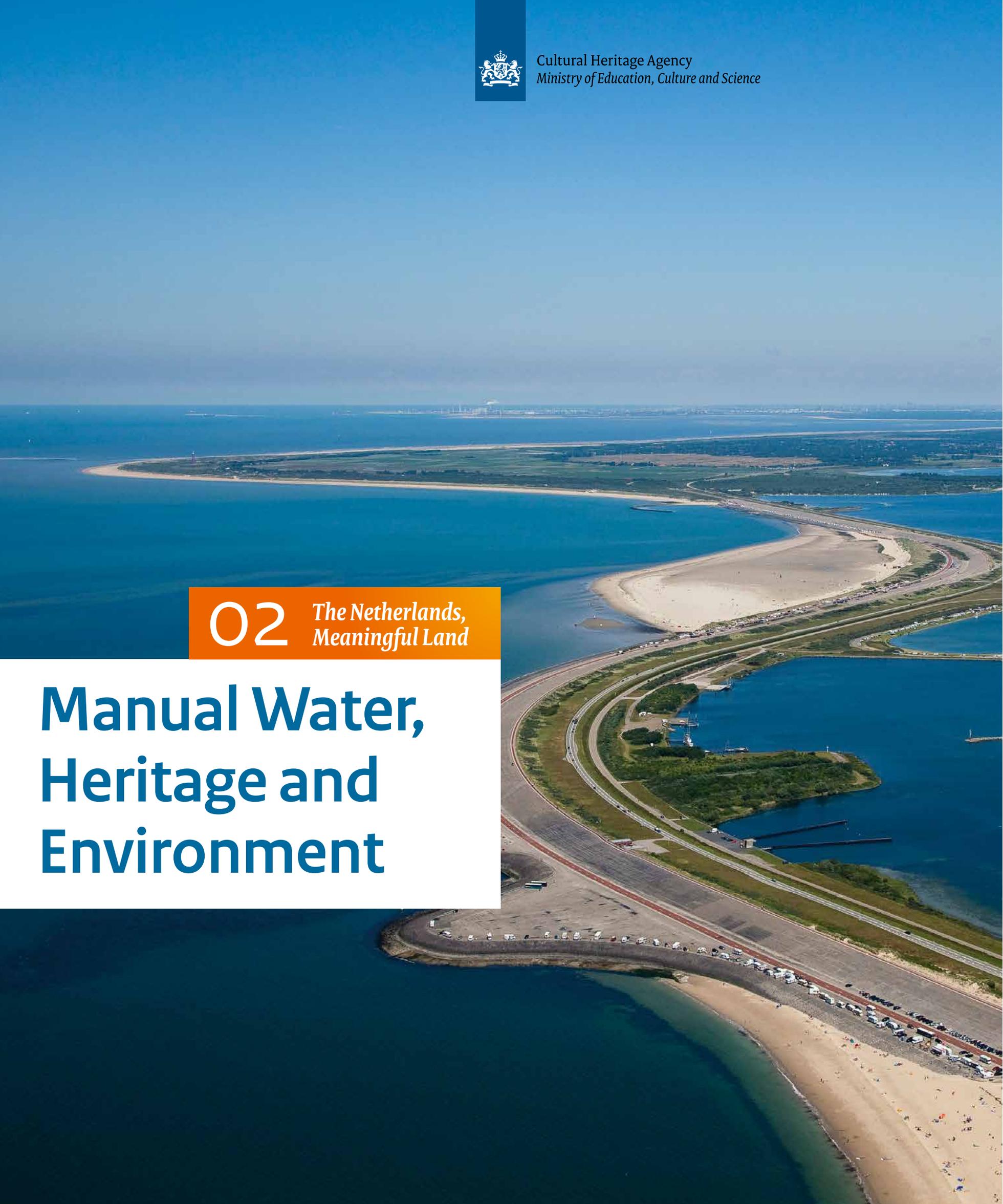




02 *The Netherlands,
Meaningful Land*

Manual Water, Heritage and Environment



Water safety: from past solutions...

