Advisory report in brief

Advisory report on climate adaptation

Spatial and societal choices for adaptation in the Netherlands

WKR.

Ongoing climate change requires the Netherlands to adapt. The climate will be drier, wetter, and hotter. The pace of climate change exceeds earlier projections and drives an increase in extreme weather events, including heatwaves, heavy rainfall and extended periods of drought. The Netherlands faces increasing freshwater shortages and accelerating sea-level rise. As a result, the coastal regions face heightened flood risks and worsening salinisation. As climate risks continue to mount, they could reinforce one another, intensifying their overall impact and making outcomes harder to predict. For example, there may be instances where intense precipitation, elevated river discharges and coastal storms coincide, limiting drainage capacity and increasing the risk of flooding. The Netherlands must strengthen its preparedness for these risks and adapt to an increasingly dynamic climate reality.

Mitigating greenhouse gas emissions is essential to reduce the effects of climate change. Mitigation efforts reduce climate change effects and thus the long-term adaptation challenge, delaying the point at which adaptive capacity may be exceeded. It is crucial to take climate adaptation into account in design and delivery of mitigation measures – such as constructing energy infrastructure or reducing soil subsidence in peat meadow areas.

Preserving the Netherlands' safety and quality of life now calls for pivotal decisions on climate adaptation. Such decisions are required to ensure that the Netherlands continues to follow a climate-resilient course as climate change accelerates. Some of these decisions are too urgent to defer any further. First and foremost, continued safety must be ensured and any near-term damage resulting from climate change must be mitigated. At the same time, the Netherlands must invest in long-term climate resilience. Effective preparation takes time. Indeed, the planning and implementation of such measures may take many years, much like the Dutch Delta Works, which took decades to complete.

Accelerating and sustaining climate-resilience is compounded by other societal challenges. The Netherlands prepares to make substantial investments in creating an energy infrastructure for the future, tackling housing shortages, enhancing defence capabilities, advancing agricultural sustainability and future-proofing its industrial competitiveness. Moreover, the environment is facing considerable pressure. Water quality falls short of international benchmarks, and the ecological quality of ecosystems is declining because of nitrogen deposition, climate change, shrinking habitats and environmental pollution. These challenges must be addressed within the limited space available – space that also needs to be adapted to become more climate resilient. Decisions are urgently required.

In this advisory report by the Netherlands Scientific Climate Council (WKR) for the government's National Climate Adaptation Strategy (NAS), we provide recommendations on pivotal decisions for climate adaptation. The Minister of Infrastructure and Water Management has invited the WKR to provide input for the NAS revision, which will be published in 2026. In this context, the WKR addresses the question: *What are the pivotal decisions regarding climate adaptation when considering its interdependence with climate mitigation? How can we ensure that decision-making is both adequate and timely?*

In this advisory report, the WKR sets out pivotal decisions in two domains essential to making the Netherlands climate-resilient and keeping it that way: spatial planning decisions and societal choices.

Spatial planning decisions for adaptation

Spatial planning decisions involve determining where to intensify planned adaptation policy, and where and when to pursue more transformative approaches. For flood safety, waterlogging, freshwater provision and protection from extreme heat, the WKR identifies key decisions related to land use and water system management. This also requires other factors to consider, such as the natural environment, soil quality, economic development, housing needs, landscape values, air quality, and climate-change mitigation efforts. In the case of *intensification*, the function of an area remains broadly unchanged, but measures are required to keep it that way, including *intensified* protection against climate risks. This intensification may be relatively minor, such as targeted 'flushing' of polders to combat salinisation, or highly interventionist, such as sealing off access to the sea. While intensification may be desirable or even necessary in some areas, it cannot serve as a universal solution in the context of ongoing climate change. Contributing factors may include increasing costs and physical or spatial limitations – for example, a shortage of fresh water or a lack of space for water retention and drainage. This was clearly demonstrated in the dry summer of 2018, for example, when fresh water had to be transported to the province of Zeeland by road tankers to support agricultural production. Thus, in specific areas, a *transformation* in land use and function is essential to bring about a better balance with the natural water and soil system, in alignment with the requirements of a changing climate. Transformation involves making structural spatial adjustments and facilitating new functions. For example, transformative spatial planning may allow for salinisation or for increased water tables in agricultural and nature conservation areas, or for reassessment or relocation of planned industrial and housing development sites.

Recommendation 1

Identify at the national level where immediate transformation is needed and where it can be deferred, and translate these decisions to regional contexts. Decisions should be grounded in considerations regarding water, soil and climate risks. This calls for an area-specific approach, one that recognises the interconnectedness of regions, particularly through the main water system. Initiate transformation without delay:

- in peat meadow areas, where opportunities exist to cut greenhouse gas emissions, retain water and counteract soil subsidence, in connection with the challenges around agriculture, nature restoration, and cultural heritage;
- in salinisation-prone clay regions under pressure from high water demand, in connection with challenges around agriculture, housing development, industry, water quality, and a healthy living environment;
- on sandy soils that are already drying out and at high risk of waterlogging, in connection with challenges around drinking water supply, nature restoration, housing development, and agriculture;
- in urban areas where elevated heat risks disproportionately affect vulnerable groups, aligned with initiatives to enhance the quality of the living environment and health.

