



ADBPPO

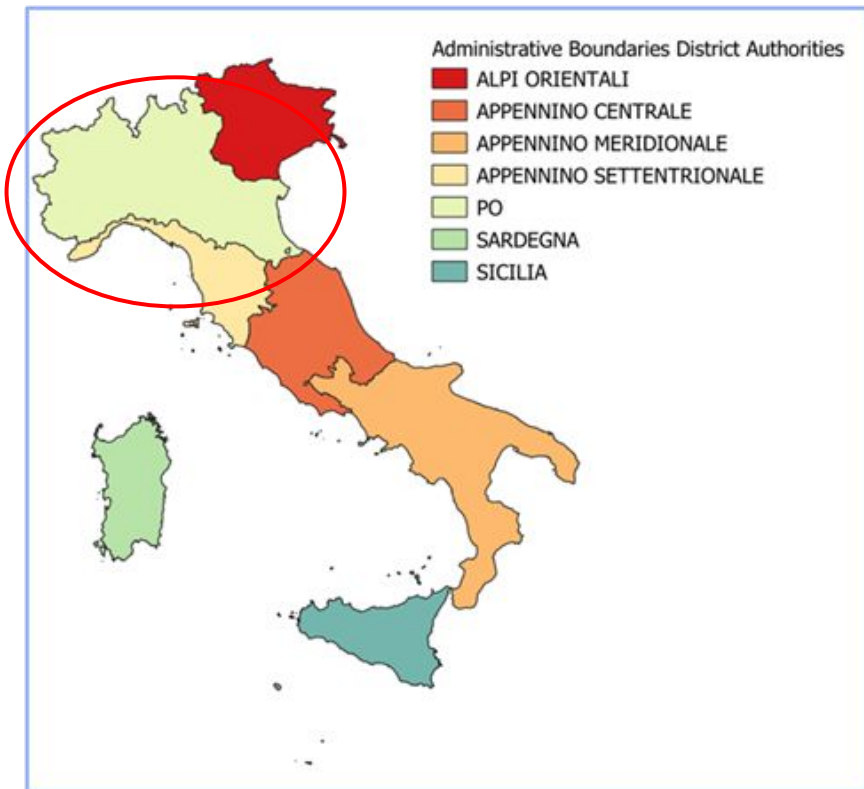
Autorità di bacino distrettuale del fiume Po

District water balance and use of water in agriculture in the Po river basin

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Water availability in the District



The Po River District has always been characterized by a great abundance of water.

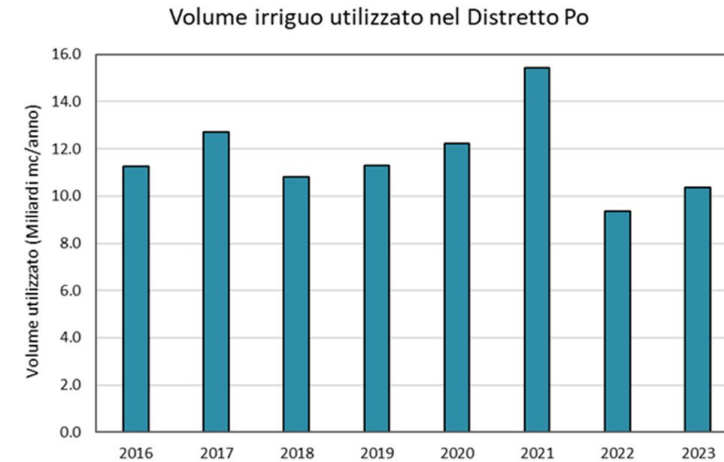
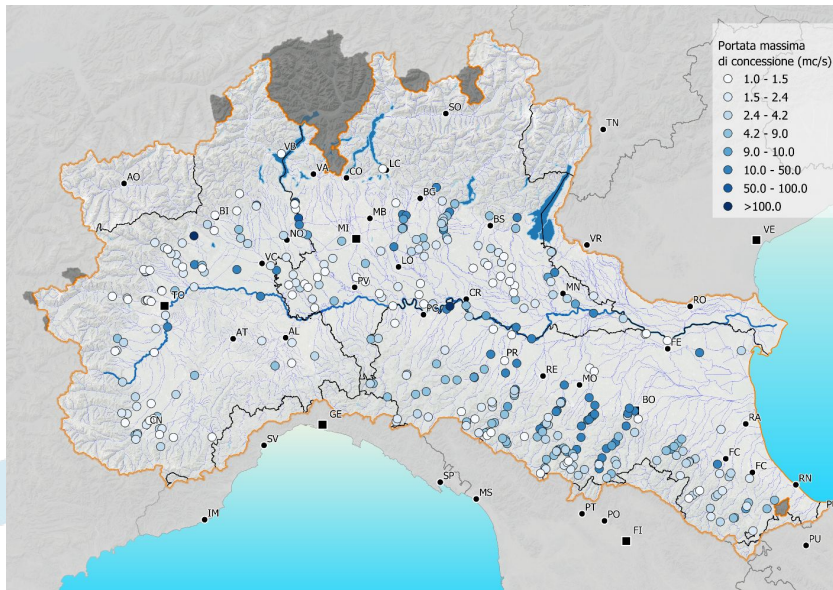
Analyzing the precipitation data available it is possible to observe that the average annual precipitation in the District, referring to the period 1991-2020 (thirty-year climatic reference period), has reached an average value of about **995 millimeters**, which corresponds to an average annual volume of water inflow of about **86 billion cubic meters**, of which about 47 billion are transformed into surface runoffs while the remaining 39 billion are attributable to infiltration, evapotranspiration and uses.

