

PILOTING INSURANCE SOLUTIONS FOR CLIMATE CHANGE ADAPTATION

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The PIISA (Piloting Innovative Insurance Solutions for Adaptation) project develops innovative insurance products to encourage adaptation and bring security to policy holders. The PIISA Pilots have developed new insurance frameworks to: promote green roof adoption, quantify soil stability risks for homeowners via a web tool, test forest insurances solutions for abiotic risks, and design wildfire insurance that enhances adaptive actions. The new solutions have been co-designed for a targeted user group, geographical region, and socio-economic context. During the next 12 months, PIISA will assess the potential of new solutions for a wider uptake in parts of Europe, incl. the Boreal region.

PILOTS	HAZARD(S)	MAIN OBJECTIVES	PILOTING REGIONS
Green Roofs & Insurance Concepts	Floods, heat stress, biodiversity loss, ...	Innovate insurance concepts to stimulate green roof adoption	Development: Netherlands Piloting: Boreal, Mediterranean
Building Damage Assessor for Homeowners	Soil instability due to Clay Soil Shrink-swell (CSS) event (drought)	Educate and empower homeowners, reduce risks associated with a CSS events	Development: Lyon Piloting: France. Exploration of a wider suitability in Europe
Wildfire Insurance	Wildfires: forests & wildland-urban interface	Introduce novel insurance concepts, which incentivize to implement risk management measures of NAP	Development: Portugal Exploration of a wider uptake in Europe
Forest Insurance	Wind damage (fire)	Develop parametric insurance products, incentivize adaptation	Development: Germany Piloting: Boreal
Insurances for Agriculture	Drought, Temperature	Develop parametric insurances meeting farmers needs, climate services	Development: Spain (Finland) Exploration of a wider uptake in Europe

1 GREEN ROOFS AS A NATURE-BASED SOLUTION

HOW DO PEOPLE VALUE GREEN ROOF (NATURE-BASED) SOLUTION AND ITS BENEFITS?

Framing information on green roofs on **“Pro-self” individual benefits** (indoor cooling and roof lifespan increase) leads to a **statistically significant increase in Willingness-To-Pay** for flood risk protection and indoor cooling. Considering **public benefits** of green roofs greatly increases their overall economic value, i.e. Cost-Benefit Ratios become positive. Which kind of **business models, incentive schemes and/or information campaigns** can enable wider green roof adoption?



Dutch insurers mention as incentives for uptake of nature-based insurance products (e.g. for green roofs):

- differentiating premiums,
- building information infrastructures,
- applying the build back better approach,
- and offering a broader coverage for nature-based interventions;



What do people care about the most?

Feature	Willingness to Pay (€ = ~€30/year)
Indoor Cooling (Green Roofs)	LAND LAND LAND LAND
Biodiversity	LAND LAND LAND LAND
Roof Protection	LAND LAND LAND
Flood Risk Reduction	LAND LAND
Aesthetic Amenity	LAND LAND

