MAAS
MAP OF THE MEUSE BASIN
Posad spatial strategies 2016
Scale 1:720.000
ENGLISH
Legend
Nuclear power plant
Oil power plant
Gas power plant
Hydro power plant
Coal power plant
Dam
Port
Airport
Bridge
Heritage site
Water sampling station
Water intake point
Wastewater treatment plant
Mineral extraction
Water producer
Meuse river
Flooding area
Catchment basin
National border
Urban area
Industrial area
Road
Railways
Roman road
Natura2000 (European network nature protection areas)
Grindmaas
Kierbesluit (weir that allows fish to swim through)
Distance of water in 1 hour
Emergency planning zone nuclear power plant 20 km
Core cities
Cities > 500.000
Cities 100.000-500.000
Cities 20.000-100.000
DIALECT
bureau europa
Platform voor architectuur & design
50
100
150
200
250
300
350
400
450
480 km
Maastricht
Luik
Namen
Charleroi
Eindhoven
Rotterdam
Tilburg
Breda
Venlo
Roermond
Aachen
Monchengladbach
Heerlen
Sittard-Geleen
Verviers
Seraing
Helmond
Oss
's Hertogenbosch
Roosendaal
Charleville-Mezieres
Verdun
Neufchateau
Differdange
KLEVERLANDS
NOORD-LIMBURGS
OOST-LIMBURGS
KERKRAADS
RIPUARISCH
PLATDIETS
LIEGOIS
CENTRAAL-LIMBURGS
OOST NOORD BRABANTS
MIDDEN NOORD BRABANTS
NOORD WEST-BRABANTS
WESTHOEKS
NOORD ZEEUWS
NAMUROIS
WALLO-PICARD
LORRAIN
CHAMPENOIS

MAAS PARADOX

Cultural resilience
in times of climate change
05.11.16–22.01.17

Water is both a curse and a blessing. We depend on it for drinking water, agriculture, and recreation, but water also causes flooding. *Maas Paradox* is an exhibition in which designers, artists, and residents consider the impact of climate change on the lives of people in the Meuse region. The Meuse flows through five countries, along the residential areas of nine million people, where three different languages and twenty-two dialects are spoken. The river brings great prosperity but also has a downside in the form of floods. For centuries, people in the Meuse region have lived with the threat of flooding, developing all kinds of self-sufficiency. *Maas Paradox* surveys these experiences and seeks possible answers to the question of whether and how climate change will alter life on the banks of the Meuse. Artists, designers, and architects, from home and abroad, examine the culture of the Meuse basin through three paradoxes: scarcity and abundance, border and connection, and source and drain. Residents are invited to share their stories as the foundation for the exploration. The exhibition generates a dialogue that looks, in a renewed way, towards the ingenuity of people in times of scarcity and flooding.

THE PARADOXES

Source vs. Drain
The Meuse's natural flow created its geography over millennia. The Meuse rises on the Langres Plateau in France, subsequently dropping four hundred meters over a distance of 935 km. The water flow reaches forty-five tributaries connecting to other rivers such as the Ruhr and the Waal. This natural flow makes the Meuse and its connecting rivers prone to pollution. Of all the water in the world, only 2.5% is fresh water, making humans very dependent on the fresh water supplies of rivers like the Meuse. The Meuse region relies on the river for drinking water and agricultural irrigation. Industries need river water for cooling power plants and transporting materials. A lot of heavy industry operated along the Meuse during the twentieth century. Today, two nuclear power stations are on the river's banks. Everything released into the river follows its flow downstream. If there is an illegal toxic discharge or an accident at a nuclear power station, it will pollute the remaining part of the river. The flow between source and drain is a vulnerable system on which man and nature depend.

Scarcity vs. Abundance
Our dependence on water gives rise to scarcity and abundance. Examples of scarcity are drought and the lack of freshwater occurring in the world's warmer regions. Examples of abundance are increasing rainfall, cumulative flood risks, and rising sea levels. Global inequality highlights the paradox of scarcity and abundance. The combined wealth of world's richest 85 people equals that of half the earth's population: 3.5 billion people. Poorer countries will be less capable of protecting themselves against climate change, and its effects will hit the poorest half of the world's population hardest, leading to rising tensions resulting from immigration. The Western world's present-day abundance allows us to buy and own more goods than we can ecologically handle. The amount of energy and resources we use, however, must dramatically decrease to avoid more damage to the environment. The future will require fixing and reusing objects rather than disposing of them.

Border vs. Connection
The Meuse basin covers five countries and incorporates three languages and twenty-two dialects. The Meuse is more often a connection than a border between cultures. Over time, this border region's patchwork of languages and cultures evolved into a unique cultural landscape. The Eburones, the Romans, and many others have settled along the river. In medieval times, the river's banks comprised earldoms, duchies, and estates. The Meuse became a national boundary after the 1839 Belgian Revolution. Historically, many rivers are also borders, and river crossings are strategically important. Many rivers, therefore, had fortifications along them, and some still exist on the Meuse such as the Eben-Emael Fort south of Maastricht. Since the 1995 Schengen agreement, the EU allows free mobility of persons and goods, and national borders are no longer actively patrolled. The recent reintroduction of guarding some EU borders is due to the influx of refugees. Some even want border fences within the EU. What effects could this have if the Meuse becomes a guarded border?