Afflusso meteorico Distretto Po					
Anno minimo 2017		Media (Anno prossimo al valore medio: 2016)		Anno massimo 2014	
Precipitazione mm	Volume miliardi di m ³	Precipitazione mm	Volume miliardi di m ³	Precipitazione mm	Volume miliardi di m ³
735	64	995	86	1.389	121

The uses of the resource in the District

20 BILLION (AVERAGE) OF WATER WITHDRAWN FOR DIFFERENT USES

- 12 BILLION IRRIGATION USE
- 3 BILLION FOR CIVIL USE
- 2 BILLION INDUSTRIAL USE
- 3 BILLION NON-DISSIPATIVE USES (Energy production, navigation, etc.)



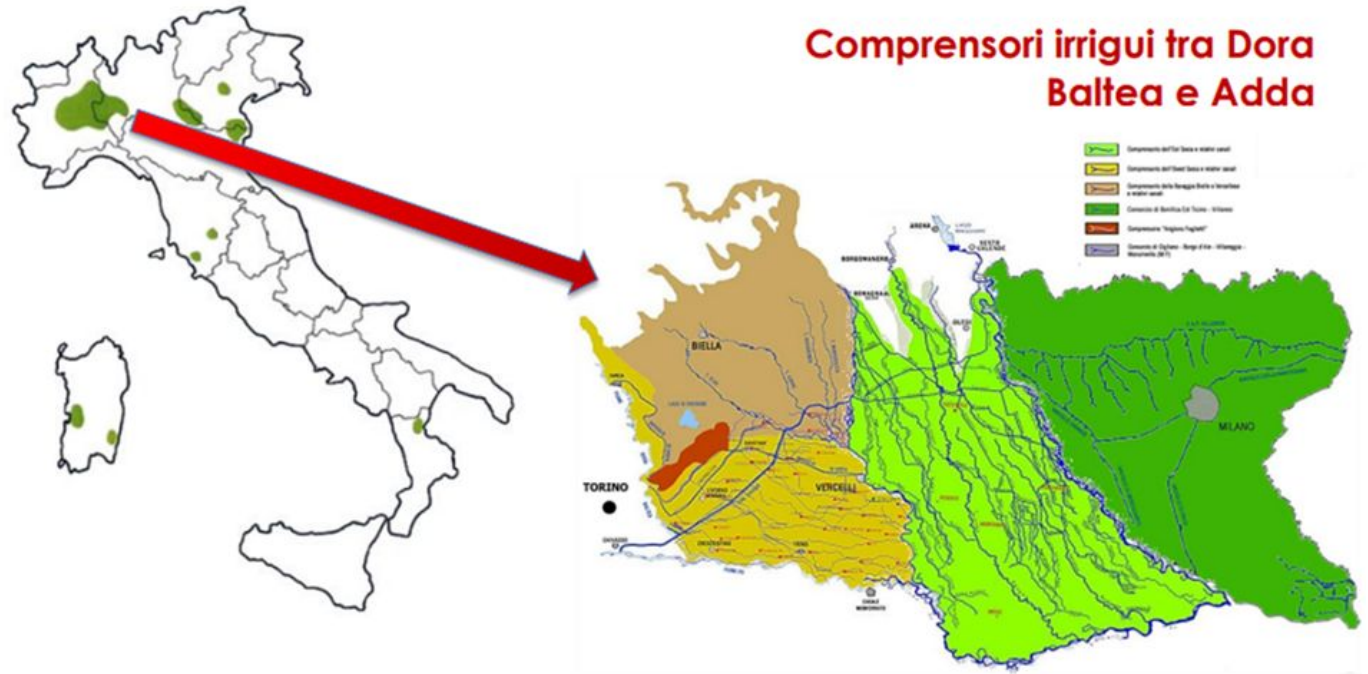
Approximately 3 million hectares of utilised agricultural land

Region	Hectares	Main crops
Valle d'Aosta	58.856	Meadows and pasture
Piemonte	960.445	Arable crops
Lombardia	958.378	Arable crops, cereal crops, legumes, vegetables, industrial crops
Veneto	781.630	Arable crops, cereal crops, legumes, vegetables and industrial crops
Emilia-Romagna	1.081.217	Arable crops, cereal crops, legumes, vegetables, industrial crops

The uses of the resource in the District: rice

In the Po River District, about **214,000 hectares** of UAA are cultivated with rice. The total production of rice in the district in 2022 was **1.2 million tons**, with about 60% of the production coming from Piedmont and 37% from Lombardy.

The total water requirement for rice in the Po district amounts to about **3.6 billion m³**. Of this amount, about 1.8 billion m³ are destined for Piedmont and about 1.7 billion m³ for Lombardy.

