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More!

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THE NETHERLANDS - A NATION OF WATER, VULNERABLE AND DEPENDENT

Arjen Hoekstra

We like to portray our beloved country as a true nation of water. And we have a lot to show for it: the battles won against water, the Afsluitdijk closing off the IJsselmeer from the Wadden Sea, the Eastern Scheldt Storm Surge Barrier, the Maeslant barrier near Rotterdam - we love to show these to visitors from abroad. We have strict standards to protect us from flooding and know more about dykes than just about anyone. A quarter of the country is below sea level, sometimes metres below, but we are still safe. The Rhine used to be a sewer, salmon disappeared, but water quality has been greatly improved and now the salmon is back. In the east of the Netherlands, brooks have returned to their natural course. The coastline and rivers used to be strictly guarded corridors, but today we work more with the natural dynamics of water. The Netherlands is a pioneer in water management. It sounds like a beautiful fairytale. The obvious question is - is this image true? Haven't we become a bit vulnerable? Time and again, we have managed to reduce the chances of flooding, but we keep quiet about uncertainties, and the potential consequences of 'it going wrong after all' are more far-reaching here than anywhere in the world. And how sustainable is our water management really? We have managed to put our own house in order, but maybe we have simply started to import dirty products.

In this essay I would like to show that we are start-

ing to ignore some of the realities of the situation. Past performance does not guarantee future results - an old saying that applies just as much to water management as anything else. I will show that we need to take new steps, both in our battle against water and in protecting our fresh water supplies. I would like to make two points. First of all, we need to both reduce the chances of flooding and tackle our vulnerability. This is possible by thinking more about how our spatial planning can respond to the opportunities and threats water presents. This is a huge project, and a long-term one - one does not change a country's spatial plan and infrastructure overnight. Secondly, we need to not only produce sustainably, but also consume sustainably. As a small country, we are very dependent on fresh water from elsewhere. At the moment most of our products are far from sustainable: the cotton in our clothing largely comes from areas where irrigation causes rivers to run dry and lakes to disappear. Our fruit and vegetables are grown in countries where intensive water use drains valuable wetlands and lowers groundwater levels. Our meat and dairy demand huge quantities of water in areas that used to be rainforests, and our fuels, computers and appliances come from areas where rivers are heavily polluted by mining and industry. This all takes place abroad, and is therefore hidden from us.

As day to day we do not see evidence of our vulnerability and dependency, these notions remain abstract. The last serious flood in the Netherlands was the North Sea flood of 1953, which occurred in the south-western part of the country. Nowadays we no longer see water as a threat. And we are also blind to the lack of sustainability of our imports. Yet these are all very real matters. According

to the German sociologist Ulrich Beck we currently live in a 'risk society' where efficient organisation and production have led to unprecedented prosperity. We have, however, also created new, large-scale dependencies and risks. There is no better example of Beck's theory than Dutch prosperity, which would not exist without dykes and the import of the bulk of our consumer goods. Our wealth is therefore closely tied to the proper functioning of those dykes and trade relations. If one day an unexpected storm hits or a flood defence doesn't quite work properly, the consequences could be huge. We are pretty much completely unprepared for a big flood. Then we will learn suddenly that important internet exchanges are located below sea level, that hospitals have their intensive care departments at ground level, that people are hitting the road en masse despite well-meaning government advice, clogging slowly-submerging motorways. When we look at our import dependency it is equally easy to create nightmarish scenarios. The 1973 oil crisis might have dropped from our collective consciousness, but we have had a recent taste of what it is like when Russia stops supplying oil. And whatever oil can do, water can too. A significant proportion of the products in our shops are there only because water reserves are being exhausted and polluted elsewhere in the world. The very term 'non-sustainable production' suggests that it cannot last, and that is exactly where our problem lies. To a large extent we have, as economists put it so eloquently, externalised the costs of our consumption patterns. We benefit from cheap production elsewhere, which can only be so cheap because collectively we have failed to put a price tag on the exhaustion and pollution of water reserves. Those costs are borne by the environment, peo-

ple in other parts of the world and future generations. I will take a closer look at both issues - our vulnerability to flooding and our dependency on water-intensive goods from water-stressed areas, and discuss how to deal with these problems.

Sustainable living in a delta

If there is one lesson to be learnt from the Dutch battle against water over the past few centuries, it is that new, long-lasting protective measures are only taken after a disaster. In the last century, the Zuiderzee Works - among which the closure of the Zuiderzee by means of the Afsluitdijk - were built after the 1916 floods. The Delta Works were constructed after the 1953 disaster in the south-western part of the country. This 1953 disaster was the last of its kind. We are currently experiencing an exceptionally long disaster-free period. The downside is that we feel so safe that it is difficult to create enough political urgency - and therefore gather the money - to maintain this level of security. And it is even harder to find enough money to invest in new projects to meet future challenges like rising sea levels, increases in extreme precipitation and higher peak discharges in rivers due to climate change.

