

**THE TRANSFORMATION OF THE IJSSELMEER**

# The Blue Heart is getting greener

The IJsselmeer lake was created to prevent flooding and famine. Today, the area is the focus of many other interests including recreation and nature. Migrating fish and fish-eating birds find room here. But the fishing community is still adjusting to not having it all to themselves.

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There is not an activist or a warden to be seen. Not even one of the resident large grazers. This morning the controversial Oostvaardersplassen nature reserve is a green oasis with reeds, willows and water birds. The waters of the Markermeer lap at the other side of the dyke. Above an eel fisher's traps, two black-backed gulls bide their time; a common tern dives into the water to catch a smelt. All this nature is a familiar sight to the commuters who speed along the dyke between Lelystad and Almere, but their grandparents can still remember when the large sea bay known as the Zuiderzee dominated the area. 'In the bed of the IJsselmeer and the Markermeer, there are still bacteria that are familiar to us from the saltwater coastal environment: these are lakes in transition,' explains Piet Verdonshot, leader of the Freshwater Ecosystems group at Wageningen Environmental Research, and professor at the University of Amsterdam. 'All kinds of things go on underwater that we still don't understand. This is a unique ecosystem.'

### FAMINE

After the flooding around the Zuiderzee in 1916 and the famine of 1918, the Dutch parliament embraced plans drawn up by the engineer Lely to create the Afsluitdijk and then polders. The dyke was complete in 1932 and the Wieringermeer polder was then quickly pumped dry on account of the acute shortage of farmland. The extensive IJsselmeer polders followed later. It was agricultural engineer Roel van Duin, director of the IJsselmeer Polders Development Authority and professor by special appointment in Wageningen, who led a change of course in the late 1970s. Since then, agriculture has no longer been the sole priority and cycle paths, recreational green spaces and woodlands have been created. It was Van Duin too who saw the potential of the Oostvaardersplassen as a habitat for birds.

Immediate economic utility took more and more of a back seat. And people were starting to question whether the Netherlands still needed additional farmland. The Houtrib dyke between Lelystad and Enkhuizen >

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The creation of the Marker Wadden.

## THE IJSSELMEER AS AN INTERSECTION OF INTERESTS

Many, sometimes conflicting interests converge in the IJsselmeer region: on top of fisheries and safety, nature conservation, water storage and recreation have gained in importance.

### The Afsluitdijk

Lured by fresh sluice water, millions of fish gather here that want to migrate from the sea to fresh water. The planned Fish Migration River, a passage through the dyke with a meandering waterway which migrating fish can swim along, should help the fish reach their destination.

Fish-eaters sometimes go short of food.

### Marker Wadden

The artificial islands are intended to increase the Markermeer's capacity to support water birds. The shallow shore zones can support aquatic and marsh plants among which fish can spawn and take shelter. The islands will also be open for recreational purposes.

The hitherto stable water level will go up in the summer, providing an extra freshwater buffer for longer dry periods.

Bream, roach, perch and pike-perch are caught with vertical hanging nets.

Eel fishing is allowed in the IJsselmeer region.

Getting a licence to catch smelt partly depends on the number of fish left for the young of terns and cormorants.

Bacteria from the salty environment still live in the soil.

was completed in 1976, separating the Markermeer from the IJsselmeer, but the plan to create polders out of the Markerwaard area was put on the back burner and then scratched for good in 2003. Nature, on the other hand, was now centre stage. And to provide additional impetus for that, nature organization Natuurmonumenten instigated the creation of the Marker Wadden, a lagoon of artificial islands in the Markermeer. Work started on this in 2016, and ecologist Piet Verdonshot is now doing a study for the Ministry of Agriculture, Nature and Food Quality on whether these islands with their shallow shorelines are increasing the Markermeer's

ecosystem disappeared,' says Verdonshot. One of the effects of that was a reduction in the food supply and a decline in fish stocks. The Marker Wadden were intended to give nature a push in the right direction. 'The Markermeer is a bowl of water between dykes, more like a bathtub than a lake,' says Verdonshot. 'Natural shorelines would make a world of difference. You need shallow zones where water and marsh plants grow, and where fish can spawn and take shelter. But the most important thing is that organic material washes into the lake from those shores, and provides a source of new life. Our initial estimates suggest that the Marker Wadden are working out well, but

is not feasible to increase the fluctuation in the Markermeer; the piles on which Amsterdam is built couldn't cope with that. If you ask me, we should build a new dyke around the IJ waterway and get rid of the Houtrib dyke. At the moment, that dyke is being reinforced, but what purpose does that really serve now? Without the dyke, the wind will have more impact on the water level, and the interaction between the IJsselmeer and the IJssel River will be restored.'

