MINISTERO DELL'AMBIENTE E DELLA TUTELA DEL TERRITORIO E DEL MARE

italian delegation alpine convention

AVEPA
AGENZIA VENETA PER I PAGAMENTI IN AGRICOLTURA

REPUBLIC OF SLOVENIA
MINISTRY OF THE ENVIRONMENT AND SPATIAL PLANNING

DROUGHT RISK MANAGEMENT IN THE ALPS EXPERT WORKSHOP

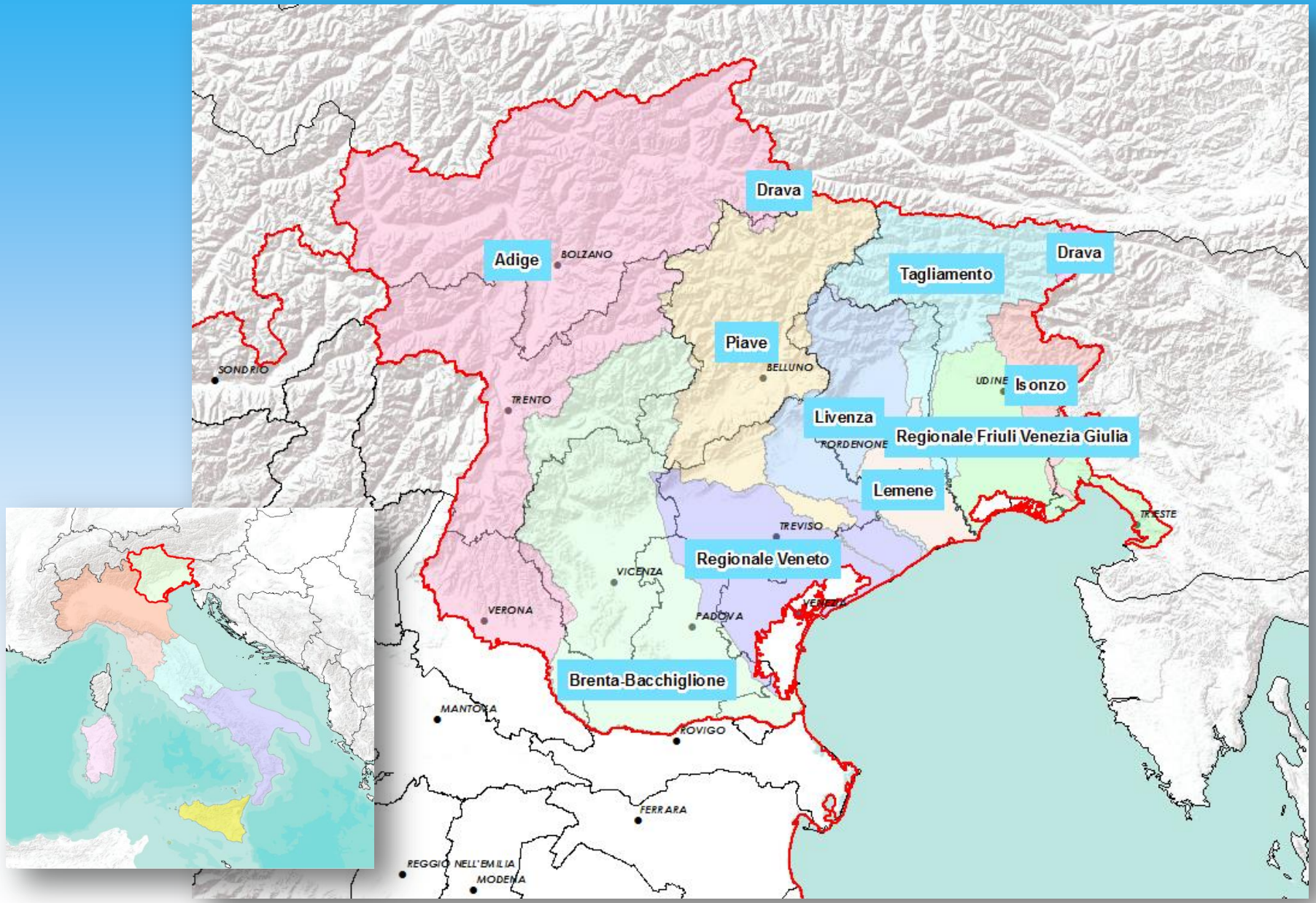
Management of water scarcity in the Adige river basin: the case of 2017 drought

