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From floods to wildfires, new ideas are helping Europe adapt to climate extremes

From wildfire-resistant landscapes in Spain to flood warning systems in Denmark, researchers are working with local communities to find, test and deploy practical ways to live with climate change – and to share what works across borders.

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Many people expect a raging wildfire to leave a blackened, lifeless landscape in its wake. But after a blaze swept through Las Hurdes in Extremadura, Spain, in 2009, the scene was quite different. In the midst of the scorched earth were patches of green where healthy trees remained standing and unscathed.

From a distance, it looked as though the flames had simply stopped at their edges. In reality, this was no coincidence.

Fernando Pulido, an ecologist at the University of Extremadura, had been studying ways to slow the spread of wildfires. His research focused on so-called “productive fire breaks” – carefully designed areas where different types of vegetation are managed to make it harder for fires to pass through. The approach in Las Hurdes had worked well.

“You can’t fight fires with just helicopters and water. We need more strategies to make these megafires less destructive,” he said.

The urgency is real. In the summer of 2025, fires burned more than 45 000 hectares of land in Extremadura – one of Spain’s warmest regions and increasingly prone to wildfires. Projections suggest conditions will only become hotter and drier.

More than a decade later, Pulido is building on those early experiments as part of a broader five-year EU-funded research effort called RESIST to help vulnerable regions prepare for the impacts of climate change.

Different places, similar problems?

Extremadura is not alone. Across Europe, many regions are facing different but equally pressing climate risks. Some try to deal with flooding and landslides, others with drought, soil erosion or extreme heat. Researchers are finding that solutions developed for a specific risk in one place can often be adapted elsewhere.

The RESIST team brings together researchers, local authorities and businesses from across Europe to test and refine more than 100 climate adaptation solutions – from new technologies to changes in land management and planning.

The aim is to reduce the time and risk involved for new ideas to move from testing to real-world use.

Many regions share similar environmental conditions, despite being geographically distant. Flood-prone farmland in central Denmark has much in common with river basins in southern Latvia, while the heat and drought affecting Catalonia resemble conditions in parts of southern Italy.

By pairing such areas as “twinning regions” – matched territories that share key climate challenges – researchers and businesses can test whether solutions developed in one location can be transferred to another.

“These regions face many different challenges and have different needs,” said Vilija Balionyte-Merle, RESIST’s project coordinator at the Norwegian research organisation SINTEF.

“You need to speak to the people who live there to really understand their concerns and make a concrete difference. Only then can you consider the most effective solutions and apply them both locally and in the twinning regions.”

Digital tools for climate adaptation

In central Denmark, where flooding is a recurring problem, researchers and businesses are combining several approaches to improve preparedness.

One involves adapting buildings to better withstand floods. Using extended reality tools, residents and planners can visualise what these changes would look like before they are implemented, making it easier to plan and gain public support.

Another strand focuses on early warning. A network of underground sensors is being installed to monitor groundwater levels – often an early indicator of flooding. The data is fed into an early warning app that can alert authorities and residents before water becomes visible on the surface.

Researchers are also creating digital replicas, or “digital twins”, of local landscapes. These models allow different flood scenarios to be tested virtually, helping decision makers choose the most effective measures before investing in physical infrastructure.

Together, these tools – the result of consultation between researchers and the tools’ end users – aim to give communities more time to act and reduce the damage caused when floods occur.

The solutions developed in Denmark will then be applied in similarly affected regions, such as Zemgale in Latvia and Blekinge in Sweden.

Working with nature

Not all solutions rely on technology. In Extremadura, Pulido’s work focuses on reshaping the landscape itself.

Large areas of forest in the region are poorly managed or abandoned, which makes them more vulnerable to fire. With little economic value attached to the land, there is often little incentive to maintain it and protect it from wildfires.

Pulido and his colleagues are working with municipalities to create the kind of productive fire breaks he first tested in Las Hurdes. These are strips of land within forests where vegetation is managed using native, mixed-species plantings – not monocultures like eucalyptus or pine – to reduce fire risk, while also supporting activities such as grazing or the cultivation of fire-resistant crops like olive.

If the land generates income, it is more likely to be maintained.

“Any change to the landscape has to make economic sense, otherwise it won’t last,” Pulido said.

Local authorities, farmers and businesses are closely involved in shaping these measures. The aim is not just to test new approaches, but to ensure they are adopted and maintained over time.

“We’re working with mayors, associations and companies,” Pulido explained. “If they are part of the process, they are more likely to use the strategies we are now developing.”

Such nature-based solutions sit alongside the technological tools being developed in other regions, giving local authorities a wider set of options to deal with floods, wildfires, drought and the other climate risks their regions face.

From local trials to wider impact

It is part of a wider European push to help regions adapt to climate change by the end of the decade as part of the EU Mission on Adaptation to Climate Change.

By 2027, many of the tools being developed, including early warning systems and planning models, are expected to be ready for broader use, though the ambition extends well beyond the project’s end date.

The aim is not only to help the regions directly involved, but to create solutions that can be adopted elsewhere. Taken together, these approaches could benefit millions of people across Europe as they are rolled out more widely and the EU Mission on Adaptation to Climate Change continues to serve European regions.

“We want the tools, strategies and knowledge we develop to keep helping communities adapt to the challenges brought by climate change,” said Balionyte-Merle.

***The project in this article received funding as part of the EU Mission: Adaptation to Climate Change. EU Missions are EU?funded initiatives that mobilise research, policy and citizens to tackle major real-world challenges by 2030.*

More info

- RESIST (CORDIS)
- RESIST project website
- EU Mission: Adaptation to Climate Change