Water safety is an important challenge. Water management has always been crucial in the Netherlands. To the Dutch, living in a delta meant learning to cope with water. We accepted it, and adapted. As better technologies became available we tried to gain more control. Today, we once more have to anticipate unknown and unpredictable situations. That makes an adaptive strategy more advisable, and in this process past solutions can perhaps be re-used in novel and surprising ways. They may inspire us to creative ideas and innovative approaches.

Linking historical water systems to a modern problem

The Netherlands is a nation of designed water systems. Trial and error have taught people to make use of the most suitable locations in the delta in order to organize the landscape as efficiently as possible. From fortified towns with water lines, polders with polder mills and pumping stations; from dunes, dams and dikes and from canals and stream systems lined with water mills to icons like the Delta Works. By recording these water systems and assessing whether they can be reconstructed locally, potential solutions to present water issues emerge. Former fortifications and other defensive structures and lines with their water systems – once used to

Water safety



Old drainage canals, embankments and (compartment) dikes can be used again to regulate the water, thus limiting flood damage.

Water retention



Photo BNDaStem

During a peak flood, ponds that originally were part of a water mill complex can still receive water and retain it until discharge levels have returned to normal. Reversely, they can retain water for longer periods during lengthy droughts so that downstream areas may have more water at their disposal.

Waterproofing infrastructure



Photo Gemeente Utrecht

In several Dutch towns and cities, such as Utrecht, opening up filled-in canals and water courses not only facilitates recreation and tourism but also helps to restore former water systems. This may reduce problems caused by excess water.

... to today's challenges

deliberately inundate stretches of land – may again function as retention areas in case of excess water. In places where dikes suffer from piping, embankments may be constructed as a preventive measure against seepage.

Using tried and tested construction methods

Historical construction methods may also be particularly informative as to how to cope with excess water. In areas liable to flooding, thresholds were often raised and 'flood planks' were kept in readiness to keep the water out. Such adaptations can still be encountered in waterfront towns such as Dordrecht, Kampen and

Den Briel, but also at rural farms in the Dutch Rhine-Meuse river plain. On the island of Marken, some houses stand on artificial mounds (terps) while others are pile dwellings. From the 17th/18th century onwards, farmhouses in the peat areas and those in the IJ Polders as well as town houses in waterfront towns like Amsterdam, Dordrecht and Edam were occasionally equipped with a 'floating cellar'. These structures could move with the rising or falling water table or the tides. A number of spatial and technical solutions from the past may provide inspiration or even be directly copied today to cope with modern water-related issues.



Retaining or repairing old dikes creates more inland buffers to counteract flooding. Creating footpaths on top of these dikes results in an enhanced landscape experience.



Historical river towns, such as Kampen and Zutphen, can utilize their medieval town walls and 17th-century fortifications as water barriers.



Former flood-prone areas such as the New Holland Waterline are suitable as retention areas for excess water.



Reconstructing former brook systems, spring-fed artificial brooks, and water meadows – in the past, the latter were inundated in winter to allow deposition of the fertile sludge – ensure that more water is retained during a peak flood.



In towns that are prone to flooding, fairly small measures such as a raised doorstep or slots to insert planks or boards may help to keep the water out. This is currently being implemented in Dordrecht, Kampen and Den Briel.

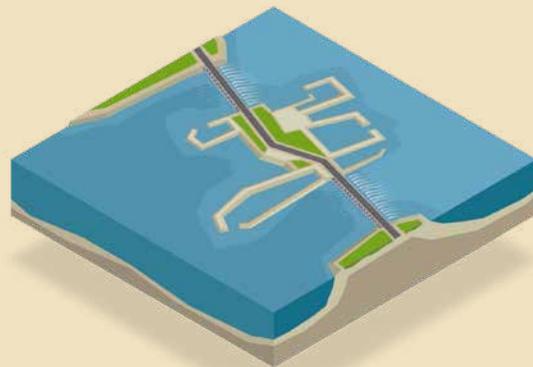


By placing houses on top of terps or building them on stilts, as on Marken, or by raising new terps, as in Overdiepse Polder, people can keep dry feet.