WHO OWNS THE WATER? THE COMPLEXITY OF NEW COLLECTIVITY

Saskia van Stein, director Bureau Europe

The outrage caused by Nestlé's Chairman, Peter Brabeck-Letmathe, declaring access to water is not a public or human right, thus legitimising its privatisation, galvanised Bureau Europa to address this issue. Indeed, it is within Bureau Europa's mission to link present-day social challenges to the design disciplines.

Water covers more than seventy per cent of the world's surface. It is a primary condition for life. The human body is about sixty-five per cent water. We are advised to drink one and a half to two litres of water daily. On average, a Western European uses approximately 130 litres of water per day. Of all the raw materials, the dependency relationship that humans have with water, as well as air, is as urgent as it is ambivalent. Water is not only a vital necessity; it also poses a threat to life. Flood disasters caused by climate change, water scarcity due to lack of rain, hair-trigger geopolitical relationships due to the construction of dams and locks in other countries or regions, and the developments above regarding the water privatisation are just a few of this complex issue's themes. Globally, the differences in how we deal with water, the critical lack of water, and the role water plays are massive. We are confronted daily with the consequences of these complexities. On the other hand, the paradox of scarcity and abundance informs the idea that water is the gold of the twenty-first century. This exhibition focuses on a global problem from a regional perspective.

The issue of water is seen through the lens of a contemporary design brief: water design in the Meuse basin.

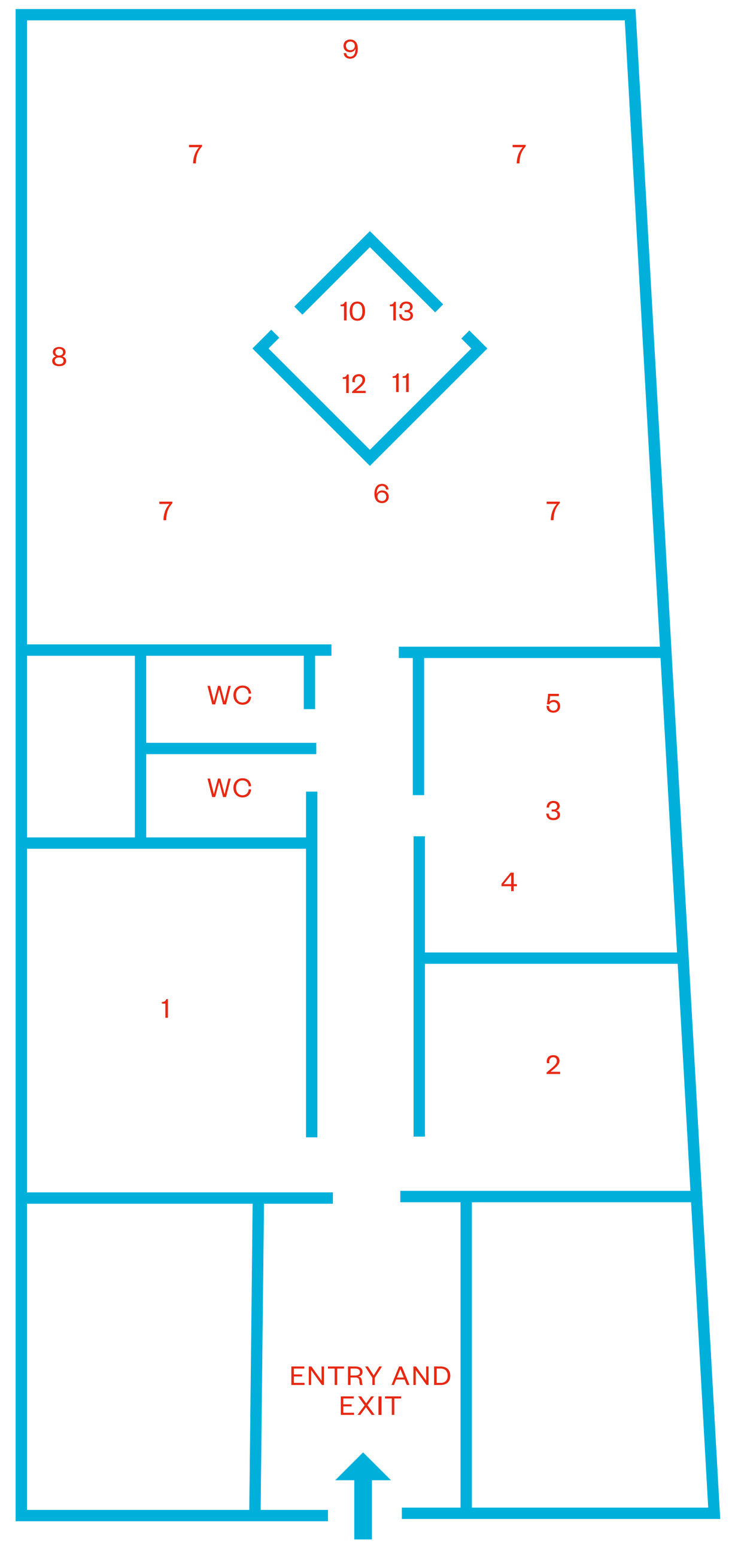
The Meuse is, above all, a biotope, the lifeblood, and economic engine for our region. Prompted by practicalities, humans have always managed to live by rivers. Under the influence of climate change, the Meuse should expect to carry much higher amounts of water – something that is already sporadically occurring. In December 1993, Dutch and Belgian Limburg were caught unawares by the Meuse bursting its banks, flooding nearly 7,000 homes in the Netherlands alone. Since then, preventive measures, such as river widening, ecological retention areas, and reinforced Meuse dykes, minimise flood risks at high tide. Dealing with river flooding in the Dutch Delta area is, however, a trans-boundary issue. Water drainage from Belgium and northern France means the South-Limburg Meuse valley, and especially the buitendijk (English: outer dyke) area means that floods are not only a design problem; they are a political issue. Reaching political consensus between countries is slow and complex. National governments also experience the side effects of water's negative influence; for example, who is liable in case of floods or water shortages. At a European level, there is still no agreement on issues such as water privatisation or how to reconcile this with national budgets.