2 WILDFIRE INSURANCE SOLUTIONS

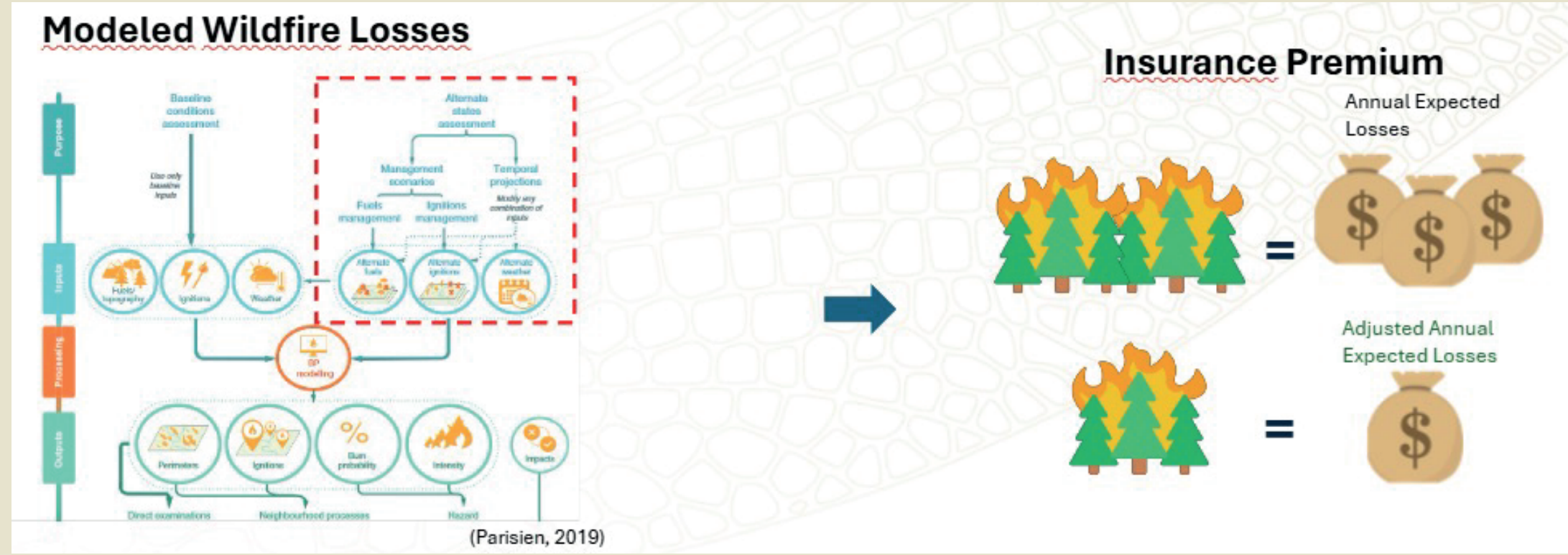
HOW TO INCENTIVIZE ADAPTATION MEASURES?



Copernicus Sentinel-3 satellite on 17 September 2024, shows the large smoke cloud generated by the wildfires. The fires affected over 10,000 hectares between Porto and Aveiro, and more than 5,000 firefighters were mobilised to battle the flames.

Wildfire pilot aims at developing innovative wildfire insurance solutions that incentivize adaptation measures at both the household and forest management levels. Key stakeholder active in participatory design is the Integrated Rural Fire Management Agency (Agência para a Gestão Integrada de Fogos Rurais - AGIF) in Portugal. The project team has identified high-risk areas and gathered essential data to map current wildfire risks. Also, various wildfire mitigation scenarios based on Portugal's National Adaptation Plan (NAP) were developed.

- In the PIISA Project, fire spread models are going to be tested in real-case scenarios as a first step to support the development of new insurance coverage.
- Fire models may improve the understanding of the risk and the impacts of adaptation actions in the hazard reduction at local scale.
- The innovative insurance framework might have positive impacts, reflecting individual risk reduction needs, discouraging development in fire-prone lands and encouraging adaptation measures.
- The next steps are to assess performance of the fire models, quantify the impact of adaptation measures and build a new insurance framework.