How can cultural history and water safety strengthen each other?

There are three possible strategies to deploy cultural history in the context of water-related issues: *preservation, embedding, or transformation*. The utilization of cultural history in water-safety projects must always be situational.

Sea and coast



Preservation

Sand for beach replenishment and civil-engineering projects extracted from national waters, such as the Wadden Sea and the North Sea. Both these areas were once dry land and still contain archaeological traces of our earliest settlement history. Digital cultural-historical maps may indicate where the sea bottom is still intact or disturbed, and where sand extraction is and is not recommended.



Sand extraction on the North Sea

Photo Rijkswaterstaat

Rivers

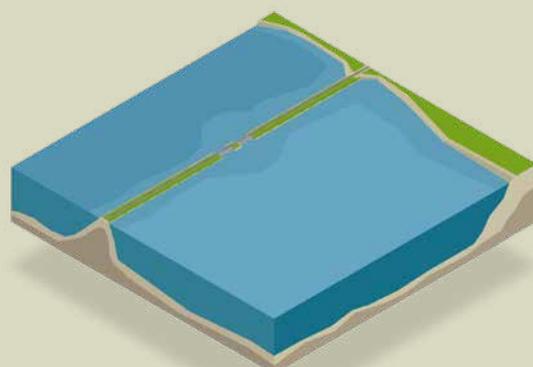


Many river dikes are centuries old and as such have their own story to tell. As functional elements they always were a work in progress; change was and is the norm. Old dikes no longer capable of keeping the water out may receive a new function so that they can contribute to a sense of regional identity.



In the past, the Knardijk (Flevoland Province) directly faced the water. Today, however, it marks the boundary between the eastern and the late reclaimed southern section of Flevoland Province.

Large bodies of water



The relation between large bodies of water and any heritage in and around them (dikes, historical towns, polders, wrecks) is often an interesting one. Occasionally the significance of cultural heritage is such that planning has to take it into account. At the same time, heritage itself may become a vehicle for regional development.



With respect to spatial and water-related issues in the IJsselmeer region, involved parties aim to keep its characteristic features recognizable as such.

Embedding

The Dutch coast has a characteristic appearance of alternating dunes, dams, dikes and various beach access points. By using these features as starting points for measures to improve water safety, the experience value of a stretch of coast is enhanced and kept visible.



Photo DPI Animation House

During the renovation of the Scheveningen boulevard an original bend in its course has been restored, marking the spot where fishing boats were pulled ashore in the past.

A well-designed dike may renew the old relation between towns and villages and their rivers. Thus, these places are not only made safer but they also gain an attractive riverfront.



Impressie HOSPER landschapsarchitectuur & stedenbouw

The plan for the modification of Zutphen's IJsselkade to create more room for the river IJssel provided an opportunity to restore the relation between this town and its river.

Interventions in the context of water-table regulation or the construction of a new waterfront can be designed so as to tie in with their cultural-historical and landscape settings. A good example are the flexible flood barriers that can be raised at high tide.



Photo Rijkswaterstaat

Two breakwaters flanking the drowned village of Valkenisse (Zeeland province) in the Westerschelde inlet have helped to once more cover the archaeological remains under a protective layer of sand, besides creating an extensive new feeding ground for birds.

Transformation

Upon careful study, the coastal landscape as recorded for centuries by the great Dutch masters, may yield valuable details that may help us to design a better plan that in addition to ensuring water safety also suits the specific location. Water projects such as the Delta Works and the Afsluitdijk are showcases of 20th-century collaboration in the fields of civil engineering, spatial design and architecture. Our task in the future will be to combine these assets with technological innovations. Thus, preserving the identity of the Dutch coast will continue to go hand in hand with keeping dry feet.