Francesco Baruffi

Giuseppe Fragola

Eastern Alps River Basin District

Eastern Alps River Basin District



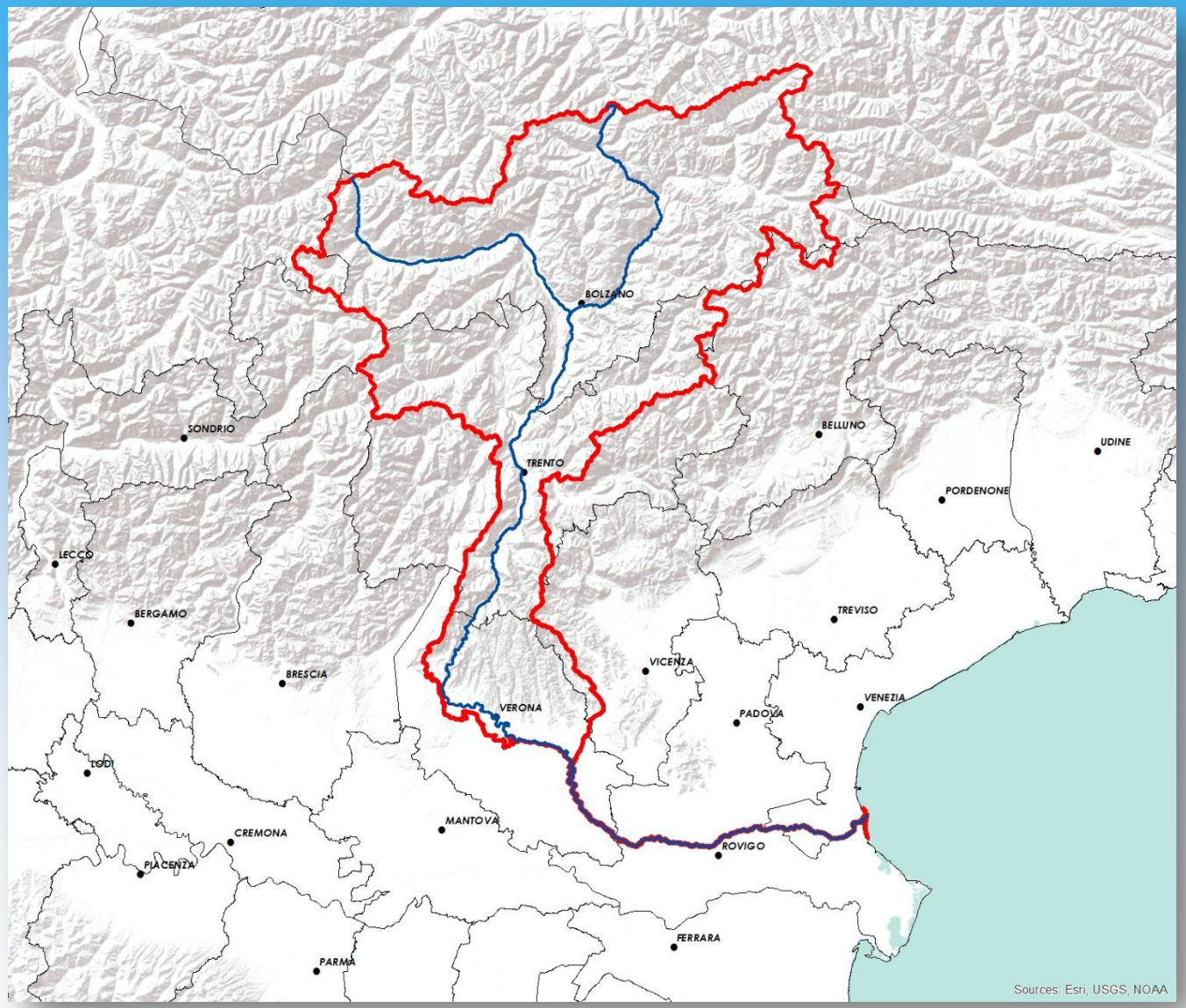
Adige River Basin

Hydrographic basin surface
12.100 km²
3° in Italy

Length Adige river
409 km
2° in Italy

Inhabitants
1.350.000

Average altitude
1.500 m s.m.



