenges are increasing, the Delta Programme must speed up

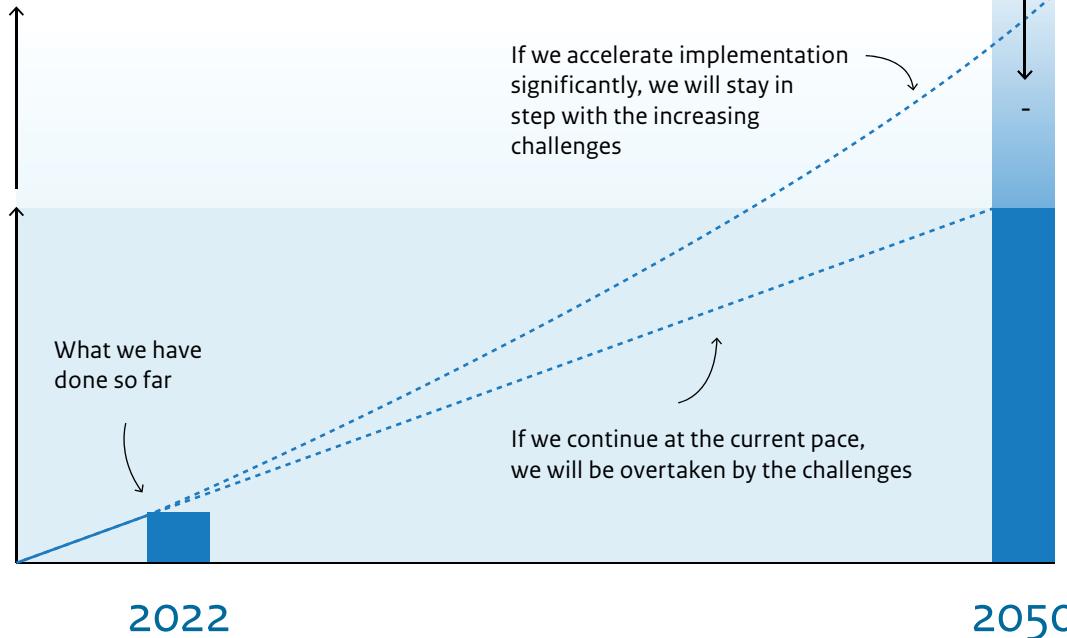
Goal of the Delta Programme:

**The Netherlands will remain a safe and liveable delta.**

Implementation is on track but the challenges will increase more than expected as 2100 approaches, especially in the area of extreme flooding and drought. This is the result of faster climate change and transitions in urban and rural areas.

What is probably necessary because the challenges are increasing

What we thought was needed for a safe and liveable delta in 2050



The challenges will become even larger as 2100 approaches: we must take steps in anticipation now

### Opportunities and threats

### Recommendation from the Delta Commissioner

↙ (click for details)

The climate is changing faster than expected

> The time for freedom of action is over, we really must get to work

Torrential rainstorms of the kind seen in Limburg could fall anywhere in the Netherlands

> Work on mitigating the consequences now (layers 2 and 3)

Other transitions make challenges larger but also generate opportunities

> Give transitions in rural areas a flying start: make use of the Delta Programme

The freshwater shortage will increase if current consumption remains unchanged

> Link agendas for nature and sustainable agriculture to the DP agendas

## AGENDAS

Major agendas in the areas of flood risk management, fresh water and spatial adaptation



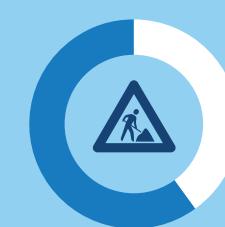
#### Flood risk management

By 2050, everyone in the Netherlands will have the basic level of protection



#### Fresh water

The Netherlands will be resilient to water shortages by 2050



#### Spatial adaptation

The Netherlands will be climate-resilient and water-robust by 2050



DETAILS



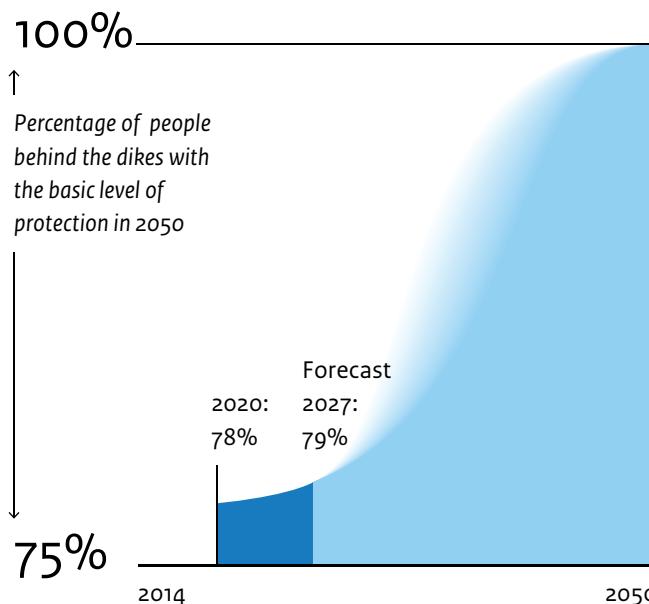
Delta Fund

## AGENDAS &gt; FLOOD RISK MANAGEMENT

# By 2050, everyone in the Netherlands will have the basic level of protection

## What is the goal and what is our current position?

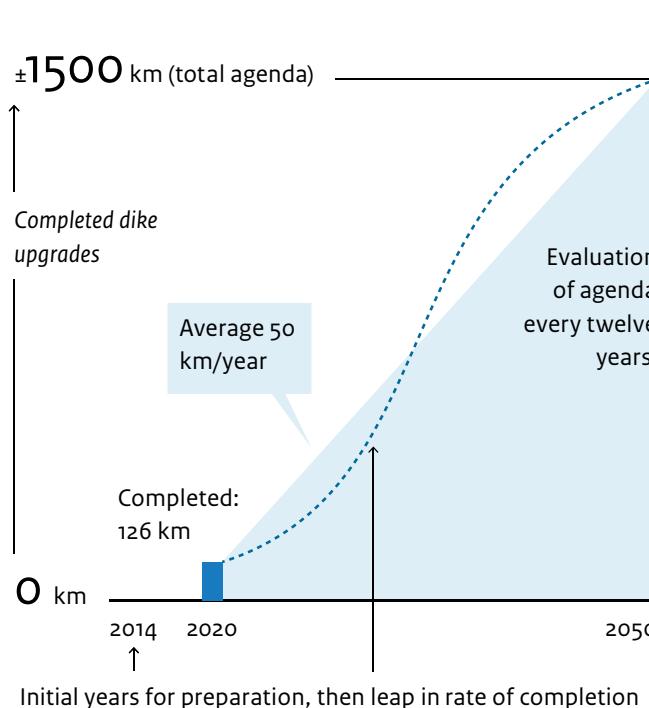
National Water Programme: in 2050, the basic level of protection\* will apply to everyone behind the dikes



\*probability of mortality due to flooding must not exceed an average of once in 100,000 years

## How are the measures progressing?

Dike upgrades are the most important measure in the Delta Plan for Flood Risk Management



## Key issues and opportunities

- Maintain pace in the Flood Protection Programme
- Focus more on mitigating consequences and crisis management as well
- Make use of dike upgrades as a driver for area development
- Disaster in Limburg has generated more interest in flood risk management

## AGENDAS &gt; FRESH WATER

# The Netherlands will be resilient to water shortages by 2050

## What are our goals and what is our current position?

Preferred sequence for freshwater management from the NOVI:

1. Water and soil lead spatial planning

Progress: hardly begun

2. Economical use of water

Too little: more savings, for example when tackling salinisation

3. Better water retention

Progress mainly in High-Lying Areas with Sandy Soils

4. Smart allocation of water

We are traditionally good at this but smarter approach possible

5. Acceptance of damage/residual damage

Acceptance of economic/ecological damage/  
residual damage not yet an explicit choice

100%  
(expert opinion)

## How are the measures progressing?

Focus is on water retention and influx

Freshwater Delta Plan:  
investing in six  
freshwater regions  
and the main  
water system

€ 400  
million  
Almost completed

€ 150 mln  
Delta Fund  
€ 250 mln  
Regional contribution

Phase 1: 2015-2021

€ 800  
million  
Just begun

€ 250 mln

Phase 2: 2022-2027

€ 550 mln



DETAILS

> Water Availability Process

> Resilient to water shortages

> Concrete goals

## Key issues and opportunities



Limits of water system  
coming into view:  
transitions in spatial  
planning needed



