

# Polders of Kruibeke

A combination of large water storage capacity and unique estuarine nature





© TOV

# Welcome to the Polders of Kruibeke

Only a stone's throw away from Antwerp, in the area of Kruibeke, Bazel and Rupelmonde, we find the Polders of Kruibeke. These Polders include a flood control area that protects Kruibeke and particularly the upstream villages from flooding from the Scheldt and its tributaries during storm tides. Of all the controlled flood areas in the Sigma Plan, the Polders of Kruibeke have the largest water storage capacity during storm tides.

The Sigma Plan will better protect Flanders from flooding and restore the unique estuarine nature along the Scheldt and its tributaries. With more than 600 hectares of nature reserve, the plan has certainly been very successful here. In the Polders of Kruibeke, you can enjoy everything the Scheldt has to offer in peace. The Polders are heaven for hikers and cyclists and a boost to the local hospitality industry and entrepreneurs.

Even though the Sigma Plan works in the Polders are now over, the area will continue to evolve. The tidal area and other nature will continue to develop here, so there will always be something new to experience in these beautiful Polders.

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## Imprint

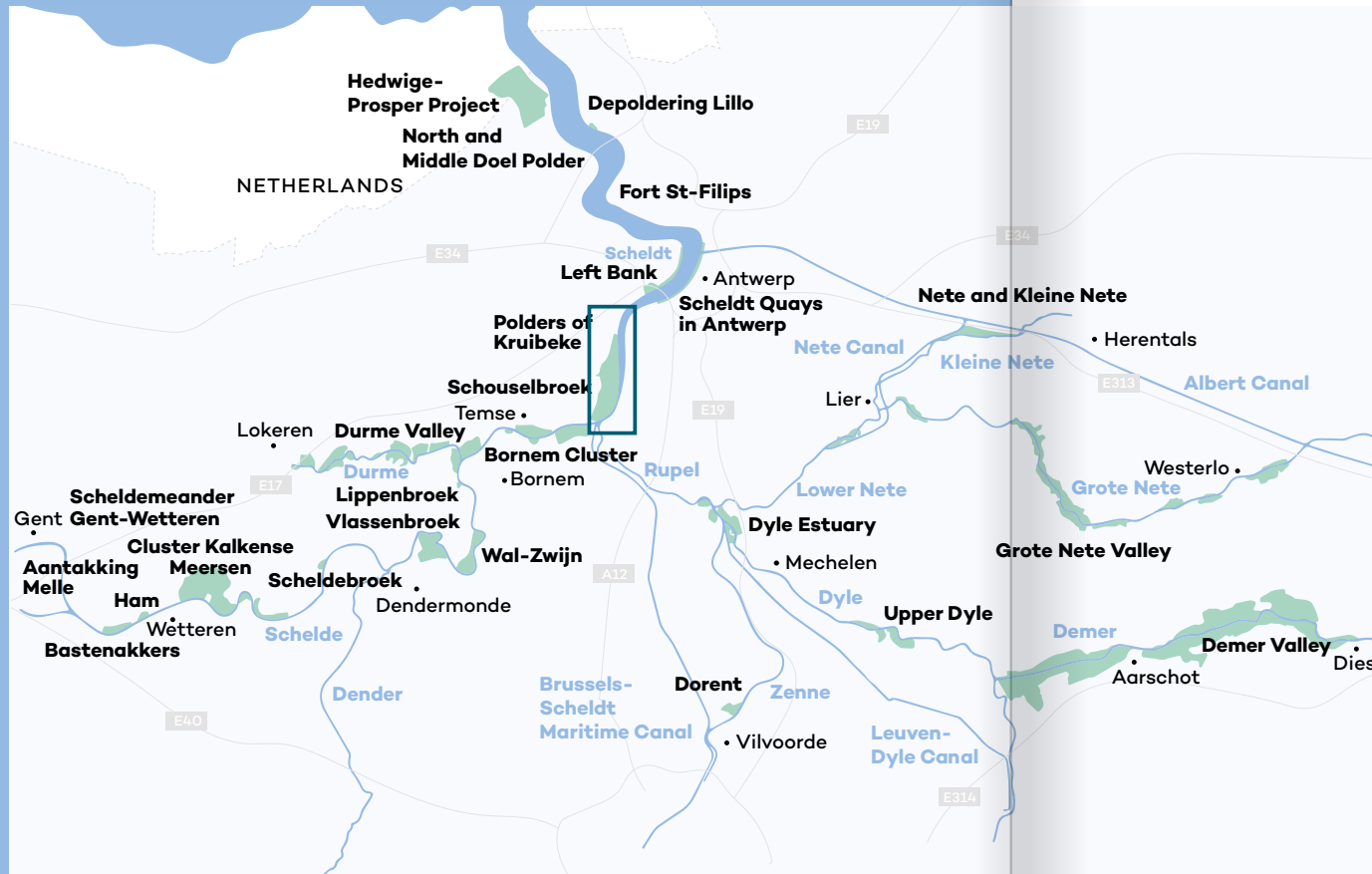
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**Cover image:** Vilda