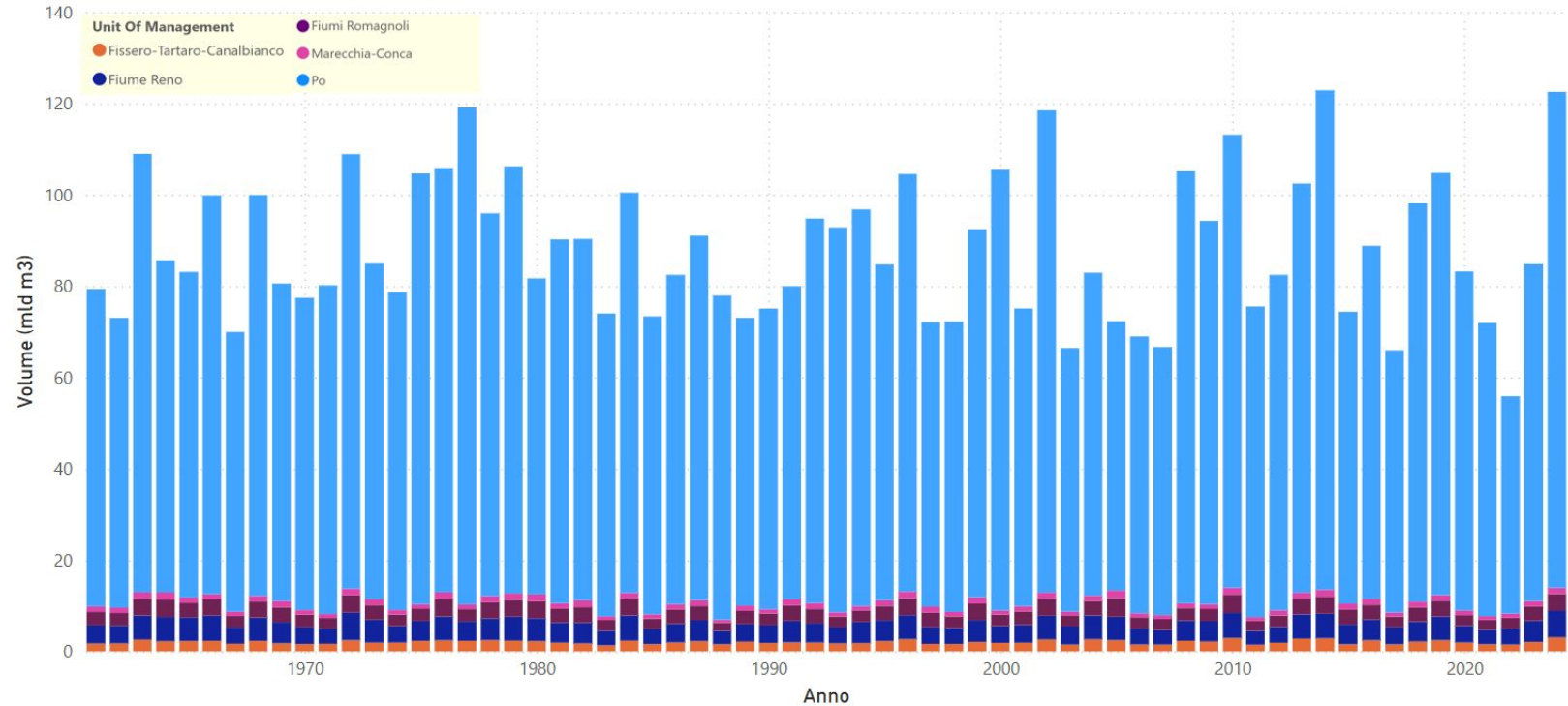


> 200 000 ha, ~ 93% nel bacino lombardo-piemontese
Superfici irrigate «per sommersione», almeno in teoria...