Management based  
more on economical use  
or acceptance of damage



Agree on quantitative  
result-driven targets,  
nationally and regionally



Linkage with transformation  
of agriculture and nature,  
avoid regret measures



Sustainable groundwater  
management: needed for  
water consumers and  
nature restoration

## AGENDAS &gt; SPATIAL ADAPTATION

# The Netherlands will be climate-resilient and water-robust by 2050

## What is the goal and what is our current position?

National Water Programme: by 2050, NL will be resilient to heat, drought, problems with excess water and the effects of floods

Stress tests-risk dialogues-implementation

First round finished, six-yearly reiteration required

Climate-resilient/water-robust in environmental visions of provincial authorities (in 2022) and municipal authorities (2024)

Implementation at present is above all policy-poor

National vital and vulnerable functions, stress tests (2021) and ambitions (2023)

Demands greater effort, good step made for infrastructure

Always act in climate-resilient/water-robust ways

More often than not, more time needed

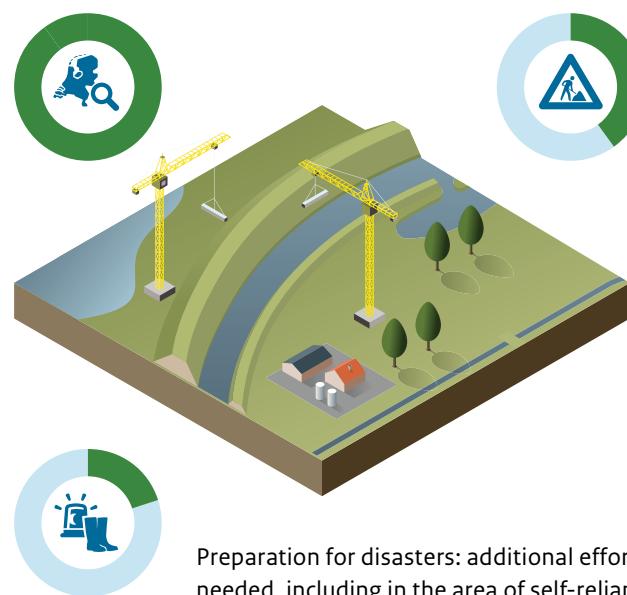
100%  
(expert opinion)

## How are the measures progressing?

The Delta Plan for Spatial Adaptation and the National Adaptation Strategy encourage climate-resilient design

Implementation programmes: in operation, applications for stimulus scheme ongoing

Implementation: dozens of small measures in operational phase, good progress being made



## Key issues and opportunities



Tackle the problem at source: make new buildings/infrastructure climate-resilient from the outset



Analyse vulnerabilities at multiple scales, including consequences of flooding



Municipal authorities are achieving good results, struggling with accumulation of spatial claims and lack of capacity



Implementation accelerated by Stimulus Scheme (€600 million, including regional contributions)



Investing in green/blue cities and landscapes is good for healthy living environment and climate resilience

## AREAS

All regions are working on the implementation of the Delta Programme



Area-specific approach

Anticipate the major  
water challenges  
after 2050 now



Key issues for implementation

Accumulation of agendas  
imposes new demands  
on implementation



## AREAS &gt; AREA-SPECIFIC APPROACH

## Anticipate the major water challenges after 2050 now

Each area has a tailored preferred strategy for the tasks of the Delta Programme. Despite the substantial key issues identified by this report, the regions are optimistic about implementation between now and 2050. They do understand the necessity to anticipate the major water challenges after 2050 now.

### Key issues and opportunities



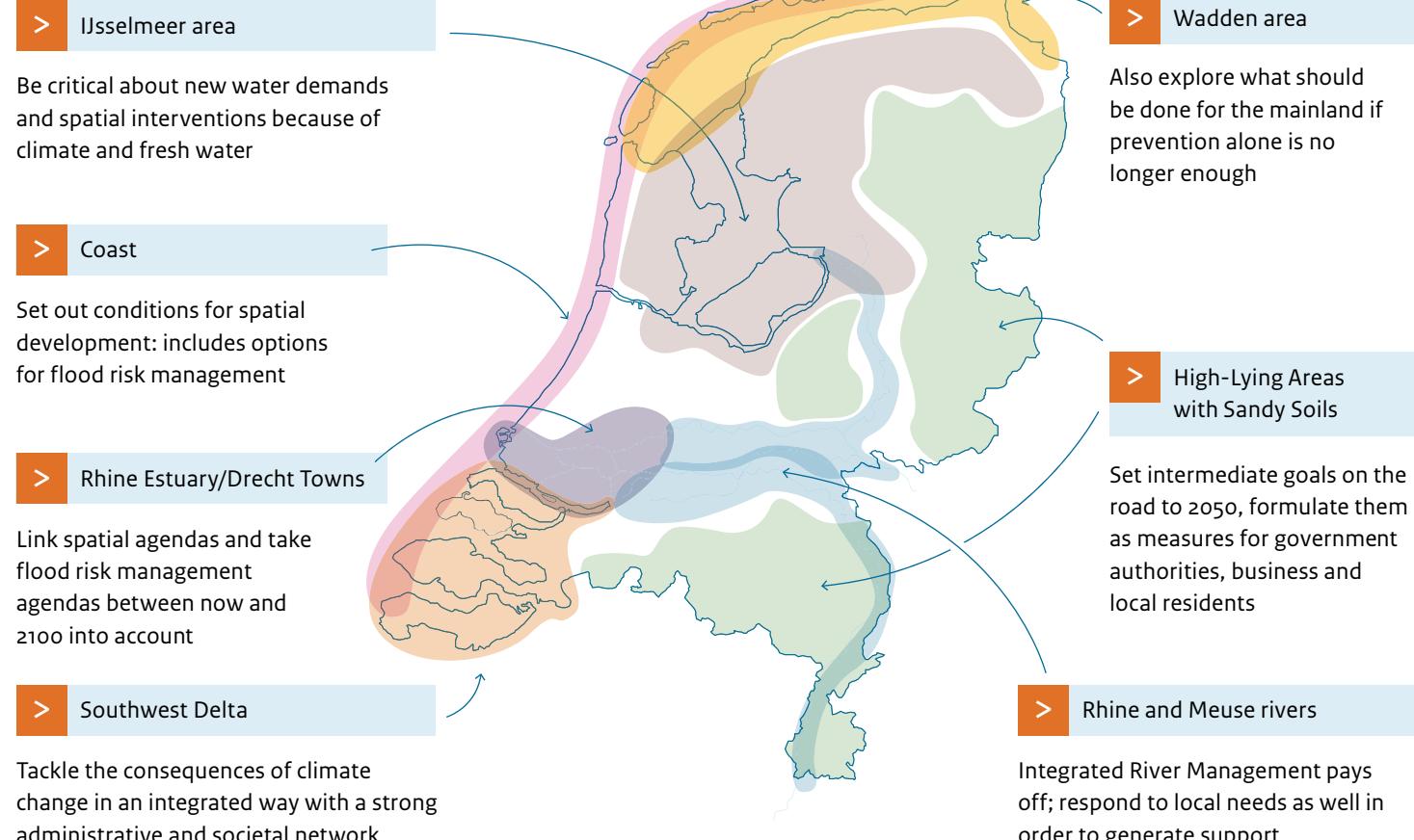
Accumulation of agendas: integrated area approach affords opportunities but also takes time



Capacity is a limiting factor at all government authorities



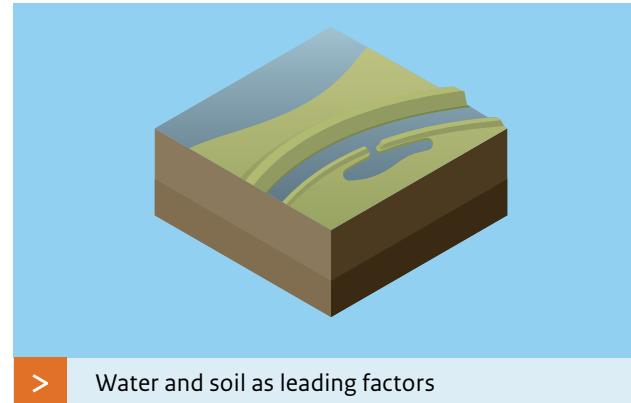
Moving targets due to climate change, new construction, and other developments: how do we keep up?



