FOREST MONITORING SERVICE FOR SOUTH TYROL

Providing information on changes of forest extent and conditions tailored to the needs of a regional Forest Service to support management and planning.

The challenge

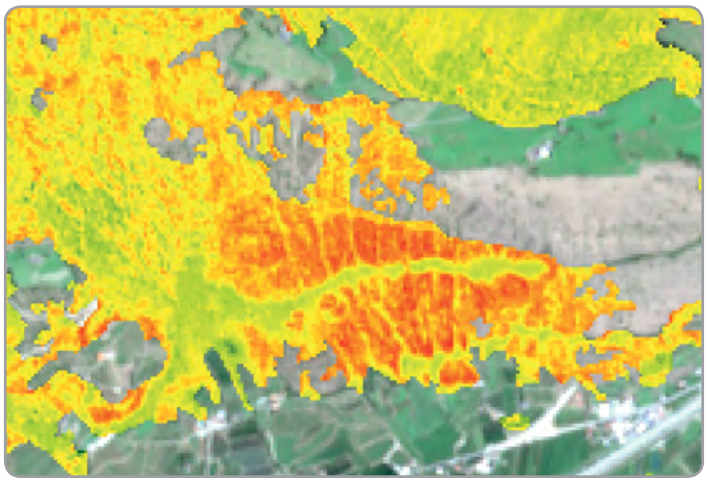
Vast areas totalling 800 ha of dried up pines dominated the slopes of the Vinschgau Valley in South Tyrol (Italy) in spring 2017. These were largely the result of the severe drought of the previous two years combined with an increased vulnerability towards pest infestations. This is only one example where the Forest Service of the regional administration needs specific information about forest conditions to define and adapt site-specific management strategies and to control their effects on the forest ecosystems. Due to the i) large dimension of forest, ii) the importance of protecting the forest and iii) the remoteness and inaccessibility of mountain areas, Earth Observation is often the only means to monitor the extent and conditions of mountain forests and efficiently alert and inform about forest changes in a timely, accurately and spatially explicit way.

The space based solution

At Eurac Research, we developed a pre-operational Forest Monitoring Service that is tailored to the needs of the regional administration and adapted to the IT of the Forest Service. The service is entirely based on the Copernicus programme and makes use of all available high-resolution optical imagery provided by the Sentinel-2 satellite constellation as well as the geographical information by the Copernicus land monitoring service, which makes it scalable to any other region. The Forest Monitoring Service offers a set of accurate, timely and area-wide information on forest ecosystems. This set comprises annual information such as cloud-free image mosaics and information on forest extent, loss or partially damaged areas. This is complemented by a near real-time mapping service that identifies potentially damaged areas with each new satellite image acquisition and continuously tracks forest stand vitality as well as recovery based on vegetation indices. We provide all information (images, maps, quality measures and metadata) via a Web Map Service to allow the direct integration into the Forest Information System for supporting the work of a total of 300 foresters. To foster the acceptance of our maps, we regularly meet with the Forest Service and provide information and training sessions to foresters.

Benefits to Citizens

Mountain forests cover nearly half of the area of South Tyrol and provide a wide range of benefits: provision of wood and natural resources, conservation of biodiversity, recreation opportunities for tourists and residents but most importantly the effective protection against soil erosion and natural hazards such as avalanches, landslides and debris flows. The Forest Service's mission is to sustain the forests in providing the lasting benefits to citizens and forest owners who rely on them. The Forest Monitoring Service strongly supports the Forest Service in developing tools and generating datasets to achieve this objective. The continuous provision of high quality, timely, area-wide and digital information on forest conditions is crucial to plan and evaluate management



Monitoring of forest conditions using vegetation indices to identify and map vitality loss.

Thematic Area: AGRICULTURE, FOOD, FORESTRY AND FISHERIES

Region of Application: SOUTH TYROL

Sentinel mission used: S2

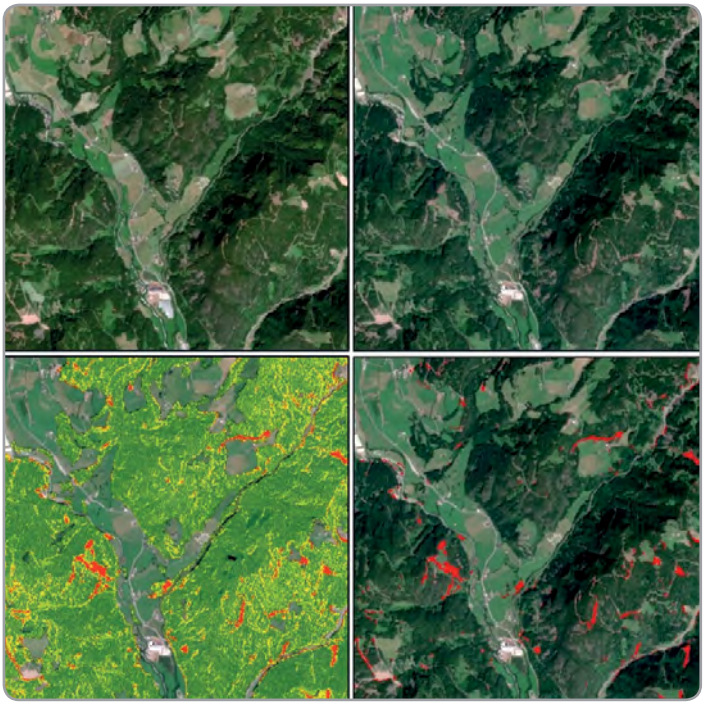
Copernicus Service used: CLMS

Usage Maturity Level: 4

measures now and with a view on climate change. The ongoing conversion of pine forest stands in lower elevation zones to hardwood dominated near-natural mixed forests across South Tyrol is only one example. The Forest Service estimates its direct annual monetary benefits of around € 50,000 coming from the assessment of 1,200 forest damage locations by 1.5 person/year.

Outlook to the future

The strategy for the future is to improve and enhance the Forest Monitoring Service according to the requirements and priorities of the Forest Service. We plan to map the actual distribution of tree species to evaluate their site-specific suitability in the face of climate change projections to better adapt forest management decisions. This mapping attempt will benefit significantly from the synergies of the fully operational Sentinel constellations. As an institution which is primarily regionally funded, we can ensure the long-term sustainability of our service and plan to extent it on an alpine level as part of our Sentinel Alpine Observatory initiative (www.sao.eurac.edu).



Near-real time identification of forest changes to support the management of protection forests.

> "Earth Observation and change products suitable for a mountain region like South Tyrol is revolutionizing our forest monitoring."
>
> ***Günther Unterthiner,***
> ***Forest Service of Bolzano***

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ABOUT COPERNICUS4REGIONS

This Copernicus User Story is extracted from the publication "**The Ever Growing use of Copernicus across Europe's Regions: a selection of 99 user stories by local and regional authorities**", 2018, Edited by NEREUS, the European Space Agency and the European Commission.
The model cases focus on local and regional authorities who successfully applied Copernicus data in 8 major public policy domains.
The views expressed in the Copernicus User Stories are those of the Authors and can in no way be taken to reflect the official opinion of the European Space Agency or of the European Commission.
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