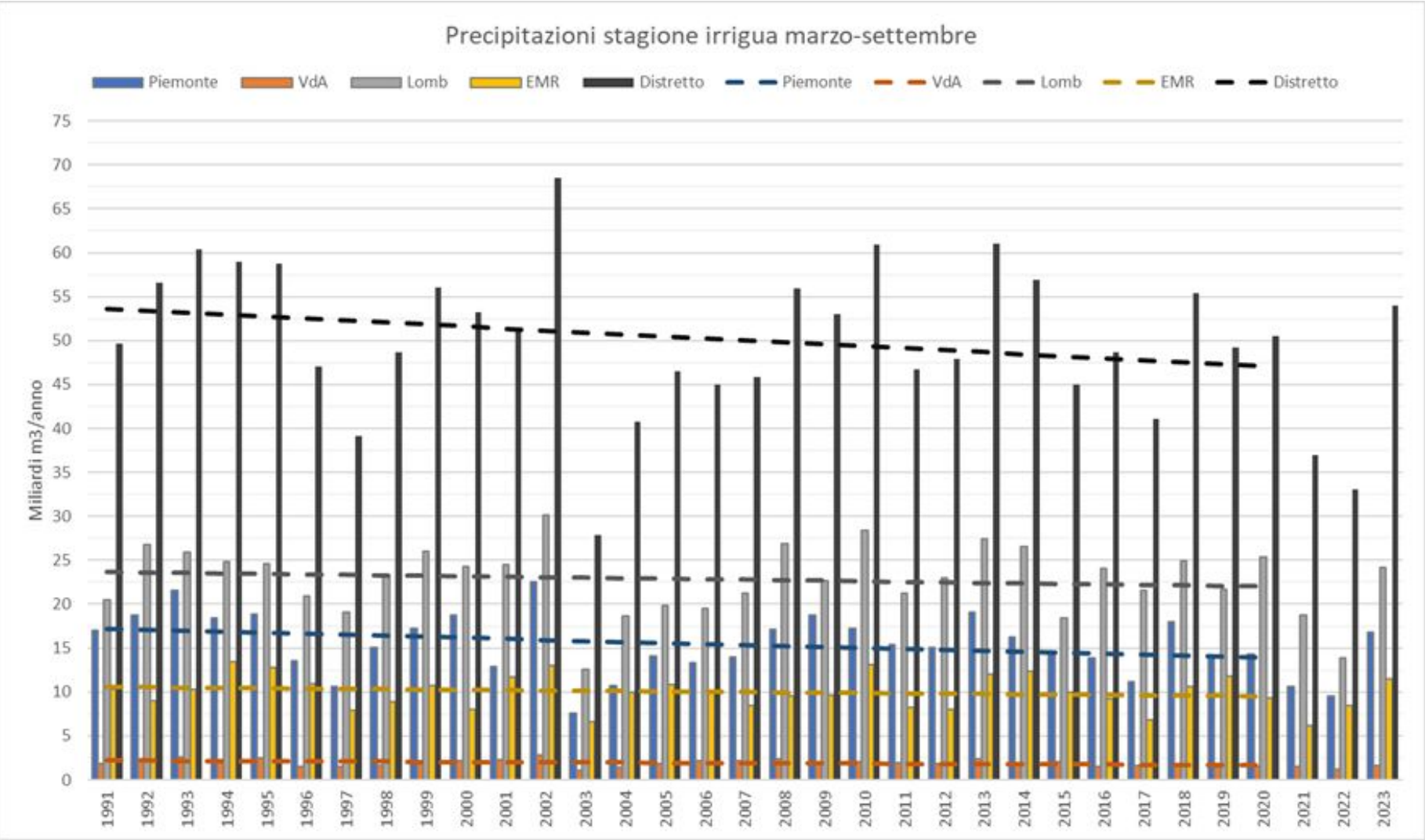
Water availability in the District: hydrological variability

The Po River District has always been characterized by a marked inter-annual meteorological and hydrological variability, but since 2000 there have been seven years in which the hydro-climatic balance (i.e. the difference between rainfall and evapotranspiration) has been negative with **an increase in the intensity of individual rainfall events but an overall reduction in the number of total events.**

Volume di afflusso (miliardi di m3) - distretto del fiume Po



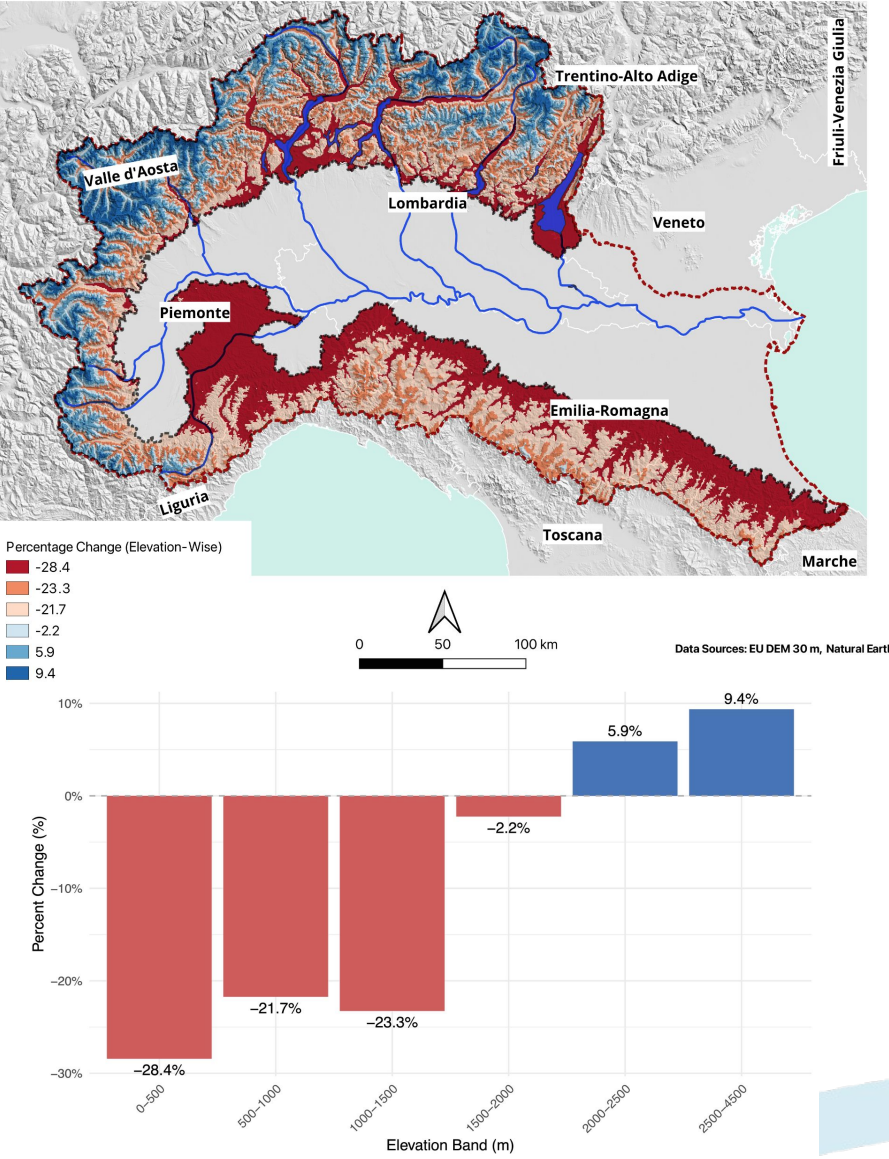
Water availability in the District: hydrological variability



