DESIRA

DESIRA POLICY BRIEF

Digitalisation in wildfires management

«*How can digitalisation contribute to reduce the damage caused by wildfires and make more effective firefighting and restoration of degraded land by 2031?*» is the focal question of the **Andalusian Living Lab (LL) coordinated by the University of Córdoba**. Representatives of all stakeholder groups gathered together to reflect on the current situation, the drawbacks and opportunities for the future. We imagined **two different scenarios for 2031**. A positive one in which augmented forest vulnerability due to Climate Change is balanced thanks to a combination of technological progress and increased awareness about the importance of forests. The second scenario envisions a lack of forest management and urban-forest interface planning. Coupled with uncontrolled land occupation and disappearance of traditional farming activities linked to forests, the result is a deterioration of forest areas. Policies should aim **at creating more resilient forest ecosystems, economically and socially revitalised rural areas, and quick and coordinated technological uptake** for wildfires management.

CONTEXT

The LL focuses on the influence of **digitalisation in firefighting and post-fire recovery** in Andalusia. Wildfires are an increasingly recurrent phenomenon with an everchanging and more unpredictable behaviour, which is highly relevant in a context of climate change. Minimising their impact requires a significant amount of effort, resources, and coordination from all the stakeholders, which are, at the same time, embedded in a complex Socio-Cyber-Physical system. Factors affecting this system include **rural depopulation** and **ageing** as well as agriculture land abandonment, which have led to an increase of forest areas, many of which are unmanaged. Also, the **boundaries between urban and forests** vary with new communities settling within or in the vicinity of forest areas, increasing the complexity of land management. Rapid **progress in R&D** applied to wildfire management requires a more agile and responsive public administration to establish **data protocols** and **data interoperability** mechanisms, and to orchestrate a better coordination with the communities and the private sector. **75% of forest properties are private** and their profitability is compromised by the high costs of forest management actions for fire prevention and the delays in getting their revenues.

Finally, the sector is **demanding professional profiles** linking both forest and technological knowledge which requires the adaptation of universities to more suitable study programmes.

Technologies have significantly **evolved and contributed** to manage and to control wildfires faster and better. Currently, **Remotely Piloted Aircraft Systems** support wildfire monitoring; smartphone **devices and fast networks** allow for immediate communication and geolocation with fire brigades and the civil population; and **hardware improvements** enable to process vast amounts of data in real time. Moreover, public administrations in charge have got **strategies** in place to support the development and adoption of new technologies for wildfire management. These initiatives should be coupled with strategies and **policies to revitalise the rural areas both economically and socially.**

Figure 1. INFOCA fire control team on-site. Source: INFOCA

RESEARCH APPROACH

Starting by the question of "**how can digitalisation contribute to reduce the damage caused by wildfires and make more effective firefighting and restoration of degraded land by 2031?**" we aimed to imagine plausible futures and which strategies would lead there.

💡 *WILDFIRE MANAGEMENT REQUIRES A STRONG COLLABORATION AMONG ALL STAKEHOLDERS. THE LIVING LAB PROVIDED A UNIQUE OPPORTUNITY FOR THEM TO INTERACT AND DISCUSS.*

We followed a co-creative and collaborative approach by engaging all stakeholders involved in wildfires in Andalusia, namely, representatives of the public administration, civil society organisations, private sector and academia.

A first face-to-face session -held in December 2020 in Córdoba- enabled us to identify the situation of digitalisation in wildfire management and the key issues related to it.

A second session with stakeholders was organised in Seville in December 2021, where we combined interactive exercises with group discussion and presentations.

First, we created a timeline with the **milestones of digitalisation** in wildfire management in the past decade. Then, we agreed on the **Drivers of Change** (DOC) understood as critical uncertainties for the future, namely: The occupation and use of forest areas; real time information flows and the availability of digital tools to prevent and control wildfires; Climate Change; valorisation of forest resources and farming activities in forest areas; and communication channels and protocols. For each DOC, we proposed a set of assumptions, including a Business-as-Usual case, a more positive case, a more negative case, and, for some DOCs, an alternative one, neither positive nor negative. Participants then defined individually different **pathways** that could lead to the **creation of future scenarios**.

Figure 2. Participants during the workshop. Source: UCO

SCENARIOS DEVELOPED

In group, we drafted two scenarios. The **positive scenario**, called "*In tech we trust*", is envisaged within a context of moderate climate change, with forests being slightly more vulnerable to wildfires. In this scenario, a combination of technological progress and increased awareness about the importance of forests, achieves to revitalise the rural areas socially and economically, and to significantly reduce the impact of wildfires. It depicts a situation in which all stakeholders win. The main challenges of this scenario are the high dependence on technology and the reliance on people's will to change their behaviour towards nature. This scenario offers opportunities to start new businesses associated to farming in forests and to exploit alternative forest resources.

