REMOTE SENSING FOR GARAJONAY NATIONAL PARK MANAGEMENT

Understanding the Laurisilva forest dynamics has been crucial for the management of Garajonay. In the last decade this has been made possible thanks to the historical series of Landsat images.

The challenge

Laurisilva forest in Garajonay National Park (GNP) (La Gomera, Canary Island) is the best preserved sample of this type of vegetation throughout the Canary Islands. It has a mature state of conservation but presents signs of decay in some areas. Understanding the possible causes is crucial and analysis of forest evolution through images over the last decade is the main tool for a complete overview of the problem.

The space based solution

The historical series of Landsat imagery allowed the analysis of annual variability of different vegetation indices between 1995 and 2016. We aimed to identify areas showing a devitalisation tendency during the studied period.

The temporal resolution obtained with Landsat enabled the provision of enough images to build mosaics free of clouds. For the devitalised areas detection we created annual mosaics and tested various vegetation indices together with an algorithm called "greenbrown". This algorithm is used to analyse trend changes in gridded time series such as from satellite observations or climate model simulation. In this case vegetation indices were computed from historical series of Landsat images. The Enhanced Vegetation Index (EVI) showed the…It shoud be: The Enhanced Vegetation Index (EVI) showed the best performance. The figure shows the mean tendency of an area labelled as devitalised (see next figure). It is normal to observe the lowest values in years of severe drought. However, this kind of vegetation recovers quickly with the presence of clouds.

We also used Sentinel-2 images to evaluate the current state of Laurisilva forest in GNP. We located devitalised and healthy areas during a summer field campaign in 2017 and used the data, first, to train a classification model applied on Sentinel images and then to validate results.
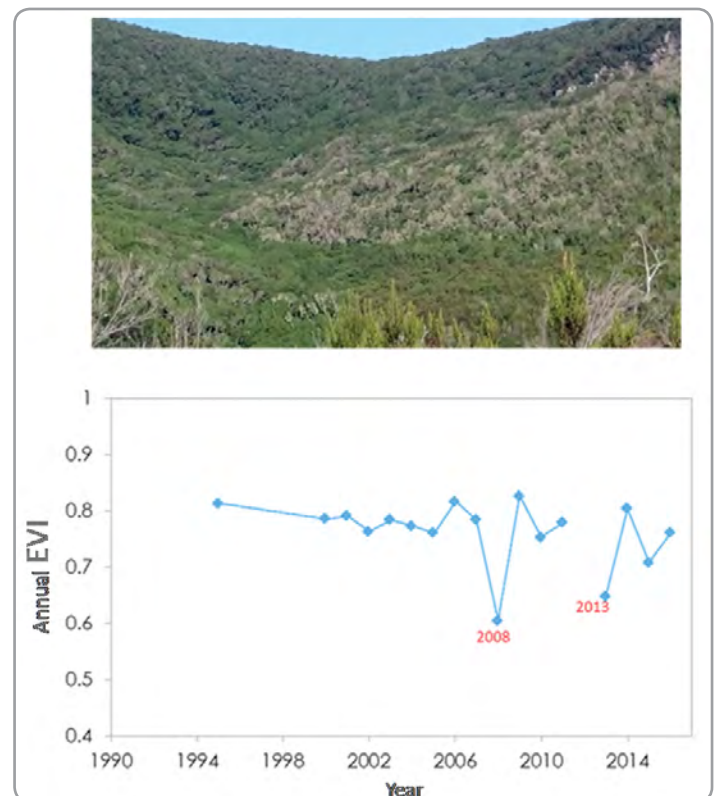
Evolution of EVI for an area with devitalisation symptoms, mainly in years of severe drought.

Benefits to Citizens

Updated maps of the state of Laurisilva forest and location of devitalisation hot spots are useful tools for decision-making in forest management.

| Thematic Area	Region of Application	Sentinel mission used	Copernicus Service used	Usage Maturity Level
AGRICULTURE, FOOD, FORESTRY AND FISHERIES	LA GOMERA	S2	–	3

Free availability of images together with open source image processing software like QGIS or SNAP (Sentinel Application Platform) allows high quality spatio-temporal studies, at low cost. It enables the study of large areas and the analysis of landscape dynamics that help explain current forest state and processes. Easy access to these tools also brings this technology closer to citizens. This also provides greater understanding and awareness for the care of the environment.

In addition, Agresta S.Coop. has automated all the processing chain from image to products, making the work more efficient.
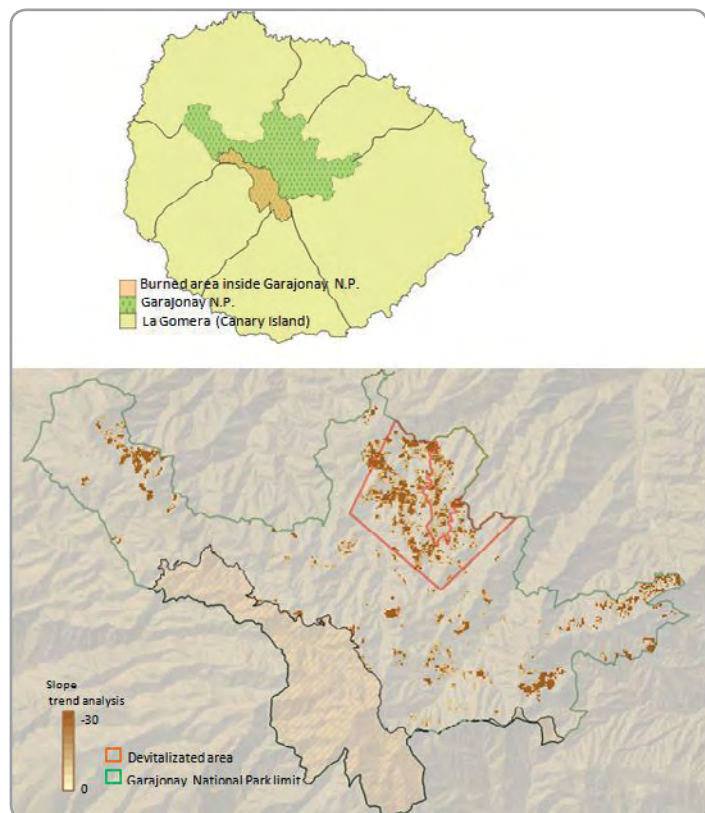
Mapping of areas showing a negative slope in trend analysis (1995-2016) in Laurisilva forest in Garajonay National Park

" This application is revolutionary in the forestry sector and is a great advance in the way that decision-making can be carried out in forest management."

Ángel Fernandez,
Garajonay N. P. Director

Outlook to the future

Finer spatial and spectral resolution of Sentinel- 2 compared to Landsat helped improve the identification of devitalised areas in Laurisilva forest. Sentinel-2 opens up a wide range of possibilities for detailed studies in the forestry sector. For Agresta S.Coop, the Copernicus Programme is essential for many of its current work and future strategies. For example, current efforts focused on forestry species identification will certainly be improved by the possibility of combining different sources of imagery like optical Sentinel-2 and radar Sentinel-1.

Acknowledgements

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