National drought hydrologic and agricultural monitoring system "natDHMS"

QUESTION. How can we develop an integrated framework aimed at assessing water resources and drought impacts across multiple spatial and temporal scales?

OBJECTIVE.
To deploy an advanced monitoring tool that, by integrating various data sources, provides both real-time and historical information on water resources through a comprehensive approach.

DESCRIPTION. Drought represents one of the most pressing climate challenges for Italy, with significant impacts on domestic water use, agriculture, production sectors, water resource management, and ecosystems. This advanced monitoring tool serves as a comprehensive resource, offering historical and real-time data on water resources at multiple spatial scales. Its holistic approach, data integration capabilities, flexibility, and predictive functionalities make it an essential asset for delivering the insights needed to understand, manage, and plan the sustainable use of water resources in Italy.

HOW IT WORKS. The National Drought Hydrological Monitoring System (NatDHMS) is an advanced monitoring tool for the assessment of water resources. It is a national-scale drought observation system that integrates data from meteorological stations, hydrological models, and satellite observations. NatDHMS provides a spatial resolution of 1 km and monthly data from 2010 to 2024, delivering essential tools for drought monitoring, analysis, and water resource management.NatDHMS includes a set of indicators that enable the assessment of different drought-related processes (meteorological, hydrological, and agricultural drought). Its key features include:

- Extensive Geographical Coverage: The system spans a wide range of geographic areas—from national scale down to smaller hydrological basins—providing indices, datasets, and algorithms. This broad coverage ensures a holistic understanding of water resource dynamics.

- Multi-Use Water Resource Assessment: NatDHMS not only estimates the available water quantity but also considers its various potential uses, including agriculture, industry, and domestic consumption.
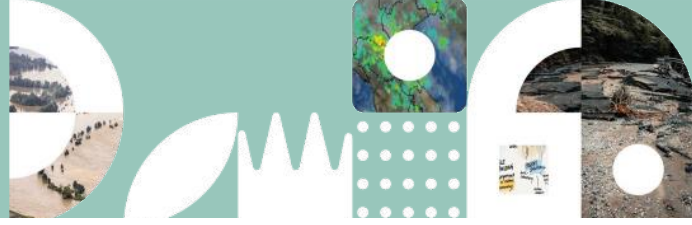
- Data Integration: The system leverages a combination of data sources, integrating models, in-situ measurements, and Earth observation data. This synergy ensures the accuracy and reliability of the information provided. By combining real-time data with historical records, the system offers a rich temporal context for analyzing trends and changes in water availability.

- Guidelines for Information Use: To support effective and intuitive interpretation, the tool incorporates guidelines for using and understanding the various indices. These guidelines assist users in making informed decisions and developing sound policies by translating complex data into actionable insights.

NatDHMS is a valuable tool in addressing the challenge of drought in Italy. Its high spatial and temporal resolution enables the development of effective strategies for monitoring, prevention, and drought risk mitigation, contributing to territorial resilience and the sustainable use of water resources.

" Impact-based decision making allows the prioritization of strategies for targeted future investments."

FAPAR anomaly [-]
Sep.2023 (reference period 2012-2022)
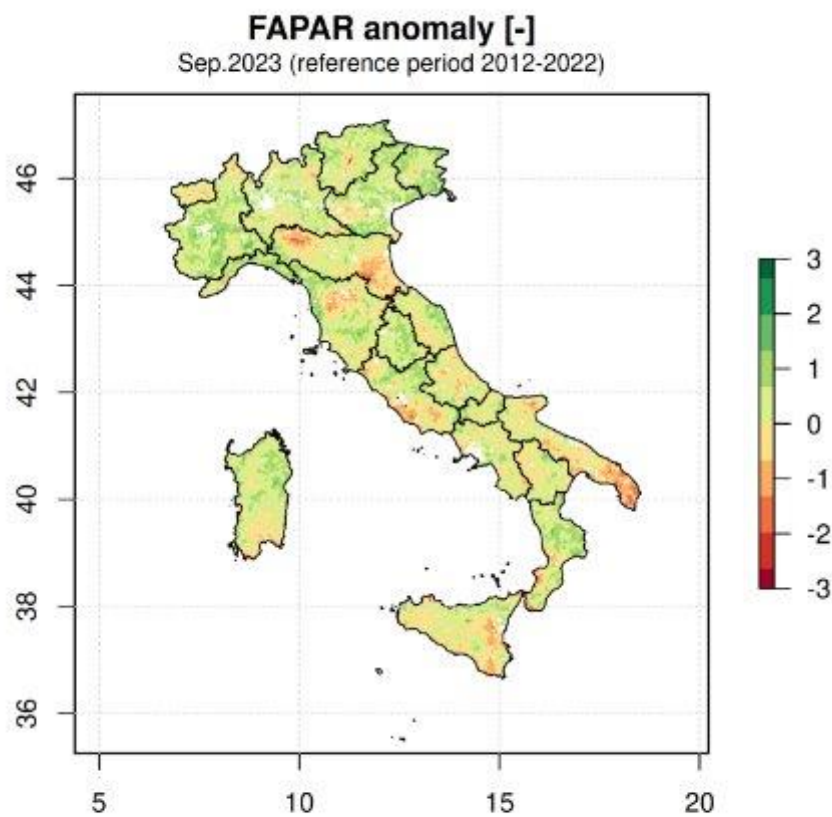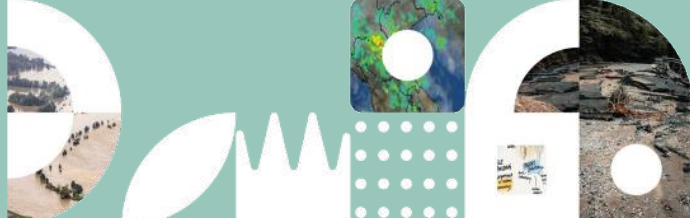
Fraction of absorbed
photosynthetically active radiation (FAPAR) anomaly

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