Regardless, who owns the water? Who carries which burdens and who benefits economically? In 1609, Hugo de Groot's *Mare Liberum* already warned that the waters must remain common property because it is detrimental to everyone if individual countries or parties own waters. The scale and complexity surrounding the question of climate change are overwhelming, especially concerning the potential influence of an individual's possible actions. The relationship between these two variables requires developing a form of global solidarity. Closer to home, this issue is seen in the context of decentralisation from central government to local governments, and the shifting responsibilities between the welfare state and self-reliance in times of emergency.

The inception of Dutch water authorities in 1255 – one of the Netherlands oldest political partnerships – saw not only the emergence of a coherent network; they informed the development of our egalitarian culture of dialogue. The battle against the water transcended local interests and security expenses were shared, contributing to the early development of democracy. The Netherlands' knowledge and expertise of water (management) have made us who we are, and it is now an export product. The land of the Netherlands, along with its identity and culture, is steeped in these formative relationships that we, as a nation, have with the water.

My sincere thanks to curators Han Dijk and Ruben Pater for accepting our invitation and the impossible task of interpreting the complexity surrounding the issue of water. Rather than offer solutions, this exhibition examines possibilities for integrating data and knowledge and the potentialities for coalescing self-motivation and the metaphor of storytelling. *Maas Paradox* shows that the Netherlands is a designed country and that the scale of the challenges posed by the water requires our collective contribution.

FLOOR PLAN



WORKS

1. Tributary 28 - Roderik Rotting
Video, 13:45 min., 2016
'The Geul Valley [Geuldal], with its spectacular nature embedded in a thousand-year-old cultural landscape, is developing into a site for the four million people living in its vicinity. Supported by the Nationale Postcode Loterij, it can grow into a European example of how natural and cultural landscapes can inform a new rural economy.' – Foundation ARK for nature development

Since its mines closed in the sixties and seventies, the Geuldal is now subject to economic decline and an ageing population. The local economy depends heavily on tourism. Local inhabitants bend to the needs of the many visitors of this scenic landscape – a redeeming feature of its hilly landscape. In this film, Roderik Rotting observes the valley, its users, and the phenomenon of 'nature experience'. www.roderikrotting.com

2. The Dyke as Dutch Design - LOLA Landscape Architects
Projections and voice-over, 2016
The Netherlands has an extensive system of dykes, and humans made every dyke. Building dykes started as a rather primitive activity to protect the land, mostly carried out by farmers and monks. It was only later in history that design became a factor in their construction. In time, many engaged in dyke building in the Netherlands: millwrights, water board officials, public servants, committees, and environmental organisations. The designing of dykes is now participatory and integrated. Despite the work of predecessors such as Leeghwater, Vierlingh, and Lely, the Netherlands still faces dangerous threats from the water. Indeed, it is one of the most unsafe countries in the world when it comes to natural disasters. As the climate changes, the rivers drain increasing amounts of water in progressively irregular quantities, and the sea level is rising. Furthermore, the ground is subsiding: as water is pumped away, the Netherlands sinks. This mini-documentary, based on the award-winning book *Dutch Dikes* by LOLA Landscape Architects, depicts the relation between designers and the Dutch dykes. www.lolaweb.nl

3. In Search of Habitat, Untitled, Untitled II - Jorge Bakker
Mixed media, 2012, 2016
Jorge Bakker's works need often no explanation, yet they often have a connecting story. In this installation, Bakker playfully addresses the human relation to water as a form of society or cohabitation, which is then seen through the lens of material research. The exhibited works interrogate the buoyancy of materials through a series of objects. *In Search of Habitat* evokes a maquette or a landscape that plays with scale refers to the past or a future. *Untitled* and *Untitled II* continue his research into material qualities and buoyancy but depart from the focus on physical scale in favour of a personal chronology. What he achieves are autonomous objects that resemble a bridge, a buoy, or even an unknown, future object. www.onderwerper.nl