The Haringvliet Locks and Haringvliet Dam, together forming the sixth of the Delta Works, link together the Zuid-Holland islands of Voorne-Putten and Goeree-Overflakkee.

Landscape transformation is a never-ending process. We are constantly adding new layers, whenever an opportunity presents itself, and with respect for what is already there. A case in point is the central Rhine-Meuse river plain, which has already seen many radical interventions.



Photo Jeroen Bosch

Park Lingezegen, a landscape park under construction between Arnhem and Nijmegen, provides opportunities for water retention, water fun, and water as an element of new nature.

When planning interventions such as the inundation of polders or the creation of new islands it is recommended to refer to existing landscape historical information. Suitable locations for new islands, for instance, include past attempts at land reclamation, the so-called aanwassen (accretions). Their remains just below the surface make present interventions easier since less soil needs to be moved about.



Photo John Gundlach - Flying Holland

The construction of the first island of the innovative nature-building project Marker Wadden involves extensive sand extraction.

Heritage perspective

Heritage can be approached in three ways in the context of water management.

Preconditions

- Including heritage in the spatial planning process at an early stage.
- Ensure access to correct (digital) information.
- The Heritage sector as information partner.
- Prevent delays during subsequent stages.

Incorporating heritage and heritage-related expertise as well as legal or planning conditions into the project at hand at an early stage makes it possible to consider various spatial options and to file permit applications in time. This will prevent delays.

Public support

- Telling the story of a location or area and looking for common ground.
- Using heritage appropriately may mitigate opposition to major interventions.
- The Heritage sector as communication partner.
- Heritage enjoys considerable popular appeal.

Collecting local stories of past forms of water management and then re-telling them makes it possible to engage in conversations with involved parties and to create a mutual understanding of the other party's perspective. It also facilitates a search for shared solutions.

Inspiration

- Enhancing spatial quality.
- Heritage as a (co-)vehicle for development.
- The Heritage sector as development partner.
- The past as an economic asset and/or a source of innovative solutions

The combination of modern design and the application of knowledge of (historical) water management in relation to landscape and heritage may result in innovative and integrated solutions and balanced choices.

The Cultural Heritage Agency of the Netherlands: Expertise and advice

The Netherlands are constantly changing. How to keep its specific character visible?

The Cultural Heritage Agency of the Netherlands focusses on offering expertise and consultancy in the field of cultural-historically inspired spatial development. Our partners are invited to contact us if they desire to incorporate heritage in the realization of their projects.

The Netherlands - Land of Water

For centuries, the Netherlands have been transformed by adding new meaningful layers. The series '*The Netherlands, Meaningful Land*' (Land van betekenis) presents a number of stages that illustrate how the country has changed through time. The starting point for each publication in the series is a spatial challenge, such as water safety. How can we make clever use of the lessons of the past and let them inspire us in our new spatial designs? '*The Netherlands, Land of Water*' will enable you to place your own water-related challenges in a historical perspective and to engage in a discussion on the added value of cultural history in your own project realization.



The manual 'Water, Heritage and Environment' shows how cultural history can be a source of inspiration in water-related issues. The manual is also available online (www.erfgoedenruimte.nl/water) and is regularly updated, with new information and case studies being added (www.kiezenvoorkarakter.nl).

Infodesk

If you have any questions, call (+31) (0)33 – 421 7 456 or send an email to info@cultureelerfgoed.nl

The Cultural Heritage Agency of the Netherlands offers expertise and advice to give the future a past.

Illustration acknowledgments

Photos: Collection Cultural Heritage Agency of the Netherlands unless indicated otherwise.