## Better flood safety and estuarine nature in Flanders

The Scheldt is a tidal river. The gravitational forces of the sun and moon combine to create 2 spring tides a month. Combined with a north-westerly storm in the North Sea, this leads to a storm tide. This pushes up the water to an extremely high tide. The gales of 1953 and 1976 are well-known examples of a storm tide. They caused tremendous damage, so the government launched the Sigma Plan in 1977 to better protect Flanders from flooding on the Scheldt and its tributaries. Since 2005, the plan has focused on water safety and the restoration and development of nature along the rivers.

The Sigma Plan counters flooding and aridification by raising and widening levees, creating controlled flood areas, depoldering, and restoring natural river bends. This promotes the development of unique tidal nature, creates wet nature and achieves the conservation objectives of Natura2000, the European network of nature reserves.

## Polders of Kruibeke, the largest controlled flood area in the Sigma Plan

The Polders of Kruibeke are the largest controlled flood area in the Sigma Plan. This 600-hectare water buffer benefits 3 key areas: water safety, nature and recreation. The area only floods once or twice a year on average. On all other days you can use this varied landscape of tidal mudflats, tidal marshes, wet grasslands and alluvial forest for hiking, cycling and fishing without any worries.



© Vilda

Kruibeek Creek

# Polders of Kruibeke: a review

## Turbulent origins

You can enjoy the natural environment of the Polders of Kruibeke by hiking, cycling or angling. In addition, the Polders protect upstream residential areas from flooding. Despite all these advantages, the creation of this beautiful nature reserve wasn't easy. There was once fierce protest against this project.



Ruisbroek, 1976

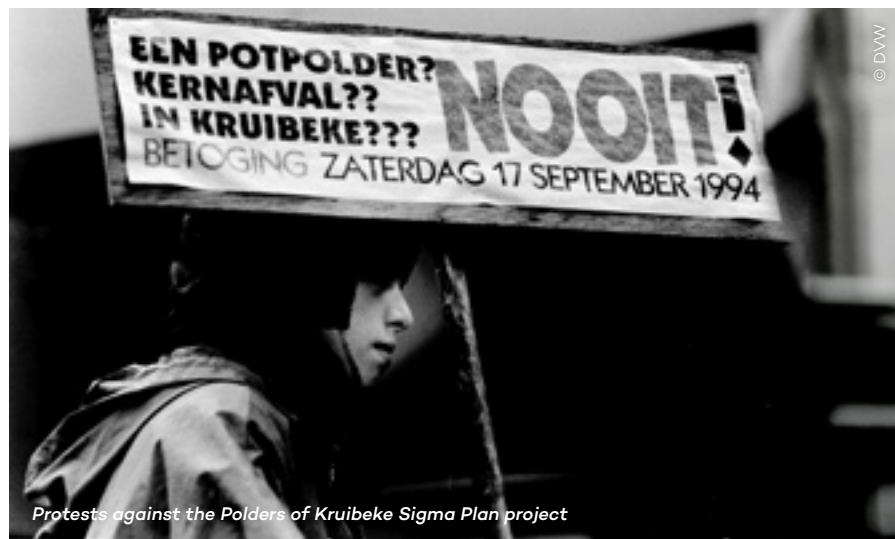
## From resistance to participation

The Polders of Kruibeke have always been part of the original Sigma Plan. The plan included 3 types of interventions: to raise and strengthen the levees, to create flood control areas and to build a storm surge barrier on the Scheldt in Oosterweel, Antwerp.

The plan was created a year after the flooding disaster of 1976. In just one year, several bright minds had come together to devise a wide range of technical solutions, but they failed to consult the villages concerned.

As a result, there was no local support for a plan that repurposed a 600-hectare area and allowed the Scheldt water to come closer to the residential areas. Many affected parties therefore kept challenging the decision.

