

## EARTH OBSERVATION DATA TO DETECT IRRIGATED AREAS: AN APPLICATION IN SOUTHERN ITALY

*A satellite-based service that allows to map areas irrigated without permission was implemented in two land reclamation consortia in Campania.*

### The challenge

In Southern Mediterranean regions, irrigation is essential for ensuring high crop yields during late spring and summer, characterised by high temperatures and lack of rain. Indeed, irrigation allows lands to be, on average, twice as productive as rain-fed lands. Improving the efficiency of water use for irrigation is required to ensure long-term sustainability of irrigated agriculture. Current Earth Observation (EO) systems like Sentinel-2 provide multispectral imagery of crops with relatively high spatial and temporal resolutions and is free of charge.

The goal is to empower water managers to optimise the detection of non-authorized water abstractions for irrigation in two land Reclamation Consortia located in the Campania Region (Italy).

### The space based solution

The mapping system for irrigated areas is based on the temporal variability of vegetative vigour. In detail, a time series of NDVI (Normalised Difference Vegetation Index) maps are computed using Sentinel-2A (S2A) and Sentinel-2B (S2B) data.

This process allows a classified map of the growth patterns to be obtained and to verify that the growth curve is linked to the supply of established water. By overlaying the information layer of the registered cadastral parcels and the classified map, it identifies the areas without water authorisations also called water rights.

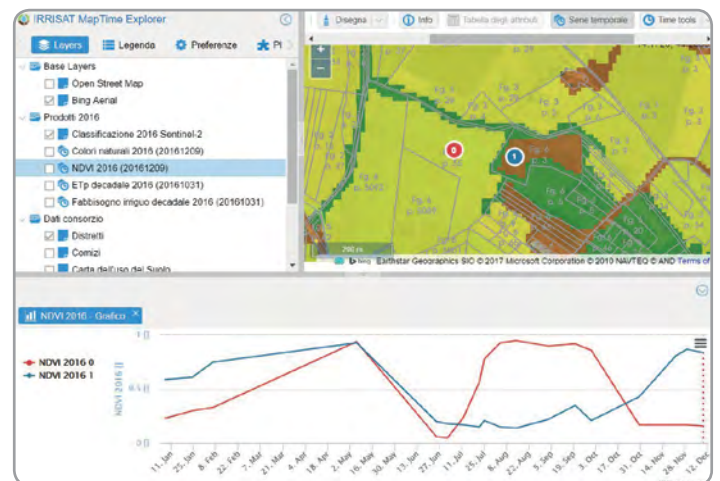
In detail, the map of the irrigated and non-irrigated areas, must be intersected with parcel boundaries with regular irrigation authorisations (Compliance parcels). For each farm, cadastral

references, extension of irrigated area, irrigation period, permitted crops and water volume, are indicated.

Based on these data, it is possible to detect the irrigated areas without necessary water authorisations (Non-compliance - First type) and the irrigated areas which exceed the declared irrigated areas (Non-compliance - Second type). This methodology highlights the potential of EO data to improve water management policies and practices, especially in extreme conditions such as drought.

### Benefits to Citizens

Improvement in the efficiency of water use for irrigation is required to ensure long-term sustainability of irrigated agriculture. The EU Common Agricultural Policy (CAP), combined with the Water Framework Directive, imposes a substantial increase in the efficiency of water use in agriculture for the next decade on farmers and irrigation managers.



Cadastral parcels with (green parcels) and without (red and orange parcels) necessary water authorizations and its location in Campania region (Italy)

Thematic Area



AGRICULTURE,  
FOOD, FORESTRY  
AND FISHERIES

Region of Application



CAMPANIA

Sentinel mission used



S2

Copernicus Service used



-

Usage Maturity Level



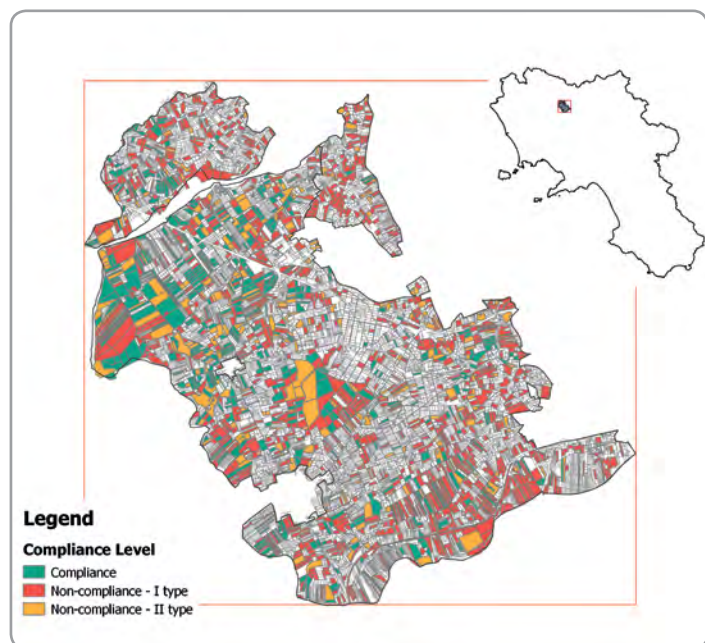
5

Monitoring irrigated areas and the abstracted volumes on a systematic basis, and better targeting of field inspections aimed at assessing compliance with legal water allocation, ensure the legitimacy of self-declared irrigation water abstractions and safeguard compliance with water restrictions set in special occasions such as drought.

In conclusion, it is possible to obtain an equitable redistribution of costs related to the use of water resources as well as economic and environmental benefits for the local community.

## Outlook to the future

Further lines of development could be the introduction of this methodology in the context of the emerging open data "Marketplace", with the aim of using the open data and services, involving and combining individuals, businesses and public sector bodies.



Cadastral parcels with (green parcels) and without (red and orange parcels) necessary water authorizations and its location in Campania region (Italy)

“We view it as an extremely useful tool, whilst up until recently our controls were based on random and, from a human perspective, burdensome on-site audits, today we start from satellite data to gain overall information and when things don't add up we go on site for a visual inspection.”

*Eng. Massimo Natalizio,  
Irrigation Consorzio Sannio Alifano.  
Platinum magazine - November 2017*

## Acknowledgements

This story synthesises the works performed within the project DIANA – EU H2020 (Detection and Integrated Assessment of Non-authorized water Abstractions using by EO).

Carlo De Michele, Salvatore Falanga Bolognesi and Oscar Rosario Belfiore.  
ARIESPACE S.r.l., Italy  
Email: [carlo.demichale@ariespace.com](mailto:carlo.demichale@ariespace.com)

## 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.

Funded by the European Union, in collaboration with NEREUS. Paging, printing and distribution funded by the European Space Agency. IPR Provisions apply. Copernicus4Regions material may be used exclusively for non commercial purposes and provided that suitable acknowledgment is given.