Adige River Basin

main use of water resources

Hydroelectric

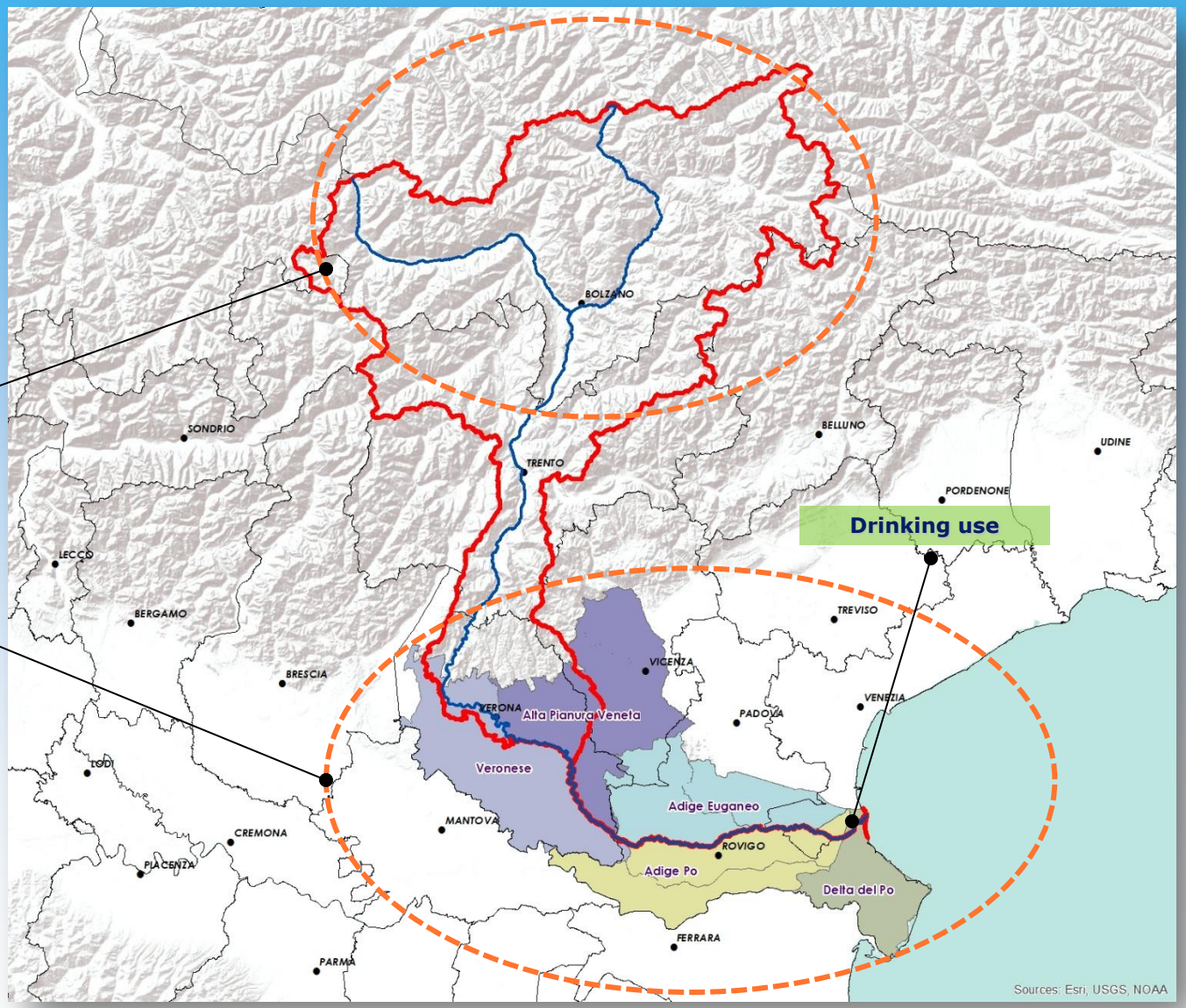
Volume stored in the reservoirs

500 milions m^3

Agriculture

Irrigated surface