In 2001, the Emergency Decree removed all legal obstacles. Further legal action against the controlled flood area had suddenly become impossible. The preparations for the construction of the ring levee could start on site. The newspapers were full of counter-arguments and there was widespread lack of understanding. Many felt that farmland, fishing ponds and holiday homes were being sacrificed and people had to make way for nature. The municipality of Kruibeke also protested against the flood control area, mainly because there was much uncertainty about the plans.



Protests against the Polders of Kruibeke Sigma Plan project

In 20 years, public opinion on the Polders of Kruibeke has now evolved from strong resistance to pride and enthusiasm. A key turning point was the move to engage with local residents and make them co-owners of the area using 10 keys. This plan even earned a Natura2000 award. Clear communication and participation ultimately proved to be the key to gaining widespread support.



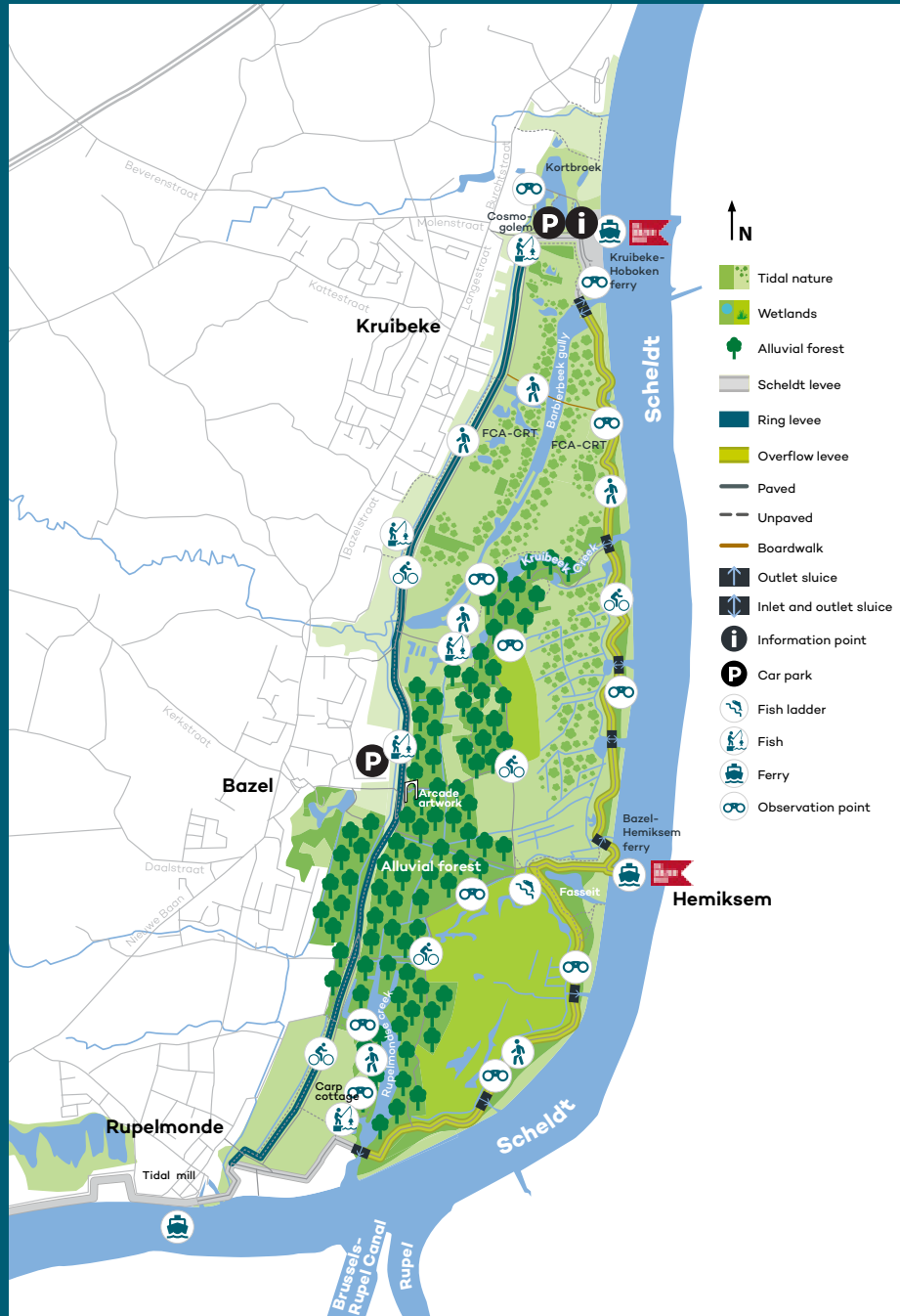
Kruibeke-Hoboken ferry

## With EU support

The Waterways and Maritime Affairs department of the Ministry of the Flemish Community in Belgium, the Province of South Holland and Department for Rural Areas of the Netherlands and the UK Environment Agency joined forces in the FR@ME Interreg project (2003-2006) to come up with ideas for allowing rivers more space again. In Kruibeke, every detail of the local water management was scrutinised. The design of the area offered a permanent solution to local flooding problems. The Barbierbeek watercourse, for example, was given more space both outside and inside the polder and now even plays a leading role in the creation of a valuable tidal natural environment.

De Vlaamse Waterweg nv and the Flemish Agency for Nature and Forests collaborated with De Biesbosch National Park (NL) and Broads National Park (UK) from 2009 to 2013 in the context of the Interreg project for Sustainable Tourism in Estuary Parks (STEP). The aim was to collect best practices for sustainable tourism in tidal areas. STEP was a strong tool for embedding recreational co-use.

