Horizon
The EU Research & Innovation Magazine

European Commission

Uncovering the ripple effects of the climate crisis

Understanding how climate change affects livelihoods and industries is an EU research priority.

20 March 2024 - By TEREZA PULTAROVA

No roads lead to Iquitos, a Peruvian port city surrounded by the Amazon rainforest and reachable only by river.

The city's diverse communities and ways of living – including fishing and farming – were what drew Heidi Mendoza. She's a researcher who leads field work there on the human toll of climate change.

Livelihoods under threat

For centuries, inhabitants of the Peruvian Amazon have lived by the seasons, fishing during the wet part of the year and farming in the dry months. But now prolonged dry spells – often followed by torrential downpours – threaten livelihoods as fish move to other parts of the river and once-thriving crops yield less.

'The dry season is becoming either too hot or too prolonged,' said Mendoza, a researcher based at the Institute for Environmental Studies of VU Amsterdam in the Netherlands. 'Same with the wet season; when the river floods, it happens either too suddenly or for a longer period of time.'

She is part of a project that received EU funding to take a hands-on approach to the study of climate change's effects by carrying out research activities with affected communities.

Called PerfectSTORM, the five-year project runs through February 2026 and studies drought and flood processes through data analysis, modelling and storytelling.

Through the United Nations Paris Agreement, the world is seeking to cut emissions of greenhouse gases in a bid to limit global warming to 1.5 degrees Celsius above pre-industrial times and counter more frequent – and increasingly severe – droughts, storms and floods worldwide. This effort is known as climate-change mitigation.

At the same time, countries are trying to help their cities and rural areas cope with and prepare for the effects of global warming that it's too late to avert – an effort known as climate-change adaptation. The EU has a

whole research mission helping regions adapt and prepare.

Village vulnerabilities

Mendoza and colleagues spent a combined three months in 2022 and 2023 visiting riverside villages on the outskirts of Iquitos. The team's goal was to understand how climate change and other human activities are affecting local lives and spot vulnerabilities for local residents.

The team is also collecting evidence from eastern Kenya, where members spent four months in late 2022 and early 2023 working with villagers in the basin of the seasonal Tiva River.

The researchers are learning more about the underlying connections among changes in rain patterns, adaptation measures taken by affected communities and the subsequent impact of extreme weather.

For example, human activities such as building water pans – depressions in the ground to collect run-off water – during dry periods might worsen the impact of subsequent floods, according to Anne Van Loon, an associate professor in drought risk at VU Amsterdam who leads PerfectSTORM.

'We have seen many cases where floods that happen after a dry period have a worse impact than those that are not preceded by a drought,' she said. 'We want to understand whether any of the human activity during the dry spell may be altering the flood risk.'

Movements of people or livestock towards rivers during dry periods can make settlements more vulnerable to floods, according to Van Loon.

With each cycle of drought and flood, people risk becoming more vulnerable, including with regard to their health.

Fighting back

That's why efforts to step up climate resilience are so important, especially in relatively poor countries where more people live directly off the land.

Two decades ago, the Organisation for Economic Cooperation and Development warned that climate change risked undermining poverty reduction and undoing decades of development efforts worldwide.

Today in Peru, the villagers around Iquitos have begun experimenting with a greater variety of crops such as corn and coriander instead of the traditional staples cassava and plantains.

They have also started increasing the length of the stilts on which houses are raised to prevent them from being damaged or even destroyed by floods.

In Kenya, a shift from raising cattle to goats has helped villagers adapt to droughts (goats require less water), while tree planting and conservation are strengthening the landscape's resilience against severe weather.

Ripple effects

Another Dutch researcher – Bart van den Hurk – has been looking at the human costs of climate change from a broader angle: the ripple effects across national borders and regions.

Van den Hurk is a professor of climate-sociology interactions at VU Amsterdam's Institute for Environmental Studies and scientific director at Deltares, a water-studies institute in the Netherlands. He led an EU-funded project that linked changes in global weather patterns with socioeconomic consequences for Europe.

The project, called RECEIPT, ran for more than four years until the end of 2023.

The RECEIPT team set out to understand how climate effects play out in an interconnected world, with a particular focus on how weather-related disasters in distant parts of the world affect Europeans.

For example, catastrophic flooding in Thailand 13 years ago sent shockwaves through the global electronics industry because the country is the world's second-biggest producer of computer hard drives.

The months-long inundations of 2011 were the worst in 50 years, forcing Thai ports to close, disrupting production and destroying inventory intended for export. In the ensuing months, prices of hard drives jumped tenfold and industries in Europe were shaken.

'We saw that smaller companies in Europe were affected much harder than bigger ones,' said van den Hurk. 'The smaller companies would go bankrupt and get bought by the bigger companies. So those floods in Thailand caused quite a shake-up of the market in Europe.'

New view

The RECEIPT team mapped these kinds of knock-on effects, analysing climate-crisis trends in various regions of the world that have economic links to Europe.

For example, the disruption to oil, natural-gas and chemical production wreaked by Hurricane Harvey in the US state of Texas in 2017 affected markets in Europe.

So did droughts that hit Argentina, Brazil and the US five years earlier, causing a global shortage of soy. Overall, 17 weather-related disasters and their global consequences were studied in detail.

In a sign of the political priority that the EU is giving the matter, the European Commission this month published a policy paper on managing climate risks in Europe.

The RECEIPT team zeroed in on the tangible impact that Europeans would feel from extreme weather elsewhere and considered options to help make European communities and industries more resilient.

The responses include policy proposals to help prevent the effects before the weather-related disasters hit and new tools to identify possible disaster hotspots.

One visual tool enables people including policymakers to zoom in on areas that have connections to Europe and look at how various climate-change scenarios may affect industries in the region including agriculture, finance and manufacturing.

The project participants included not just climate modellers but also people with backgrounds in economics, psychology and other disciplines that reflect the broad nature and impact of the climate crisis.

'I hope that we have contributed to a new generation of climate analysts who will look at climate change more from a direct impact point of view rather than just at the pure physical processes,' van den Hurk said.

Research in this article was funded by the EU's Horizon Programme including, in the case of PerfectSTORM, via the European Research Council (ERC). The views of the interviewees don't necessarily reflect those of the European Commission. If you liked this article, please consider sharing it on social media.

Watch the video

More info

- PerfectSTORM
- RECEIPT
- EU climate change science
- EU Mission: Adaptation to Climate Change