4. Bottle Vases - Foekje Fleur van Duin
Porcelain and video 1:41 min., 2009
An area in the North Pacific Ocean, also described as The Great Pacific Garbage Patch, is notable for its exceptionally high concentrations of plastics trapped by the currents of the North Pacific Gyre. Plastics are not biodegradable; they only break down into smaller pieces, they are poisonous, and easily enter the food chain. After first reading about this problem, Foekje Fleur inspected nearby riverbanks on the Meuse and indeed found many non-biodegradable plastic objects, including a collection of detergent bottles that seemed to tell the complete history of plastic packaging. Apart from some decolouration, the bottles – some over 50 years old – were completely intact. To raise awareness of this problem, Foekje Fleur translated the plastic into a material even less degradable but with a valued longevity: porcelain. Salvaging her finds from the Meuse to use as moulds and colour inspiration, she created the porcelain Bottle Vase. They look very much like their plastic originals but last even longer. Foekje Fleur hopes the Bottle Vase will make people rethink their plastic consumption and, in a distant future when plastics are long forgotten, function as a fossil of the plastic era. www.foekjefleur.com

5. Mien Blééch - Henriëtte Waal
Water bottles and video 13:10 min., 2015
The Belgian region of Limburg's mining history has created an incongruous social condition where there is an abundance of high-quality drinking water, yet its people prefer bottled water. The equivalent of twelve Olympic-sized swimming pools of water is poured daily into canals leading to the Meuse River. In the context of global water scarcity, it is strange this water does not yet have a higher value in this region. Derived from her ethnographic research on miners, Waal explores the untapped potential of hydroforming by producing a series of steel drinking bottles whose shape and the size emulate the bottles miners took underground before the mine's closure in 1987. The hydroforming technique requires no moulds, which makes it ideal for producing in small quantities. The *Mien Blééch* (miner's dialect: d'r Bleech) bottles come in three sizes and are intended to promote drinking tap water in Limburg.

6. Totem of Deluge - Monadnock
Pavillion, 2016
This object serves as the central emblem of *Maas Paradox*, expressing both regional awareness and addressing the threat of the river. As the exhibition's pivotal point, it is an accessible construction accommodating four video works. The patterned facade is an abstracted reference – a distant echo – to local timber-framed structures. Although evidently departing from the traditions of this type of timber structure, the painted framework combines with contemporary visual elaborations to impart the pattern with a more decorative and symbolic character. The tilted position turns the generic block into a small sunken house. www.monadnock.nl

7. 'Then all of a sudden the water was inside' - Klaas Burger
Five interviews, audio
For *Maas Paradox*, Burger engages in conversations with people of the Meuse region who have encountered the threat of water in their direct environment. He focuses on two cases: the village of Itteren, which saw the building of a new ring dyke after two large floods in the nineties, and Slenaken at the Gulp, a small river whose water level can rise suddenly with torrential rains. www.klaasburger.nl

8. Infographics - Untold Stories and Posad spatial strategies
Wallpaper print, 2016
For purposes of scoring political points, climate change and its effects are either underrated or overrated. It becomes even more complicated when one wants to understand the effects at a local level. How will the river outside one's house change over the coming decades? For *Maas Paradox*, months of research were conducted to find statements that convey the Meuse basin's future. Untold Stories and Posad Spatial Strategies looked into flooding, drought, pollution, drinking water, economic importance, and historical relevance. The research culminated in a large wall graphic focusing on different elements of the river, its basin, and the future it holds. The shape derives from seasonal differences in the river's water flow. The river's water flow forms a cycle that will continue as it always has, but is subject to changes due to rising temperatures and increasing precipitation.
www.untold-stories.nl www.posad.nl

9. Map of the Meuse basin - Posad spatial strategies
Wallpaper print, 2016
In running its natural course, the Meuse basin crosses five countries and dissects many different areas of culture and language. Map-making is the basis for designing and developing Dutch waterways, but making a map of such an area proves to be very difficult practically. Maps almost always focus on national borders or a combination of boundaries such as continents or country groups. For this map, data was pulled from many different sources to generate a geographic image that adequately represents a natural phenomenon such as a river basin. The map includes landmarks, points of interests, and the locations of other works in the exhibition. www.posad.nl

10. Polder Cup - Maider López
Video 16:00 min., 2010
Polder Cup was a site-specific project by Spanish artist Maider López. The façade of Witte de With Center for Contemporary Art functioned as an open call to participate in a one-day football championship in the polders of Ottoland, which took place on 4 September 2010. López's displaced football field intersected by water channels challenged the rules of football and encouraged players to seek and invent new strategies. Not only does the location create an unusual situation, but it also reflects on the long history the Netherlands has with water and the consensus society. *Polder Cup* brings together people from very different backgrounds through play, sport, and social exchange. Through the participation of football players and audiences from all walks of life, the polder underwent a transformation in which its use was opened up to new interpretations, rethinking the landscape and challenging the way in which we perceive our spatial surroundings.
www.maiderlopez.com