The Life+ project SCALLUVIA was part of the European Commission's LIFE programme and ran from September 2013 to September 2018. Four partners worked together on this project: the Flemish Agency for Nature and Forests, De Vlaamse Waterweg nv, local Natuurpunt association KRUIN vzw (Kruibeeks Natuurbehoud) and the municipality of Kruibeke. The European Commission supports the restoration and development of nature reserves with this programme. Together, they make up the Natura2000 network. This also includes the Polders of Kruibeke.



# The new Polders of Kruike with respect for people and nature



As a flood control area, the Polders of Kruike absorb water from the Scheldt when water levels are extremely high. Inlet and outlet sluices allow water to also enter and exit in about half the area under normal conditions, creating unique tidal nature.

The Polders of Kruike already were an ecologically valuable natural environment with alluvial forest, grassland, creeks and tidal mudflats and marshes beyond the levees. Besides improving the nature that was already there, the Sigma Plan project created additional tidal mudflats and marshes, open wet grasslands and forest.

In 2021, the Polders of Kruike were recognised as a nature reserve. The focus is on the experience of nature as well as nature restoration. An accessibility scheme was developed as part of the Polders of Kruike reception plan implemented through the Sustainable Tourism in Estuary Parks (STEP) Interreg project.

The result is a well thought-out but simple network of paths and trails that introduce visitors to what the Polders have to offer in a sustainable way: tidal mudflats and marshes, open water features, cars and wet grasslands.

# Building blocks for a safe environment

With some thoughtful interventions and innovative structures, we created a controlled flood area in the Polders of Kruikebe that makes Flanders no less than 5 times safer.



## 1. The overflow levee, crucial in extreme storms

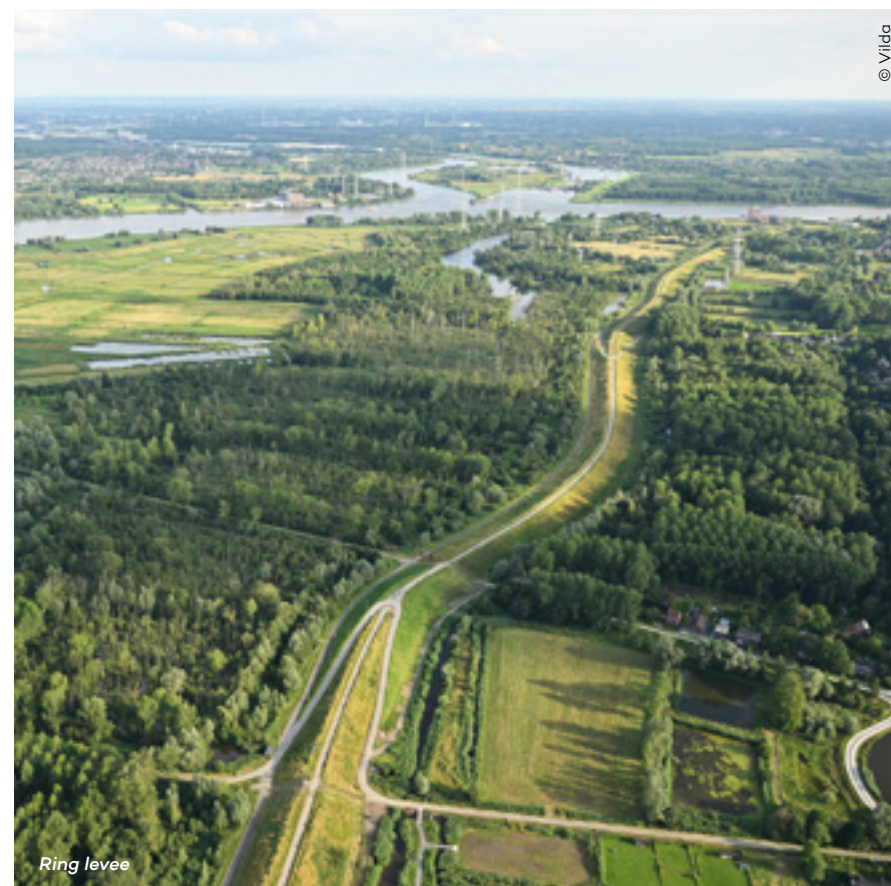
The former Scheldt levee is now an overflow levee. This water barrier, which is 8 km long, has been lowered from 8.35 metres to 6.8 metres based on the TAW benchmark used for height measurements in Belgium.

