



Mapping a bright future

In 100 years' time, the Netherlands could be an attractive mix of green cities, sustainable agriculture and climate-proof nature, claim Wageningen researchers in a vision paper. That's if we tackle the spatial planning challenges with nature-based solutions.

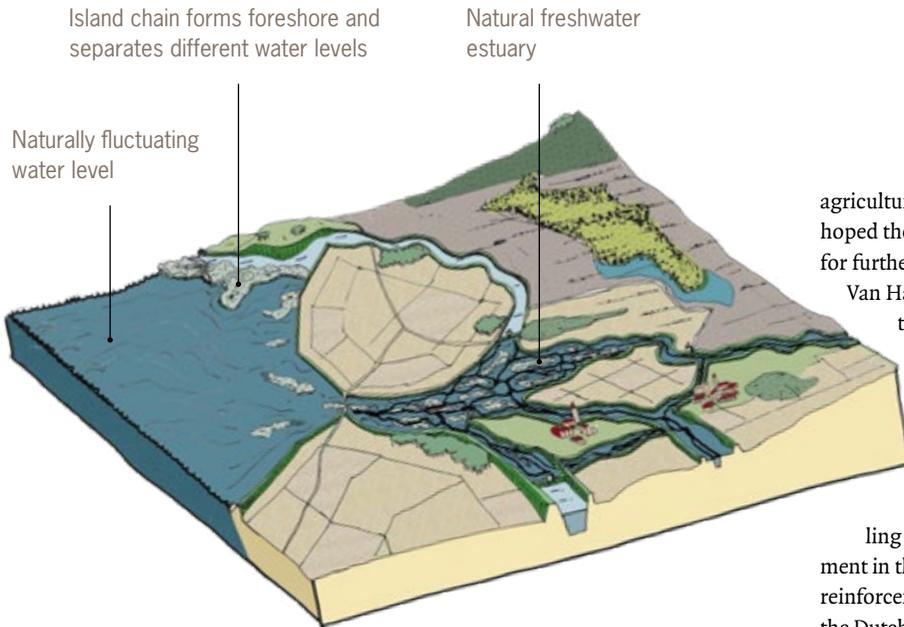
TEXT NIENKE BEINTEMA ILLUSTRATIONS WUR

The first thing that strikes you is the amount of green and blue. Dense forests on the Veluwe and on the sandy soils of Twente, Drenthe and Brabant. Green foreshores around the IJsselmeer bay, restored wetlands in the peaty soil areas, wide rivers meandering through the countryside. That is what the Netherlands could look like in 2120, according to a diverse team of Wageningen scientists. Last December, they presented a detailed map in the vision paper *A natural future for the Netherlands in 2120*. The report caused a stir in the Dutch media, and got coverage on TV, radio, social media, and in full-page articles in national newspapers. 'We were quite surprised by all that attention,' says Tim van Hattum, Green Climate

Solutions programme leader in Wageningen and one of the instigators of the report. He can guess at the reasons for all the attention, though. 'We are facing a number of huge, complex challenges such as climate adaptation, rising sea levels, the energy transition and housing construction,' he says. 'All you hear in the media is doom scenarios. It seems like people badly need a more hopeful outlook. A graphic can give them that: see how beautiful it could be. It really won't be all gloom and doom. As long as we prepare for all those changes in time.' As far as Van Hattum is concerned, this is the core message of the vision paper and the pretty blue-green map: the Netherlands could be a very attractive country in 2120, and one that is climate-proof and offers scope for >

THE NETHERLANDS IN 2120

At the behest of the Dutch ministry of Agriculture, Nature and Food Quality, 17 Wageningen scientists have come up with a vision on how to make the landscape of the Netherlands future-proof. This can help the country tackle the major social transitions ahead, such as climate change adaptation, the energy transition, agricultural reform, and urbanization. The main principle is to make optimal use of natural processes in spatial planning.



