



PRACTICE ABSTRACT

Digital technology

# FRESH LIFE – DEMONSTRATING REMOTE SENSING INTEGRATION IN SUSTAINABLE FOREST MANAGEMENT

Gherardo Chirici, Università degli Studi di Firenze / Accademia Italiana di Scienze Forestali

Climate change is a challenge that significantly impacts the functioning of forest ecosystems and the services they provide. The complex nature of climate change increases the uncertainty in predicting future forest ecosystem dynamics and requires an adaptive management approach. Forest managers need monitoring and analysis tools to assess the condition of forest resources and their capacity to supply ecosystem services.

Geographic information systems (GIS) and remote sensing are useful tools to quantify sustainable forest management (SFM) indicators to support local decisions. SFM is widely recognised as a key objective of forestry policy and practices.

The FRESH LIFE – Demonstrating Remote Sensing Integration in Sustainable Forest Management (LIFE14 ENV/IT/000414) project demonstrated innovative methods to integrate forest inventory data collected in the field with remote sensing information, to estimate selected SFM indicators at local scale. Within the project, high-resolution data were collected at three sites in central Italy using drones equipped with light detection and ranging (LiDAR) and optical sensors. Automated and semi-automated mapping methods were then used to spatially characterise the variables used to assess forest physiognomy and conditions at the scale of the forest management unit.

## Application scenario

Data fusion among field-collected forest inventory data and remote sensing information to quantify sustainable forest management (SFM) and support precision forestry

## Digital technologies

Unmanned Aerial Vehicles (UAVs), GIS, remote sensing

## Socio-economic impact

- Economic: less expensive data collection, less time-consuming methods, resources mapping, transparency of value chains, certification
- Environmental: sustainable forest management, resilience of forests
- Social: forest data, management decisions

More info: <https://freshlifeproject.net/>



## Purpose of the tool

The FRESH LIFE project demonstrated that remote sensing, using drones equipped with multispectral sensors, can be used to develop a forest information system based on multiple indicator maps. This was shown to be a less expensive and less time consuming method for acquiring forest data than traditional approaches based only on field observations.

Information generated through these new techniques can help in improving forest management decisions. The information is also useful in helping to achieve sustainable forest management targets and forest certifications in the framework of precision forestry.

The applicability of the methodologies at a wider scale and the integration with European Forest Data infrastructures is possible.

## Description of the tool

Under the coordination of the Italian Academy of Forest Sciences, the FRESH LIFE project aimed at integrating forest inventory data (collected in the field) with remotely sensed information (collected through multiplatform instruments) to spatially estimate a number of forest variables.

Data were used to implement a Forest Information System (FIS) in order to support local sustainable forest management actions. Three demonstration sites in Italy were involved. In Ricine (Tuscany Region), the growing stock data and other variables were integrated in the FIS to support the implementation of the new forest plan. In Caprarola (Lazio Region), the FIS was used for a multi-criteria analysis between alternative uses of the local forest area. Lastly, in Bosco Pennataro (Molise Region) the FIS was adopted to discuss and take decisions about forest harvesting and other forest-related activities.

## Areas of socio-economic impacts

<b>Social</b>	Estimation of SFM indicators faster than current data collection systems.
<b>Economic</b>	Decision-making in forest management and certification based on fast and reliable information, resulting in an improved transparency of value chains.
<b>Environmental</b>	Enhanced environmental services to improve the health status and resilience of forests.



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