When a severe north-westerly storm coincides with a high tide, the crest of the storm wave washes over the overflow levee. The controlled flood area then stores a large amount of water, reducing the tidal wave and lowering the water level upstream by some 40 centimetres.

## 2. The ring levee, a wall around the controlled flood area

A 6-kilometre ring levee protects the nearby villages from the incoming water during storm tides. It is built with soil from the former Polders of Kruikebe, Bazel and Rupelmonde, the Scheldt, and the excavation of Deurganck Dock and Ketenisse Polder. This massive water barrier rises above the landscape (by 9 metres TAW\*).

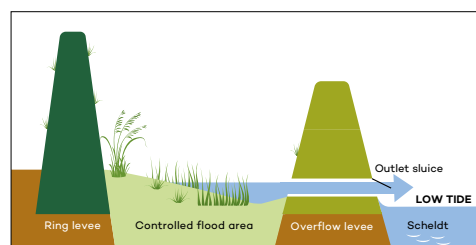
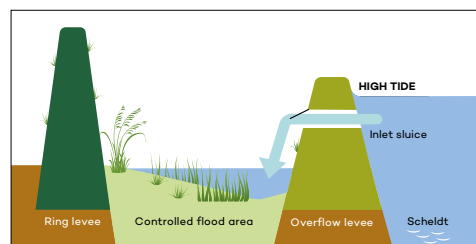
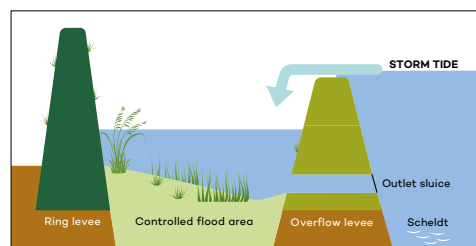
*\* Tweede Algemene Waterpassing (TAW) : the second general water benchmark that serves as the reference height for height measurements in Belgium. A TAW height of 0 metres is equivalent to the average sea level at low tide in Ostend.*



### 3. Inlet and outlet sluices

In case of extremely high water levels on the Scheldt (for example during a storm tide), the Polders of Kruibeke collect river water. The area floods at the right time (determined by the height of the overflow levee) to greatly reduce the risk of flooding upstream. When the danger of flooding has passed, the water can exit the controlled flood area again through outlet sluices integrated into the Scheldt levee.

In the Polders of Kruibeke, tidal nature is also developing. When the river level exceeds a certain height at high tide, water flows from the Scheldt into the area through inlet sluices. Not much, just enough to flood the lower areas twice a day. At low tide, outlet sluices direct the water back to the Scheldt, creating valuable tidal nature just like on natural river banks.

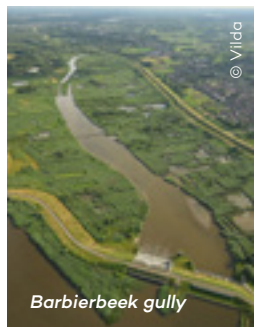


### 4. The compartmentalisation levee as a natural boundary

The compartmentalisation levee from Kemphoekstraat to the mouth of Kruibeek Creek is a reminder of the historical boundaries of the Polders of Kruibeke, Bazel and Rupelmonde. This levee is also the boundary between the tidal nature in the north and the mix of tidal nature, grassland bird habitat and forest in the south.