11. SLOOT - Koos Buist
Video 40:51 min., 2015
SLOOT (English: Ditch) is a hydro-biological art film by visual artist and filmmaker Koos Buist. Using underwater imagery, this poetic film epic reveals the rise, glory, and fall of the relatively unknown world of ditches and their inhabitants. The film dives under the surface into the arteries of the Groningen environs. Mixing the imaginary with life forms at many scales, the film shows a seemingly exotic world – a world a world whose biodiversity is richer than the one above water. Buist started by fitting a camera to a long stick, which he submerged into the water to make recordings. The first part is the water landscape captured over four seasons, the second portrays the ditches around the city of Groningen, and in the final part, the focus is on the rise and fall of life in the ditch. www.koosbuist.nl

12. Rare Earthenware - Unknown Fields Division
Video, 6:42 min., 2014
While journeys to extraordinary places are a cornerstone of the luxury travel industry, this project follows the more concealed journeys taking place across global supply chains by retracing to their origins, rare earth elements widely used in high-end electronics and green technologies. A film composed as a single panning shot along a planetary scaled conveyor belt documents the voyage of the rare earth element in reverse, from container ships and ports, wholesalers, and factories, back to the banks of a barely-liquid radioactive lake in Inner Mongolia, pumped with residues from refining processes. To accompany the film, Unknown Fields Division crafted a set of three ceramic vessels using mud from the lake. Their proportions refer to traditional Ming vases, and they are made from the amount of toxic waste created in the production of three items of technology: a smartphone, a lightweight laptop computer, and a smart car's battery cell.
www.unknownfieldsdivision.com

13. Deep Weather - Ursula Biemann
Video essay, 8:58 min., 2013
Deep Weather consists of 'Carbon Geologies', which is set in the tar sands of the Canadian boreal forests, and 'Hydro Geographies', set in the near-permanently flood-threatened lands of Bangladesh. Their connection is pursued through two narratives, one about oil, and the other about water – both vital 'primal fluids' that spark profound changes in the planetary ecology. Climate change, which is exacerbated by projects such as the Canadian tar sands where Shell oil operates, puts many of the world's population at risk. Melting Himalayan ice fields, rising planetary sea levels, and extreme weather events increasingly impose an amphibian lifestyle on the Bangladeshi population. Gigantic efforts are made by the community to build protective mud embankments. Hands-on, machine-less work by thousands is what climate change will mean for most people in the deltas of the global south. These are the necessary measures the Bangladeshi population must take to live on its flooding lands if the water is declared a site of citizenship.
www.geobodies.org

IMAGE CREDITS

1. Still from the film *Zijarm 28*, Roderik Rotting, 2016. 2. LOLA Landscape Architects. Watersnoodramp 1916, Noord-Holland, Zuiderzeedijk breach. www.beeldbank.rws.nl, Rijkswaterstaat. 3. *In Search of Habitat*, Jorge Bakker, 2012. 4. Bottle Vases, Foekje Fleur van Duin, 2009. 5. *Mien Blééch*, Henriëtte Waal, 2015. 7. Image Klaas Burger. 10. Maider López, *Polder Cup*, September 4, 2010. Witte de With Center for Contemporary Art and SKOR / Foundation Art and Public Space. The Netherlands. 11. Still from *SLOOT*, Koos Buist, 2015. 12. Unknown Fields Division, *Rare Earthenware*, 2014. Baotou, China, 4 August 2014: A metal-worker extracts molten lanthanum and steel from a forge and decants into magnet moulds before they are polarized. Photo by Toby Smith. 13. Still from *Deep Weather*, Ursula Biemann, 2013.

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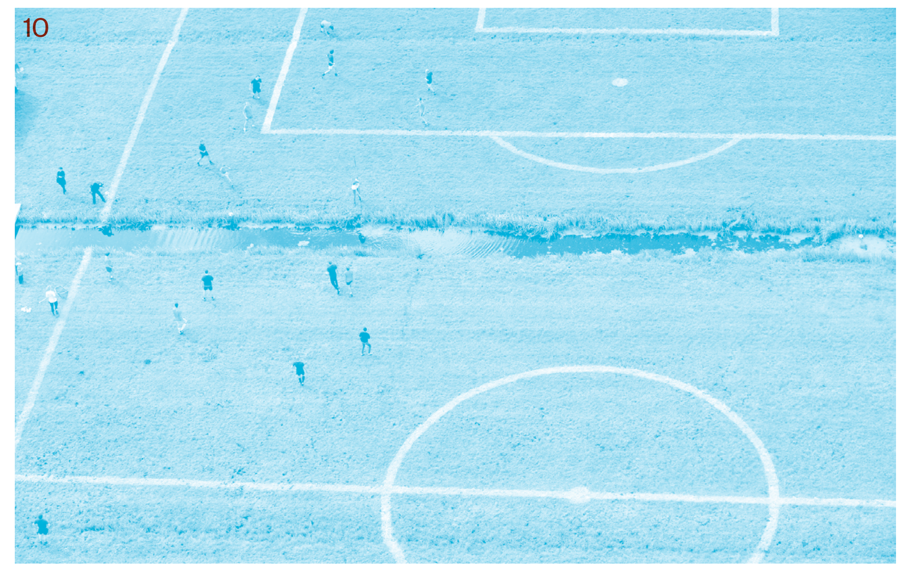