AREAS > KEY ISSUES FOR IMPLEMENTATION

## Accumulation of agendas imposes new demands on implementation

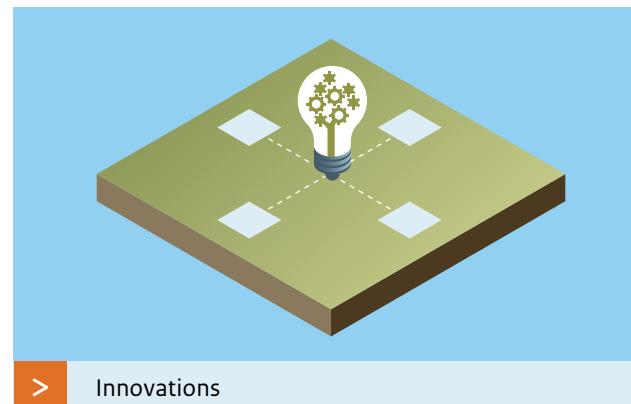
Large, urgent agendas meet in the regions: the water agenda, the housing agenda, the transition in the rural areas, the energy agenda and so on. The accumulation of agendas imposes new demands on implementation: area-specific, smart design, effective collaboration, administrative boldness, making decisions. Getting on with the job.



> Water and soil as leading factors



> Operational capacity



> Innovations



> Design-oriented approach

DETAILS

> Coordination and connections

## CLIMATE + LOCALITY

Climate change and other agendas affect the agendas of the Delta Programme



## Climate change

The climate is changing faster than expected; the challenges facing the Delta Programme are increasing



## Locality

Major national agendas in the physical domain: integrated approach is a necessity



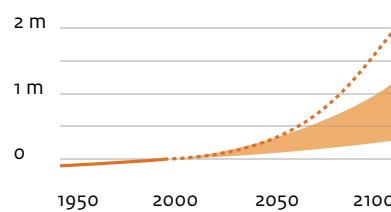
## CLIMATE + LOCALITY &gt; CLIMATE CHANGE

# The climate is changing faster than expected; the challenges facing the DP are increasing

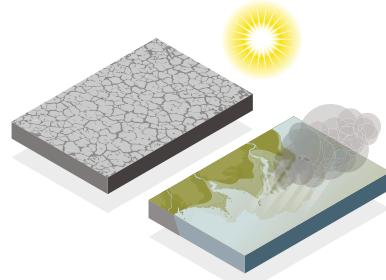
## What factors are in play?

The planet is warming up faster.  
Expected effects in NL:

Depending on carbon emissions,  
sea levels could rise by up to 1.2 m  
by 2100 and by up to 2 m if the land  
ice breaks up



More frequent extreme weather: heat,  
drought and torrential rainstorms will  
be more frequent and more intense

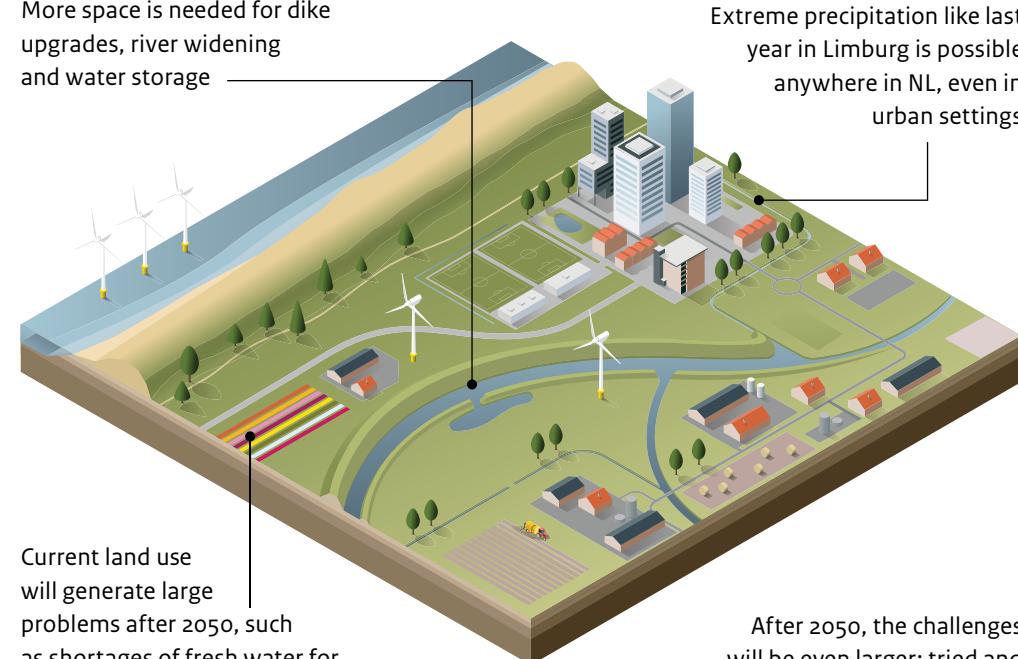


## What are the consequences?

The challenges facing flood risk management, fresh water and spatial adaptation are increasing. Drastic measures may be needed sooner, even before 2050.

More space is needed for dike upgrades, river widening and water storage

Current land use will generate large problems after 2050, such as shortages of fresh water for drought- and salt-sensitive crops



After 2050, the challenges will be even larger; tried and tested solutions will no longer suffice

## What does this mean?

Faster action is needed to keep a step ahead of disasters



Carbon emissions to be reduced substantially to keep agendas manageable



Move forward fast with climate adaptation to keep pace with risks of sea level rise and extreme weather

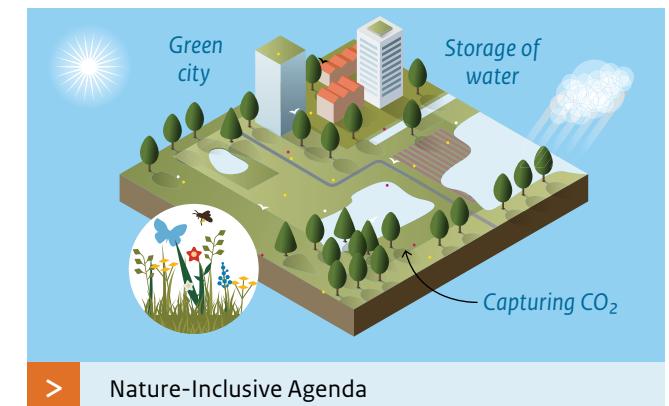
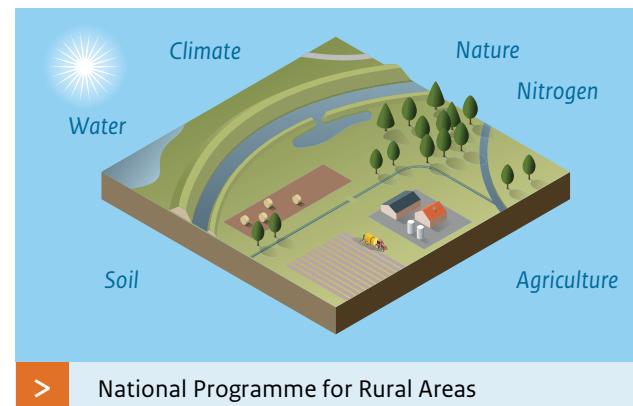
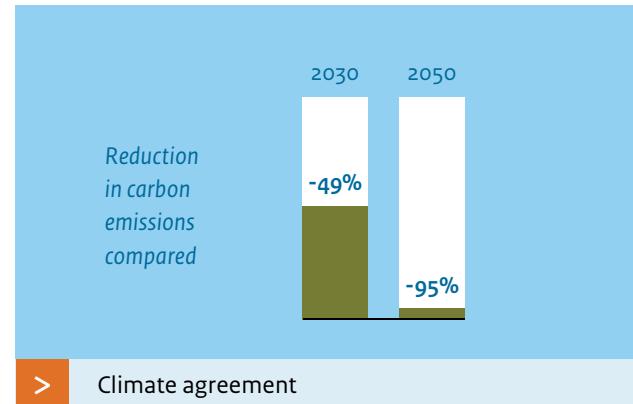


Use transitions in land use and incorporate climate change in investment agendas

## CLIMATE + LOCALITY &gt; LOCALITY

## Major national agendas in the physical domain: integrated approach is needed

The Netherlands is facing urgent national challenges. They overlap with those of the Delta Programme. Solutions to one challenge can result in new bottlenecks but also new opportunities. An integrated, coherent approach is therefore necessary for all agendas in the physical domain.