#### Electricity cables and underground pipelines

Numerous electricity cables and underground pipelines used to run right through the Polders of Kruibeke. In collaboration with the societies involved, they have all been integrated into the controlled flood area. The pipelines have now moved to the edge of the ring and other levees, including the compartmentalisation levee. The high-voltage towers have also been raised, keeping everything easily accessible for maintenance.



## 5. More space for Barbierbeek

Barbierbeek has always been the boundary between Kruikebe and Bazel. This watercourse often bursts its banks during heavy rainfall, which caused considerable flooding in the past. Barbierbeek now has more space again. A retention basin on the village side, 5 tubes with non-return valves that direct the water through the ring levee and a brand new trajectory with a wider bed through the polders should help avoid flooding.

## 6. A safe trajectory for water from the hinterland

Several streams from the hinterland come across the high ring levee. A ring ditch catches all the water and directs it through the Polders to the Scheldt through ring levee tubes. When the area stores river water during a storm tide, the incoming water closes off the non-return valves. When that happens, the ring ditch stores all the water from the hinterland for a while.

Wide buffer strips have also been dug along the ditch for emergencies. Additional water barriers protect adjacent gardens and homes where necessary. Once the water level in the controlled flood area has dropped enough, the ring levee tubes open again. This allows the streams to flow back to the river again.

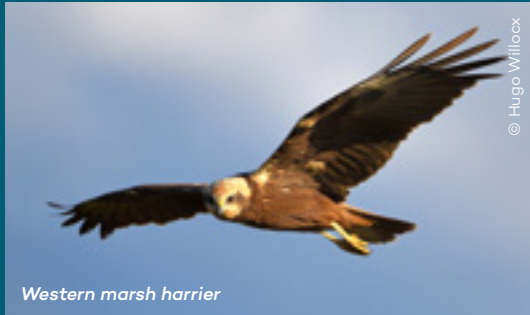


## 7. Kortbroek as a water reservoir

Besides its recreational function, Kortbroek, which is situated north of Scheldelei, also has an important safety function. A tube under Scheldelei connects the ring ditch to this nature park. When the water level in the ditch rises, the excess water flows into this buffer zone. This beautiful waterscape can store a huge amount of water in emergencies.



# Natural beauty in the Polders



## 1. Tidal nature

Tidal nature includes lower tidal mudflats that flood at high tide and upper tidal marshes that only flood at spring tide. These tidal mudflats and marshes add oxygen to water of the Scheldt and remove damaging substances such as nitrogen and phosphorus. A combination of high inlet and low outlet sluices in the Scheldt levee creates tidal nature in the Polders of Kruibeke. These allow the tides to flow in and out of the area. The tidal marshes north of Kruibeek Creek will evolve into a jungle of willows with reeds and gullies. To the south of Kruibeek Creek, targeted reed management will keep the marshes open, allowing a combination of tidal mudflats and marshes and grassland bird habitat.

Oystercatchers and avocets scavenge the silt-rich areas. The little bittern, common reed bunting and western marsh harrier are mostly found in the reeds on the tidal marshes.

## 2. Creeks and ditches

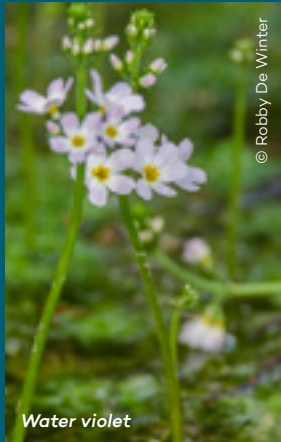
In the former fish ponds and Rupelmonde and Bazel Creeks, we cleared silt and aquatic plants, made the banks steeper and restored the ecological balance. This has created a mosaic of marsh and aquatic plants with loads of sheltered spots for insects, fish, amphibians and birds.



*This nature reserve with its extensive bodies of water and tidal mudflats is the perfect habitat for this striking water bird.*



We also cut down trees that were too close to the bank and put them in the water to benefit small aquatic animals and fish. In addition we removed holiday cottages and tonnes of debris and waste. The 2 most beautiful brick cottages are now a bat house and a bird watching and study hut. These conversion works have not missed their impact. The creeks now have clear water with aquatic plants such as yellow water lilies floating on it. The creeks and pools are popular with Eurasian teals, shelducks and purple herons. They also serve as nurseries for young fish. Otters and beavers have also emerged here.