I am genuinely surprised that at the last check of Dutch flood defences in 2011, 33% of the almost 4,000 kilometre long primary flood defences did not comply with the current safety standard, and that compliance

of another 6% could not be determined. A telling sign of how little importance we attach to water management nowadays is the complete lack of political uproar. It is also surprising that, although public confidence in politics is at deplorably low levels in nearly all fields, polls have shown that water management is the exception. Apparently citizens take flood protection for granted. With a legal flood standard of once every 1250 years along the main rivers there is about a 6% chance of a flood occurring in a person's lifetime. Knowing that at least a third of flood defences do not comply with the legal standard, this scenario becomes suddenly much easier to imagine.

Low-lying deltas are inevitably exposed to flood risks. Engineers define this risk as the chance of flooding times the damage occurred by a flood (in human lives and Euros). The risk becomes greater when the chances of flooding are greater or the possible consequences more severe. Dutch policy over the past few decades has concentrated on reducing the chances of a flood, ignoring possible consequences. These chances have been laid down in law. So, according to the government, Dutch flood defences only partly comply with those chances. They fail to state what the chances of flooding are in areas where flood defences are inadequate. They also remain quiet about the uncertainties surrounding dykes that do comply, which are enormous as it is a nearly impossible task to estimate whether a flood defence will collapse more or less than once in 1250 years. I would like to propose that from now on the government is open with Dutch citizens and clearly communicates the risks and uncertainties. At flood risk meetings I have asked a

number of mayors why municipalities don't provide their citizens with information about the chances of flooding and possible consequences, for instance by postal code area. The answer is always the same: 'You shouldn't provide citizens with information without a framework for action.' Since citizens expect 100% safety from their government, providing them with honest information might lead to difficult questions. The public could lose confidence in politics on this issue as well.

Of course honest communication is not enough by itself. If we accept that the Netherlands should be accounting for possible floods, even though the likelihood is small, then we should act as well. We are wholly unprepared for the possibility that it might happen. There is a complete lack of measures to limit potential damage. The emphasis on reducing chances combined with a lack of communication about inevitable risks has created an unwarranted feeling of total security and an unjustified expectation that governments can guarantee that safety. Government can't, however, control natural variability, meaning there is always a chance of extreme events. Policy documents speak of a 'multi-layered safety', with flood defences as the first layer, measures to limit potential damage in case of a flood the second and flood contingency plans and disaster preparedness the third layer. This multi-layered safety system is under pressure because it costs too much. The classic dyke builder argument says that flood risks can be diminished fairly easily by building a higher, sturdier dyke - much more cost-efficient than regulating what happens behind the dyke. This is, purely from a monetary point of view, probably true in most cases. It does not, however, take

into account that reduction of chances is a one-sided form of risk management. A ship is obviously built not to keel over, but there are still lifejackets and sometimes lifeboats on board. Even though a ship is constructed of sturdy material, compartments or double hulls are added to prevent the ship from instantly sinking if a leak occurs.

Dutch preparation for flooding consists of only one thing - flood defences. There is not a low-lying delta in the world where the chances of flooding are as small as in the Netherlands. And yet there is no delta in the world where the possible consequences of a flood are higher. This may seem a paradox, but it is a consequence of years of one-sided policymaking by the Dutch government. We seem to be in a technological lock-in: the dykes need to be higher and stronger because there are more and more people and economic activities behind those dykes, and the growth behind the dykes can continue unchecked because the chances of flooding become increasingly smaller as the dykes become higher. It would be wise to better balance our safety, with not only well-functioning flood defences, but provisions to limit potential flood damage as well. The widening of rivers in response to the extremely high water levels of 1993 and 1995 are a good example of an alternative to higher dykes. Giving rivers more space means that water levels are lower at high discharge than when the river needs to stay within its narrow path. This means that we can suffice with lower dykes, but more importantly, lower water levels will lead to less severe consequences in case of dyke breach. An additional advantage of wider rivers over narrow channelized rivers is that it leaves more

space for the natural dynamics of water. So it is wise to continue on the path towards more room for rivers.

But there is more. We should also make sure that a breach of a dyke isn't the catastrophe it could be. The best course of action in this respect depends on the characteristics of the dyke ring area. We could take a look at the usefulness of the old compartment dykes again and possibly restore these secondary defences. We could also reserve broader buffer zones alongside rivers and coastlines where potential floods would not do too much damage. This creates more space for nature but also for activities that can cope with incidental flooding, like farming and recreation. It should even be possible to live in these buffer zones, on mounds or in floating houses. It is not my intention to sketch a blueprint for the Netherlands, but I would like to point us in a direction where future spatial plans create space for the necessary natural dynamics of water, making us less vulnerable in the long run. It takes political courage to make these choices, as it is far easier in the short term to continue down the road of dyke construction.

Reducing our global water footprint

An estimated 2.7 billion people live in river basins with severe water scarcity for at least one month a year. Severe water scarcity occurs when the water footprint of activities in a river basin in a certain period is at least twice as much as the water available for human use. The Dutch are

not among these 2.7 billion people. But we do get a lot of our food, cotton and other water-intensive products from river basins with serious water scarcity.