Colophon

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The Netherlands Land of Water



Summary

Nearly a third of the land surface of the Netherlands is below sea level. Without the dikes, over half the country would be flooded. The effects of the predicted climate change will pose a serious challenge. Scientists anticipate episodically higher water levels in rivers as well as rising sea levels. In the west of the country, soil subsidence will continue. Other areas will become too dry as a result of global warming, with negative consequences for agriculture.

Fortunately, the Netherlands boast a long tradition of water management. It is part of our cultural DNA. By trial and error, we have learned how to keep the water at bay. We also put it to good use to raise our food production and our prosperity. Over the centuries, our actions have profoundly altered the landscape and resulted in many ingenious constructions. Good examples are the reclaimed former lake Beemster and the polder mills of Kinderdijk, both on the UNESCO list of World Heritage Sites. The Dutch have constantly invented new techniques and materials and applied them on an ever larger scale. Our expertise in water management has even become an export commodity to help other countries to reclaim land and to prevent flooding.

That rich past may be a source of inspiration when introducing measures in response to climate change. In this, we are returning to a situation in which we try to live with water rather than to control it. Rivers straightened in the past once again receive a wider, more natural channel. New terps (dwelling mounds) turn low-lying reclaimed land into a safe place to live. In the past, the Dutch have demonstrated their ability to adapt to change. When faced with climate change, that is an encouraging thought.

Then



About 11,700 years ago, a warmer period began. The melting Northern European and American ice caps caused sea levels to rise rapidly and ultimately resulted in the formation of the North Sea as well as many marshes and lakes. The first tree appeared in the open plains. Humans moved through the landscape in a seasonal round, setting up camp in suitable places. Around 2800 BC, however, they started to cultivate small fields in higher areas near the coast and to build houses nearby. When it became too wet, they dug ditches to allow the water to drain off. When that no longer sufficed, they moved away to higher ground. Of those first fields and houses, no visible traces remain in today's landscape.

Then



About three thousand years ago, the coastal zone and the marshes further inland started to become progressively wetter. Only the highest sections remained suitable for permanent settlement. New techniques were invented to render more areas safe for habitation. Peat bogs were made habitable by digging drainage ditches through them and waiting until the land had become dry enough to settle and to farm. This drainage process set in motion a process of subsidence. So-called valve culverts kept the water out of the peat areas. Later, the first dikes and dams appeared in the south-western delta and near the large Dutch rivers, to keep the water out. In the coastal zone people used higher and firmer soils to raise such places into artificial dwelling mounds called terps on which they built houses and farms.

Now



The earliest dikes and dams have disappeared beneath more recent flood defences or have been washed away by storm surges. Here and there in the provinces of Zeeland, Groningen and Friesland, elevations in the landscape still hint at the presence of the first terps.

Then



In the Roman period, a road was built along the banks of the river Oude Rijn that formed the northern border ('limes') in the Netherlands of the Roman Empire. More dams, valve culverts and bridges now appeared in the landscape. The Romans constructed canals and harbours besides digging long drainage ditches in areas like Midden-Deffland. These measures caused subsidence of the peat. Floods became more frequent and people moved to higher ground. For a long period, starting in the 3rd century AD, much of the western coastal region was once again uninhabitable.

Now



In the Utrecht housing estate De Meern, near Zwammerdam, and also near Woerden, fragments have been found of vessels that had been deliberately sunk to close off a watercourse or to influence water currents. In Zwanindam and De Meern the vessels are either on display or their remains can be visited.

Then



In the 7th and 8th centuries AD, the west of the Netherlands had silted up and thus became habitable again. Higher beach ridges, dunes or foreshores provided protection from the sea. At strategic locations along rivers, people established trade settlements such as Dorrestad (today Wijk bij Duurstede) and Wila (near Rotterdam). Merchants imported goods, half-products and precious objects that were either traded directly or required further processing. The presence of water became an important factor in regional prosperity.

