

# COPERNICUS & ME

## Monitoring and preventing floods in Wallonia



THE PUBLIC SERVICE OF WALLONIA NEEDS RELIABLE AND UP-TO-DATE INFORMATION ON FLOOD RISKS.



SENTINEL-1 AND SENTINEL-2 DATA ALLOWED FOR THE CREATION OF LAND COVER AND LAND USE MAPS OF THE REGIONAL TERRITORY.



WITH THE MAPS, THE PSW CAN COMPLY WITH THE EU FLOODS DIRECTIVE, AND DESIGN FLOOD RISK MANAGEMENT PLANS.



OCTOBER 2021



# COPERNICUS



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## IN WALLONIA FLOODS REPRESENT A VERY CONCRETE RISK FOR THE ENTIRE TERRITORY.

Wallonia is one of the three regions of the federal state of Belgium, alongside Flanders and the Brussels-Capital Region. Located in the southern part of the Country, Wallonia covers 55% of Belgium and hosts one third of the Country's population.

The Wallonia region is crossed by many rivers, has a high population density and a significant interweaving of habitat and agriculture. These features make the region particularly vulnerable to floods.

Until June 2021, the average cost of flooding by runoff was of the order of 650,000 € per year, and the cost could reach, for large floods by overflowing rivers, more than 100,000,000 euros.

**IN JULY 2021, WALLONIA WAS HARD-HIT BY VIOLENT FLOODS. THE COST OF THE DAMAGE WAS ESTIMATED BETWEEN 4 AND 6 BILLION EUROS (40 TIMES MORE THAN PREVIOUS YEARS).**

On July 14-15, 2021, the east of Wallonia experienced heavy rains, especially nearby the Vesdre and the Rochefort areas (Lesse).

The rain caused extreme floods. As a result, across the region 39 people died and 41,000 households were left without gas or electricity. More than 180,000 tons of garbage were collected.



A few days later, on 24-25 July, a flood amid heavy rain hit the Namur area, causing a mudslide. In the town of Dinant, the storm dumped 50 to 70 mm of rain in one hour, with automobiles being swept away by the waters [1].





## THE PUBLIC SERVICE OF WALLONIA

Type of organisation: Public regional administration

Country: Belgium

Annual budget in 2020: €2m - €5m

Previous experience with Earth observation data: Yes

In recent years, most of the competences related to territorial management in Belgium have been delegated to the governments of the three regions. This means that a number of users of geospatial data are now situated at the regional, provincial and municipal levels.

The Public Service of Wallonia (PSW) is the primary interface between the regional institutions and the local administrations and citizens of Wallonia. The PSW employs around 10,000 people in its central department of Namur and the decentralised departments in Wallonia and Brussels.

## THE PUBLIC SERVICE OF WALLONIA (PSW) IS IN CHARGE OF IMPLEMENTING THE POLICY OF THE WALLOON REGION.

For Wallonia, the Geomatics department of the PSW is in charge of harmonising territorial data collection and distribution, and of facilitating data acquisition and use by the region's public and private institutions.





To comply with the EU INSPIRE Directive, the Team needs to acquire precise, accurate and easily updatable information, including data on land cover (LC) and land use (LU).

Indeed, such data are of paramount importance for Walloon administrations, which use them for climate reporting, flood mapping, land take monitoring, forest management, agriculture planning, and land visualisation, among others.

Until 2017, the existing land cover and land use (LCLU) map of Wallonia was derived from cadastral and agricultural information, but did not allow users to distinguish information on LC from information on LU.

Moreover, the PSW is responsible for implementing the European Directive on the assessment and management of flood risks.

The Directive invites European administrations to carry out a preliminary assessment of flood risks, then to analyse the risk in more detail by mapping it, in order to finally establish risk management plans.

**TO COMPLY WITH THE  
EUROPEAN DIRECTIVE ON THE  
ASSESSMENT AND  
MANAGEMENT OF FLOOD RISKS,  
THE PSW HAS TO ANALYSE THE  
POTENTIAL DAMAGE TO THE  
POPULATION, THE ECONOMIC  
ACTIVITIES, THE HERITAGE, AND  
THE ENVIRONMENT.**

Today, some of this information is provided thanks to the WALOUS project, which aims to map land use and land cover.