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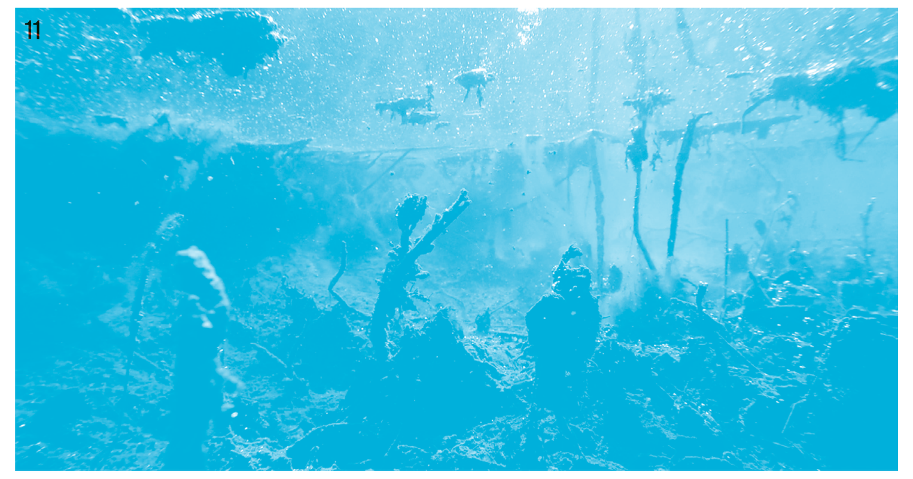

13


RESEARCH

CLIMATE CHANGE

Climate change refers to rising sea levels, salinisation of agricultural land, desertification, and growing water scarcity. The Meuse is a rain-fed river, meaning the river has to cope with high volumes of water when it rains and with none when it is dry, which means preparing for both periods of flood and drought. Besides floods, climate change affects the water's temperature and quality, making it harder for fish and plants to live in and along the Meuse.

For our world to be sustainable, there needs to be factor 20 reduction in energy and resource use: a 5% lessening of current levels. Only 90 companies are responsible for two-thirds of worldwide carbon emissions. Of these, the top eight account for 20%, including Royal Dutch Shell – responsible for 2.12% of emissions. CO_2 emissions contribute temperatures rises; in 2050 winters in Amsterdam will be similar to those now in Nantes and Bordeaux.

There will be climate refugees, but how many is uncertain. About nine million in the Netherlands inhabit areas below sea level; where will they go if a flood happens? Will those on higher ground welcome them? This was already a problem with the 200,000 evacuees from the floods in 1993 and 1995, let alone the 1.5 million refugees currently being accepted in Europe.

Rising sea levels and the impacts of flooding on other deltas, such as the one in Dhaka, will be much greater than in rich countries. And while 97% of scientists credit climate change to human activity, 36% of people in the Netherlands deny climate change is happening.

FLOODS

Ten years ago, only 44% of dykes and dams in the Netherlands met national safety standards. The Netherlands is in the top ten countries most likely to flood. Large portions of the Meuse valley are particularly at risk and Limburg experienced two floods in 1993 and 1995. Dyke failure, rising sea levels, and land subsidence significantly contribute to increasing flood risks. Compared to other nations, the Dutch population has a poor awareness of these risks.

The Meuse is a rain-fed river, and weather conditions in the French and Belgian parts of the river basin mostly influence its water flows. Flood waves in the Meuse usually result from successive days of heavy rain in the Belgian Ardennes and reach Maastricht within a day.

In Limburg, the risk of a dyke failing is once every 300 years – a figure that informs a false sense of safety. In 1993, however, an extended period of rainfall led to the highest water flow since the 1926 flood. In some places, the water rose to six metres higher than normal, and approximately 8% of Limburg (18.000 ha) flooded. Just two years later, in 1995, the river flooded again. Despite four out of five people in Limburg having experienced flooding at least once, 93% are unaware of the risks of flooding.

Since 1900, the water level of the North Sea has risen by 19 cm. Future projections predict a further 15 to 40 cm will be added by 2050 and 25 to 80 cm by 2085. Rising sea levels will also have an impact on flood risks to the Meuse; the rising water levels in the delta will push back on the outflow of water from the river, leading to higher levels on the Meuse. Should the Maeslantkering storm surge barrier at Hoek van Holland close to prevent a storm surge from the North Sea, combined with heavy rains inland, the water levels on the Meuse will rise quickly.

Of the seven largest floods recorded in Borgharen since 1911, five occurred since 1993. When the Meuse flooded in 1993, it lasted three days, 12,000 people were evacuated, and it spread throughout 18,000 ha (one hectare is about two football fields). Private property sustained most of the €120-million worth of damage. The 1995 flood lasted five days and occupied 15,500 ha, yet incurred half the amount of damage.