## RECOMMENDATIONS FROM THE DELTA COMMISSIONER

# Speed up, connect and reconstruct

Wet is getting wetter, dry is getting drier, hot is getting hotter, extreme is getting extremer. And extreme weather is becoming increasingly frequent. The Netherlands is running up against the inflexible limits of the natural system.

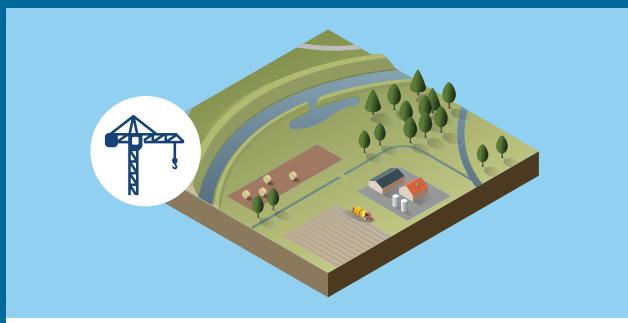
The Delta Commissioner advises the Cabinet to speed up the implementation of the Delta Programme in conjunction with the major transitions.



The time for freedom of action is over, we really must get to work



Work on mitigating the consequences now (layers 2 and 3)



Give transitions in rural areas a flying start: make use of the Delta Programme



Link agendas for nature and sustainable agriculture to the agendas of the Delta Programme



## Credits

This brochure is a publication from the Delta Commissioner.

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September 2022

**NATIONAL**  
**DELTA PROGRAMME**



## The time for freedom of action is over, we really must get to work

The challenge of keeping the Netherlands safe and liveable is a major one but the steps required are largely crystal-clear. The idea that the water and soil system must be leading has been included in policy frameworks for decades but the implementation in, for example, regulations has lagged behind. The Netherlands is already capable of climate-robust construction and it is also known how we can manage peat/peatland areas sustainably and what protection nature areas require. Even so, all this is barely getting off the ground.

### I am therefore calling on all the partners of the Delta Programme: take real action now.

Every new development should be climate-resilient. Adopt water and soil as the basis for spatial planning, use fresh water more sparingly, work on mitigating consequences and on crisis management, protect nature and biodiversity.

## Work on mitigating the consequences now (layers 2 and 3)

Torrential rainstorms of the kind seen in Limburg in 2021 could fall anywhere in the Netherlands, at any time. Physical disruption cannot be prevented in such an extreme situation. It is no longer enough to work on prevention alone. The same applies to extreme heat and drought.

The Netherlands must prepare better for extreme events with unpredictable consequences. How can we limit social disruption, damage and the disturbance of vital functions during extreme weather? This requires changes in spatial planning, better crisis management and awareness of the risks.

#### Specifically, I recommend:

- Include clear performance requirements for mitigation measures in the national yardstick for climate-adaptive building, with water and soil as leading factors.
- Include consequence mitigation in the next round of stress tests, risk dialogues and implementation agendas.
- Cabinet, work with the regions to decide which party should take the lead in mitigating the consequences of flooding.

## Give transitions in rural areas a flying start: make use of the Delta Programme

The major challenge facing rural areas is to adapt land use in sustainable ways in line with the water and soil system and to restore nature on a large scale. The goal is to start implementing measures in 2024. A huge challenge.

The three responsible ministers will be doing this in collaboration with the local government authorities in the National Programme for Rural Areas (NPLG). Experience in the Delta Programme is that launching a large national programme with a large number of stakeholders takes a lot of time. The Delta Programme now has operational organisations in the regions (such as those for fresh water) that are working well and measures that comply with the goals of the NPLG. Make use of them.

#### Specifically, I recommend:

- Make use of the measures and organisation of the Delta Programme to speed up the transition in rural areas.
- Start implementation immediately using existing funding arrangements pending the adoption of the Transition Fund.

## Link agendas for nature and sustainable agriculture to the agendas of the Delta Programme

The transition to sustainable nature and agriculture in rural areas overlaps extensively with the agendas of the Delta Programme. Brook restoration will be an important measure for improving water quality and raising groundwater levels, particularly in the High-Lying Areas with Sandy Soils. Brook restoration is also a measure in the Delta Programme with the aim of making the High-Lying Areas with Sandy Soils resilient to water shortages.

Nature requires more space and better water conditions, but it can also form robust buffers that cushion the effects of climate change. It is therefore important for government authorities to establish links between measures for the Delta Programme as far as possible with the agendas for nature and biodiversity, preferably opting for nature-based solutions.

#### Specifically, I recommend:

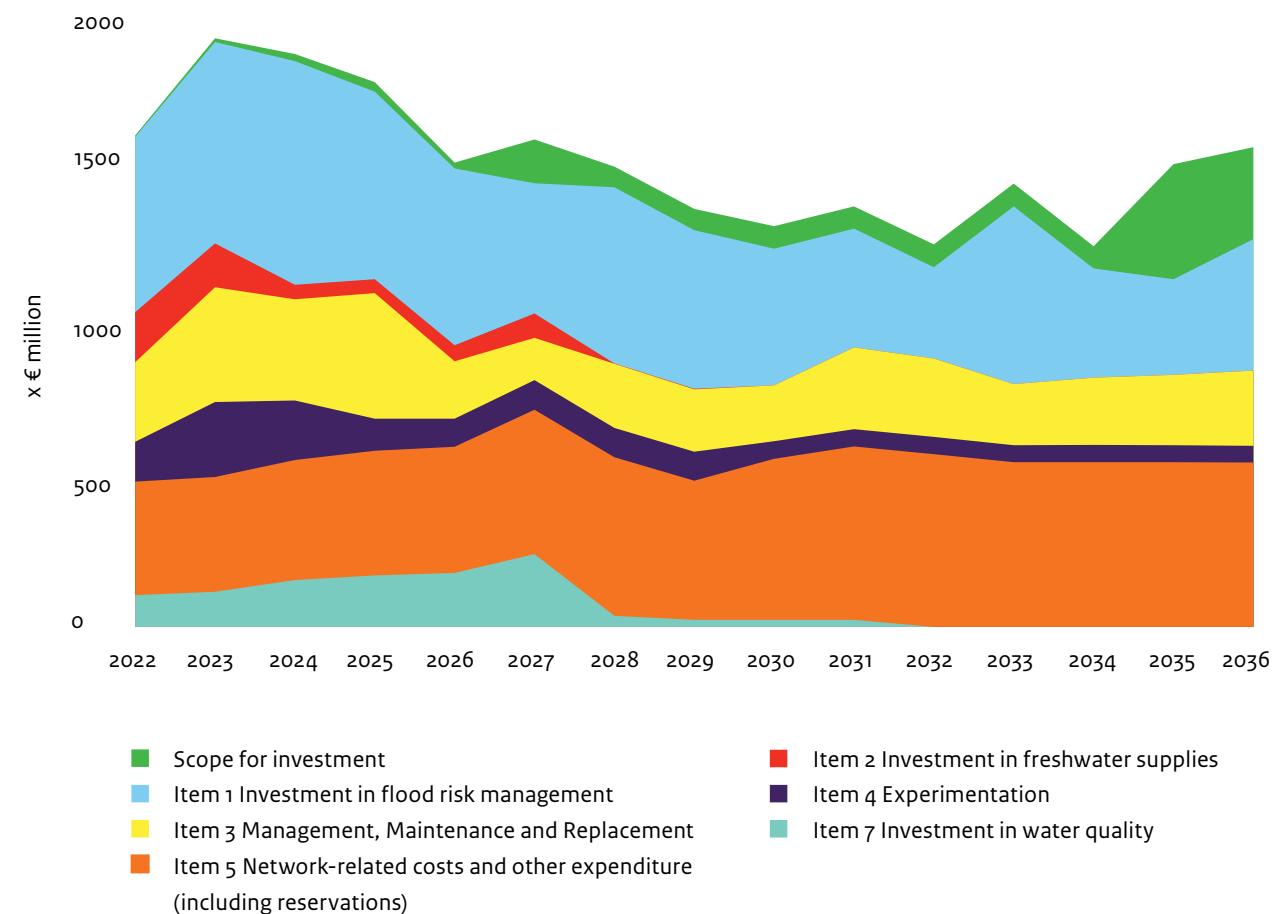
Connect agendas in rural areas for nature restoration and sustainable agriculture with the objectives of the Delta Programme wherever possible.