Now



At present shipment of imported goods to the European hinterland still takes place at the port of Rotterdam. As an European mainport Rotterdam contributes substantially to the Dutch economy.

Then



After ca. 1000 AD, the residents of the south-western delta reclaimed silted up salt-marshes by surrounding them with embankments and dikes. Such constructions were often poorly maintained. Furthermore, peat digging (for turf and salt) which left deep holes in the land directly behind the dikes and on the foreshore. Drainage of the marshes on behalf of farming led to soil compaction and subsidence. These three processes together rendered the area vulnerable to flooding. Dike breaches were common. When a series of storm surges claimed large swathes of land, the inhabitants decided to protect themselves from the water by building new dikes to encircle and compartmentalize the threatened areas.

Now



On the beach at Westenschouwen, the remains of a drowned medieval village can still be seen at low tide. South-east of Burch-Hasmedede stands an isolated tower, Plompe Toren, the only visible remnant of Koudekerke, a village swept away by the Oosterschelde inlet, in Noord-Holland, in an area surrounded by the Westfriese Omringdijk, some encircling dikes are still visible in the landscape. The drainage and reclamation of Flevoiland, formerly a part of Lake IJssel (IJsselmeer) was the final stage in massive turning shallow waters into dry land.

Then



The arrival of encircling dikes sparked off the construction of new drainage systems and harbours. In the 13th century, ports like Middelburg, Zierikzee and Veere had a harbour with a tide mill. Such basins were filled with water at high tide. During falling tide, the basins were closed by a sluice. At low tide the sluice was opened and the current passed the mill, setting in motion a water wheel which also scoured the harbour bed, keeping it at the right depth. Elsewhere, small rivers that drained the hinterland were being dammed and 'dam' towns appeared, such as Amsterdam, Rotterdam and Monnikendam. This was the period when farmers and townspeople established the first official water boards for the maintenance of a growing number of water management features.

Now



Old tide mills still exist in Bergen op Zoom and Middelburg. In these two towns, also the connection between the location of the dam and the water is still tangible. In Amsterdam, however, Dam Square has an iconic status but any direct link to its river has been lost.

Then



After 1550, villages and towns were severely damaged by a series of successive storm surges. During the Eighty Years' War the dikes were neglected and occasionally deliberately breached to keep the enemy at bay. Water now began to be used in a systematic fashion for defensive purposes: defensive water lines such as the Holland Waterline and the Staats-Spanish line were constructed. In the 17th century, technical innovations like stepped series of polder mills made possible the drainage of several larger and smaller lakes such as Beemster and Schermer. The resulting new land was used to feed the growing urban populations.

Now



The Holland provinces' major polders of Beemster, Schermer and Purmer are still easily recognizable in the landscape, as are some of the old auxiliary dikes (inlaagdijken), such as those near Kattendijke, Zeeland province. Elsewhere, similar barriers have disappeared as a result of modern dike improvements. In the 19th century, the huge lake Haarlemmermeer was drained by a team-powered pumping station and surrounded by a circular drainage canal. The undertaking ended both the erosion by the Zuiderzee and numerous shipping disasters (hence Schiphol, 'ships' hell'). The most recent polders post-date the Afsluitdijk, a dam which closed off the Zuiderzee. The 20th-century Flevo Polders are situated in the resulting new lake, IJsselmeer.

Then



In 1798 the precursor to Rijkswaterstaat was established (the Ministry of Waterways and Public Works). New regulations and better monitoring ensured better maintenance of dikes, dams and embankments. In the 19th century, the arrival of steam power and the utilization of iron, steel and concrete opened the door to new technical solutions. After 1850, rivers were channelized, dikes raised, canals dug and equipped with locks, as in the case of Noord-Hollands Canal and Zuid-Willemsvaart. Steam dredgers kept the river at a navigable depth. Two more large canals were built, Nieuwe Waterweg (1872) and North Sea Canal (1876). For the first time, steam vessels could sail directly to Rotterdam and Amsterdam, encouraging the development of the inland ports.