The Maaswerken programme consists of the Zandmaas and the Grindmaas projects, which are estimated at a total cost of €696.4 million and financed by the national Delta Fund. This is relatively little compared to the €5.5 billion worth of investments in projects in the west of the Netherlands, although Limburg's flood risk is substantially higher (once in 300 years) than the Randstad's (once in 100,000 years). The Zandmaas project deepens the Meuse from Linne to Lith, where the riverbed mainly consists of sand to a depth of at least three metres. The Grindmaas project offers protection against floods by widening the river at 12 locations and lowering the flood plain. The bottom of the Meuse is mainly gravel, thus adding to the Dutch gravel market which in turn finances part of this project.

THE EFFECTS OF DROUGHT

Droughts pose significant threats to the Netherlands because it is highly dependent on fresh water. Periods of water scarcity pose several challenges: permanent damage to valuable peatland, ecological damage, drinking water shortages, higher penetrations of salt water, and disrupted shipping. Low-flow in the Meuse mostly occurs between August and October after a dry summer, but can also take place in May or June after a dry winter.

When water shortages occur in the Meuse, protecting water works and the landscape from permanent damage is the first priority. When the Meuse experiences a low-flow, water levels drop in the surrounding canals and groundwater, leaving swamps and peatlands dry. Dried peat causes barren soil and CO_2 emissions.

In the river itself, extreme low-flow can cause stagnant secondary gullies, creating ideal conditions for algae and the Botulinum toxin, produced by bacteria common to water and soil. The bacteria produce this toxin when exposed to low oxygen levels and certain temperatures. The toxin causes Botulism – a threat to fish, birds, and human beings.

The second priority in case of drought is the supply of drinking water and electricity. On average, 15 m^3/s of water is extracted for the production of drinking water, about one Olympic-sized swimming pool (7500 m^3) every eight minutes. In times of drought, this extraction of water is detrimental to the river's water quality. Water temperatures rise and the pollution – resulting from domestic sewage, industrial, and agricultural discharge – is less diluted when the river's water content runs low.

Finally, since the primary economic sector dependent on the river is shipping, its continuity on the Meuse is also an important priority. Usually, the weirs control the depth of the waterway to a minimum of three metres. This measure was made policy after the 1976 drought made the passage of ships on the Meuse impossible.

THIS MAP IS WATERPROOF

ANIMAL SPECIES OF THE MEUSE

The warming of the Meuse catalyses the growth of algae, and higher algae concentrations in rivers reduce the water's oxygen levels, thus significantly disturbing the overall biological balance. The Meuse contained large numbers of salmon up until the 1950s. The seasonal salmon run – their migration upstream towards spawning grounds on gravel beds – enabled a commercial fishing sector. The increasing number of barriers in the river, including watermills, dams, weirs, sluices, and hydroelectric power plants, as well as escalating pollution and dredging of gravel, made the river uninhabitable for salmon. By 1957, salmon was considered extinct in the Netherlands.

Projects to improve the quality of riverbeds for spawning, and the construction of fish passages near weirs have led to a slow revival of salmon in the Meuse. The slower flow of secondary gullies in the river is important for sheltering salmon during migration. Increasing drought and low-flows due to climatic changes can, therefore, be detrimental to the Meuse's salmon population.

All countries on the Meuse basin now have restoration programmes in place: reforestation, construction of fish ladders, and restoration of fish beds. The Kierbesluit is a policy for the locks of the Haringvliet Dam, part of the Dutch Deltaworks, leaving the locks ajar to allow passage for anadromous fish – fish that migrate upriver from the sea to spawn such as salmon and sea trout.

Another restoration programme is the Meuse Valley River Park, a cross-border environmental project extending between Maastricht and Kinrooi, marking the border between the Netherlands and Flanders. From 2006 to 2011, this programme extended its nature reserve from 150 ha to 650 ha, with participating nature organisations actively contributing to increasing biodiversity in the Kerkeweerd nature reserve. As a result, 72 threatened plant species are again growing in this area.

WATER TEMPERATURE

The Meuse's water temperature is rising. This stems from two factors: thermal pollution from industrial cooling water and higher air temperatures from climate change. What are the consequences of this increase in water temperature?

Since 1910, the Meuse's water temperature rose by 2.4°C. Year on year, the number of days the water temperature exceeded 20°C increased from 32 to 86 days. Moreover, the number of days the water temperature exceeded 25°C rose from one to four days. This increase dramatically affects the water's ecological state. Riverine fish life is hard to sustain above 25°C due to decreased oxygen levels in the water. Warmer water also leads to excessive algae growth and the risk of botulism: a sometimes fatal poisoning caused by bacteria that flourishes in water temperatures above 20°C.

The main reason for rising water temperatures is thermal pollution – mainly caused by discharging cooling water from power stations and industry. This water is free from polluting substances, but the sudden temperature rise in recipient waters increases fish mortality rates. When the Meuse's water temperature exceeds 25°C, cooling water intake is restricted, causing power plants to decrease production or turn on cooling towers, thus increasing CO_2 emissions.