Water violet

The water violet can be found along Blauwe Gaanweg. It is typical of areas with seepage or rising groundwater.



Oystercatcher

### 3. Grassland bird habitat

The grassland bird habitat is a haven for rare protected species such as the common redshank, northern lapwing, black-tailed godwit and oystercatcher. As these ground-nesting birds like to keep an eye on the area around their nests, we make sure the landscape stays open through a combination of mowing and grazing in collaboration with local farmers.

The introduction of the grassland bird habitat (and especially the ring levee) meant that many trees needed to be removed. We compensated for this by planting new shrubs and trees, by introducing forest edge plants, by moving forest land and by enabling spontaneous development. For every tree that disappeared, at least one new one was planted.

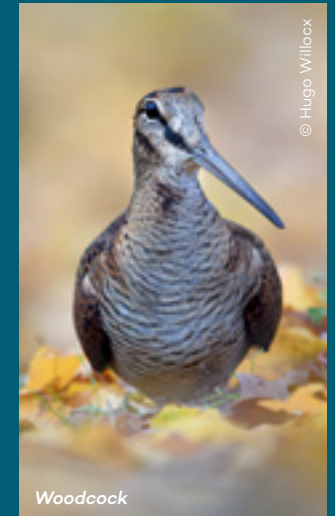


Common redshank

### 4. Alluvial forest

In an alluvial forest, the roots of alders and ash trees are submerged for most of the year due to a very high water table. This type of forest is very rare and is therefore protected by the EU. The support of the EU LIFE+ Scalluvia project has helped to restore 90 hectares of alluvial forest and creeks.

Numerous forest dwellers get to enjoy a safe habitat here. It is a great source of food for deer and a great place for marsh and forest birds such as siskins and woodcocks to build their nests. The more open areas accommodate various species of dragonflies. Many marsh plants, such as the beautiful marsh marigold, have every opportunity to grow here.



Woodcock



Alluvial forest

## 5. Fasseit

Fasseit was originally a tidal marsh beyond the levees. In 1718, it was reclaimed by adding a river bed to the polder. This is a classic example of how increasing reclamation continues to restrict the natural course of the river.

The depoldering of Fasseit is an important sub-area in the Polders of Kruikeke. The removal of the levee between Fasseit and the Scheldt river re-exposes the area to tidal action. This promotes the restoration of natural phenomena such as tidal mudflats and marshes and gives the river more space. This intervention reduces the pressure on downstream levees and lowers the flooding risk during extreme weather events.



Development of tidal nature

# The importance of monitoring

The Sigma Plan's measures have transformed the Polders of Kruibeke. Thanks to extensive monitoring, we have already obtained some great results.

## Rich tidal nature for a healthier Scheldt

The University of Antwerp is monitoring the development of tidal nature in the northern half of the area. The tide is creating a landscape of creeks, tidal mudflats and marshes there. Monitoring tidal flow, erosion and sedimentation is important for nature but it is an important safety measure too, as too much silting will reduce the area's water storage capacity. Several pilot projects show that the area is developing as expected.

Vegetation is also evolving as predicted, with thickets being the dominant vegetation in the higher parts and reeds elsewhere. In the lower areas, the frequent flooding and brackish Scheldt water are challenging for the trees. The very lowest parts remain bare tidal mudflats.

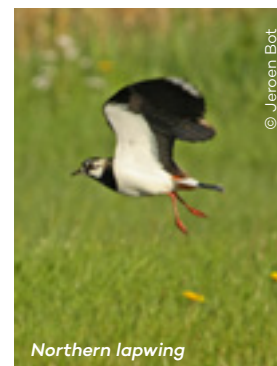
Monitoring has shown that the area is improving the nitrogen and silicon cycles and has raised the oxygen levels in the Scheldt. The Kruibeke waterfalls at the inlet sluice in the north of the area have a strong aerating effect and the water flowing from the tidal mudflats and marshes is always oxygen-rich.

## Development of nesting habitat and carrs

The southern half of the Polders of Kruibeke consists of woodland and grassland bird habitat. Every year, the volunteers of Kruin, a local division of Natuurpunt Waasland vzw, create an overview of the breeding birds in the area.