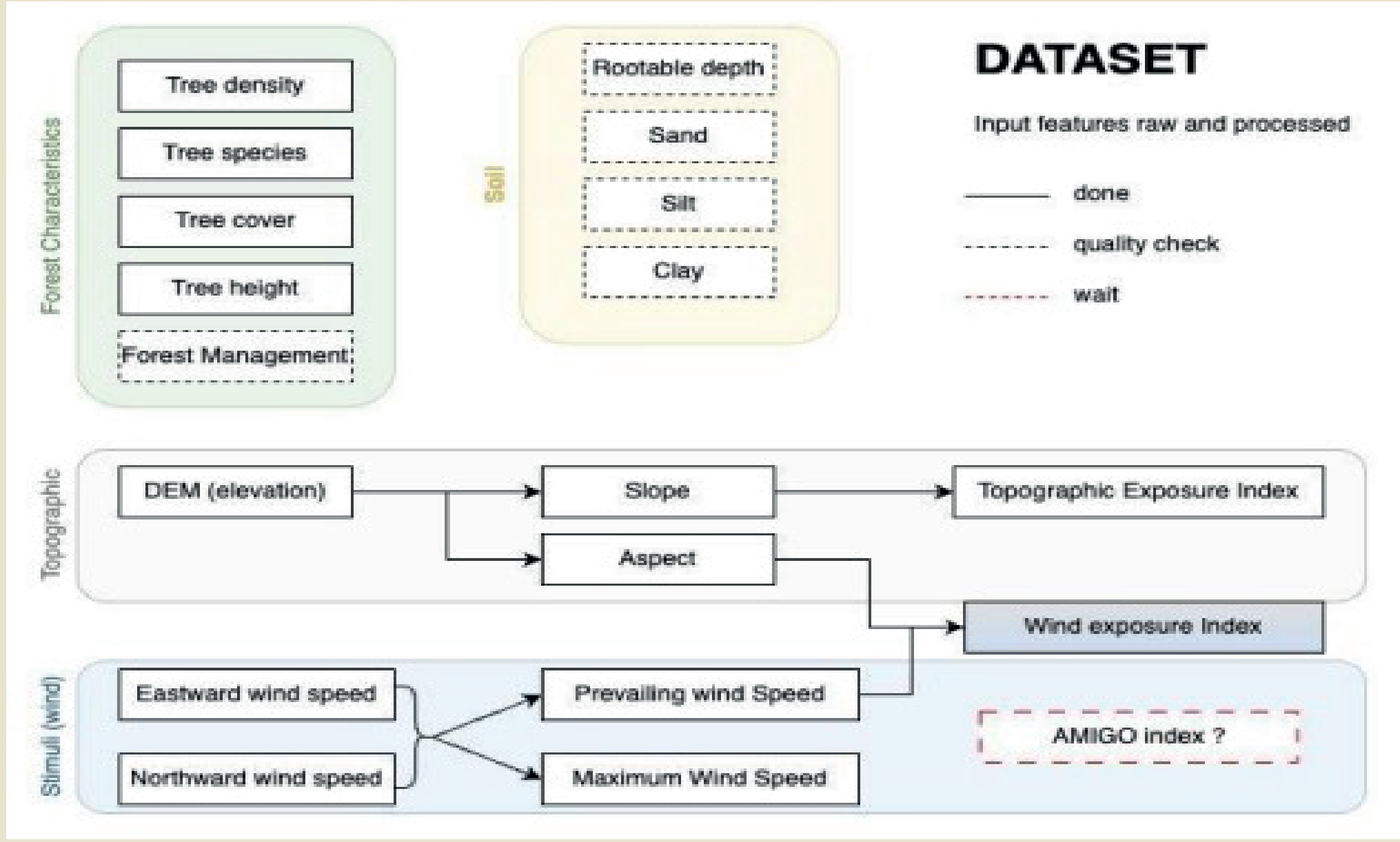


- Goals**
- Identifying the adaptation solutions that have the potential to be combined with insurance modeling
 - Map wildfire risk and quantify risk reduction benefits for households in the WUI and forest owners
 - Develop innovative wildfire insurance that incentivizes adaptation measures
 - Test the replicability and transferability in other areas of Europe

3 CLIMATE CHANGE RISK SENSITIZED FOREST INSURANCE

HOW TO ENCOURAGE ADAPTIVE MANAGEMENT PRACTICES?

Aim is to co-design and co-develop a new climate change risk sensitized forest insurance products to de-risk investments in forestry and encourage adaptive management practices. Development is based on a pilot in Germany, then testing applicability of new schemes, and explore replicability of new insurance concepts in Boreal region (incl. Finland). In Germany, with only 1-5% of the national forest area covered by insurance, the financial risks for forest owners are substantial, threatening both the sustainability and resilience of these critical natural assets.

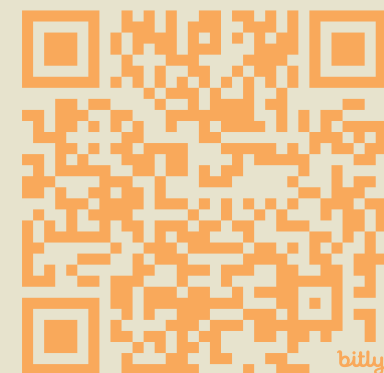


Overview of the data used for windthrow modeling.

The windthrow model is being studied in depth, including detailed vulnerability mapping, sensitivity analysis on the proposed indices, and modelling considering potential adaptation measures. Preliminary results are promising due to low basis risk indicating good potential for insurance applicability. There are however some limitations around data availability and reliability at this stage regarding the losses, parameters and resolution, and new modelling methods and datasets are being explored.