IJSSELMEER WITH WATER LEVEL FLUCTUATION

The water level of the IJsselmeer is kept stable around the edges for shipping, with natural dynamic fluctuation in the middle of the lake. The Houtrib dyke between Lelystad and Enkhuizen has been divided into sections, creating little islands with bridges between them. A new freshwater delta has been created at the mouth of the IJssel river. Maintaining two separate water level regimes is a new idea, which the researchers want to develop further.



‘It seems people badly need a more hopeful outlook’

agriculture, home-building, industry and nature. It is hoped the report will provide inspiration and pointers for further thinking. ‘It is a very appealing picture,’ says Van Hattum. ‘But it is also well researched and realistic. It is not a utopian fiction.’

SAND REPLENISHMENT

The vision’s starting point is the concept of nature-based solutions. The idea here is to take the natural processes at work in the soil, water and coast as the basis for tackling spatial planning challenges. Sand replenishment in the right places can automatically lead to a reinforcement of the dunes along the entire length of the Dutch coast. Dunes help with water purification, and green roofs are useful for tempering rainfall peaks and keeping buildings cool effectively. Besides their primary function, natural solutions often have additional positive effects – on biodiversity and the quality of life, for example.

Nature-based solutions produce dynamic systems that regulate themselves, adapting to changes such as rising sea levels. This makes them cheaper in the long run than static systems made of steel and concrete. Van Hattum: ‘We consciously chose to present just one perspective, and not to offer other scenarios that involve using concrete or doing nothing.’ The reason for this is that the Wageningen researchers feel there has been too little interest in nature-based solutions. ‘We are quick to reach for technological solutions,’ says Van Hattum, ‘whereas worldwide forests and wetlands capture a lot of carbon and therefore have the potential to contribute 30 per cent of the necessary global CO₂ reduction. And in the process they also increase climate resilience, biodiversity, health, quality of life and a whole lot more. That’s why we say: take a good look at this scenario. Just let this sink in.’

It is hard to say exactly what the cost-effectiveness of the scenario is, says Van Hattum. ‘The costs and benefits are much harder to calculate than they are with civil engineering solutions, because we have far more experience with those.’ Also, the advantages of nature-based solutions lie precisely in areas that are not easy to express in money terms. What is the monetary value of biodiversity, health, quality of life, or recreation? ‘Precisely on those points, this scenario outstrips other solutions,’ claims Van Hattum. ‘We are convinced that

this is more cost-effective. The next step is to calculate that properly.'

FANTASTICALLY BEAUTIFUL

Many of the elements on this map are not new, emphasizes co-author Michael van Buuren, Landscape Architecture researcher at Wageningen Environmental Research. 'What is new is that all those aspects are now interlinked,' he says. 'That synthesis. The fact that something so fantastically beautiful has been created, which is actually feasible as well.'

Van Buuren's role in this project has mainly been focused on freshwater. 'Just look at the lovely lake zone with the Randmeren, the IJsselmeer and the Markermeer,' he says. 'Our proposal is to start managing them in a very different way. You allow more water-level fluctuation in the core zone, to create more natural dynamics. On the edges you keep water levels more stable, partly by creating foreshores and chains of islands. That is better for agriculture and for shipping.' Following two different water-level management regimes is a very new idea, Van Buuren stresses. 'We want to work that out in more detail.'

Another striking feature is the wide rivers. 'A lot of the water meadows along the Waal have already been designated for temporary water storage and nature development,' explains Van Buuren. 'We must carry on with establishing these zones. Instead of reinforcing the dykes, Wageningen researchers propose a more natural solution. On the inside of the existing winter dyke you can build small dykes with water and swamps in between them, to hold back the groundwater that wells up at high water and wants to seep under the winter dyke and flow on. In the area in between, there can be space for wetland agriculture or nature.' Wetland agriculture could give us reeds, wetland nature reserves, sphagnum moss and cranberries. You could even graze water buffalo there, says the report. Columnist Bert Wagendorp in the Dutch daily *De Volkskrant* is looking forward to 'delicious Dutch mozzarella'.

DALMATIAN PELICAN

In this plan, the IJssel river will become twice as wide as it is now. 'A wider IJssel can help dispose of the additional peaks in the runoff from Germany.' A wider IJssel would also provide more space for new nature areas. 'Thanks to nature development, we already have breeding pairs of fish eagles in the country,' notes Van Buuren, 'and there could be a lot more of them. In the

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long run, you can expect other interesting species too, such as black storks and Dalmatian pelicans.'