Jeroen Veraart, who coordinates IJsselmeer research at Wageningen University & Research, notes that the IJsselmeer region has gained importance as an intersection of different interests: both lakes are Natura 2000 areas, fisheries operate there, water recreation is a big economic factor and there are plans to build housing and wind turbines along the shores. Not all these ambitions are mutually compatible. Veraart sees a lack of a coherent vision on developing the region. 'Of course there is a joint regional agenda, but that is largely a product of the creation of the polders. What often happens in the end is that ministries and provinces each make their own plans and only look at the long-term vision after that.' But in May, 60 government bodies, lobby groups and citizens' initiatives did decide to improve their collaboration in The IJsselmeer 2050 Agenda. This is the first time such a broad coalition of organizations has rallied behind the 'Blue Heart of the Netherlands' in areas including water safety, nature, fisheries and recreation. There is also broad agreement on reinforcing and transforming the Afsluitdijk between the IJsselmeer and the sea between the end of this year and 2022.

## TWO LITTLE EYES

I met Ben Griffioen at the brand-new Wadden Centre at Kornwerderzand on the Afsluitdijk. Every day, superfluous water is pumped into the Wadden Sea here, just as it is at Den Oever on the North Holland coast. 'Millions, and maybe billions of fish that want to migrate from the sea to fresh water are attracted by that influx of fresh water,' says Griffioen. 'For strong swimmers such as the sea trout or the salmon, that migration is feasible, but most of the fish cannot cope with the strong current. A flounder larva is not much more than two little eyes staring at you. Under natural conditions, >

**'There are still bacteria in the soil that are familiar to us from the saltwater coastal environment'**

capacity to support water birds.

'To answer that question we first had to get to grips with how the Markermeer's ecosystem worked,' explains Verdonshot. Postdoc Mariëlle van Riel took samples of the soil life of the Markermeer at more than 80 locations. Research is also being done on the extent to which water plants thrive in the muddy water, and the fish are being studied in partnership with Wageningen Marine Research. 'In two years we hope to have a good idea of the food web. Initial findings are that the birds that eat water plants and soil creatures do find enough to eat, but that the fish-eaters only find half the amount they need at present.'

## SEWAGE WATER FROM AMSTERDAM

Fish stocks changed dramatically after the closing of the IJsselmeer in 1932 and the desalination of the water. But the rich fishing grounds remained, largely because of the phosphate-rich river and sewage water from Amsterdam that flowed into the lake. That pipe closed in the 1980s, and the Markermeer has undergone a second transformation since then. 'A major nutrient source for the

that at their current size they only produce 1 to 2 percent additional material. The area is too small.'

The ecologist sees more future in plans to connect the Oostvaardersplassen and the Lepelaarsplassen at Almere with the Markermeer. 'The lake would then gain a large riparian zone, which could boost that percentage gain considerably,' says Verdonshot. He would also like to see big fluctuations in the traditionally stable water levels. Minister of Infrastructure and Water Management Cora van Nieuwenhuizen decided this spring to authorize a fluctuation of 20 centimetres so that an extra freshwater buffer can be built up in the summer. That is necessary in order to protect the north of the Netherlands against longer periods of drought.

## BIGGER FLUCTUATIONS

Verdonshot says 20 centimetres is not enough. Nor is he very keen on a low water level in winter and a high one in summer. Nature would benefit from the exact opposite, he thinks. 'I expect that the Marker Wadden islands won't get flooded enough, or it will happen at the wrong time of year. It



they just get swept in on the incoming tide.’ The ministry of Infrastructure and Water Management has an obligation under the Water Framework Directive to make sure these migratory fish can access fresh water. To this end, a kind of elevator for fish has been installed at Den Oever, and experiments are going on with more fish-friendly ways of pumping water into the sea. Work will start next year on the crowning glory: the Fish Migration River, an opening in the Afsluitdijk for migrating fish to swim through. ‘The idea is to recreate a tidal flow on a small scale, specifically to help the smaller fish to migrate from the Wadden Sea to the IJsselmeer,’ explains Griffioen. These fish will pass through a 10-metre-wide gap in the Afsluitdijk on the incoming tide, into a meandering channel that runs for four kilometres before flowing into the IJsselmeer. The Province of Friesland has designed that channel to create a gradual transition from salt to fresh water. ‘On our advice, there will be a bed of sand and gravel so that the speed of the current varies; for the smaller species especially, it is important that they can rest when the tide goes out, and find shelter from predators. Narrow passages with a lot of turbulence are taboo, because a lot of fish hate them. It’s our job to think from the fish’s point of view.’ Griffioen expects a colourful variety of fish in the channel, from local sticklebacks to long-distance swimmers such as the eel. The fish migration river could be the salvation of freshwater fish, thousands of which currently land in the Wadden Sea every time water is pumped into it. ‘They survive for a little while in the freshwater bubble; perhaps some of them will be able to swim back along the Fish Migration River.’