2.000 km^2



Adige River Basin

simplified basin working scheme

HYDROELECRTRIC PLANTS

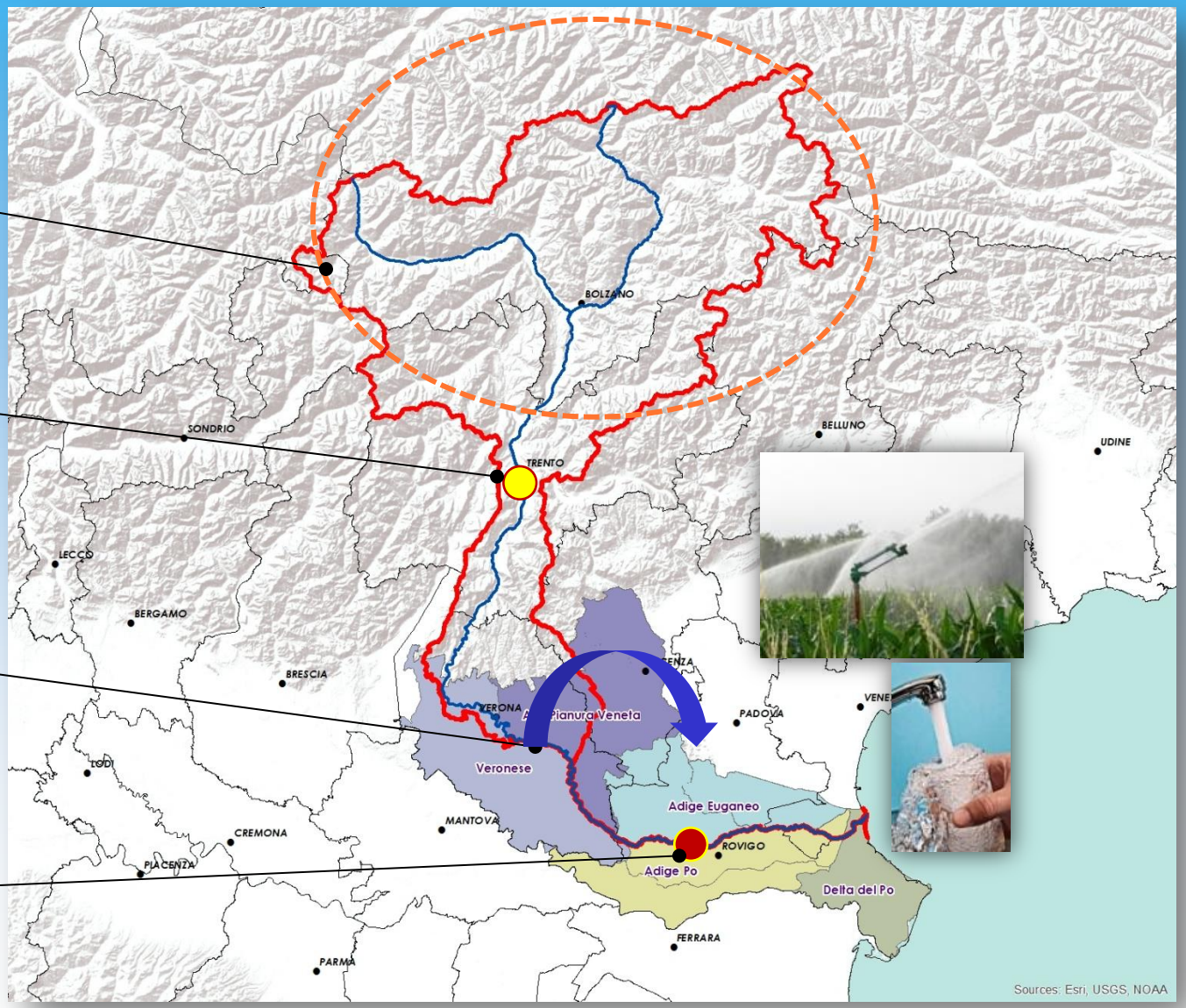
Trento

control section of water availability