INSURANCE TYPE	DESCRIPTION
Indemnity Insurance	Compensates the insured based on the actual loss or damage suffered. A loss assessment is conducted after the event (e.g., wildfire), and the payout is calculated accordingly. This can take time as it requires a thorough damage evaluation.
Parametric Insurance	Provides payouts based on predefined parameters or triggers (e.g. wind speed), regardless of the actual damage. It allows for quicker payouts since no loss assessment is needed, but the payout might not reflect the exact loss. Other advantages include transparent methodologies, and the possibility to assess how much the management of an area impacts the risk and price.
Hybrid Insurance	Combines elements of both indemnity and parametric insurance. Part of the payout is based on triggers (like parametric insurance), while another part is based on actual damage assessment (like indemnity insurance), offering a balance of quick payouts and accurate compensation.
Carbon Credit Insurance	Covers risks related to carbon credits, such as project failure or underperformance in carbon sequestration. It ensures that the value of carbon credits, which represent reduced or removed emissions, is protected for forestry or other environmental projects.

Table 1: Overview of Insurance Models



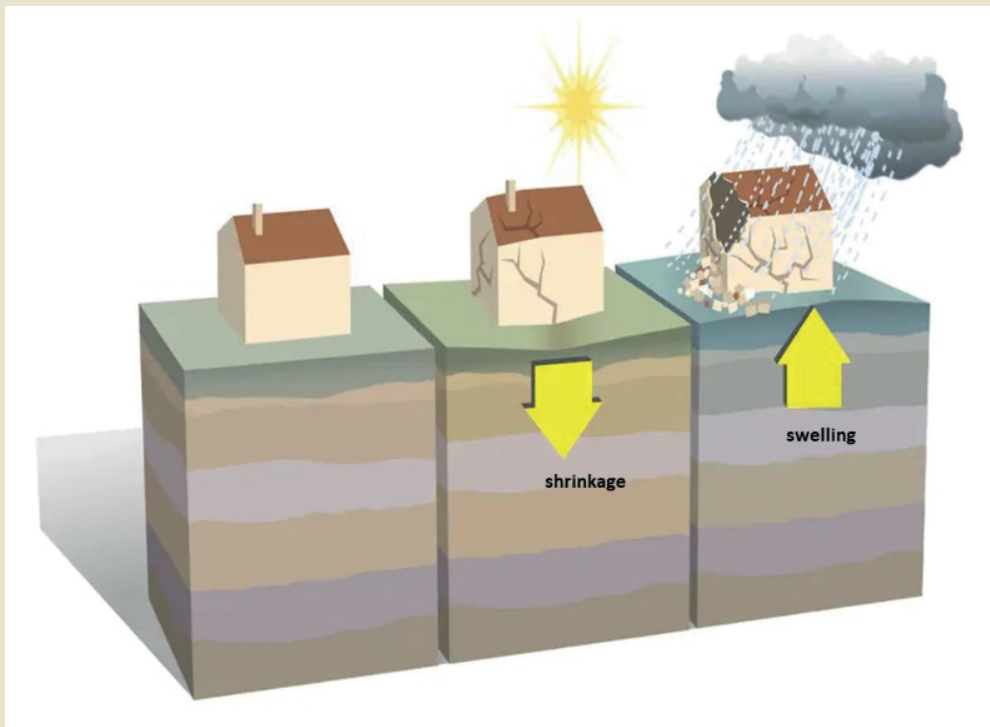
4 SOIL STABILITY BUILDING DAMAGE ASSESSOR

IS YOUR HOME AT RISK FROM GROUND MOVEMENT?

Clay soil consistency can easily change depending on the soil's water content. When it rains, clay soils absorb water and expand like a sponge. When it is dry, the water contained in the clay soil evaporates and the clay soil shrinks. This can lead to ground movement which causes property damage to your home. A clay shrink swell event can occur if the relevant local factors (top soil contains clay >10%, local hydrology, vegetation, etc.) are present and combined with the triggering climate factors (evapotranspiration and precipitation from weather events such as droughts, heatwaves and rainfall).

