EUROPEAN UNION

EU MISSIONS

ADAPTATION TO CLIMATE CHANGE

May 2026

# Supporting homeowners to understand and adapt to soil instability in Lyon, France

## An online dashboard helps homeowners understand and assess clay shrink-swell risk under climate change

***In Lyon, a significant proportion of homes are potentially vulnerable to property damage due to ground movement caused by clay shrinkage and swelling events. Educating homeowners about their potential insurance risks, how to address them, and preventive measures can increase resilience and reduce damage costs.***

**Key Learnings**

- **Citizen empowerment**: Educating homeowners about climate-related financial risk can help increase adaptation measures and reduce the gap between professional awareness of the issues at stake (among experts, insurers, public authorities, etc.) and individual action at the local level.

- **Insurance challenges**: Uncertainty around recognition of clay shrink-swell events under France's *Catastrophes Naturelles* (Cat Nat) insurance scheme, and potential insurance risk for many homeowners exists. Clearly communicating when and why such events may not be insured and promoting preventive measures and early risk assessment contribute to closing this coverage gap.

- **Communication is key**: User-centred design of an online dashboard's interface and of communication materials helps present complex data through a clear, accessible layout. This also helped engage homeowners who are unfamiliar with climate or insurance terminology.

- **Scalability**: The methodology and open-data framework developed and tested through the Lyon pilot were extended to the French national territory and can also be transferred and adapted to other European regions. By relying on open data, transparent methods, and a flexible structure, the online dashboard can be scaled to cover the entire French territory while supporting replication in other areas across Europe facing similar risks, thereby fostering broader uptake.

## About the region

Lyon, in the Rhône department, is France's third-largest city with about 1.4 million metropolitan residents. Around 26% of houses are in areas with high clay content and potentially vulnerable to clay shrink swell events triggered by drought and rainfall variability. From 2009 to 2020, 47% of municipalities in the region submitted clay shrink-swell-related disaster recognition requests.

## Climate Hazards

Droughts, Extreme Heat

## Sector

Urban, Buildings

## Key System

Critical Infrastructure

## Climate Threats

Lyon faces growing climate risks, particularly from flooding and clay shrinkage and swelling events, which threaten infrastructure, housing and water management systems. More frequent and intense rainfall events increase the likelihood of river flooding and urban runoff, particularly in densely developed and impermeable areas. At the same time, prolonged dry periods and higher temperatures dry out the soil, causing clay-rich soils to shrink and then expand during subsequent rainy phases, which can damage building foundations, roads, and underground utilities. These processes already affect many neighbourhoods built on sensitive ground, and projections suggest the situation will worsen by 2050. In Lyon, the 2022 drought

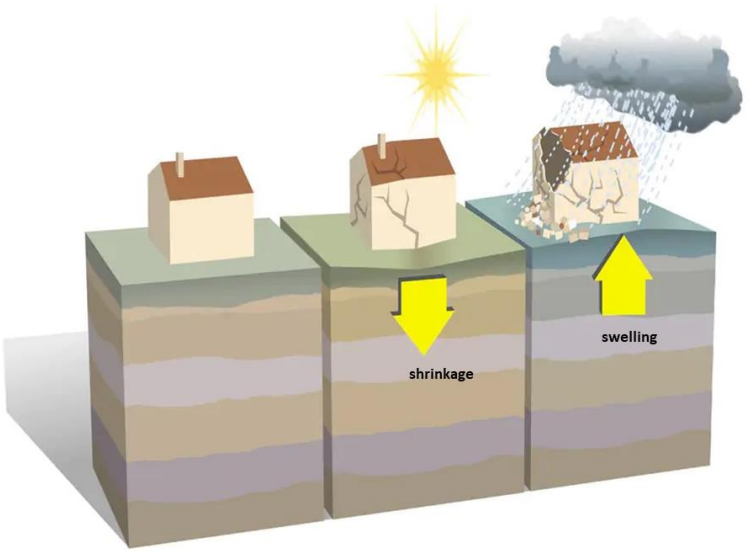


*Figure 1: Graphic shrinkage and swelling (DPPR-SDPRM, 2008).*

cost the Natural disaster insurance scheme approximately €2.4 to 2.9 billion, underscoring the rising financial and adaptation pressure. Figure 1 shows a simplified graphical representation of the clay soil shrink-swell phenomenon.

Figure 2 demonstrates the projected increase in combined drought and heatwave events in France between 2020 and 2050, based on the *Climate Dryness Index*. The maps display the expected number of events exceeding historical thresholds, highlighting a clear rise over time, particularly in southern and eastern regions of the country.