When setting priorities for the timing and location of transformation, consider criteria such as contributions to the energy transition, the food system transition, and the transition to a circular economy. The spatial planning decisions can be integrated into the NAS, the National Spatial Strategy, the Delta Programme, and relevant spatial development visions.

In the years ahead, the Netherlands is set to undergo substantial redevelopment – not least to mitigate climate change – and it is essential that climate resilience is integrated into this process. Major energy infrastructure developments are planned or already underway, including high-voltage networks, hydrogen systems, and nuclear power plants. Meanwhile, additional housing is required, and the agricultural and industrial sectors will transform. Much of the new infrastructure is designed to last for many decades, which will attract additional development, which in turn locks in the required level of protection against climate risks for decades to come. For this reason, a climate adaptation assessment is required, with a planning horizon of at least one hundred years. This assessment must consider the impacts of an investment decision both on a specific site and on its surrounding area. This is important, because distinct areas are interconnected through the main water system. A substantial investment in the Port of Rotterdam may have far-reaching impacts on other regions, such as the Zeeland delta. The Environment and Planning Act partly guarantees the role of water management authorities, but in practice, their input often carries insufficient weight, as site selection for spatial development has often already taken place by the time they are consulted.

Recommendation 2

Ensure that spatial plans involving investments in infrastructure, housing development, or industrial development are subject to a climate adaptation assessment. This assessment considers their impact on the adaptation challenge and on burden-shifting across regions. The assessment should cover a planning horizon of no less than one hundred years and should explicitly involve the broader supra-regional interdependencies through the main water system. Such an adaptation assessment can be used in spatial development visions, programmes, and design proposals, and could, for example, be incorporated into the (obligatory) environmental impact assessment report (in Dutch: 'mer'). Revise spatial plans where required and take appropriate measures.

Facilitating transformative planning requires a different approach to funding of climate adaptation measures. The current climate adaptation funding landscape is predominantly geared to climate change impact protection measures. Consequently, priority is given to funding interventions that enhance flood protection and secure freshwater availability. It is considerably more difficult to secure funding for transformative land-use measures. The WKR deems it necessary to shift public funding more towards spatial transformation. This includes measures such as allowing rivers more room for flooding or for urban greening for cooling purposes, while fully exploiting potential synergies with nature restoration and climate mitigation. Currently, the plethora of funds and funding sources, with their explicitly defined objectives, together with an emphasis on short-term efficiency, acts as a barrier. Project funding should, therefore, not be driven solely by immediate, often short-term interests, but should instead give decisive weight to the long-term societal benefits, many of which are indirect.

Recommendation 3

Create more scope for financing transformative adaptation measures by broadening the objectives for the use of public funds for climate adaptation.

Expenditure on climate-resilient water management is projected to increase further in the coming years. Continued spatial development in climate-sensitive zones drives up the cost of climate adaptation. Currently, water authorities shoulder the main financial burden of climate-resilient water management for new developments, including housing estates and industrial estates. These costs are passed on to residents within the area served by the water authority in question.

Consequently, there is little incentive for developers to implement climate-resilient projects. The WKR calls for policies that incorporate the costs of adaptation measures required for spatial development into the overall budgets of the projects concerned. In this way, project developers will be incentivised to integrate climate adaptation into their plans. This ensures that such additional costs of climate adaptation are not socialized, but borne by the residents of new neighbourhoods or the businesses on new industrial estates.

Recommendation 4

The foreseeable additional costs of water management and adaptation in spatial developments must be incorporated into project budgets and allocated within the development itself, to avoid shifting the burden onto society. This could include expanding the (legal) powers of water authorities to pass on the additional costs of water management and adaptation associated with new spatial developments to those who caused them. Appropriate cost allocation requires the timely inclusion of water authorities in the spatial planning process.

Improving societal resilience

Societal choices reflect the joint responsibility of public authorities, individuals, and the private sector, and must aim to enhance the overall resilience of society to a changing climate. The Netherlands is recognised globally for its Delta Works and for key government programmes, including the Flood Protection Programme, Room for the River, and the National Heatwave Plan. However, as climate risks intensify, governments must do more than just aim to safeguard their populations. Moreover, policy measures alone will not suffice to shield society from the growing frequency of climate-change impacts, particularly those arising from extreme weather. We must, therefore, learn to live with climate change, which requires both individuals and the private sector to assume greater responsibility for adaptation.