Irrigation and drinking water demand

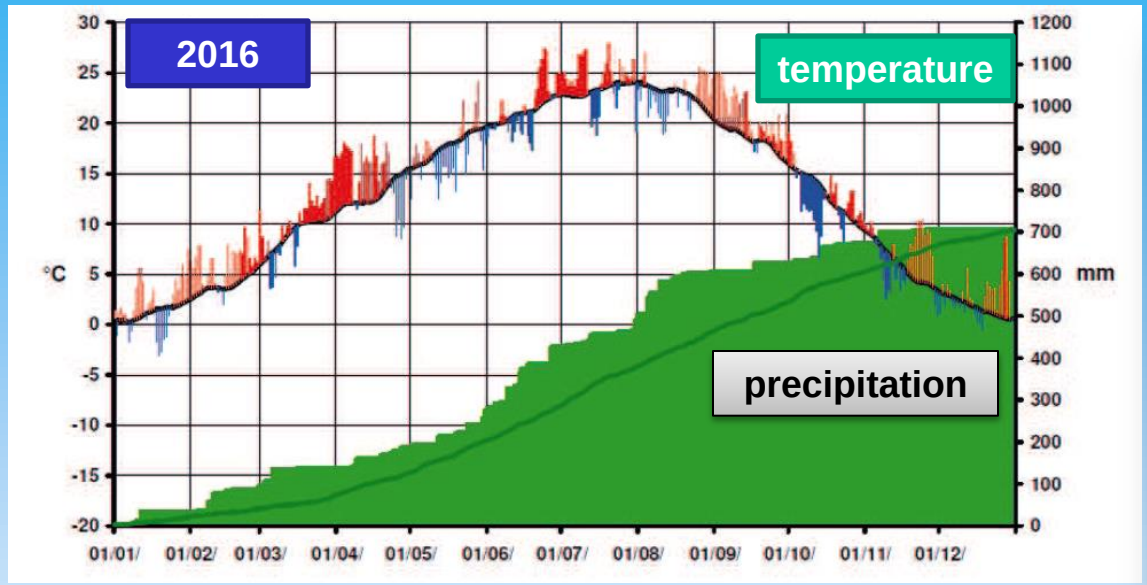
Boara Pisani

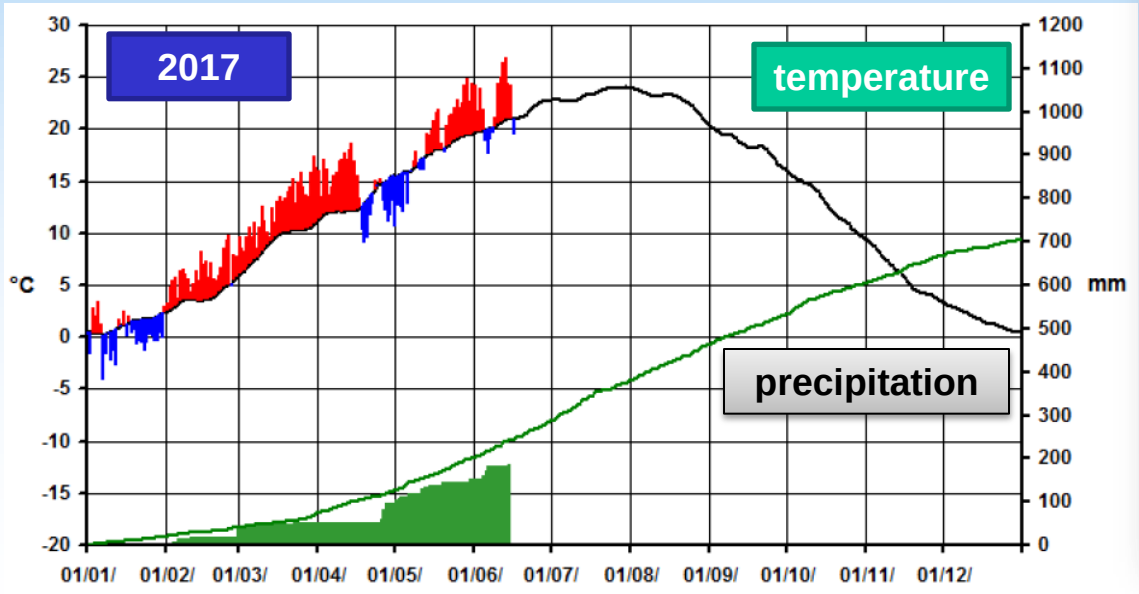
control section of water availability at the mouth of the river