In the period 1991-2022, no statistically significant changes in the overall volume of rainfall are observed annually, but, if we refer only to the irrigation season, then the downward trend in rainfall is much more evident.

Water availability in the District: snow

Recently, ADBPO has carried out a study on the spatial distribution of the **Snow Water Equivalent (SWE)** calculated on a daily scale for the years 1991 to 2021. An initial analysis of the data shows that the trend towards winters with little snow seems to be consolidating, especially in the areas of the District located below 1300 meters above sea level. Above 2000 meters, on the other hand, the depths of the snowpack in the middle of winter (December to February) do not show a clear trend, although most measuring stations show a sharp decline in the number of days with snow-covered ground, the main culprit being an earlier snowmelt in spring. The late appearance of snow in autumn also has its effects especially on the stations located at lower altitudes.

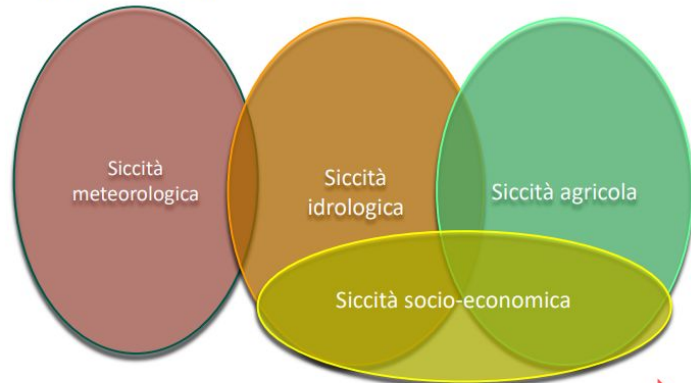


Percentage change in Total Volume of water (Elevation-wise)

Drought and water scarcity

La siccità

Fenomeno **naturale** determinato da una condizione **temporanea** di riduzione o deficit della disponibilità idrica definita come lo scostamento rispetto alle condizioni climatiche medie di un determinato luogo di interesse (Schmidt et al., 2012).



La scarsità idrica

Riduzione della **disponibilità** di risorsa **idrica** (capacità di offerta del sistema naturale) che rende **insufficiente** il **soddisfacimento della domanda media** a lungo termine, o quando la portata erogata è inferiore alla domanda istantanea per quei sistemi idrici alimentati da sorgenti che non dispongono di invasi per l'immagazzinamento.

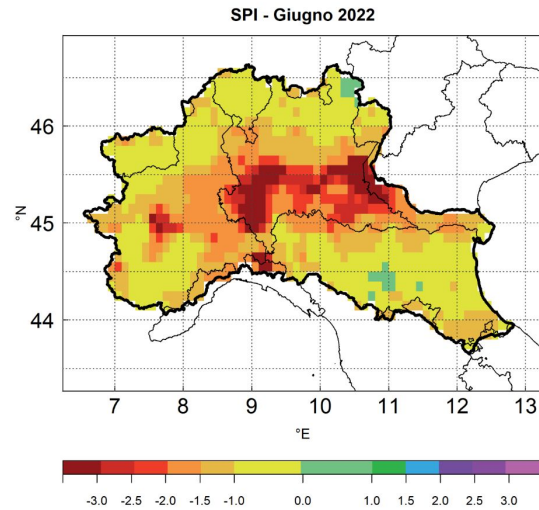


The overall need for the various uses is sustainable in conditions of normality and abundance, but the increasingly frequent and long-lasting periods of drought observed in recent years have brought to light important problems of scarcity, especially in the irrigation sector.

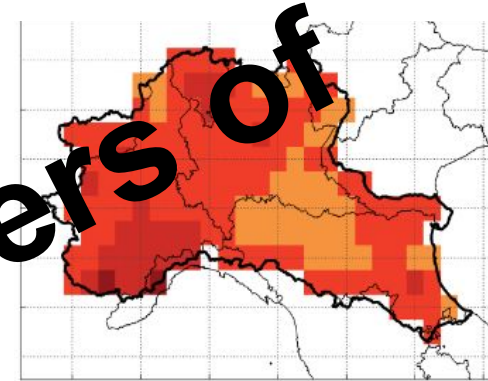
Greater demand and less availability are thus making it increasingly difficult to manage water resources within the Po district.