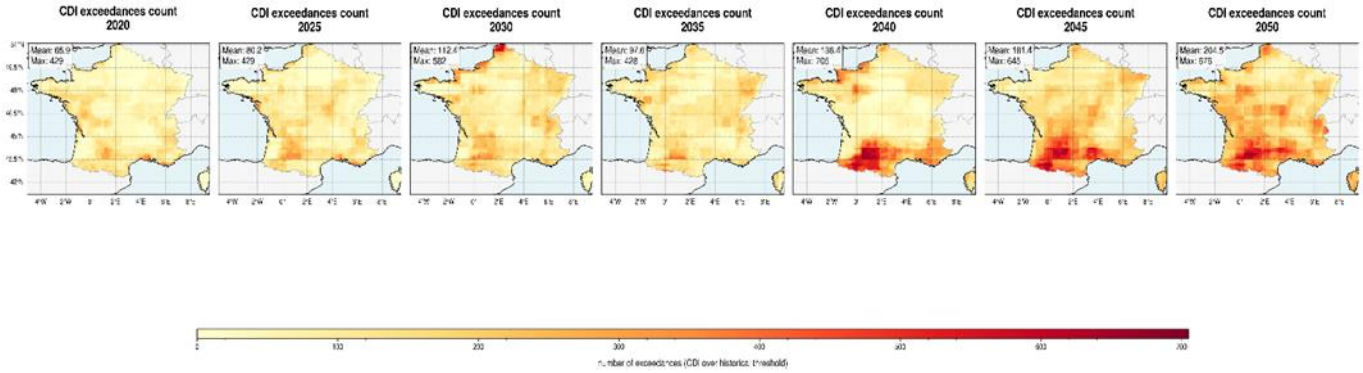


*Figure 2: Evolution of the exceedance frequency of compound drought and heatwave events in France between 2020 and 2050, as estimated by the Climate Dryness Index (CDI). Image Credit: Amigo Srl.*

## Estimating homeowner's financial risk with the Clay Shrink Swell Building Damage Assessor

The Clay Shrink Swell Building Damage Assessor is an online dashboard that helps French homeowners understand their exposure to clay shrinkage and swelling risks and identify preventive actions. This online dashboard uses real estate data, soil risk maps, and climate projections derived from the *Climate Dryness Index*. It helps homeowners estimate potential costs of damage caused by clay shrinkage and swelling events and compare these to property values, raising awareness of financial vulnerability.

*Figure 3: Screenshot of the Clay Shrink Swell Building Damage Assessor. Image Credit: PIISA.*

Under the French Cat Nat insurance scheme, compensation for clay shrink-swell damage depends on the official recognition of a natural disaster event at the municipal level. Because recognition criteria can be complex and may vary depending on local conditions and event severity, some homeowners may face uncertainty regarding

insurance coverage for damages linked to drought-induced soil instability. By enhancing homeowners' understanding of risk, the initiative promotes early maintenance and more resilient property management, while leveraging this increased awareness to support better insurance coverage. The Lyon pilot successfully demonstrated the feasibility of combining climate projections, soil information and real-estate data into an accessible risk communication tool for homeowners. Building on the success of the Lyon pilot, the team scaled up the approach and open-data methodology for national deployment in France, while assessing its potential for replication in other European regions facing similar soil stability risks.

---

*"By testing the online dashboard in Lyon, we demonstrated how transparent risk information and accessible communication can empower citizens to better understand their exposure to climate-induced soil instability, fostering both individual and collective adaptation action."*

*Laura Trentini, Data Scientist at AMIGO, PIISA project*

---

*Figure 4: Sustainable Finance Observatory attendance at the Forum de la Finance Éthique (Ethical Finance Forum).*

The pilot implementation of the Clay Shrink Swell Building Damage Assessor in Lyon demonstrated that combining accessible design, clear communication, and strong local partnerships is key to engaging citizens on complex climate-related risks. Collaborative design, outreach and gathering continuous feedback from users through the website and in-person events contributed to the success of the Clay Shrink Swell Building Damage Assessor pilot. The online platform was developed thanks to a structured procurement process, which enables the tool to accurately assess homeowners' risks of property damage from clay shrinkage and swelling events. The communication strategy combined targeted online engagement – through LinkedIn and newsletters – with direct outreach at local events, including the Ethical Finance Forum in May 2025. User testing sessions allowed homeowners to explore the online dashboard and provide feedback, which informed continuous improvements.

## Summary

Testing the Clay Shrink Swell Building Damage Assessor in Lyon helped homeowners understand the potential insurance risks posed by climate change-induced soil instability. Being exposed to clay shrinkage and swelling makes Lyon a good testing ground for the pilot. The online dashboard combines soil maps, real estate data and climate projections to show where risks are highest, how insurance coverage may be insufficient, and what preventive measures can be taken. Citizen empowerment through clear communication, tailoring dissemination channels to reach homeowners effectively and in-person engagement alongside digital outreach are important to raise awareness and expand climate adaptation efforts. While the pilot phase primarily focused on awareness raising and user engagement, feedback from user-testing sessions and outreach events showed an increasing understanding among participants of soil instability risks, insurance coverage limitations, and possible preventive actions. The dashboard also demonstrated the value of accessible climate-risk communication tools for supporting citizen engagement and adaptation awareness, while showcasing how open data and adaptation methods can be scaled to the national level in France and replicated in other high-risk regions across Europe.

## Further information

PIISA

The work presented in this adaptation story is part of the PIISA Mission project.

*This Mission project has received funding from the European Union's Horizon Europe programme under grant agreement 101112841.*

- https://piisa-project.eu/home
- https://home-risk.eu/en

## Contact

Gregow Hilppa (FMI) Hilppa.Gregow@fmi.fi

Laura Trentini

REGILIENCE+

REGILIENCE+ Adaptation Solutions for Regional Climate Resilience collect 150 proven adaptation solutions and transform them into 70+ hands-on materials. These outputs feed into platforms such as Climate-ADAPT and Mission Implementation. More information in **regilience.eu**

Funded by the European Union

**Disclaimer**

This document reflects only the author's view and the European Commission is not responsible for any use that may be made of the information it contains.

Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

Reuse is authorised provided the source is acknowledged and the original meaning or message of the document is not distorted.

The European Commission shall not be liable for any consequence stemming from the reuse. The reuse policy of the European Commission documents is implemented by Commission Decision 2011/833/EU of 12 December 2011 on the reuse of Commission documents (OJ L 330, 14.12.2011, p. 39).