### SNACK BAR FOR BIRDS

Some professional fishers are sceptical about the Fish Migration River, calling it ‘a snack bar for birds’, but a bigger influx of glass eels and flounders could work out well for them too. Although banned in the IJssel River, eel fishing is still allowed in the IJsselmeer. There are poles with eel traps every few hundred metres along the dykes, and mitten crabs are caught in them as well. The cast net fishing is less eye-catching, and involves kilometres of metres-high nets that hang in the water like curtains to catch bream,

### REINFORCING THE HOUTRIB DYKE

The ministry of Infrastructure and Water Management is currently working on reinforcing the Houtrib dyke between Lelystad and Enkhuizen. Up to Trintelhaven, the half-way point, that is done in the conventional way with more basalt blocks. For the remaining 10 kilometres to Enkhuizen, the dyke is being reinforced with a sandy bank which absorbs the shock of the waves. That is good news for nature, says Marieke de Lange of Wageningen Environmental Research. ‘You get a shallow riparian zone full of water plants, and that benefits fish. And above the water it all starts looking much more attractive too.’ De Lange was involved in a pilot study carried out by Ecoshape, to try out this ‘softer’ approach for 500 metres of dyke. ‘In the summer of 2014, 80,000 cubic metres of sand was deposited on the Markermeer side,’ says the researcher. ‘We focused on the vegetation: what starts growing there, how deep-rooted are the plants, and how does the plant growth contribute to erosion control? We also experimented with planting out plants to speed up the reinforcement. This ‘gardener option’ worked particularly well, says De Lange.



‘When the fishermen set out, they still say, we are going out to sea’

PHOTO HOLLANDESE HOOGTE

There are over 30 professional fishing companies plying the IJsselmeer and Markermeer lakes, with a combined turnover of more than 4 million euros per year.

roach, perch and pike-perch.

Fishing quotas are determined by the minister of Agriculture, Nature and Food Quality. They are based on Wageningen research on fish stocks, explains Joep de Leeuw of Wageningen Marine Research. ‘To estimate numbers we fish with a trawl in the autumn. We supplement the information we get with catch data from the fisheries themselves and on the size distribution and the age breakdown of the main species. All that information is used to decide how much fishing to allow, so that it is sustainable,’ says De Leeuw.

‘For fish with a long lifespan, these models work fine. We can estimate the impact of fisheries quite accurately,’ he adds. But that does not apply to small fish with short lifespans, such as the smelt. ‘We don’t know exactly what determines the population growth.’ Early in the spring these little fish set off en masse to spawn at the coast. There they are fished using smelt traps and sold to Spanish consumers. ‘That is a season of two to three weeks, but this smelt fishing can boost fishers’ incomes significantly,’ says De Leeuw. ‘Fishers think not catching them is wasteful. Their argument is that the fish die after spawning anyway. We question that. We are seeing a lot of older smelt too, now they have no longer been fished for the past few years. We don’t know what the respec-

tive roles are of fisheries, fish-eating birds and the weather. These are not unsolvable questions but it would cost a lot of money to find the answers to them.’

If the ministry of Agriculture, Nature and Food Quality authorizes smelt fishing, that decision is based on the fish stocks and fisheries legislation. The fisheries still have one more bureaucratic hurdle to jump, though. They need an exemption from the nature conservation law because they work in Natura2000 areas established for water birds. They have to apply for that exemption to the provincial governments, which test whether terns and cormorants are still able to find sufficient fish to feed their young if fisheries catch some of them too. Because you cannot be sure about that, no licences have been issued in recent years, or they were withdrawn by court order after objections from the Society for the Protection of Birds.

#### HARD TO JUSTIFY

Wim Zaalmink of Wageningen Economic Research understands that it must be difficult for fisheries to observe all the rules. ‘Last year the ministry required them to catch 36 percent less roach and bream. You can only do that if you fish with fewer or shorter cast nets. But then the fishers catch fewer pike-perch too, which are their most

lucrative fish. Whereas the pike-perch stocks are fine at the moment. That is hard to justify.’

Professional fisheries in the IJsselmeer and Markermeer lakes make up a modest sector, says Zaalmink. A total of 60 licences for a certain number of nets or traps are issued to over 30 companies, which have a turnover of over four million euros a year between them. In this profession, people are attached to their traditions. ‘When the fishermen set out they still say, “we are going to sea”,’ says Zaalmink. ‘Smaller fishermen do other jobs when times are hard, in construction for instance. But they want to go on fishing come what may. There is a strong sense that they have a right to pass this occupation on from one generation to the next. But the fish stocks are a strong argument for rationalization. In the past there were arrangements for buying companies out but now the EU sees that as unfair state support.’

There is a good living to be made for a limited number of fishers, thinks Zaalmink, as long as they adapt to the focus on nature. ‘And it’s fine for them to branch out too, running boat trips to the Marker Wadden, for instance, or reaping water plants.’ ■

[www.wur.eu/IJsselmeer](http://www.wur.eu/IJsselmeer)