



After rain comes



21.09.24
22.06.25

Visitor guide

Sewer Museum
Porte d'Anderlecht - 1000 Brussels
sewermuseum.brussels

@sewermuseum



Welcome

The Sewer Museum is housed in the two pavilions at Porte d'Anderlecht. You enter one and exit the other! Take a tour of several rooms and experience an underground walk along the iconic river of Brussel, the Senne, then into the collector sewer under Chaussée de Mons.

The river and its tributaries have forged the Brussels landscape, leaving its mark not only on its relief but also on the construction of its sewer system.

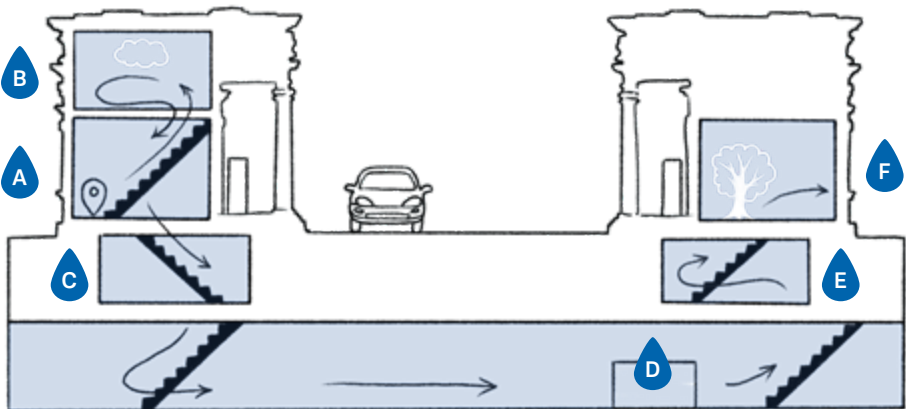
Enjoy a multi-sensory experience as you discover a largely unknown part of the city: its underground.



After rain comes...

In this exhibition, we take part in the journey of a raindrop from its formation in the heart of a cloud to its meeting with the earth, where its journey is far from over.

In cities, rain often ends up mixed with wastewater in the sewers. It's high time we reconnect this precious resource to its natural cycle and stop treating it as waste. By acting in this way, our living environments will be better able to cope with floods and droughts.



Is it pouring with rain in Brussels?

Every year, the Uccle weather station records an average of 837.1 mm of rainfall and 190 days of rain per year. This distribution depends on the season, but also on where you are in Brussels.

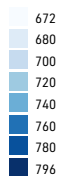
Look closely at the cloud and the 12 months of the year represented. The amount of rain is not proportional to the number of rainy days. The summer months are characterised by shorter periods of intense rainfall.

Where do people take out the most their umbrellas in Brussels?

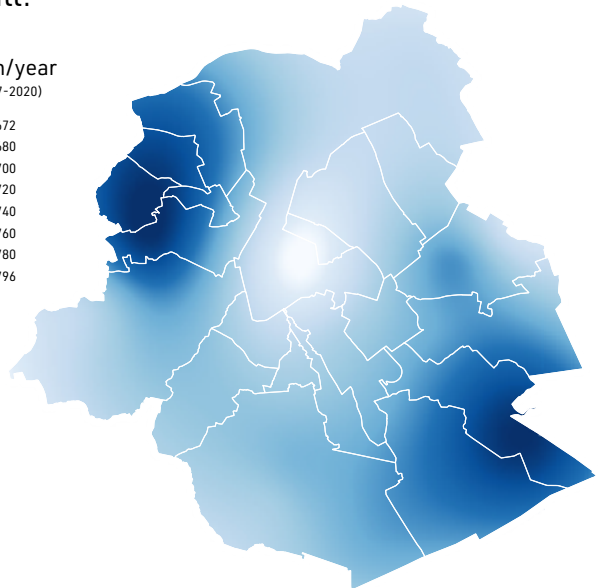
Over the last 15 years, data collected by 16 rain gauges spread across the Brussels region have shown that it does not rain uniformly in Brussels, especially when it comes to storm rain.

Data: Flowbru, Hydria
Cartography: Brussels Environment

mm/year
(2007-2020)



Imagine how the rain will behave when it falls on the model, and where it will run off to.