## Delta Fund

The Delta Fund contains the resources provided by the national government to pay for some of the measures in the Delta Programme. Other partners of the national government and other government authorities also contribute to measures. In 2023, € 1.9 billion will be available in the Delta Fund, with € 1.2 billion of that amount being available for the objectives of the Delta Programme. The Delta Commissioner makes an assessment of the financial underpinning of the Delta Programme every year. It is expected that, between now and 2050, € 29.4 billion will be needed for the measures.

High inflation is putting pressure on the budget (see 2023 Delta Programme for further details). The low availability of commodities and construction materials, in combination with labour shortages, is resulting in a risk of delays. For the time being, the pressure on the budgets needed to implement the Delta Programme is manageable given the established scope, the earmarked budgets from the coalition agreement, the long duration and the margins of uncertainty that are common in cost estimates for such a long period.

## Delta Fund Budgets





## Flood Protection Programme

The Flood Protection Programme (HWBP) brings together an alliance of the 21 water authorities and Rijkswaterstaat. The alliance is working on strong primary flood defences so that they will comply with the new statutory standards by 2050 at the latest. The alliance will upgrade approximately 1,500 kilometres of dikes and about 500 locks and pumping stations between now and 2050.

The ambition is to complete an average of 50 kilometres of dike upgrades annually. The most sub-standard defences will be given priority. These are generally large, complex projects with longer lead times. The upgrades are therefore proceeding at a slower pace at present. From 2027 onwards, the number of completed dike upgrades will increase to more than 50 kilometres a year.

In 2023, work will take place on the upgrading of approximately 600 kilometres of dikes. These activities will range from inventory studies and planning to implementation.

## Flood Protection Overview

The agenda for flood risk management depends on the condition of the flood defences: which parts of the defences are not strong enough according to the requirements in place since 2017?

There is a national assessment of all primary flood defences every twelve years. This gives the water authorities and Rijkswaterstaat a clear picture of the condition of their primary flood defences.

The first national assessment round for primary defences based on the new standards began in 2017. This will result in the first national Flood Protection Overview in 2023: a picture of what is needed for the management, maintenance and upgrading of the primary flood defences.

The second and third National Flood Protection Overview will be available in 2035 and 2047. In the meantime, Rijkswaterstaat and the water authorities are steadily working on upgrading the flood defences. In 2050, the entire system of primary water defences will have to be in order.

## Spatial quality and sustainability

The Flood Protection Programme includes the Programmatic Approach to Sustainability and Spatial Quality. This approach is intended to support the transition to sustainable, climate-neutral and circular upgrades with spatial quality. The aim is to ensure that the focus on sustainability and spatial quality is structurally embedded in all HWBP projects after 2023.

In the area of sustainability, gains can be achieved in earthmoving, which accounts for most of the carbon footprint of dike upgrades by far. The footprint can be reduced substantially by optimising the design and use of local soil. This can also contribute to circularity and nature development. Five sustainability projects are in progress at the Rivierenland, Drents Overijsselse Delta and Vallei en Veluwe water authorities to further implement innovations of this kind.

In 2021, studies were conducted for four projects to see how emissions could be reduced on the construction site and what the costs would be. In 2022, the measures are being implemented in the Rijnkade Arnhem, Sterke Lekdijk- Salmsteke and Hansweert projects.

## Knowledge and innovation

Investing in knowledge development and innovation pays off. In over 60% of upgrade projects, for example, it has already reduced the amount of work required and therefore resulted in savings of approximately € 370 million in dike upgrades. It also provides other benefits such as the reduction of carbon emissions and designs that fit in better with the local conditions.

The Waaldijk Gumeren study, for example, resulted in the Coarse Sand Barrier, a new solution for the washing away of sand under the dike (backward erosion piping). Overtopping trials and the Delta Flume trial have shown that a section of the dikes is stronger than thought.

In the Knowledge for Flood Defences Programme, knowledge is being acquired for the further development of the instruments for the assessment and design of primary flood defences. In the second national assessment round for primary flood defences (2023- 2035), the authorities managing flood defences will be able to use the improved instruments.

[Back to flood risk management](#)



## Water Availability Process

Government authorities and water users work together in this process to make it clear how much fresh water is available in an area. Then they make agreements about measures and addressing shortages. The Water Availability process consists of three steps:

### Step 1 Transparency

The parties determine freshwater demand and supply in normal and dry periods, now and in the future. This allows users to prepare for water shortages and, for example, to build water storage facilities or accept damage.

### Step 2 Optimisation

The stakeholders explore promising measures to optimise demand and supply in accordance with the priority sequence in the National Environment Planning Vision and the National Water Programme. The underlying principles are economical water use and adapting spatial planning in line with the water and soil system.

### Step 3 Agreements

The parties agree on measures and how to address water shortages. In this way, users know what to expect from the government and what they themselves are responsible for. This results in an action perspective and helps with investment decisions.

[Back to fresh water](#)

## Resilient to water shortages

The Netherlands will be resilient to water shortages by 2050. That is the goal of the Delta Programme for Fresh Water. But what does 'resilient' mean? An initial inventory has yielded three perspectives of resilience that may be appropriate in different situations and phases:

- Robust: sudden shocks can be absorbed with existing land use
- Adaptive: new developments (in the climate and elsewhere) can be absorbed in the water system without a fundamental change in function
- Transformative: spatial planning is adapted to the water system

With this knowledge, the Delta Programme is looking at what is needed to be resilient to water shortages by 2050. This process involves the use of three questions:

1. Construction: which transformative measures are needed?
2. Deconstruction: which measures obstruct the transition to a new system over time (lock-in effect)?
3. Reconstruction: which optimisation measures are always a good idea (no-regret measures)?

This inventory will provide input for the periodical evaluation in 2026.

[Back to fresh water](#)

## Concrete goals

The overarching goal of the Freshwater Delta Programme is for the Netherlands to be resilient to water shortages by 2050. The further concretisation of this goal has been taking place since 2021. That is needed to assess how effective measures are and to determine what is still required to attain the ultimate goal. The process of concretisation also provides input for major transitions such as the National Programme for Rural Areas.

The focus is on concrete goals at the national and regional levels. The national goals will have to provide frameworks for resilience to water shortages in different areas and sectors. The regional goals will respond to the local characteristics of freshwater regions and they will be consistent with transformations in rural and urban areas.

The underlying principle is that soil and water will lead spatial planning. The new climate and delta scenarios provide boundary conditions for the concretisation of the goals.

[Back to fresh water](#)

## Choices IJsselmeer area

In 2021, the Freshwater Delta Programme conducted a stress test for the freshwater supplies from the IJsselmeer, the largest freshwater buffer in the Netherlands. Agriculture, nature, industry and drinking water supplies in the north of the Netherlands depend on it.

The stress test shows that, in 2050, water shortages may occur once every five years (Steam scenario: rapid climate change, strong economic growth and increased water demand). The Delta Decision in 2014 assumed a probability of once every 50 to 100 years. It emerged from the stress test that adaptive policy and planning are prerequisites to achieve resilience to freshwater shortages.

In the near future, for example, we have to be able to respond to new issues: how do we deal with the additional water demand for salinisation in polders, peatland areas, data centers and hydrogen production? How can we stop the salinisation of the IJsselmeer? And can we increase the size of the freshwater buffer in the IJsselmeer with more dynamic water-level management or alternative influx routes?

[Back to fresh water](#)



## Stimulus Scheme

Since 1 January 2021, the temporary Stimulus Scheme for Climate Adaptation has been in place to accelerate work on climate adaptation. The Ministry of Infrastructure and Water Management has made € 200 million available in this scheme. The working regions of the Spatial Adaptation Delta Programme can submit proposals in which they themselves co-finance two thirds. In total, therefore, this is an investment of € 600 million.

In 2021, more than half of the 45 working regions submitted their first official applications. Fifteen applications were processed in 2021. The government contribution for these applications is € 48.95 million; including the contributions from the working regions, the package of measures from 2021 for which applications were submitted amounts to almost € 150 million. A peak in the applications is expected in 2022.

The working regions are required to substantiate applications with an implementation agenda based on stress tests and risk dialogues. The funds are not available for tackling heat stress; working regions can propose measures as part of an integrated approach that also reduces heat stress.

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## Vital and vulnerable

The vital and vulnerable processes in the Netherlands – energy and drinking water supplies, the main infrastructure and hospitals, for example – will have to be climate-resilient and water-robust by 2050. The national government is working on this with local government authorities and providers of network functions. Due to the large number of processes and stakeholders, it is difficult to establish a clear overview of progress. In addition, roles and responsibilities are not always clear; that is being worked on.