The **negative scenario -*Less shepherds, more developers***- envisions a future in which there is a lack of forest management and a lack of urban-rural interface planning. All these, coupled with uncontrolled land occupation and disappearance of traditional farming activities linked to the forests, results in the deterioration of forest areas. In this scenario, the use of technology is not enough to revert the situation and forest awareness is insufficient. Within a context of severe changes in the climate, the wildfire risk increases significantly. People leveraging from forests without contributing to their maintenance (newcomers and visitors) are the winners in this scenario. In return, the rural population are less benefited as they have been gradually expelled from the forest areas and deprived of their legacy. Some of the challenges that this scenario presents are linked to the use of technologies to (1)

benefit and to maintain the rural population as well as the farming activities that favour landscape resilience; (2) improve wildfire risk assessment, and predictions; (3) enhance forest management modelling; (4) valorise forest resources and (5) increase forests awareness.

POLICY RELATED DISCUSSION

Policy options discussed during the workshops were linked to sustainable forest management and rural development, land planning, the uptake of technologies and data management.

Participants agreed that **sustainable forest management** policies should aim (1) to **valorise all the forest ecosystem** services, for example, by giving a market value to the carbon sequestrated by forests; (2) to promote a sustainable use of **forest resources**; (3) to foster more **resilient forest ecosystems**, namely multifunctional and diverse; and (4) to **enable different forest land uses**, such as the combination with agroforestry or renewable energy installations. These measures could reduce the impact of wildfires while improving the profitability of forest properties. The main challenge is to choose an appropriate funding mechanism, as 'green taxes' are not mostly welcome.

Protocols for data gathering, data classification, data storage and data sharing are pivotal for a fluent **interoperability** of systems and a quick use of existing information by both public and private entities. Efforts should be made to establish **future-proof mechanisms for data management**, while keeping high standards of security and data protection. Progress in this sense should **not be detrimental to the digital gap** which currently exists in rural contexts; quite the opposite, it should aim to be more inclusive and to reduce the administrative burden for forest property owners and farmers.

Similarly, **sustainable rural development and land-use** policies should support an organised **occupation of urban-forest interfaces and rural areas**, as well as to ensure the **provision**

of high-quality services (e.g., ensuring reliable internet connection to allow for remote working, provision of medical and school services, etc.). These policies would benefit the rural population, especially if they are **combined with** more challenging strategies to **increase forests awareness** and to **maintain traditional agricultural activities** linked to forests, like grazing.

POLICIES SHOULD LOOK AT NEW STRATEGIES TO REVITALISE RURAL AND FOREST AREAS, CAPITALISING ON EXISTING RESOURCES AND KNOWLEDGE. TECHNOLOGIES CAN PLAY A KEY ROLE IN SUCH A TRANSITION.

Strategies to facilitate swift **uptake of technological advances** in wildfire management should be designed to allow the **participation of private companies**, which is currently very limited, and to improve the **coordination and allocation of resources**.

Finally, **collaboration frameworks** among public administration, private sector and communities should be promoted to deploy wildfire prevention, control, and recovery actions.

These strategies should aim to establish shared communication procedures and databases at different scales from local to supra regional level.

Figure 3. Remote cattle grazing control
Source: Pixabay

POLICY OPTIONS

Sustainable forest management

- To assign market value to forest ecosystem services and to channel the revenues through appropriate funding mechanisms to enable the implementation of wildfire prevention measures.
- To promote a sustainable use of the forest resources and to raise awareness on sustainable use and property rights.
- To create more diverse and multifunctional forests through appropriate silviculture, the increase of species variability and livestock grazing.
- To enable different forest land uses, such as the combination with agroforestry or renewable energy installations.

Data management

- To establish common and interoperable protocols to gather, classify, store and share data among the platforms used by stakeholders, quickly and safely.
- To establish accessible mechanisms for citizens to allow them contributing, consulting and using relevant data.
- To establish good data management practices to reduce the administrative burden for citizens.

Sustainable rural development and land-use planning

- To regulate urban planning in rural areas and forest-urban interfaces to support a controlled increase of settlements.
- To assign resources to ensuring the provision of high-quality services in rural areas.
- To assign resources to maintaining and to revitalising traditional farming activities in forests.

R&D

- To boost the development and use of new technologies for wildfire prevention strategies and for more efficient soil restoration measures.

Collaboration framework

- To set up frameworks to enable the coordination of public administration, private companies, and communities to manage wildfire prevention, control, and recovery at multiple scales (from local to national).

DESIRA POLICY BRIEF

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalisation in the context of wildfire management in Andalusia.

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