Small cloud, big data

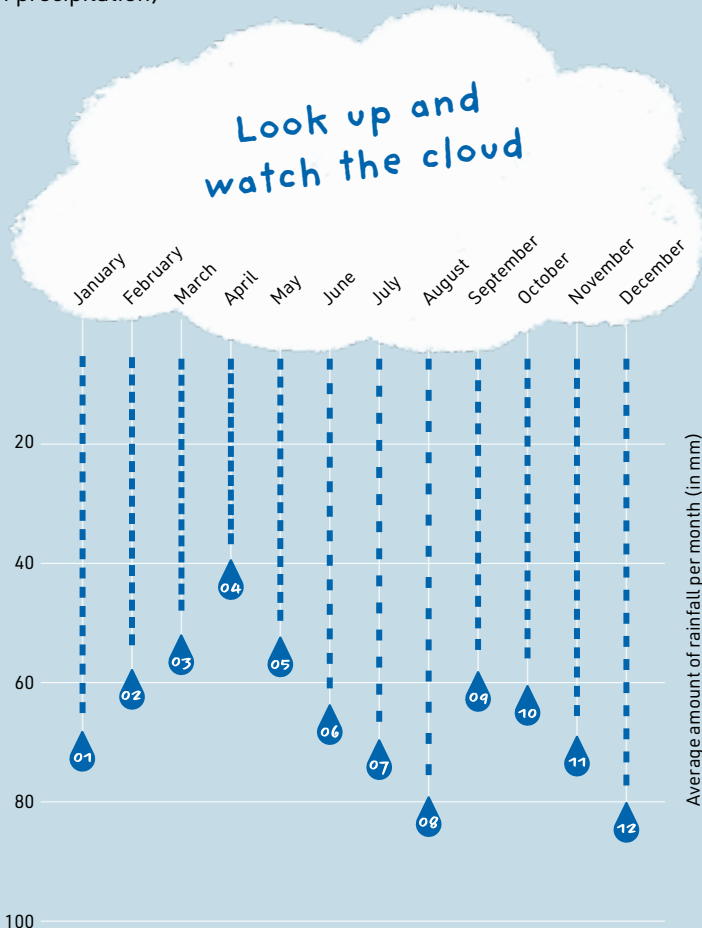
RMI, Climate normals defined based on the period 1991-2020 (amount and number of days of rainfall).

The data you are observing correspond to average values calculated over a period of 30 years.

Referred to as "climate normals", these average data are useful as a decision-making tool for public authorities and activity sectors that are particularly sensitive to the climate (energy, water resources, agriculture, tourism).

■ = 1 day

Average number of days of rain (minimum 1 mm of precipitation)



How is rain measured?

The amount of rain that falls from the sky is measured using a rain gauge. This is generally a graduated container that channels rainwater to measure its volume. To assess the height of rainfall, the unit used is the mm or L/m².

Rainfall measurements began in Brussels in 1833. At the time, the rain gauge consisted of a bottle topped with a funnel. Today, the RMI has 200 weather stations in Belgium where volunteer observers daily record the amount of rainfall in 24 hours.

*Do you know
the units for rain?*

$$1 \text{ mm} = 1 \text{ L/m}^2$$

This means that if water cannot penetrate the soil, evaporate or run off, 1 mm of water or 1 litre of water per m² remains.



Garden rain gauge

A rain gauge is an essential tool for a gardener or apprentice meteorologist.

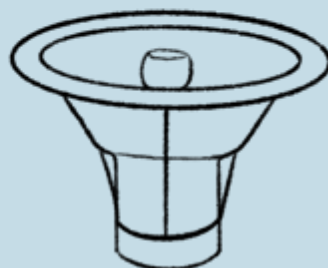
This very common model can be used to find out how much rain has fallen locally. The location of the rain gauge will determine the reliability of the measurements. Ideally, it should be located away from houses and trees.



Flowbru rain gauge

There are not many rain gauges in Brussels, as it is not easy to find suitable locations in the city.

The Flowbru project has made it possible to install 16 of this type, in addition to the one at the Uccle climate station (RMI). They are used to refine rainfall data for Brussels, where it does not rain uniformly. A better understanding of local phenomena enables better risk management and prioritisation of the necessary improvements.



Rain gauge with cone

This rain gauge works in much the same way as a garden rain gauge. It is installed 50 cm above the ground and surrounded by a Nipher cone, named after its inventor in the 19th century. This cone helps to reduce the influence of wind on measurements.

This type of device is currently in use at the climate stations managed by the RMI.