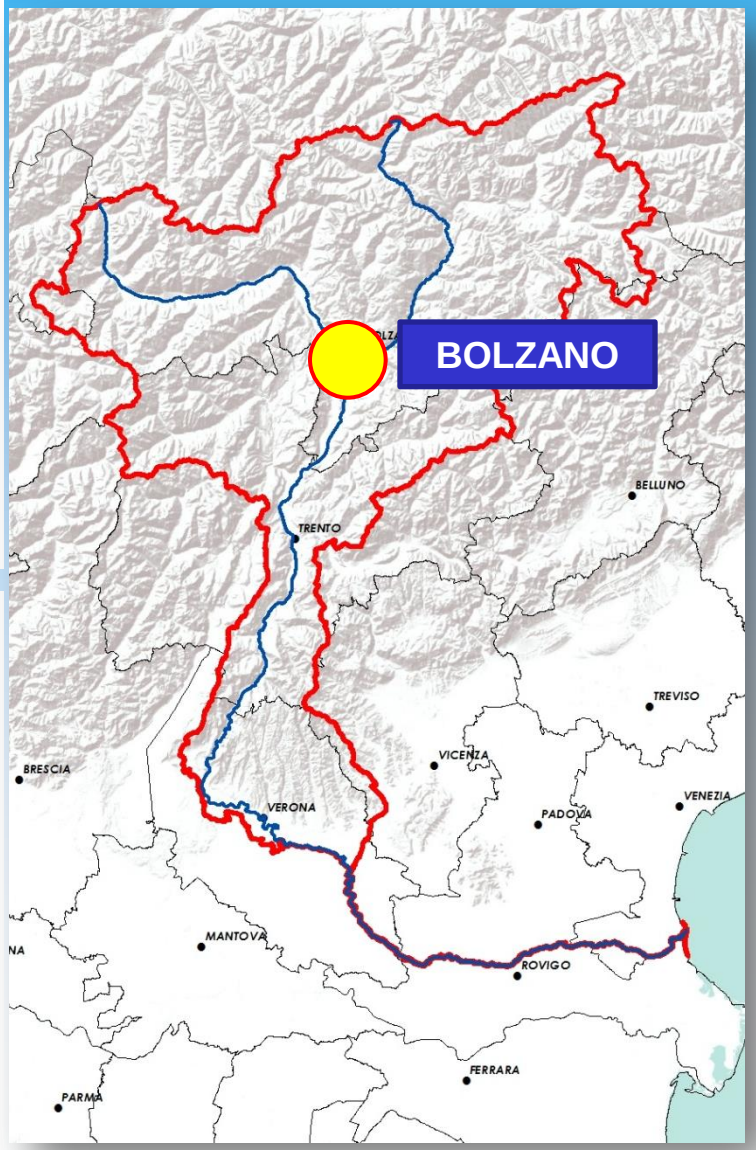


Adige River Basin

Drought 2017

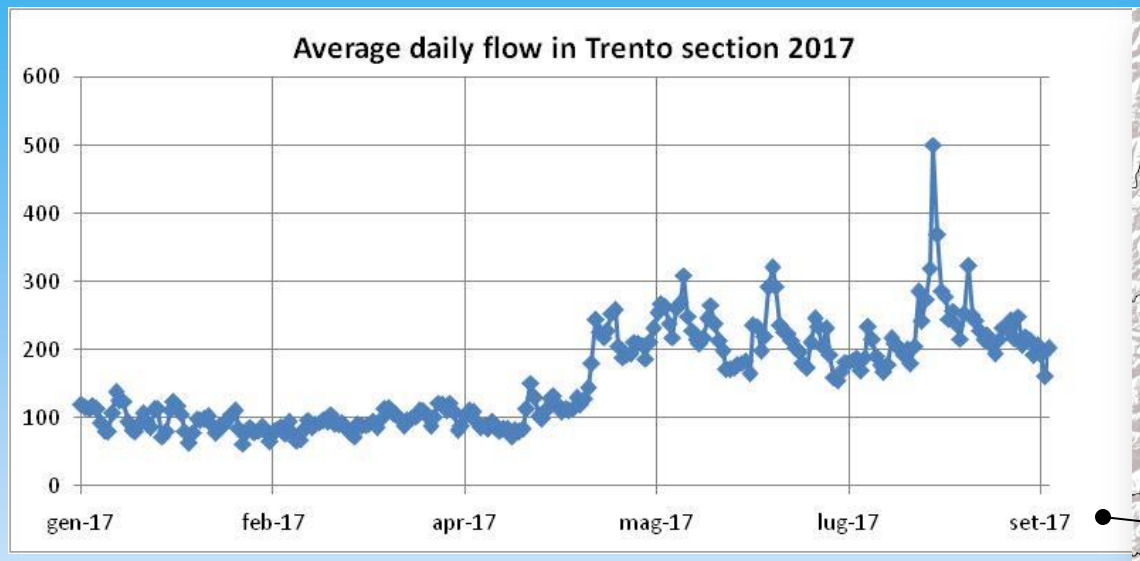


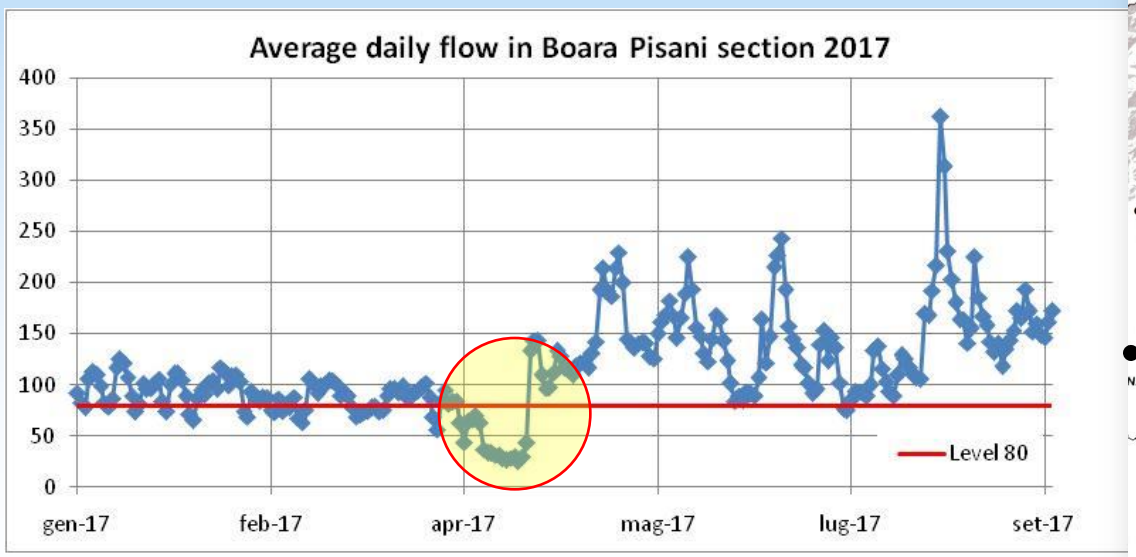


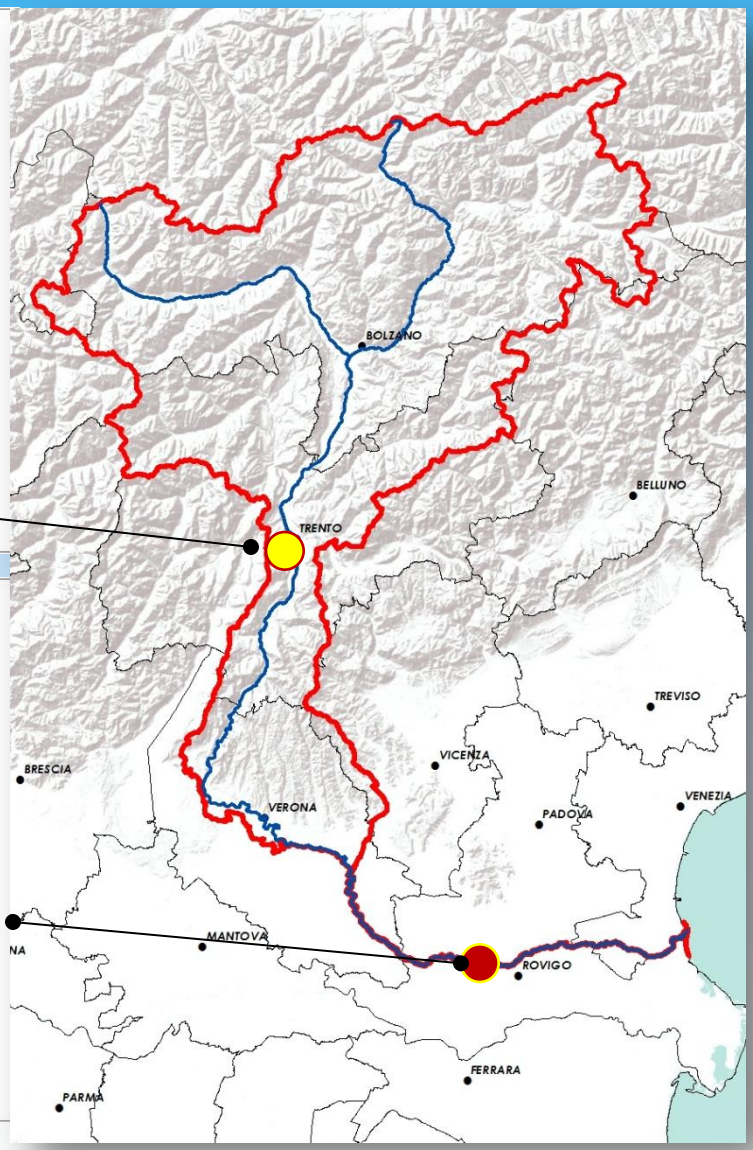


Adige River Basin

Drought 2017

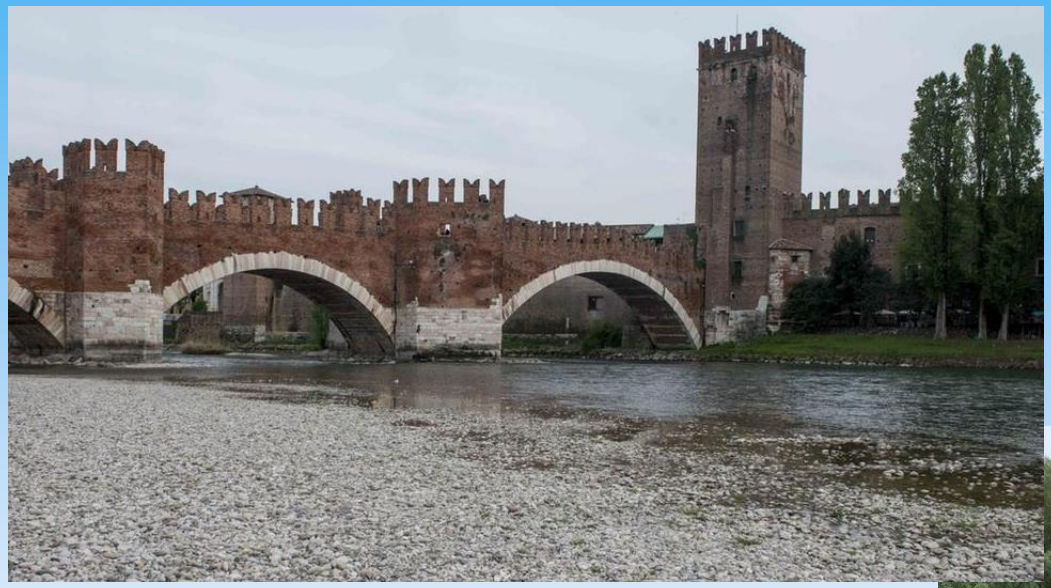






Adige River Basin

Drought April 2017



Verona city center