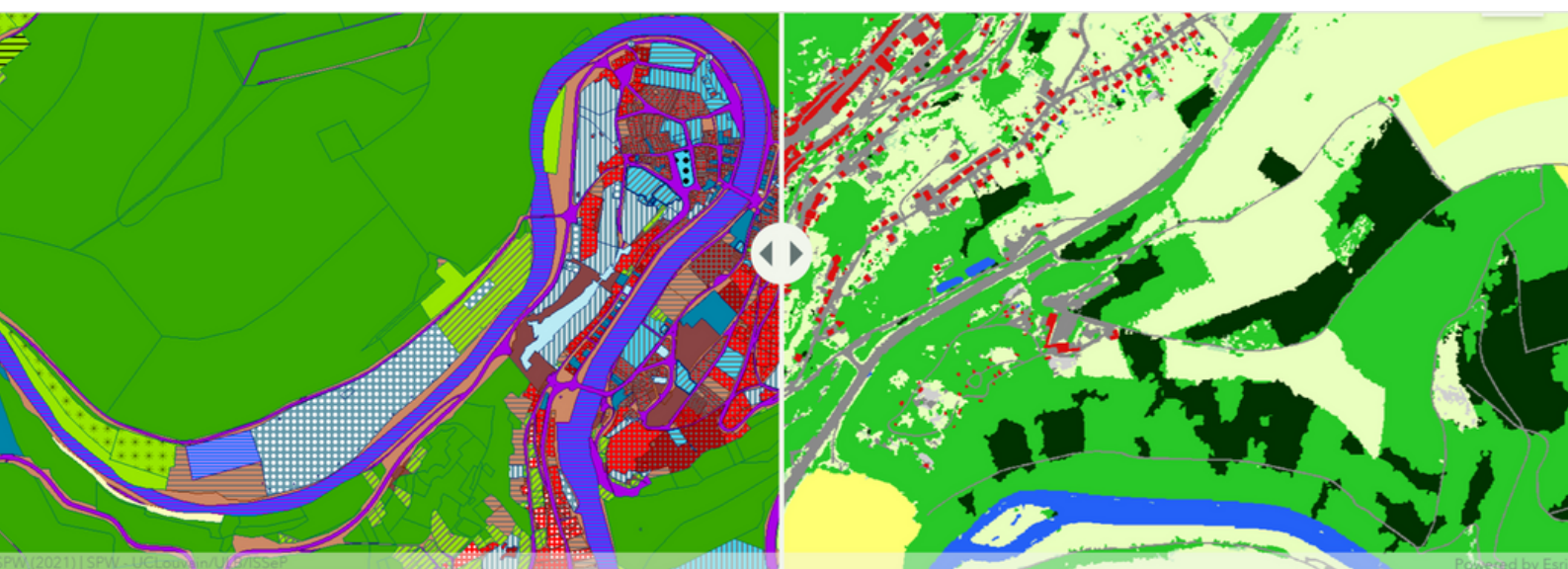
**WALOUS IS A PROJECT OF THE PSW THAT USED COPERNICUS DATA TO MAP LAND COVER AND LAND USE IN WALLONIA.**

Funded by the Public Service of Wallonia, WALOUS was implemented by the Free University of Brussels, the Catholic University of Louvain and the Scientific Institute of Public Service.

In the framework of WALOUS, the Walloon government produced new land cover and land use maps for the whole territory.

The maps integrate the latest georeferenced data on the whole Walloon territory. Manmade assets, such as buildings and infrastructure, are precisely classified in the WALOUS land use map by using the sub-metric resolution of orthophotos, digital elevation models and other geodatabases, while vegetation and rural areas are better distinguished thanks to seasonal information from decametric satellite imagery (from the European Sentinel-1 and Sentinel-2 satellites). The algorithm producing the final maps integrates all the data collected to characterise the different classes.

**THE MAPS WERE REALISED USING EXISTING GEOGRAPHIC DATABASES, AERIAL PHOTOS PRODUCED BY THE PSW SERVICES AND SATELLITE IMAGES THAT WERE OBTAINED FREE OF CHARGE THROUGH THE EUROPEAN COPERNICUS PROGRAMME.**



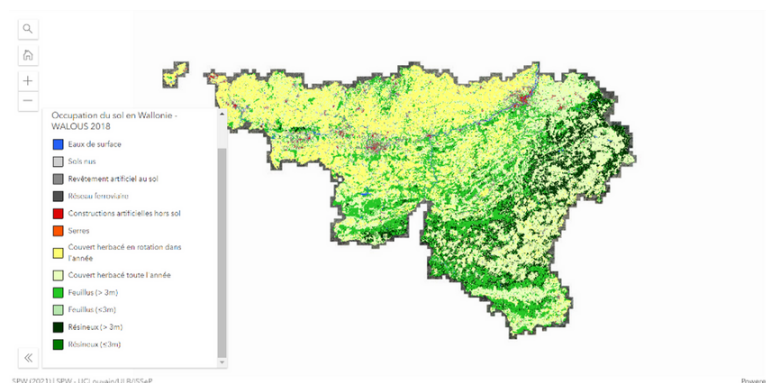
View of the Semois river – On the left, the land use map. On the right, the land cover map. Source: WALOUS, Powered by Esri