How many mm or L/m² rain do you think has fallen on that day?

$$8 \text{ mm} = 8 \text{ L/m}^2$$

Every year, 85% of the daily rainfall recorded in Brussels is 8 mm or less.



$$20 \text{ mm} = 20 \text{ L/m}^2$$

This is the threshold for a day of heavy rain. The number of days of heavy rainfall is on the rise as a result of climate change.



$$2 \text{ mm} = 2 \text{ L/m}^2$$

Light rain, a common occurrence in our regions. This drizzle is invaluable for replenishing the water table in winter. Provided the drop of water can seep into the ground!



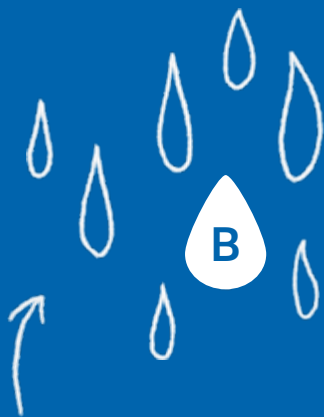
$$60 \text{ mm} = 60 \text{ L/m}^2$$

A fairly exceptional phenomenon, when several heavy thunderstorms follow one another on the same day.

These rains often cause damage because the city is not adapted to such intense rainfall.



Photos : © Eric Ostermann



Go upstairs
to continue the tour

How do clouds form?

Clouds are part of our daily lives. It's fun to detect shapes, to see them as threatening or pretty, or simply to watch them go by.

There's something magical about these cottony masses floating in the air.

*By opening the flaps,
you can discover
the secrets behind
the formation of clouds.*

- 1 The sun is the driving force behind the transformation of liquid water into water vapour (gaseous state).

This water evaporates from rivers, seas and oceans, but also from the soil and plants through evapotranspiration. And yes, just like us, plants perspire.



2

1 **1** **EVAPOTRANSPIRATION**





2 What happens to water vapour as it rises in altitude?

The temperature drops and the water vapour condenses into droplets (liquid state) around small particles in the atmosphere. These particles are also called "condensation nuclei".

3 The condensation nuclei are diverse: dust, pollen, fungal spores, pollutants and even certain bacteria.

4 Why doesn't it rain under certain clouds?

It's not enough to be a thick, dark cloud to make it rain. It is the enlargement of the droplets, by condensation and collision between them, that produces the rain.

Will the sky fall on our heads?

The concept of return periods helps us to understand how often intense rainfall occurs and to prepare for these rare but destructive events.

The return period (RP), expressed in years, represents the average period between occurrences of this event.

For example, a return period of 10 years (RP10) means that, on average, rain of this intensity or more over a given time interval occurs once every 10 years.

It's raining cats and dogs

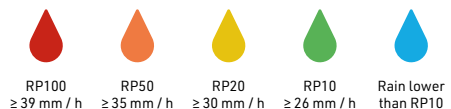
At present, the city is able to withstand rainfall of RP10, except in the most flood-prone areas. In the context of global warming, the Brussels regional authorities want to increase this protection to RP20, which means 15% more rain to manage. This surplus could be dealt with by disconnecting 13% of impermeable surfaces from the sewer system.



TURN THE UMBRELLA! Which part did you get?

Each part of the wheel represents one year. There are 100 parts on the wheel, but not all the parts are the same colour. The probability of running into a RP10 (10%) is not the same as a RP100 (1%). Try your luck!

You may never come across an exceptional event, but you may also come across an exceptional event twice in a row. If that's the case, everyone take shelter!



Urbanisation and global warming:

a rainy but not so happy marriage

The water cycle is currently being severely disrupted globally by global warming and locally by spatial planning.

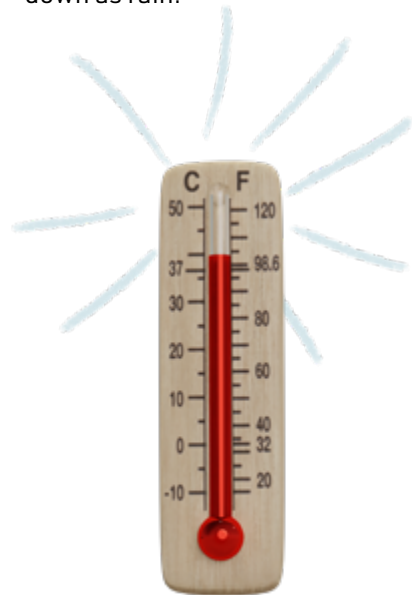
In Belgium, although still relatively trouble-free, record-breaking temperatures and rainfall are becoming recurrent topics in the press.