Almost 95% of the water footprint of Dutch consumption lies abroad. The water footprint of a product is the volume of fresh water that is used to make the product, measured over the various stages of the production chain. A water footprint measures the volumes of water that are consumed or polluted and consists of blue, green and grey components. The blue water footprint measures the consumption of surface and ground water. 'Consumption' refers to the amount of water that is extracted from a drainage basin without returning - water that evaporates, is added to the product or transported elsewhere. Processes that use, but not 'consume' water (in the case of closed cooling systems) do not have a blue footprint - this water remains available to downstream users. The green footprint measures the amount of rainwater that is consumed and is mainly relevant for agriculture. The grey water footprint is an indicator of water pollution. In the case of properly treated wastewater the grey water footprint is zero. The water footprint in a river basin is not sustainable when it exceeds the basin's natural boundaries in terms of water availability and assimilation capacity of polluted substances.

One aspect of humanity's total water footprint leaps out - food. About 85% of the global water footprint comes from the consumption of agricultural products, 10% relates to industrial products and only 5% to domestic water use. If consumers wish to reduce their water footprint they are therefore better off taking a critical

look at what they buy in the supermarket than their water use in the kitchen, bathroom and garden. This is especially true for the Netherlands, where domestic water use only makes up 1% of the average consumer's water footprint and water is not scarce for most of the year. Many of the things we buy in supermarkets are imported from areas with severe water scarcity - strawberries from Spain, rice from Thailand, cane sugar and soy from Brazil and cotton from Turkey, India or Pakistan to name but a few.

Humanity's water footprint is a global problem. Many countries still produce most of their own food, but large quantities of foodstuffs and animal feed are traded internationally, as are increasing amounts of biofuel. Sustainable freshwater management can therefore no longer be seen as a problem of individual countries. Forty per cent of Europe's water footprint - the total amount of water needed to extract and process all the raw materials that are used by European citizens - lies outside of Europe. European consumption is therefore strongly reliant on water sources outside of Europe, making water an important geopolitical factor. Unsurprisingly, the EU has put water scarcity higher on the political agenda with the 2012 Blueprint Water publication. It is expected that an increasing number of countries will follow Spain's example of a compulsory water footprint assessment for drafting river basin plans.

Just as we need to reduce our carbon footprint to combat climate change we have to put limits on our water footprint. In the case of the carbon footprint we need to limit the amount of greenhouse gas emissions in the world as a whole; the maximum water footprint will have to be

determined for each river basin separately. This is primarily a task for governments. The water footprint in at least half of all river basins is already beyond the sustainable level. As our consumption patterns indirectly contribute to this situation, we will eventually have to change them. This demands action not only from governments, but from companies, investors and consumers as well.

For a start, companies can reduce the water footprint of their own activities to practically zero by avoiding evaporation loss and wholly recycling wastewater or discharging it clean. Then only water that is a necessary part of the product will have to be extracted from a river basin. Secondly, companies can reduce the water footprint in their production chain by conscious purchasing. Large corporations can set up agreements with suppliers and help them to stick to them. Coca Cola for instance is one of the largest sugar users in the world and can therefore play a part in reducing the water footprint of global sugar production. Companies can also work together by adding water footprints to product labels, developing water footprint benchmarks for individual products and by formulating water footprint reduction goals for each product. Investors like the International Finance Corporation are starting to include criteria for sustainable water use and water risks in their investment plans. This should become standard practice for all banks.

Consumers have two options for reducing their water footprint outside the home. Changing their consumption pattern is one. Eating less meat or going vegetarian is probably the most effective immediate step, as 22% of the average global consumer's water footprint is a

consequence of meat consumption. Wasting less food and buying cotton clothes less frequently would also significantly help. There are limits to this approach as consumers are only partly willing to adapt their consumption patterns to environmental considerations. A second option is creating a situation in which consumers, when faced with a choice between two similar products, take the size of the water footprint into account in their purchase. This means that consumers need the right information to make this choice. As this kind of information is generally not available, companies will have to allow product transparency and governments will have to encourage, and eventually enforce, this transparency. Currently we are still a long way from being able to compare the water footprint of one pair of jeans with another. The water footprint of cotton clothes widely varies depending on areas of production and production systems (irrigation or not, use of pesticides or not). The difference between the smallest and the largest water footprint for the same kind of product is usually a factor of at least ten. A lot could be achieved if consumers, companies and governments agree to reduce the water footprint of products, especially in areas where this is most urgent.

Making choices

In *Collapse*, his book about the downfall of great civilizations in history, Jared Diamond concludes that there are many reasons why societies collapse, including climate change or a shortage of natural resources. Yet he also says there is only one factor that determines whether societies

succeed or fail in overcoming a threat - a society's ability to take signs seriously, to question certain patterns and make the necessary changes to ensure future prosperity. For the Netherlands, the two largest long-term challenges are probably a vulnerability to floods and dependence on imports made using ever scarcer raw materials - land, energy and fresh water. Although we have our dykes and integration into the world economy to thank for our prosperity, they are also the things that make us vulnerable. Our future will depend on our ability to drastically reduce our vulnerability to floods and dependence on non-sustainable imports. To this end, we need to 'flood proof' our spatial planning and work towards sustainable consumption and trade.

