



FORWARDS Project - EIP-AGRI Practice Abstracts

A EUROPEAN REMOTE SENSING SYSTEM FOR THE EARLY DETECTION AND MAPPING OF FOREST VULNERABILITIES AND RISKS

Healthy forests are essential to rural livelihoods, biodiversity, and the bioeconomy. However, they are under increasing threat from storms, droughts, pests, diseases, and fires. These dangers often develop quietly and, if not identified early, can cause significant economic and ecological damage. The FORWARDS project is developing an innovative sensing system that can quickly identify and map forest vulnerabilities and risks across Europe.

By combining satellite observations with advanced data analysis techniques, we are producing Europe-wide maps of forest vulnerability and risk. These maps will highlight areas where forests are most exposed to climate stress, disturbance, or pest outbreaks. This innovative method enables risks to be identified earlier and more reliably than traditional field surveys, at a much lower cost.

For practitioners, the benefits are clear:

- **Better planning** – foresters and landowners can prioritise interventions where they are most needed.
- **Reduced losses** – early warning helps to minimise losses of timber, biodiversity, and carbon storage.
- **Cost-effectiveness** – remote sensing provides information without the need for expensive and time-consuming field campaigns.
- **Scalability** – information is available from the local to the European level, supporting both daily management and long-term policy decisions.

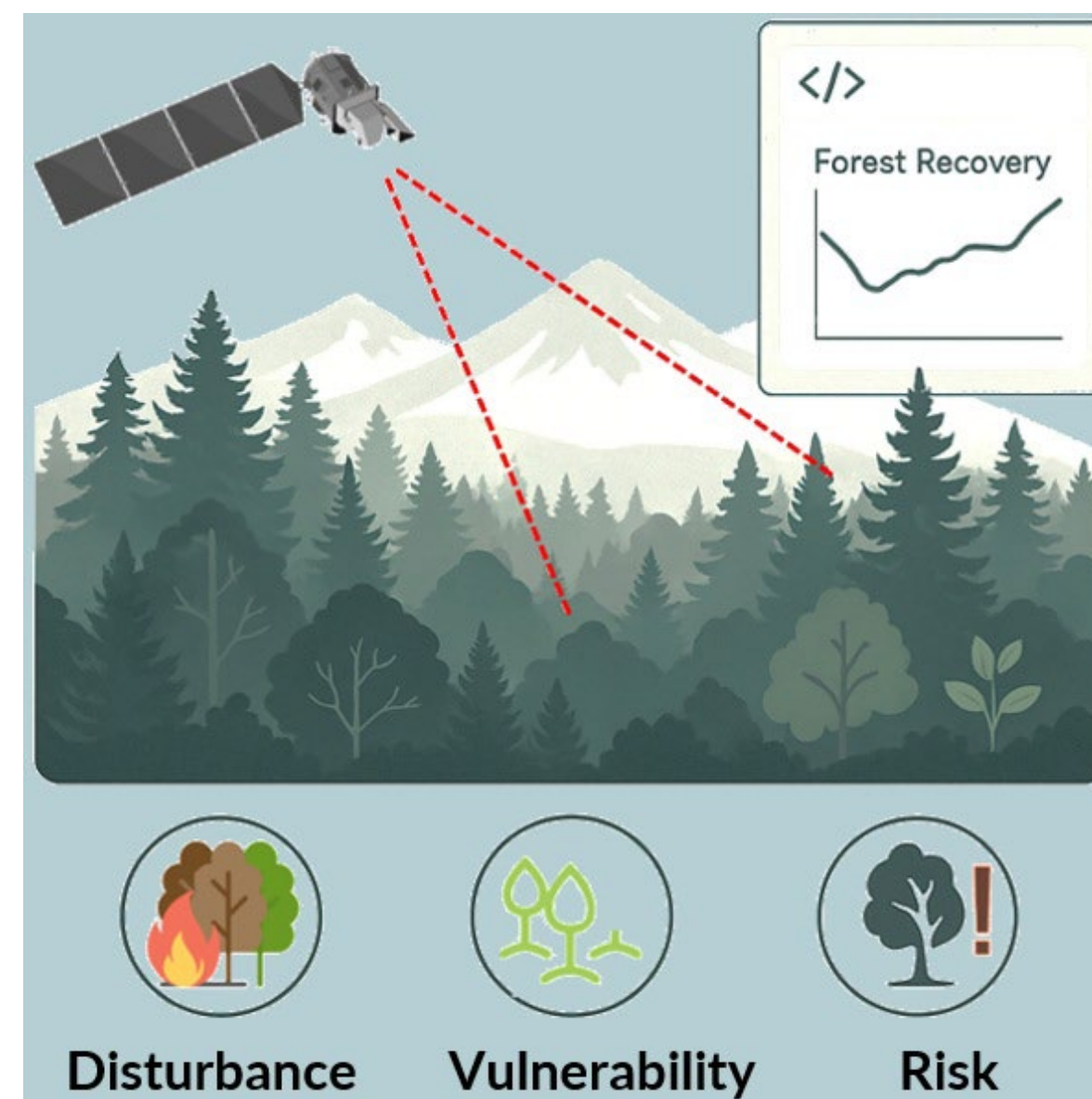


Illustration of remote sensing technology for assessing forest vulnerability and risk.

In practice, forest owners and managers can use these maps to guide monitoring, adapt silvicultural practices, plan harvests, and reduce vulnerability to future risks. For instance, identifying stands under drought stress can inform irrigation or thinning strategies, while pinpointing pest-prone areas enables earlier and more targeted control. Entrepreneurs can turn timely information into proactive management to reduce damage costs while boosting productivity and resilience.

ADDITIONAL INFORMATION

The successful application of European forest vulnerability and risk maps depends on a number of key factors. Remote sensing data is freely available and regularly updated, which ensures long-term consistency and low costs for users. The maps are designed to be easily accessible and interpretable, enabling foresters and policymakers to swiftly identify potential issues. The growing digitalisation of the forestry sector further supports the integration of these tools into existing management systems.

However, some obstacles still exist. A reliable internet connection and basic digital skills are necessary to utilise the maps to their fullest potential. In some cases, local managers may be reluctant to adopt satellite-based information and may require training to understand its value. Another challenge is that, although remote sensing offers a broad overview, ground validation remains important for refining local management decisions. Finally, the concrete benefits of adopting digital technologies remain unclear, which may hinder their uptake among practitioners.



Photos taken in northern Italy after Storm Vaia

Looking ahead, future work should focus on:

- Enhancing the local resolution and detail of maps to assist stand-level decision-making.
- Incorporating forecasts (e.g., weather and climate data) to identify and anticipate risks.
- Creating user-friendly platforms that integrate vulnerability maps with practical guidelines.
- Providing capacity building and training to support practitioners in interpreting and applying results in daily operations.

The main message for end-users is clear: timely information is a powerful tool for managing and reducing risk, and for protecting both the environment and investments. By adopting these tools, practitioners can reduce damage costs, improve forest resilience, and secure long-term productivity.

Collaboration among scientists, managers, and policymakers is crucial to ensure that these solutions evolve to address the real needs of forestry.



Photo taken in northern Italy after Storm Vaia

ADDITIONAL MATERIALS

D'Amico, G., Francini, S., Valbuena, R., Borghi, C., Vangi, E., Chirici, G. (2025).

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[Vulnerability of European forests to natural disturbances](#)

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[Emergent vulnerability to climate-driven disturbances in European forests](#)

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