Since the end of the 19th century, there has been an average increase in rainfall of around 15%. Summers are increasingly characterised by heavy downpours. At the same time, the annual temperature is rising and the number of heatwaves increasing.

Do you remember how clouds form? What do you think will happen with global warming of +1 °C?

Remember that the heat emitted by the sun's rays allows evapotranspiration to take place.

So, with +1°C of warming, there is 7% more water vapour in the atmosphere, which will have to fall down as rain.





A day of heavy rainfall is defined as a day with a daily total of at least 20 mm.



Change in annual temperature in Brussels from 1850 to 2023

Each climate stripe corresponds to a year. The colour indicates whether the year is cold (blue) or warm (red) compared with the average temperature for 1850-1900.

number of days of heavy rainfall per year



trend curve

Number of days of heavy rainfall during the summer in Uccle from 1950 to 2023

Data RMI

There has been a significant increase in the number of days of heavy rain in summer. These are generally caused by intense thunderstorms that fall over a short period of time, the famous downpours.

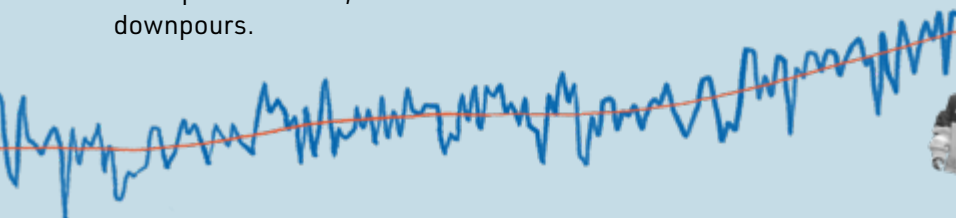
Change in annual temperature in Brussels from 1833 to 2023

Data RMI

A 2.1 °C rise in temperature has been observed since the middle of the 19th century.

annual values

trend curve



And all the while... humans were concreting

The impermeability of soil has a major impact on the environment and on the viability of the city. The growing presence of impermeable surfaces increases the risk of flooding and poses problems for groundwater recharge, river water quality and the urban microclimate.

If a raindrop cannot infiltrate where it falls, it will run off and carry waste and pollutants. Unfortunately, it will not be possible to treat all of this run-off in wastewater treatment plants.

More than half of the Brussels region is impermeable

These maps show impermeable surfaces where rainwater cannot, or only with difficulty, infiltrate into the ground.

Since 1955, soil impermeability has doubled, rising from 26% to 53% by 2022. In many cases, however, the size of the sewers has not increased. As a result, the drainage network is becoming increasingly saturated.





Photography of Joseph Quatannens,
5 May 1938. Archives of the City of Brussels, Private
archives collection 87.

Under this photo, dated 5 May 1938,
Brussels journalist Louis Quiévreux
(1902-1969) wrote: "Brussels
scene: Repairing the asphalt on the
boulevards. Patiently, the crowd
awaits... something important. "





MAKE RAIN AND SHINE over the landscape you've created

- 1 Put your hands in the sand and shape the landscape of your choice. You can see that it changes colour according to the relief.
- 2 Play with your landscape by creating hills, small ponds, steep or gentle slopes and even one or more rivers.
- 3 Put your hand above the sand (~20 cm) to turn it into a cloud and make the rain fall over the different areas of your landscape.
- 4 Observe how the rain flows according to the relief.
- 5 Press the  button for a few seconds and watch what happens when the rain covers your entire landscape.
- 6 The sun comes back if you press the  button.
- 7 Position your house in the landscape, taking care not to put it in water.