Now



Today, the main canals and channelized rivers from this period are all still in use and form remarkable features in the landscape. The westward expansion of the ports of Rotterdam and Amsterdam has been considerable. Near Rotterdam, the new docklands of Tweede Maasvlakte have just been completed while the oldest harbour basins have been converted into attractive residential and business districts. The concept of channelization is still relevant, for keeping the Dutch waterways navigable continues to be crucial. Water safety measures no longer always involve raising the dikes; instead, the river is given more room to find its own course within its embankment.

Then



Storm surges battered the coasts and neglect had weakened many dikes. The 1916 floods provided the impetus for the drainage of Lake Wieringer (Wieringermeer; 1925) and the construction of the Afsluitdijk (1932). The Zuiderzee, formerly a body of salt water, was closed off and as Lake IJssel (IJsselmeer) became the largest freshwater lake in Western Europe. The same Afsluitdijk also improved the connection between the provinces of Noord-Holland and Friesland.

Now



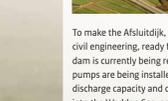
To make the Afsluitdijk, that icon of Dutch civil engineering, ready for the future, the dam is currently being reinforced. Special pumps are being installed to increase the discharge capacity and drain off more water into the Wadden Sea, and to better enable fish to swim in an out of Lake IJssel. The Dutch government and its regional partners are also looking to the IJsselmeer region's rich history to create acceptable solutions to enhance water safety and the freshwater supply, while at the same time bringing the area's specific character to the fore.

Then



After the 1953 North Sea flood, in which large sections of the south-western Netherlands were inundated, the government decided to embark on the so-called Delta Works. Between 1956 and 1998, Rijkswaterstaat built several dams, barriers and sluices, such as the Brouwers Dam between the islands of Goeree-Overflakkee and Schouwen-Duiveland, and the Oosterschelde Barrier. All this made the Dutch delta safer and the province of Zeeland more accessible. In the adjoining section of the central-Dutch river valleys, dikes were raised.

Now



After 60 years, the Delta Works have acquired an almost mythical status. As the oldest of the Delta Works, the Haringvliet Dam and its locks between Hellevoetsluis (Voorne-Putten) and Stellendam (Goeree-Overflakkee) as well as the Algeira Barrier near Krimpen aan den IJssel are now listed as national monuments. The famous Oosterschelde Barrier allows the tide into the Oosterschelde, thereby retaining a large nature area. It is only closed during storm surges. Considerations of nature, environment and water safety make new demands upon the Delta Works. Also for the Haringvliet Dam there are plans to make a small gap in it to allow fish to swim to and from the sea more easily. While a tidal energy plant is being considered for the Brouwers Dam, a modern version of the medieval tide mills.

Then



Following the extreme water levels of 1993 and 1995 the Dutch government decided that the central Dutch Rhine-Meuse river plain had to be made safer. The programme 'Room for the River' marked a turning point. The emphasis shifted from dike improvement to creating more room for the rivers whilst focussing on an attractive living environment as well. The new side channel of the river Waal near Nijmegen is a good example of these occasionally radical interventions in the landscape. The programme was the precursor of a much more ambitious plan to prepare the Netherlands for the consequences of climate change. In 2007, a second Delta Committee was appointed to come up with suggestions for a new Delta Programme.

Now



The second Delta Committee recommended the introduction of a second Delta Act, and since 2010 a Delta Commission has been preparing a Delta Programme. The Delta Programme aims to ensure the present and future protection of the Netherlands against high tides, to guarantee sufficient fresh water, and to render the country climate proof in financial terms. The Delta Fund was established to finance the introduced measures. These developments mark a new phase in living with water. This time, we do not respond to a disaster but try to prevent a new one from happening through spatial adaptation and increased water safety. Past experiences are an important source of inspiration.

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