Drought and water scarcity: the water crisis of 2022

Precipitation-Standardized Index (SPI)



Temperature-Standardized Index (STI)



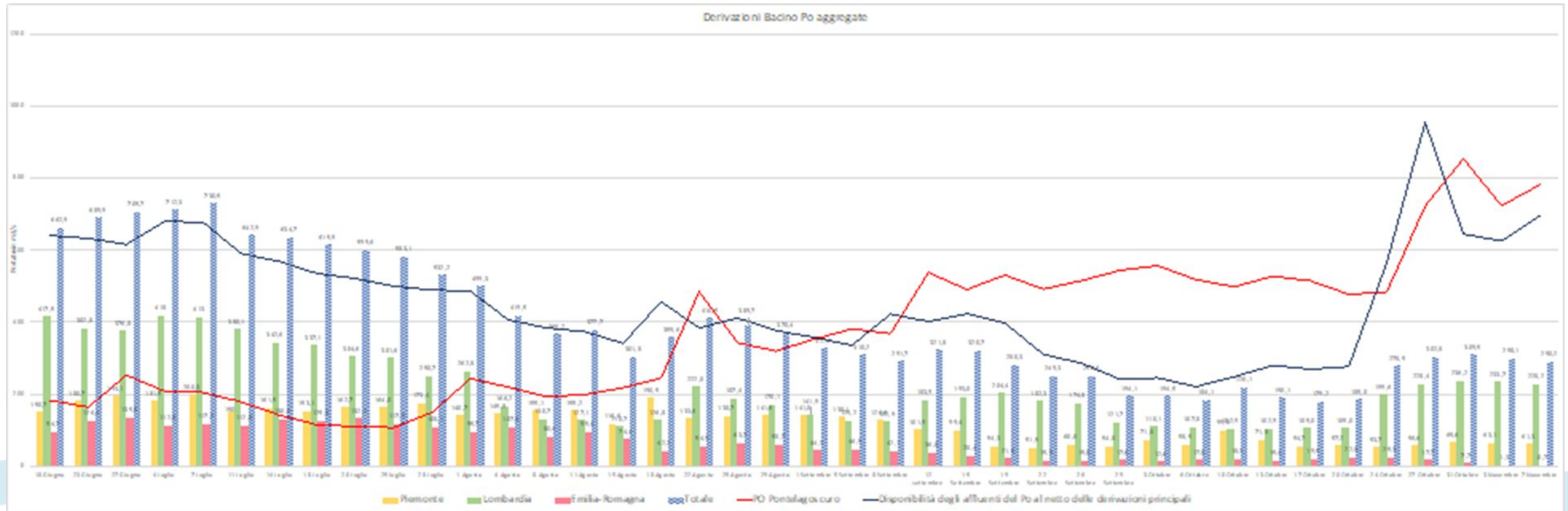
Since February, the Standardized Precipitation Index (SPI) calculated for the last three months has reached values of less than -1.5 in various parts of the District, corresponding to **'Severe Drought'** and **'Extreme Drought'** weather conditions, respectively.

The greatest positive temperature anomalies were recorded during the months of June, July and August.