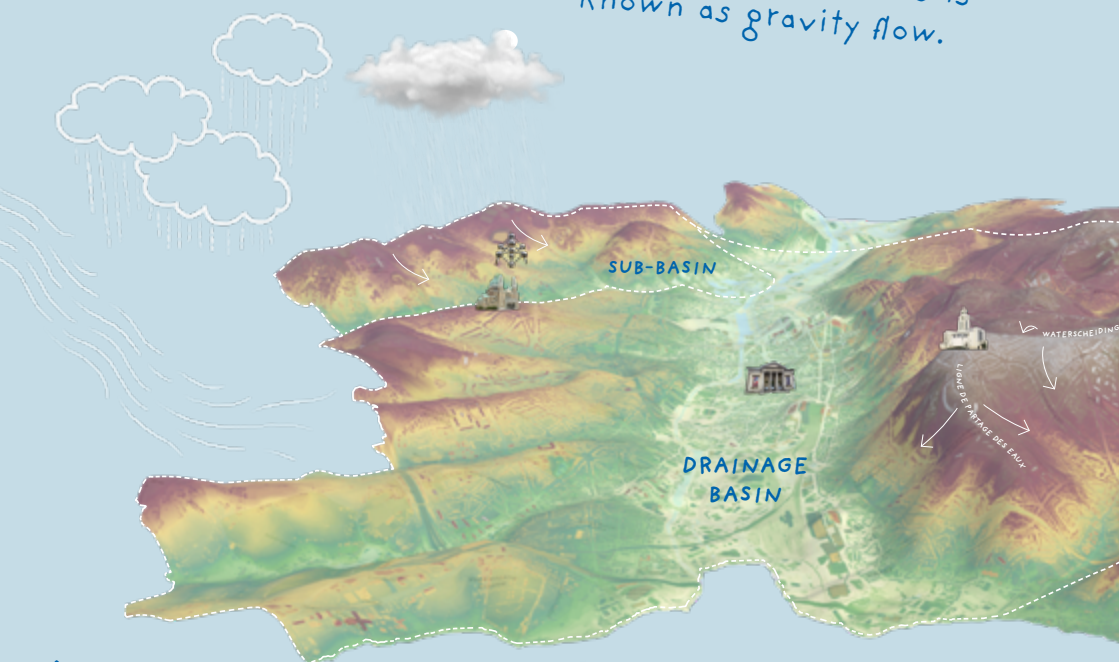
The Brussels area from the clouds

A drainage basin is a geographical area where all the rainwater that runs off ends up in the same watercourse.

The drainage basin is geographically delimited by the drainage divide.

Map : © Digitaal Vlaanderen,
Digitaal Hoogtemodel Vlaanderen II
(2013-2015), DSM, raster, 5 m

Have you noticed that the water always flows towards the bottom of the valley and therefore towards the lowest point? This is known as gravity flow.



Go downstairs
to continue the tour





Nature-based solutions

Our towns and cities are faced with a number of challenges, while at the same time ensuring a pleasant and functional living environment. Thus, depending on the uses and constraints of a given location, there are various solutions for managing rainwater. Wherever possible, nature-based solutions should be preferably used.

Composed of the «water-soil-plant» trio, they restore the natural water cycle by encouraging two essential processes: **infiltration** and **evapotranspiration**.

Their secret? A healthy soil. Often hidden beneath concrete, it is nonetheless essential to life.



The diagram illustrates the water cycle in an urban environment. At the top, rain falls vertically. In the sky, two bees are shown. Three blue wavy arrows point upwards from the ground towards the sky, representing evapotranspiration. On the left, various plants (a pink flower, ferns, and a yellow iris) are shown with their roots extending into the soil. A grey pipe is shown running horizontally through the soil, with a section of it broken away to reveal the interior. Below the ground surface, three white wavy arrows point downwards into the soil, representing infiltration. A magnifying glass is positioned over the soil, focusing on a circular area that contains illustrations of soil organisms: a centipede, a worm, a beetle, and a spider. The text 'A whole ecosystem under our feet' is written in a circular path around these organisms. At the bottom right, there is a small white teardrop-shaped icon containing the letter 'C'.

EVAPOTRANSPIRATION

This process brings freshness to the city.

STOCK

INFILTRATE

Limits run-off into the sewer
and feeds the water table.



How do you right-size a rain garden?

The size of the rain garden must represent at least 5 to 10% of the surface roof that collects rainwater.



Behind the scenes of a rain garden

One of these solutions is the rain garden. This is a small patch of greenery that can take a variety of forms. It stores and infiltrates rainwater from roads, pavements and roofs. In this way, the raindrop avoids going down the drain.

By planting local species that may be melliferous or edible, this garden encourages the development of biodiversity and enhances the conviviality of the neighbourhood.

*By digging galleries,
I help the water to
infiltrate and stimulate
root development.
Who am I?*



Go downstairs
to visit the river
and the sewer....



... then take
the stairs to the
second pavilion



Photo contest



SHOOTING IN THE RAIN

From 21/09 to 01/12/2024,
the Sewer Museum
is organising a photo
competition in collaboration
with photographer Eric
Ostermann.



Try your luck at seeing your photo
of the capital in the rain exhibited
alongside his, in Brussels' most
underground gallery, from
January 2025.

Let yourself be inspired by the
shadows and lights effects of
Léonard Misonne (1870-1943),
pioneer in this field, as demonstrated
by his view of the area where the
museum is located today.