However, a range of activities are taking place. Providers of national vital processes are working on resilient infrastructure in a nationwide approach. Actions are also being implemented at the regional level. For example, in 2022, the Zaanstreek-Waterland Safety Region conducted a supra-regional Flood Impact Analysis to study the impact on society of a failure of vital infrastructure and processes.

Rijkswaterstaat and ProRail completed the stress tests and risk dialogues for climate-resilient infrastructure in 2021. The results for the Rijkswaterstaat networks can be found in the Climate Impact Atlas and the Implementation Agenda.

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## Lessons from Limburg

The Flooding Policy Platform was established in response to the flooding in Limburg in the summer of 2021. This is because extreme weather conditions such as those in Limburg, Germany and Belgium could occur more often, including in other locations in the Netherlands, and this will lead to major problems and billions of euros in damage everywhere.

The Policy Platform has stated that serious problems cannot be prevented in circumstances of this kind. All the efforts in this area should target the prevention of social disruption: work on mitigating the consequences, water-robust spatial planning, awareness, better weather forecasts and collaboration, both national and international, in the event of disasters.

Among other things, the Policy Platform also recommends the ongoing standardisation of the principles underlying stress tests and the improved coordination of risk analyses at different scales. A second report will follow in the autumn of 2022.

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## Substantive goals

When the previous Delta Programme was presented, the Delta Commissioner pointed out that there was a widely felt need for substantive national goals to make the Netherlands climate-resilient and water-robust in addition to the process-based approach with seven ambitions in the Delta Plan for Spatial Adaptation. The Minister of Infrastructure and Water Management adopted the recommendation to make the goals more concrete.

This recommendation is now being implemented, for example in the 2022-2025 Action Programme for Climate Adaptation in the Built Environment. One action from this programme is the establishment of a national yardstick for climate-adaptive building, with performance requirements for problems with excess water, water shortages, floods, heat and biodiversity.

The government has stated that the water and soil system must lead spatial planning. This principle will be further elaborated under the leadership of the Minister of Infrastructure and Water Management.

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## IJsselmeer area

**Be critical in about new water demands and spatial interventions because of the climate and fresh water.**

The goal for flood risk management for 2050 would certainly seem to be achievable in the IJsselmeer area. This will involve dike upgrades and building pumps in the Afsluitdijk barrier dam. The pumps will make it possible to drain enough water into the Wadden Sea until 2050. By about 2050, the Afsluitdijk's discharge complexes will have to be replaced. Drainage will become increasingly difficult in the future due to sea level rise. It is important to find solutions in time and to ringfence the space required.

A large part of the Netherlands depends on fresh water from the IJsselmeer area. The aim is to maintain a balance between supply and demand. A major step has been taken with flexible water-level management; that has resulted in a

considerably larger buffer.

Even so, the goal for 2050 would seem to be unattainable: the stress test shows that the probability of water shortages as 2050 approaches will increase dramatically.

New developments (peatland conservation, additional drinking water, data centers) are already resulting in increased water demand and pushing out other water consumers. Changes to the Policy Framework for water demands are needed; the regions will work on this. Moreover, as a result of housing, new nature and other developments (actual or planned) the freshwater buffer will get smaller. This has implications for water allocation. This makes it more likely that raising the water level will be necessary even before 2050 to keep the freshwater buffer large enough. The Spatial Inventory will show the spatial developments, opportunities and bottlenecks in conjunction.



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## Coast

**Set out conditions for spatial development: include options for flood risk management.**

The goal for 2050 is a safe, appealing and economically strong coast, taking sea level rise into account. The preferred strategy provides two types of measure to attain this goal: maintain the coast with sand management operations where necessary and take future flood risk management issues into account in spatial ambitions.

Linking spatial ambitions with future challenges in the area of flood risk management requires clear boundary conditions based on flood risk management: which long-term options should we keep open and what space is needed to do so? And which no-regret measures can we already implement in the near future? The answers to these questions are currently shrouded in considerable uncertainty but, in the years ahead, the Sea Level Rise Knowledge

Programme will provide more concrete boundary conditions.

It is important to set out these conditions in municipal environmental visions. Future options for flood risk management and other water agendas will then become standard components of spatial plans. In that way, it will be possible to prevent developments along the coast that we will regret later. It may also be possible to take no-regret measures that respond to future sea level rise. For now, there seems to be enough time to work in this way towards the goal for 2050.



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## Rhine Estuary/Drecht Towns

### **Link spatial agendas and take flood risk management agendas between now and 2100 into account.**

The current system of dikes and storm surge barriers will remain a tenable flood risk management strategy until at least 2070, along with adaptation to flooding in unprotected areas outside the dikes and good crisis management. The condition is that the flood defences must be assessed in accordance with the statutory requirement every twelve years and upgraded if necessary.

After 2050, major decisions will be required in the area of flood risk management; the Sea Level Rise Knowledge Programme will make them concrete. It is already clear that additional space will then be needed for measures in the area of flood risk management. That will have consequences for other developments: they will have to leave enough space for flood risk management in the long term. This ties in with the principle of allowing soil and water to lead spatial development.

In the short term as well, it will be necessary to combine dike upgrades and other developments as much as possible. The regions have reported two obstacles. First, the scheduling of dike upgrades is not flexible enough to work with other developments.

Secondly, financing for a dike upgrade is not possible as long as no decision has been made that the dike in question fails to meet the statutory standards, even when it is fairly certain that this will happen in the future.

The Western Netherlands freshwater region is committed to three pillars: the optimisation of the water influx, the use of alternative sources such as effluent from wastewater treatment plants, and enhancing the robustness of the regional water system, reducing its dependence on water influx and flushing operations.

The emphasis is now on the water influx, particularly through the Climate-Resilient Water Channel (KWA). However, because of climate change, the other pillars are becoming increasingly important.



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## Southwest Delta

### **Tackle the consequences of climate change in an integrated way with a strong administrative and societal network.**

The Southwest Delta's ambition is to be the world's first climate-resilient region by 2050. That ambition can be achieved by energetic investments over the next 5-10 years in scaling up successful small-scale living labs and pilot projects to larger areas. In the period 2030-2050, that can be extended further to the entire Southwest Delta. Delta regions worldwide can benefit from this approach.

Flood risk management is kept up to par by always upgrading dikes and taking other measures in good time. Major challenges include resilience to water shortages and climate-resilient and water-robust spatial planning. In addition, there are many other challenges in the Southwest Delta. An important underlying principle is that water and soil should lead spatial developments. This requires a link between the agendas of the Delta Programme and other agendas.

In the Southwest Delta, the emphasis is on the link with the National Programme for Rural Areas.

A prerequisite for success is that administrators should look further ahead together – beyond their own period of office and their own interests – and take the relevant decisions with the support of the constituencies they represent. Furthermore, a sound balance is needed between investments of the national government and the regions. Finally, this approach requires all stakeholders to work together on the identification of opportunities for integrated customisation for each area and sub-area.



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## Wadden area

**Also look at what should be done for the mainland if prevention alone is no longer enough.**

The objective for the Wadden area is to maintain flood risk management in the most natural way possible using integrated coastal management. The ebb-tidal deltas and intertidal areas provide a natural buffer in front of the flood defences. Until 2050, sand nourishment operations can be used to ensure that these protective buffers can grow in line with sea level rise. In addition, innovative dike upgrades are being implemented on the mainland coast and on the Wadden Islands; the first upgrades have already been completed.

In the event of flooding on the islands, evacuation to the mainland is not possible. Each island must therefore have enough shelter locations to keep people safe. This is the underlying principle for the flood risk management strategies that all the islands are now working on.

On the mainland, floods can come from the sea and from regional waters. Both situations require mitigation measures: water-robust planning for the hinterland and crisis management. It is important to develop these measures in conjunction and also to link them to other area agendas. This requires considerable commitment from the partners in the Wadden area. One of the major challenges is to provide perspectives for agriculture by looking for appropriate forms together.

## High-Lying Areas with Sandy Soils

**Set intermediate goals in the run-up to 2050, formulate them as measures for government authorities, business and local residents.**

The agendas for freshwater and spatial adaptation meet on the High-Lying Areas with Sandy Soils: the objective for 2050 is a climate-resilient and water-robust region that can cope with extreme weather and water shortages. The transition required for this purpose will contribute to a beautiful, healthy and prosperous Netherlands. The intermediate target for 2027 is that 20% of the High-Lying Areas with Sandy Soils will have been designed to be climate-resilient and water-robust by then, and also that this approach to planning will be the usual practice everywhere.