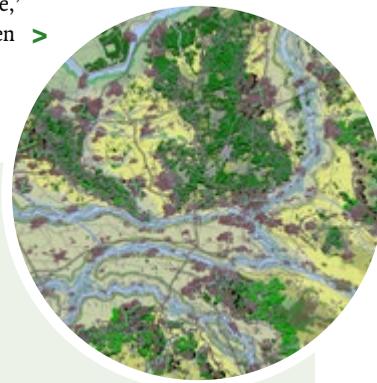
More woodland, more cities, and more wetlands too: that raises the question of how all this will fit in this overful country. Tim van Hattum's answer is: 'We shall have to explore where multifunctional use – combining functions – is possible.' Examples include solar farms and marine protein production, nature-inclusive cities and nature-inclusive agriculture. 'Through the transition to more plant-based food, the right crop in the right place, and production at sea, we can further optimize our agriculture and that will make room for new functions.'

WIND FARMS

Another noticeable feature of the map is how much of the Netherlands consists of sea. 'The part of the North Sea that is Dutch is larger than our land surface,' says Martin Baptist, a researcher at Wageningen >

WIDE RIVERS

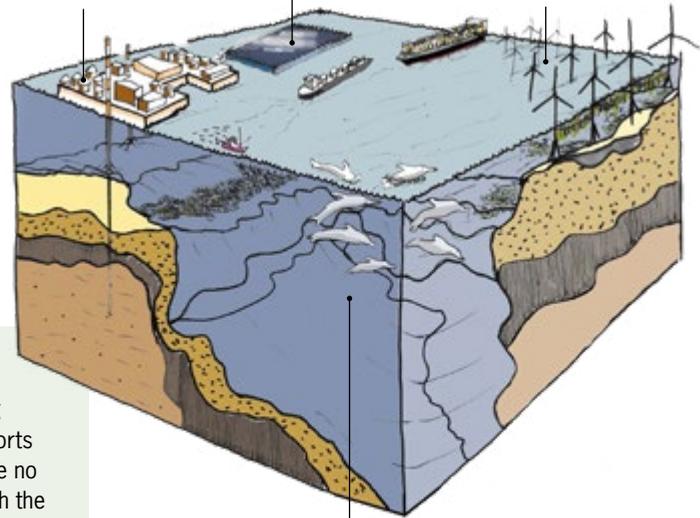
The rivers will have to be able to carry more and more water. River beds are doubled in area. Instead of reinforcing dykes, you can build small new dykes inside the current main dykes, with water or swamps between them that help push back water seeping under the main dyke at high water. This area between the dykes lends itself to wetland crops such as cranberries. The river zone could also serve as a location for floating homes.



Floating island with hydrogen production plant and CO₂ storage

Floating island for solar energy

Wind farms with natural reefs, shellfish farms and seaweed cultivation



Nature reserve

THE NETHERLANDS AT SEA

The map shows large offshore wind farms and floating islands covered in solar panels. Transshipment in the ports can become floating too. Solar panels out at sea make no demands on scarce space on land, and they move with the rising sea levels. Mussels, oysters and seaweed are grown in the North Sea, mainly around the wind farms. Energy and food harvesting in the North Sea is combined with nature development, with nature reserves being established to create space and peace for species such as anchovies and porpoises. Natural reefs with flat oysters and sand mason worms can grow around the bases of the wind turbines.



Marine Research and another of the project's instigators. 'That part of the Netherlands is often forgotten. I am pleased that it is now on the map.' There are large marine wind farms drawn on the map. 'The cabinet has already decided to go for wind power,' notes Baptist. 'But those wind turbines don't last 100 years. You can remove the old turbines, but you can also use the infrastructure, the piles for instance, for other purposes such as seaweed farms or oyster farms.' The map also features floating islands full of solar panels. Placing solar panels out at sea makes no demands on scarce space on land. Because they float, they adapt to rising sea levels. 'You can even make transshipment in ports floating,' adds Baptist. The biodiversity of the coastal zone will be richer in 2120 than in the previous century, the report says. Species such as anchovies, porpoises, bottlenose dolphins and humpbacked whales will be common again. Nature reserves will be established to give these species space and peace.