48 %

French national territory at medium or high risk of ground movement



Clay shrink swell is a significant and widespread problem in France

10 M

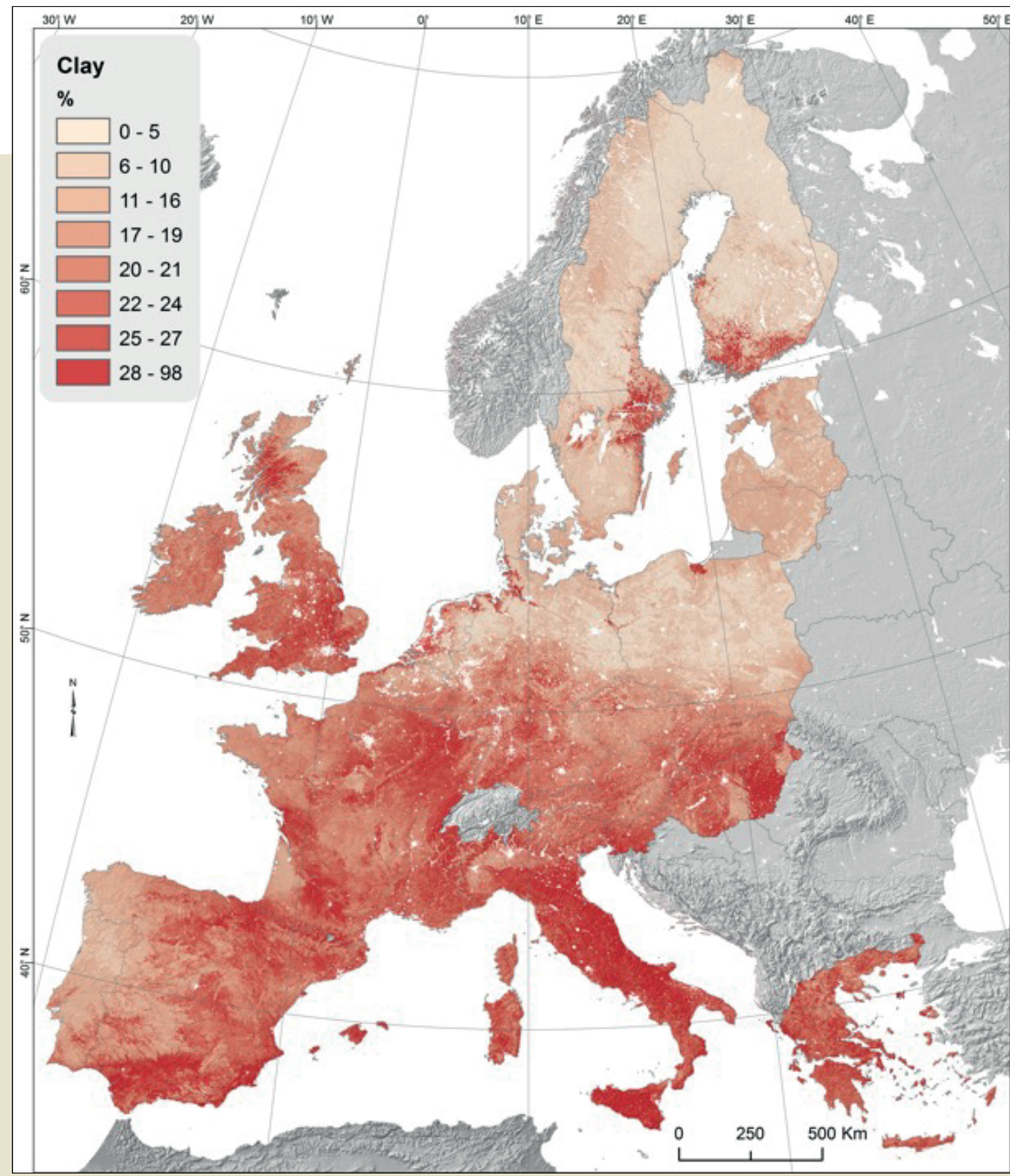
Homes potentially affected (representing 54% of all single-family homes)



50 %

Instances of property damage caused by ground movement in the last 9 years which have not received compensation

Web tool to understand financial risk from inadequate insurance for property damage caused by ground movement to family home is being piloted in Lyon, France.



Clay content (%) in topsoil (0-20cm) (map)
Reference: Ballabio C., Panagos P., Montanarella L. Mapping topsoil physical properties at European scale using the LUCAS database (2016) Geoderma, 261,110-123.