This objective would seem to be achievable. A programmatic approach has been adopted for the High-Lying Areas with Sandy Soils; the measures

can be found in the Freshwater Delta Plan. Measures can be planned flexibly in this programme: if a measure is delayed in one location, the resources can be deployed quickly for the purposes of another measure.

The regions work with planning periods of six years and can therefore intervene at regular intervals if that is required by new insights into climate change and the spatial and social context.

At the same time, the period between now and 2050 will certainly be needed for the entire country to be climate-resilient and water-robust. This requires administrators to look beyond their own terms of office and allow their actions to be guided by the ultimate objective for 2050. It is also necessary to establish close connections with other agendas for the High-Lying Areas with Sandy Soils, in particular the National Programme for Rural Areas. This requires central control, with openings for tailored solutions in the regions.

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## Rhine and Meuse rivers

**Integrated River Management pays off; respond to local needs as well in order to generate support.**

The Meuse region was hit in July 2021 by floods caused by rainstorms, with peak discharges in the brooks and Meuse coinciding. This has once again made it clear that working on flood protection along the rivers is still urgently needed, despite the creation of more room for the Meuse and Rhine distributaries. The goal of the area-specific approach is: safe, dynamic and appealing rivers. The ambition is to achieve this objective with a combination of dikes, river widening and integrated area development.

The integrated approach for the river area is worked out in detail in Integrated River Management (IRM), a programme under the Environment Act. This programme will deliver coordinated interventions for flood

risk management, navigability, freshwater availability, water quality, nature and an appealing living environment (in economic terms as well). The programme will also respond to the effects of climate change (more frequent extreme high discharges as well as extreme low discharges) and the effects of past measures (such as the falling riverbed). The establishment of Integrated River Management with all the parties concerned, both nationally and internationally, is a complex but necessary process. That an integrated approach can produce impressive results – within the available budget and on time – can be seen, for example, near Ooijen Wanssum and in the case of the Border Meuse. This is also the aim for other river widening projects such as the IJsselpoort River Climate Park and the Meandering Meuse. It is important here to respond to local needs and, in that way, to generate more support.

The expectation is that the new standards for flood risk management will be met by 2050. For the time being, this primarily involves dike upgrades, with innovative solutions such as floating flood defences and glass walls also being in the picture. In addition, rivers are being widened in various locations. For example, along the Meuse, twelve ‘systemic measures’ will be implemented to maintain enough room in the winter bed. Other measures to create more room for the rivers have been implemented to only a limited extent so far because there is no relevant investment programme: the organisations involved have to negotiate about funding and combine budgets on a project-by-project basis. That was successful in the case of the Paddenpol dike relocation project, which is part of the IJssel Works HWBP project: the project will enter the operational phase in 2023.



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## Water and soil as leading factors

The characteristics of the water and soil system must lead spatial planning. In the Water and Soil as Leading Factors programme, the Ministry of Infrastructure and Water Management is working with other parties on the formulation of conditions and planning decisions to structurally secure the carrying capacity of water and soil systems.

The programme focuses on six themes: salinisation of the coast and polders, peatlands, High-Lying Areas with Sandy Soils, climate- and water-robust urbanisation, room for the water system and the protection of the subsurface. Guidelines to provide direction for implementation will be published in late 2022. The regions will be able to integrate them in area plans.

The preconditions and decisions are established in conjunction with ongoing programmes such as the Delta Programme and Integrated River Management, and programmes under development such as the Soil and Subsurface programme and the National Programme for Rural Areas.

## Operational capacity

The regional government authorities lack operational capacity. The major urgent transitions that have to take place across the country are already demanding more capacity from these authorities than they have available. Over the next few decades, the amount of work required will continue to increase.

Regional government authorities therefore need more capacity: more manpower and new knowledge and skills. For example, specific knowledge and skills are needed to work with multiple parties in order to arrive at smart solutions that serve a range of objectives. But also to cope with disparate timelines for operational processes, synchronise agendas, and take administrative decision-making further in the knowledge that not everything is possible.

## Innovations

'We need more innovation'. That is the position of the countries working together in the Adaptation Action Coalition (a United Nations initiative). For the Delta Programme, too, the development of new methods and techniques is a prerequisite if the goals for 2050 are to be achieved.

Over the past decade, all kinds of programmes have invested in innovations to make the Netherlands climate-resilient and water-robust. Examples are the national Knowledge and Innovation Programme on Water and Climate (NKWK) and the dozens of living labs and testing grounds throughout the country.

On behalf of the Delta Programme, VPDelta has reviewed the lessons from these initiatives and described inspiring examples. One of the lessons is that new funding mechanisms and procurement methods are needed for the faster deployment of innovations for a climate-resilient delta.

## Design-oriented approach

A design-oriented approach is an important tool to integrate various agendas together in an area. The Wing consultancy firm has made an analysis of the success factors for award-winning designs and how they can be used in the Delta Programme.

Three concepts emerge from the analysis that would seem to be suitable for designs based on the principle of 'water and soil as leading factors':

- Symbiosis: adapting to the dynamics of soil and water
- Resilience: resilient to shocks such as extreme heat or flooding
- Circular: closed cycles of water, soil and other materials

The essence of the design-oriented approach is that different parties get around the drawing board together and literally map out the bottlenecks, how they are related, and which solutions are possible. This method makes the discussions concrete straightaway and leads to solutions more quickly than a discussion in an ordinary consultation setting.

## Coordination and connections

The three agendas of the Delta Programme are often interconnected. There are also overlaps with other transitions and objectives in an area. For example, to reduce the carbon emissions from peatlands, the groundwater levels in these areas have to be raised and this has implications for water demand. It is therefore necessary to establish coordination and connections.

The regions of the Delta Programme have an important role in making the goals of the Delta Programme concrete in area processes and clearly setting out the limits of the water system.

Long-term sustainability and keeping enough options open for the future (in other words, preventing lock-ins) should be the guiding principle for a coordinated approach.



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## Scenarios for carbon emissions

The extent of climate change depends very much on global carbon emissions in the decades ahead. At the Paris Climate Summit, 195 countries agreed to reduce emissions to the point where the temperature increase in 2100 will be limited to 2 degrees and, if possible, to 1.5 degrees centigrade.

It is difficult to predict carbon emissions between now and 2100. They will depend on numerous factors such as population growth and developments in technology, Gross Domestic Product and land use. The International Panel on Climate Change (IPCC) therefore uses multiple scenarios.

The IPCC's most recent scenarios (2021) show that carbon emissions will have to be reduced to almost zero in about 2050 in order to limit the temperature increase to 1.5 degrees.

## Sea level rise

Global sea level rise due to climate change is accelerating. That emerges from the report published by the International Panel on Climate Change (IPCC) in August 2021. The KNMI is also seeing the first signs of acceleration on the Dutch coast. Until now, the Delta Programme has worked with a projected sea level rise of 1 metre in 2100 as the upper limit, but that could be an underestimate.

In the Sea Level Rise Knowledge Programme, the partners of the Delta Programme are investigating the extent to which the existing strategies for flood risk management, freshwater supplies and spatial adaptation are sustainable and flexible, and which other solutions are conceivable for the long term. That knowledge is used in a range of areas, including adaptation pathways and the necessary transitions.

The results will be used by the Delta Programme for the periodical evaluation of the agendas and strategies in 2026. An interim assessment of the knowledge programme will be published in 2023.

## Problems with excess water

In July 2021, there was extreme rainfall in Limburg, Germany, Belgium and Luxembourg. This led to severe flooding and problems with excess water. Flooding, particularly from the brooks flowing into the Meuse and Rhine rivers, caused over 200 deaths in other countries, considerable suffering throughout the area and € 40 billion in damage.

Analyses have shown that such extreme precipitation could be seen anywhere in the Netherlands, including the major cities. The KNMI expects this type of event to occur more often. In July 2021, the Minister of Infrastructure and Water Management therefore established the Flooding Policy Platform with the aim of drawing lessons from the situation in Limburg about how we can cope better with the consequences of extreme precipitation throughout the Netherlands.

A range of organisations are represented on the policy platform, such as the national government, the Limburg authorities, the Union of Water Authorities, provincial and municipal authorities, and the Delta Commissioner. The Policy Platform will issue its definitive advisory report in the autumn of 2022.

## Risks of extreme weather

Heat waves, drought, and extreme precipitation are becoming more common due to global warming. Extreme weather also lasts longer and it is becoming more intense. This can already be seen in the measurements made in recent years: every year, records are broken for precipitation intensity, precipitation deficits and temperature.