'We don't say: this is the way it's got to be. We want to feed the discussion'

MUDFLATS UNDERWATER

The western part of the Wadden Sea is not going to survive the rise in sea levels, the researchers predict, and the mudflats here will disappear underwater for good. The eastern section will continue to be exposed at low tide. 'To achieve that we shall need more sand replenishment on the seaward side of Ameland and Schiermonnikoog islands,' says Baptist. Another of the Wadden islands, Griend, is a lot bigger on the map than its current

dimensions. That too will have to be achieved with sand replenishment. 'We are not going to let such an important bird island disappear.' So the Wadden Sea will change, but will be no less diverse. Rising seawater temperatures will also attract new species such as flamingos, bottlenose dolphins and whiptail stingrays.

Sand replenishment will continue to be necessary not just in the Wadden Sea but all along the Dutch coast, especially given that the dunes will be twice as broad as they are now. That will take millions of tons of North Sea sand every year. 'People often think that costs too much,' says Baptist. 'But the alternative, a technological solution, is far more expensive.

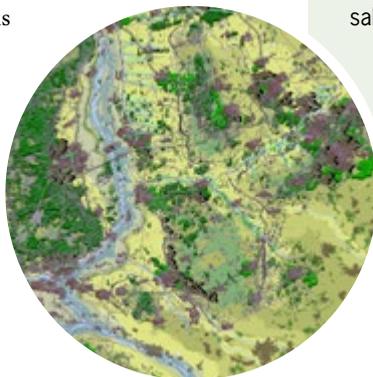
And doing nothing is the most expensive of all. The Dutch cities of the Randstad will be protected by the dunes. And we really can maintain those dunes with nature-based solutions for next to nothing.'

POLITICAL CHOICES

So all this is possible, but it does mean going into action – something all three researchers stress. 'It is important to make political choices that look further ahead than the four-year term in government,' says initiator Tim van Hattum. 'But that is tricky. And at present problems are often tackled separately. Nature, agriculture, biodiversity, climate, water safety, urban development, and so on... But of course, all these things are interconnected. Our solution contributes something positive in all these areas.'

So what is needed, according to Van Hattum, are not separate major programmes for water safety and biodiversity, as we have at present, but an integrated Delta Plan that brings it all together.

The media hype about the project has already drawn reactions from ministries and businesses. 'Big construction companies want to contribute to making the Netherlands a healthy and pleasant place to live, by helping to figure out how to create green and climate-proof neighbourhoods, for instance,' says Van Hattum. 'It really isn't the case that all they want to do is build houses, but they often run up against rigid legislation and old-fashioned contracting systems. So that is another plea we are making to the government: do something about this. Facilitate those companies.'



GREEN-BLUE CITIES

New economic hubs are no longer developed in the urban west of the country, but on higher sandy soils further inland. Cities are full of trees and surrounded by woodland, for the sake of biodiversity and to temper the heat island effect in the city. There is a lot of open water to improve the city climate and provide a buffer for weather extremes. The dominant building material is wood.

'A technological solution is much more expensive'

The Wageningen researchers have also presented their vision to the ministries of Agriculture, Economic Affairs, Home Affairs and Infrastructure and Water Management. 'It seems like we have struck the right chord,' notes Van Hattum. 'I think we've sparked off something all the way up to the top.'

Of course there are still plenty of questions to be answered: both technical scientific questions and socio-economic ones. But Van Hattum stresses that the Wageningen vision is realistic, even with our current knowledge and possibilities. 'Whether it is also a desirable scenario is not within our brief. That is for the politicians to decide.'

In other words, this is not a blueprint. This is a possible line of reasoning, which takes us in the direction of an integral future-oriented vision for the Netherlands. 'So we don't say: this is the way it's got to be. We want to feed the discussion. And if you ask me, that is already working rather well.' ■

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