Leonard Misonne,
Rain on the Boulevard du Midi,
1933. Belfius Bank-Royal
Academy of Belgium collection
© ARB - urban.brussels



What do the sewage workers do when it rains?

Unlike snails, sewer workers are wary of rain. Organised as a team, one of them constantly monitors the weather conditions on the surface to avoid tragic accidents like the one that struck Édouard Goffin in 1988.

They are now better equipped with the right tools to deal with this risk.

Listen to what some of them have to say.



Collective management of rainwater to counter flooding

Rainwater, a source of life... but also of concern and damage!

Certain areas, often located at the bottom of valleys, are more prone to flooding. In Brussels, most of the water comes from intense, short-lived showers that saturate the sewage system. Just as you can't stop a raindrop from falling, managing it once it's on the ground is everybody's business. Everyone produces run-off water by making their plots impermeable. It is therefore essential to manage rainwater collectively to support the most vulnerable areas.



© Eric Ostermann



Go upstairs
to the last room!

After rain, comes the sunshine!

It's time to design and develop our living environments to make them more resilient to the consequences of climate change (flooding, drought). In this way, we promote water and air quality, human health and biodiversity.



Brussels, was it better before?

Above all, the public authorities have a role to play in setting an example and implementing ambitious projects. Here are some examples on the territory of the City of Brussels.



Wadi's, basins and rainwater tanks make this park "nearly zero rainwater discharge".

1987 vs 2024 Parc Simone de Beauvoir

© Bruciel.brussels
Ville de Bruxelles
Dpt. Aménagements urbains



This playground lined with green spaces delights the neighborhood children and infiltrates 57% of rainwater.

2012 vs 2023 Place Marsupilami

© Bruciel.brussels
Ville de Bruxelles
Dpt. Aménagements urbains



This green boulevard collects a part of the runoff water for its green spaces.

2018 vs 2024 Bd Adolphe Max

© Bruciel.brussels
Ville de Bruxelles
Dpt. Espaces verts

Managing raindrops where they fall

There are solutions at every floor for managing rainwater where it falls: a green roof that absorbs and evaporates the water; permeable paving that allows infiltration while remaining passable for all modes of transport and a rainwater tank (buried or not) to collect and use the water for domestic purposes.



Make your home rain-friendly

Would you like to find out more and take action? Visit your local authority's website to find out about the grants available or visit the Brussels Environment website by scanning the QR code.



Rain tree

Often enclosed in pits with square, impermeable borders, urban trees don't always have the space they need to spread their roots and foliage. By diverting some of the run-off water to their planting pits, they will be able to flourish more, providing benefits for us and our environment.

*I drink a lot, but
I also perspire a lot.
Who am I?*

A mature tree can perspire up to 500 litres of water a day.



Small streams make big rivers...

Alongside the major institutional players, several associations are active in promoting better rainwater management.

Solidarity means that the inhabitants of the upper part of the town are concerned about the inhabitants of the lower part of the town, who are more exposed to the risk of flooding, and that they work together to find common solutions to these problems.

You are not the owner of your home? That doesn't stop you from taking action.

Find here a selection of inspiring local initiatives.

Less Béton

Their motto: "More nature and connections, in every corner of the city". Armed with hammers and chisels, join them in demineralising a few square metres. It's great to let off some steam!

Coordination Senne

Whatever the weather, take part in one of their guided walks on urban water management or the waterways of the Senne basin.

EGEB

Etats Généraux de l'Eau in Brussels

Residents upstream and downstream of our drainage basin, in a spirit of solidarity, help map the problems and solutions in your neighbourhoods. You are the experts in the use of your living spaces.

City to Ocean

Embark on a kayak trip to clean up the canal, or invite them onto your terrace or into your garden to install a rainwater tank for free.

The Groene Phare

Just in front of the museum, a number of residents have rolled up their sleeves to plant their façades and surroundings. Be inspired by their story on a guided tour every first Sunday of the month.



Create your sponge city

Design the city of your dreams where rainwater is a precious resource and is no longer regarded as waste that goes down the drain...

The Nature-based solutions



Green roof



Wadi



Rain garden



Rain tree

Permeable paving



Concrete slabs with grass



Permeable paving

Buried devices



Rainwater tank





The exhibition **After rain comes** is designed by the Sewer Museum of the City of Brussels.

This project is an initiative of the alderwoman of Culture for the City of Brussels, under the supervision of Anne Vandenbulcke, Director-General of the Department for Culture, Youth and Sport.





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