It is also increasingly likely that two extreme events will coincide or occur in quick succession, amplifying the impacts. An example could be a prolonged drought in combination with a heat wave, increasing the risk of forest fires. Or extreme rainfall two times in succession, with the limits of storage capacity already having been reached the first time.

As a result of these changes, existing statistics underestimate the likelihood of extreme weather and the extent of its consequences. When designing new measures and drafting emergency scenarios, we must therefore bear in mind to a greater extent that extreme weather can develop unpredictably and that severe disruption cannot always be prevented.



## Climate agreement

The Climate Agreement is a package of measures and agreements made by business, stakeholder organisations and government authorities to reduce the emission of greenhouse gases in the Netherlands. The aim is a 49% reduction in emissions by 2030 and a 95% reduction by 2050 (compared with 1990). With the Climate Agreement, the Netherlands is implementing the Paris Climate Agreement in which it was decided to limit the increase in the average global temperature to (well) below 2 degrees centigrade.

The Climate Agreement focuses on mitigation: preventing or limiting climate change. The Delta Programme focuses primarily on adaptation: how we can respond to climate change.

## Action Programme for Climate Adaptation in the Built Environment

The Ministry of the Interior and Kingdom Relations, the Ministry of Infrastructure and Water Management, the Ministry of Agriculture, Nature and Food Quality and the Ministry of Health, Welfare and Sport are working together on an ‘Action Programme for Climate Adaptation in the Built Environment 2022-2025’. In this action programme, the national government provides a picture of the ambitions on the road towards green, climate-adaptive towns and villages, which steps are being taken to achieve those ambitions, and how the national government intends to work with other government authorities and many other stakeholders. The programme will be sent to the House of Representatives after the summer of 2022.

The action programme is an elaboration of the National Climate Adaptation Strategy (NAS) for the ‘built environment’ policy priority. The Action Programme for Climate Adaptation in Agriculture and the Action Lines for Climate Adaptation in Nature have already been published. Since 2016, the NAS has focused on climate-adaptive policies for sectors to complement the Delta Programme.

## National Programme for Rural Areas

The rural area is facing major changes. The National Programme for Rural Areas (NPLG) was established to implement measures in an area-specific and coordinated way: for nature, nitrogen, agriculture, water, soil and climate. The coordinated approach is not only necessary, it also opens up opportunities for synergy. Nature restoration, for example, can go hand-in-hand with the restoration of groundwater levels and the reduction of nitrogen deposition.

The NPLG is a policy programme covered by the NOVI (National Environment Planning Vision). The national government has earmarked € 25 billion in the Rural Area Fund to finance the ambitions of the NPLG. The various authorities are working together on programmes for rural areas under the direction of the provincial authority, with the national government as a partner. These programmes must be completed by 1 July 2023.

Major agendas in the Delta Programme are involved in rural areas. For example, changes to spatial planning are required to achieve resilience to water shortages and problems with excess water.

## Nature-Inclusive Agenda

The Nature-Inclusive Agenda sets out the road to a nature-inclusive society in 2050: a society where no nature is lost and the potential of nature is used properly. This agenda overlaps with the agendas of the Delta Programme. More nature, for example, also helps to reduce flooding and heat stress. Nature also captures CO<sub>2</sub>, which is important to mitigate climate change.

The Nature-Inclusive Agenda was drafted by the Association of Provincial Authorities, the Ministry of Agriculture, Nature and Food Quality, the National Forestry Department (Staatsbosbeheer), and the nature conservation organisations Natuurmonumenten and LandschappenNL. With the Physical Environment Consultative Committee, they engaged with a wide range of parties through webinars and conferences. The Delta Programme was also a participant in this process.

The result was the Contour Sketch in early 2022, which concludes that a nature-inclusive future is an integral design challenge: “The domains of nature, agriculture, water, spatial planning, construction and infrastructure (including energy infrastructure) can no longer develop in isolation; they have to reinforce one another.

## Mitigation and adaptation

Mitigation and adaptation are both necessary to achieve the goal of the Delta Programme: for the Netherlands to remain a safe and liveable delta. Mitigation (limiting global warming) is a prerequisite for keeping the agendas manageable. Adaptation (making changes in response to the new climate) is inevitable because climate change is no longer preventable.

The Delta Programme focuses primarily on adaptation. On behalf of the Delta Programme, Eindhoven Technical University is looking at how to introduce more coordination between mitigation and adaptation measures, and where synergies are possible. The research will also state whether and how the Delta Programme can contribute to mitigation.

## Accumulation of agendas

The major challenges are stacking up in all regions. Several regions have combined the challenges in Area Agendas. The integrated approach required imposes high standards for collaboration. For example, freshwater supplies in the High-Lying Areas with Sandy Soils cannot be viewed separately from the agriculture and nature agendas, drinking water extraction or urban development. An integrated approach has been the guiding principle in this respect since the launch of the Delta Programme.

The water agendas in the Southwest Delta are related to agendas for food production, climate, the circular economy, biodiversity and energy. The 2050 Area Agenda connects the various national and regional agendas and is based on an area-specific approach. In the Wadden area, the status of the Wadden Sea as a World Heritage Site imposes specific requirements on measures for the Delta Programme.

The 2050 Agenda for the Wadden Area is committed to a safe and resilient Wadden area that can cope with the consequences of climate change and to a dynamic Wadden area that is easily accessible and appealing as a place to live and work.



## The time for freedom of action is over, we really must get to work

The challenge of keeping the Netherlands safe and liveable is a major one but the steps required are largely crystal-clear. The idea that the water and soil system must be leading has been included in policy frameworks for decades but the implementation in, for example, regulations has lagged behind. The Netherlands is already capable of climate-robust construction and it is also known how we can manage peat/peatland areas sustainably and what protection nature areas require. Even so, all this is barely getting off the ground.

### I am therefore calling on all the partners of the Delta Programme: take real action now.

Every new development should be climate-resilient. Adopt water and soil as the basis for spatial planning, use fresh water more sparingly, work on mitigating consequences and on crisis management, protect nature and biodiversity.

## Work on mitigating the consequences now (layers 2 and 3)

Torrential rainstorms of the kind seen in Limburg in 2021 could fall anywhere in the Netherlands, at any time. Physical disruption cannot be prevented in such an extreme situation. It is no longer enough to work on prevention alone. The same applies to extreme heat and drought.

The Netherlands must prepare better for extreme events with unpredictable consequences. How can we limit social disruption, damage and the disturbance of vital functions during extreme weather? This requires changes in spatial planning, better crisis management and awareness of the risks.

#### Specifically, I recommend:

- Include clear performance requirements for mitigation measures in the national yardstick for climate-adaptive building, with water and soil as leading factors.
- Include consequence mitigation in the next round of stress tests, risk dialogues and implementation agendas.
- Cabinet, work with the regions to decide which party should take the lead in mitigating the consequences of flooding.

## Give transitions in rural areas a flying start: make use of the Delta Programme

The major challenge facing rural areas is to adapt land use in sustainable ways in line with the water and soil system and to restore nature on a large scale. The goal is to start implementing measures in 2024. A huge challenge.

The three responsible ministers will be doing this in collaboration with the local government authorities in the National Programme for Rural Areas (NPLG). Experience in the Delta Programme is that launching a large national programme with a large number of stakeholders takes a lot of time. The Delta Programme now has operational organisations in the regions (such as those for fresh water) that are working well and measures that comply with the goals of the NPLG. Make use of them.

#### Specifically, I recommend:

- Make use of the measures and organisation of the Delta Programme to speed up the transition in rural areas.
- Start implementation immediately using existing funding arrangements pending the adoption of the Transition Fund.

## Link agendas for nature and sustainable agriculture to the agendas of the Delta Programme

The transition to sustainable nature and agriculture in rural areas overlaps extensively with the agendas of the Delta Programme. Brook restoration will be an important measure for improving water quality and raising groundwater levels, particularly in the High-Lying Areas with Sandy Soils. Brook restoration is also a measure in the Delta Programme with the aim of making the High-Lying Areas with Sandy Soils resilient to water shortages.

Nature requires more space and better water conditions, but it can also form robust buffers that cushion the effects of climate change. It is therefore important for government authorities to establish links between measures for the Delta Programme as far as possible with the agendas for nature and biodiversity, preferably opting for nature-based solutions.

#### Specifically, I recommend:

Connect agendas in rural areas for nature restoration and sustainable agriculture with the objectives of the Delta Programme wherever possible.