The other more structural cause of rising water temperature is climate change. With expected temperature increases of 2°C by 2050 and 3.5°C by 2085, surface water evaporation rates are estimated to rise during summer by up to 11% and 15% respectively.

WATER QUALITY

Before the introduction of sewage systems and regulations, untreated wastewater was discharged into surface water and ended up in the Meuse, resulting in very poor water quality. Between 1950 and 1977, the escalating pollution levels meant some waterbodies could no longer support living organisms. The Rhine was even known as the sewer of Europe.

The turning point came in 1970, with the introduction of laws banning the unlicensed release of wastewater into surface waters. Alongside policy measures to limit and tax the discharge of heavy metals, PAHs (polycyclic aromatic hydrocarbons: any of a group of chemicals formed during the incomplete burning of organic substances such as coal), and phosphate-based detergents, such as washing powder, significant investments were made in constructing wastewater treatment plants. Despite water quality improving over the last 25 years, present-day concentrations of nutrients, salts, and metals in the Meuse regularly exceed allowed limits. The most common pollutants are cadmium, nickel, and pesticides.

The water quality of the Meuse varies over time and geographically. Near the source of the Meuse in France, the highest water quality is measured, dropping in Belgium from the inflow of the river Sambre in Namur. Wallonia's sewage system only covers 85% of households in its part of the Meuse basin, resulting in the discharge of relatively large amounts of untreated water into the Meuse. This leads to high concentrations of organic load in the water, causing the water quality downstream from Liège seldom to meet chemical and ecological standards. A partial recovery in quality occurs in the Netherlands, thanks to the inflow of less polluted rivers and canals and the existence of a good network of water treatment plants.

DRINKING WATER

35% of the Dutch population depends on the Meuse basin for its drinking water supply. Six drinking water companies are active in the Dutch and Belgian areas of the Meuse river basin: Vivacqua and Waterlink in Belgium and WML, Brabant Water, Evides, and Dunea in the Netherlands. Together they annually extract approximately 450 billion litres from the Meuse, servicing six million people in Belgium and the Netherlands. Dutch public water companies extract ground and river water, and they also purify it, providing it to the public at an average cost of €1.80 per 1000 litres.

Ten of the 13 commercial water companies in the Netherlands are based in the Meuse basin. In Belgium, it is 15 of a total of 27 companies. One of the best-known examples, Chaudfontaine – owned by Coca-Cola since 2003 – extracts water from the Vesdre, a Belgian tributary of the Meuse.

The financial interests in this sector are high: a litre of bottled water costs up to 1000 times more than tap water. Tap water is considerably more environmentally friendly than bottled water: 2.5% of worldwide oil production is used for the manufacture of water bottles, resulting in a 500-fold increase in CO_2 emissions than for the same amount of tap water.

LANGUAGES ALONG THE MEUSE

The Meuse basin stretches over four countries and encompasses many regional languages and dialects. The three main languages in the basin are French, Dutch, and German, and there are 22 local dialects. From the river's source in France to the Belgian-Dutch border, French dialects in the Oïl languages are predominant: Champenois in France and Walloon in Belgium. The introduction of standard French in the education system means these regional languages have seen a steady decrease in generational transmission in the 20th century. Subsequently, Champenois is now in the UNESCO Red Book of Endangered Languages, and very few people speak Walloon.

In the Dutch part of Limburg, 750,000 people regularly speak one of the Limburgish dialects. Land borders and regions do not restrict the speaking of Limburgish. This is probably because, before its annexation by the Netherlands, the area was a patchwork of divided duchies. These are dialects descended from French, with characteristics of Dutch and German. Brabant province is home to another group of vital dialects. Nearly 70% of Noord-Brabant's population uses the Brabantian dialect in some form, making it the largest regional language in the Dutch language area.

MOSAN ART

From the 8th century onwards, the Meuse basin held important religious, cultural, and commercial functions. From the 11th to the 13th centuries, alongside other river cities such as Liege, Huy, Dinant, Namur, Tongeren, Roermond, and Aachen, Maastricht became a hotspot for Mosan art, which encompasses works in architecture, sculpture, illumination and miniature painting. But it is Mosan metalwork – gold, enamelwork, and jewellery – that truly marks this style. Important Mosan artists include Godefroid de Claire, Nicholas of Verdun, and Hugo of Oignies.

During Charlemagne's reign in the early middle ages, the Meuse region was one the world's most influential powerhouses. His reign was as a devout Catholic, a religion that created the outlines of modern Europe. During this period, the water's paradox – providing wealth and opportunities but threatening human life – was in sharp focus. In the 21st century, this region, with its industrial areas in Belgium, northern France, and the Ruhr, is still one of Europe's most productive. For centuries, the banana-shaped metropolitan axis running from London to Milan has been Europe's breeding ground for innovation and growth.

INFORMATION

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Wednesday - Sunday
11h00 - 17h00

Bureau Europa is closed on Mondays, January 1, during Carnival, April 30 and December 25.

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Groups (min. 12 persons) € 3
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Free admission during Museum weekend.

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COLOPHON

A project initiated by Bureau Europa, platform for architecture and design.

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