Encouraging and coordinating climate adaptation efforts by individuals and the private sector is necessary to build resilience and to prevent burden shift. Individuals and businesses often implement their own adaptation measures, e.g. by irrigating agricultural land during dry spells, managing excess water during periods of intense rainfall, fitting sunshades or by adopting air conditioning systems. This is referred to as 'autonomous adaptation'. It is a key component in building societal resilience in the face of increasing climate risks. Without effective coordination, however, adaptation efforts by individuals and the private sector may have unintended consequences, such as mutual interference, shifting burdens onto others, or through inconsistency with government measures. For instance, while irrigation may support farmers during periods of drought, it can also deplete water supplies in neighbouring areas. Coordinated action is essential to ensure that measures taken by individuals and the private sector contribute positively to the development of a robust and climate-resilient society.

Recommendation 5

Develop, within the NAS, a strategy to encourage, support and guide climate adaptation efforts by individuals and the private sector. Deploy a broad mix of policy instruments – ranging from awareness raising and subsidies to regulation and pricing mechanisms – to strengthen societal resilience in an equitable manner.

Climate risks should carry greater weight in choices about where people live and work, to encourage efforts to reduce exposure to such risks. Lenders and insurers already systematically incorporate climate risks into housing and commercial property transactions. At present, however, much of the information underpinning these decisions is held by various private entities within the financial sector. This has contributed to a lack of oversight regarding the quality of this information and its wider societal consequences, since disclosing climate risks could have significant effects on housing markets and the cost of insurance, for example. The WKR calls for a clear and accessible provision of climate risk information relating to homes, neighbourhoods, and residential areas. Having access to this information will enable individuals to better anticipate potential risks and make more informed choices about where to live and how to configure their homes. For instance, when purchasing a home in an area that is prone to flooding, new residents may opt for waterproof flooring instead of wooden parquet, or they may take precautionary measures such as installing demountable flood barriers. The WKR argues for public coordination to oversee the provision of climate-risk information for homes. It is important to combine the release of such information with policy measures designed to mitigate any adverse effects this might have on individuals and businesses.

Recommendation 6

Make climate risk data on homes and other buildings accessible to individuals and businesses to raise public awareness, encourage climate adaptation, and incentivise the market to price in these risks appropriately. Develop equitable policies to shield vulnerable groups from the impacts of risk pricing. Reach agreement with banks and insurance providers on how climate risks are incorporated into property transactions.

Projections indicate that climate change will lead to increased damages. Although both the public and private sectors are involved in the mitigation and settlement of climate-related losses, there is currently a lack of clarity

about who is accountable for what type of damage, and under what conditions. Individuals and businesses require greater certainty regarding the settlement of climate-related losses, as they cannot prepare for every climate-related risk, some of which are not insurable. Under the Disaster Damage Compensation Act (in Dutch: '*Wet tegemoetkoming schade bij rampen'* or WTS), the government can provide (partial) compensation to individuals and businesses in the event of uninsurable climate-related damage. However, there is no clarity beforehand as to which damages qualify for compensation and the extent of coverage provided. Moreover, there is a lack of clarity about when the WTS applies and when it does not. Therefore, the WKR calls for the establishment of a 'Climate Damage Ladder' that clearly indicates who is accountable for what type of climate risks, and under what conditions. This instrument would offer clear guidance on the responsibilities involved in the prevention and settlement of future damage.

Recommendation 7

Implement a Climate Damage Ladder that clearly indicates, for all climate risks, which losses are borne by individuals and businesses, and which are covered by the government. According to the WKR, the transparency and consistency of a Climate Damage Ladder are contingent upon three key factors: 1) the clear and consistent application of the Disaster Damage Compensation Act (WTS); (2) the exploration of innovative insurance mechanisms to improve the sharing of climate risks among various actors; (3) rigorous scrutiny to verify that vulnerable groups do not suffer any adverse impacts.

A comprehensive understanding of the short- and long-term impacts of climate change is essential to navigate challenges effectively in an increasingly volatile climate. In this regard, priority is to establish which indicators need to be monitored. To date, relatively few studies have been devoted to autonomous adaptation and climate system tipping points. The WKR also stresses the importance of expanding monitoring efforts to capture the societal impacts of climate change, as well as the progress and effectiveness of adaptation measures. Secondly, it is vital to establish a system for the effective collection of this knowledge and any corresponding signals. In this regard, the WKR notes that the current knowledge landscape is largely characterised by regional focus and significant fragmentation. At the national level, stakeholders may coordinate with the initiatives undertaken by the Delta Programme Signal Group and the Royal Netherlands Meteorological Institute's (KNMI) Early Warning Centre (EWC). The objective is to present the knowledge generated in a format that is engaging and actionable for policymakers.

Recommendation 8

Establish a regularly published national adaptation monitor focused on detecting emerging insights into climate risks, adaptation measures, societal trends, and the allocation of costs and benefits.

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