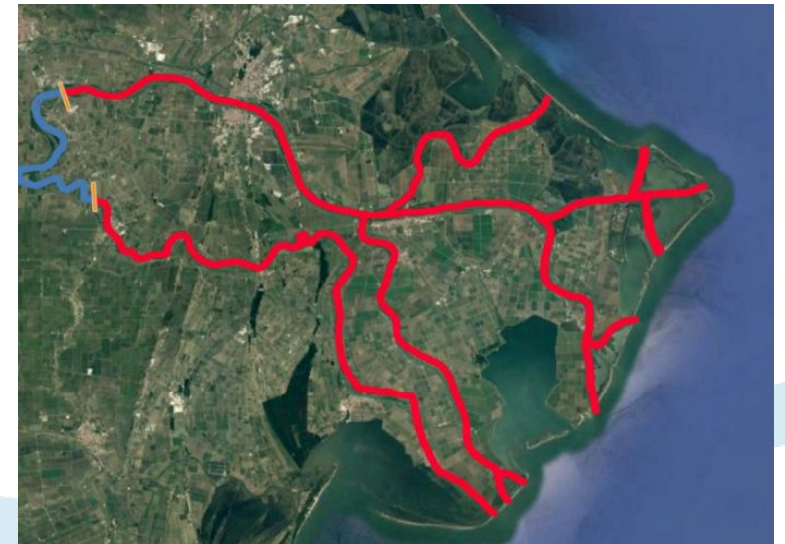
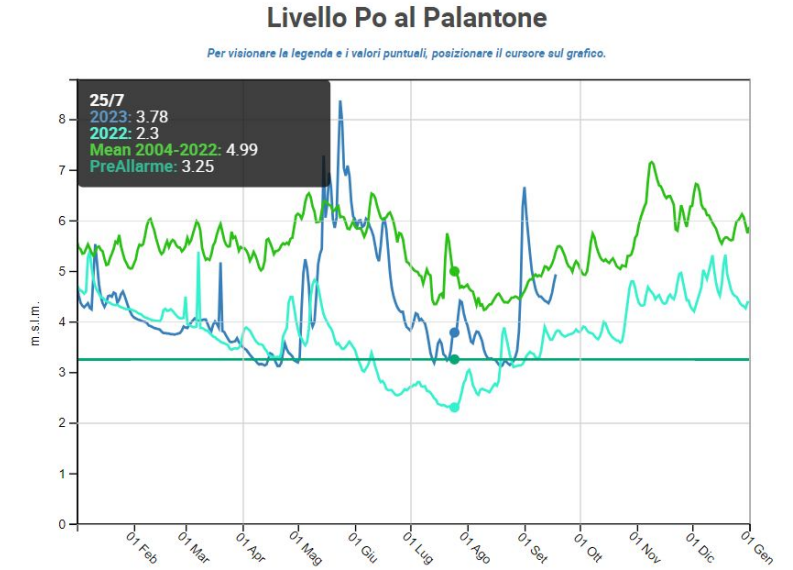
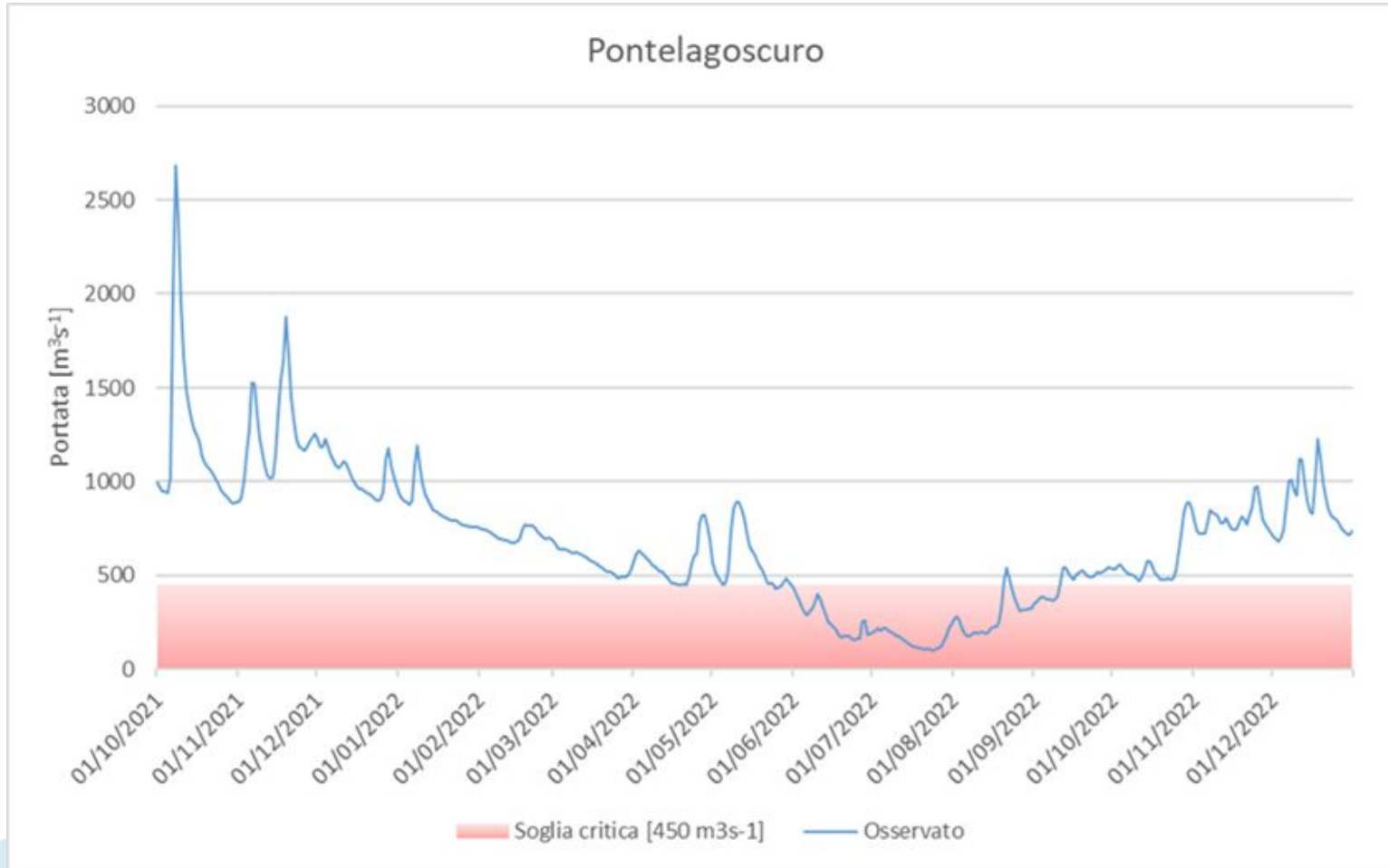
In **July**, the three-month Standardized Temperature Index (STI) was everywhere below -1.5, corresponding to **'Severe Drought'** and **'Extreme Drought'** weather conditions.