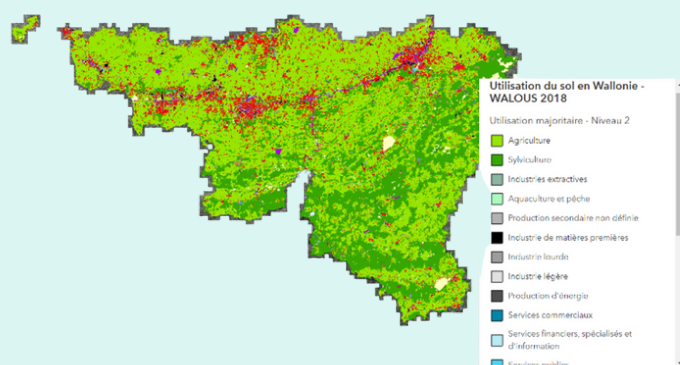
## THE LAND COVER (LC) MAP SHOWS THE PHYSICAL AND BIOLOGICAL COVER OF THE TERRITORY.

It highlights the physical and biological coverage of the land, allowing for the identification of natural features, such as trees, waters, shrubs, and grassland, as well as manmade assets, like buildings, rails, routes, and infrastructure.

The LC map provides information that can be used by public administrations and private actors to facilitate decision-making.



As an example, the Department of Agriculture, Natural Resources and Environment of the PSW uses the map to support farmers in making their declarations, while the Walloon Air and Climate Agency (AWAC) uses the information to estimate greenhouse gas emissions.



## THE LAND USE MAP (LU), INSTEAD, DETAILS THE USES OF THE REGIONAL TERRITORY.

Indeed, a parcel occupied by trees can correspond to several purposes, for example a residential garden, a recreational area or a natural area.

The WALOUS map classifies land uses under different categories: primary, secondary, or tertiary production, transport networks, logistics and public utility networks, residential use, natural areas, and other uses.

Sub-categories are also available to get more insights into land uses.

The land use map is consulted by the Walloon administrations for several purposes, e.g., to manage and monitor the inventory of abandoned sites to be requalified, and to update the regional flood hazard map and assess the potential damage associated with flooding.



## **THE WALOUS LAND COVER AND LAND USE MAPS ALLOW THE PSW TO BUILD THE FLOOD RISK MAPS REQUIRED BY THE FLOODS DIRECTIVE, AND TO REALISE THE ANALYSES AND STATISTICS NEEDED TO DESIGN FLOOD RISK MANAGEMENT PLANS.**

Indeed, the maps allow for the identification of sensitive issues in areas subject to flood risks. For example, the PSW can assess the area of economic activity potentially affected by a given flood scenario and propose measures to reduce the risk in these areas.

Combining aerial and satellite information and distinguishing land cover from land use in two different maps changed the use of LULC maps in Wallonia, while enabling the PSW to respond to the EU INSPIRE Directive requirements. Moreover, the frequent revisit of input data allows the PSW to plan for regular updates of the maps, which is required for statistical and decision-making purposes (climate, agriculture, land planning, forestry, risk management, etc.).

By updating the WALOUS maps, the PSW can amend the challenges and risks associated with floods according to the evolution of the territory. This process can be carried out for the three stages foreseen by the Floods Directive: the preliminary assessment of flood risks; the mapping of flood-prone areas and flood risks; and the development of Flood Risk Management Plans.



**THE FLOODS OF JULY 2021 CONFIRMED THE IMPORTANCE OF CONTINUING DEVELOPING MAPPING PRODUCTS ON FLOOD RISKS. INDEED, IN SOME PLACES, THE AFFECTED AREAS WERE LARGER THAN THE FLOOD-PRONE SCENARIO CALCULATED FOR AN EXTREME RETURN PERIOD.**

To enhance the use of cartographic products to better manage and prevent floods, all the information related to floods in Wallonia is now available on the brand-new site dedicated to flooding in Wallonia ([inondations.wallonie.be](http://inondations.wallonie.be)).

Resulting from a collaboration between many departments, the objective of this site is to centralise and provide all useful information on flooding to the citizens, administrations, as well as to building professionals.





## LINKS

Public Service of Wallonia:

<https://spw.wallonie.be/>

WALOUS web page:

<https://geoportail.wallonie.be/walous>

European Directive on the assessment and management of flood risks:

[https://ec.europa.eu/environment/water/flood\\_risk/](https://ec.europa.eu/environment/water/flood_risk/)

European Inspire Directive:

<https://inspire.ec.europa.eu/inspire-directive/2>

Géoportail de la Wallonie:

<https://geoportail.wallonie.be/home.html>

## REFERENCES

[1] "Inondations en Wallonie: au moins 23 morts, plus de 41.000 ménages sans électricité (direct)"

[Flood in Wallonia: at least 23 dead, more than 41,000 households without electricity]. *Le Soir* (in French). Brussels. 16 July

2021. Archived from the original on 16 July 2021. Retrieved 12 October 2021.

[2] "Belgium hit with renewed flooding amid heavy rain". *DW.com*.

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## CREDITS AND CONTACTS

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