The results are mostly positive although there are not many grassland birds nesting in the grassland bird habitat yet. This is because the adjacent tidal marshes and forest are home to predators such as foxes and martens. We therefore take measures to keep them out of the grassland bird habitat.

The Flemish Agency for Nature and Forests and the Institute for Nature and Forest Research monitor developments in the woodland area. They surveyed the carr vegetation in 2014. Subsequently, the water level was gradually raised. In 2018, they found that more moisture-loving plants were growing there, but that some trees had died due to the higher water level. In 2019-2020, tree mortality increased sharply locally after salt water had entered the area from the Scheldt through a faulty sluice. The sluice was fixed in 2021. By then many saplings had emerged underneath the dead trees so the forest is recovering.



Northern lapwing

© Jeroen Bot



Common noctule

© Rollin Verlinde

# Experience the Polders of Kruibeke

© Studiografie

Willow tunnel



Time capsule

## Journey through time

You will find time capsules dotted around the Polders: benches or picnic tables with a concrete column or steel frame showing bite-sized information about the area. Top designer Stefan Schöning designed the outdoor furniture based on the region. You will become intimately familiar with the area thanks to regional stories, exceptional observations and anecdotes from local associations, the municipality and local guides. Local residents helped to decide where the time capsules would go and what story they would tell.

Some of the new time capsules were given special locations. The former holiday cottage Coninckshofke near Rupelmonde Creek was refurbished and given two nature viewing walls. Nearby Carp Cottage, one of the few structures that survived the polder conversion works, was converted into a summer house for bats. A panoramic hill was created nearby. The time capsules allow you to explore the rich history of these polders: from the discovery of prehistoric remains during the Sigma Plan works to the stormy origins of Rupelmonde Creek, the EU's role and the importance of tidal mudflats and marshes.



Bird watching

### Fun for young and old

The Polders of Kruibeke have everything you need for a fun day out with the family: a boardwalk, willow tunnel and panoramic hills. If you like learning new things, follow the nature experience trail with a beaver lodge and feely boxes, past information signs on kingfishers and other local wildlife.



Experience trail



Observation point

### Kruibeke waterfalls

The Scheldt levee inlet sluices operate at high tide, producing spectacular waterfalls. Moreover, SuptilOne created a graffiti artwork here that is dozens of metres long, so the levee is definitely worth a visit.



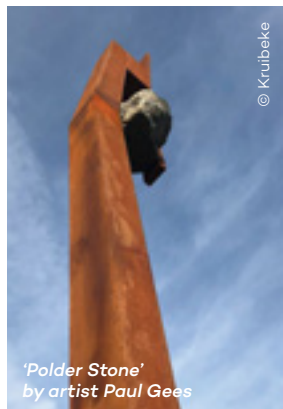
Use this QR code to access a tool that tells you in Dutch when the sluices will be activated:  
[life-sparc.eu/overstromingen/polders-van-kruibeke](https://life-sparc.eu/overstromingen/polders-van-kruibeke).



Inlet sluice



Inlet sluice

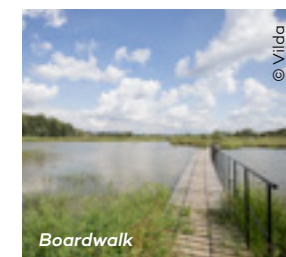
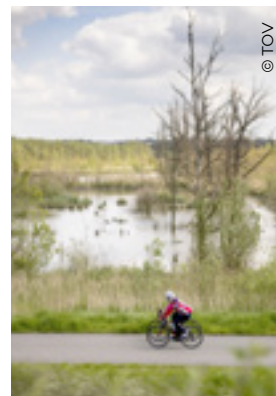


### Art in a natural setting

Artworks are dotted around the Polders to let you experience nature in a different way. Go and see CosmoGolem by Koen Vanmechelen, Ervin the big steel fish by Erwin Dieleman, Liefkesboom – a tree to which couples can attach a love lock, and Arcade by Pieterjan Gijs and Arnout Van Vaerenbergh, a work of art that breaks through the new ring levee wall between the village and nature reserve to invite visitors to experience the alluvial forest.

### Pedal and walk through the Polders

Enjoy the nature, history and modern water management of the beautiful Polders of Kruikeke with the cycling and walking routes. Want to explore the Polders in a unique way? Ask the local 'Barber Guides' to give you a tour at [info@barbiorgidsen.be](mailto:info@barbiorgidsen.be).



[www.sigmaplan.be](http://www.sigmaplan.be)



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