Drought and water scarcity: the water crisis of 2022

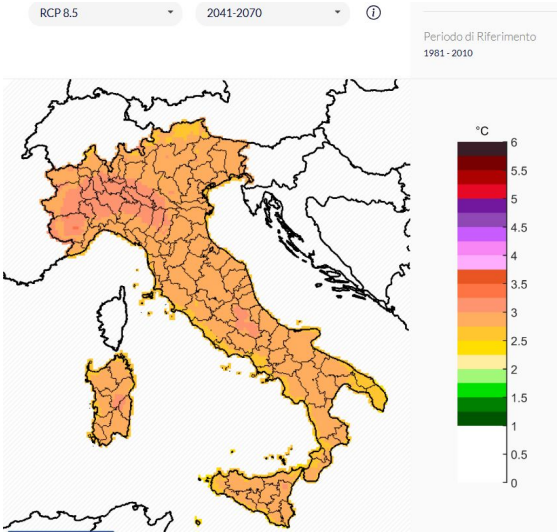
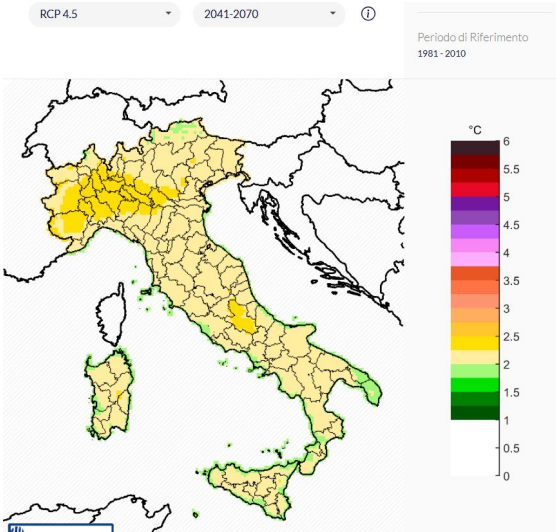
During the 2022 irrigation season, despite the full-blown drought, the cumulative volume of diversions was always higher than the flow rate of the Po at Pontelagoscuro until 22 August, with a delta that exceeded 500 m³/s on 7 July when, against a total derived flow rate of just over 730 m³/s, the flow rate measured in the riverbed was just under 200 m³/s (on 24 July the lowest flow rate ever measured in Pontelagoscuro was recorded at 114 m³/s)



The uses of the resource in the District: the critical issues

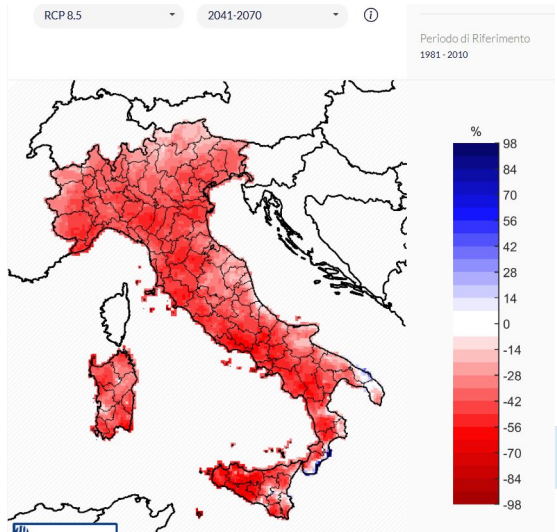
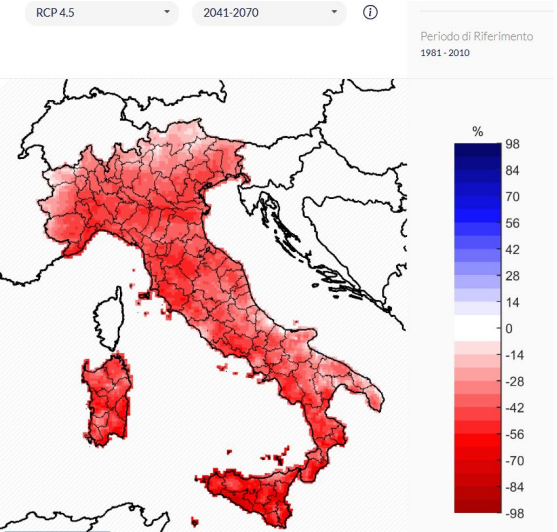


Climate scenarios



Average daily temperature

Summer precipitation



Final Thoughts

COMPLEX PROBLEMS COMPLEX SOLUTIONS

Complete, update, improve and innovate the knowledge frameworks of basin planning (PBI);

Increasing productivity per unit of water in the agricultural sector;

- Invest in improving cultivation practices and targeting crops that are better adapted to drought conditions;
- Use high-efficiency irrigation practices where possible.

Reduce waste and contain losses in distribution in the agricultural and civil sectors;

Recovering rainwater for less valuable uses and reusing wastewater where possible;

Carry out, where necessary, also following the implementation of the previous measures, infrastructural interventions that allow the increase in the availability of water in the driest periods;

Promote groundwater recharge (restore river/aquifer connectivity and reduce soil sealing, promoting traditional rice cultivation).

***Thank you for your
attention***