Near Boara Pisani control section

Eastern Alps River Basin District

management of water scarcity

Permanent Observatory on water uses in the Eastern Alps river basin district

Osservatorio permanente sugli utilizzi idrici nel Distretto idrografico delle Alpi Orientali

MINISTERO DELL'AMBIENTE
E DELLA TUTELA DEL TERRITORIO E DEL MARE

Distretto idrografico delle Alpi Orientali

PROTEZIONE CIVILE
Presidenza del Consiglio dei Ministri
Dipartimento della Protezione Civile

ISPRA

REGIONE DEL VENETO

REGIONE AUTONOMA FRIULI VENEZIA GIULIA

MIT

Ministero dello Sviluppo Economico

PROVINCIA AUTONOMA DI TRENTO

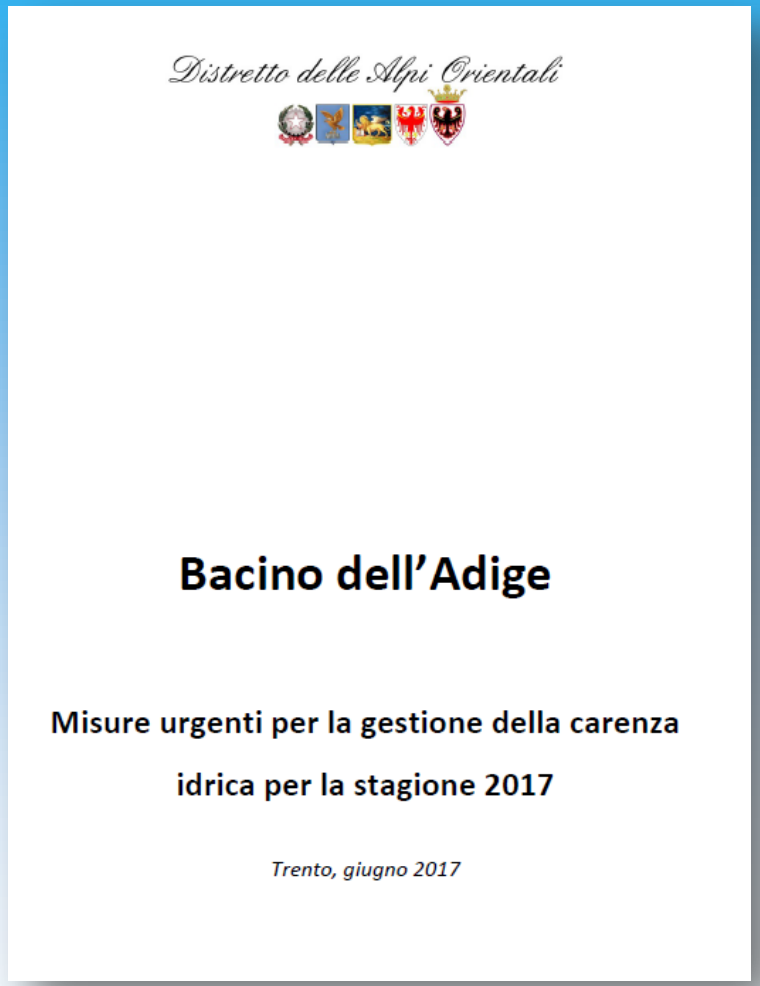
ELETTRICITÀ FUTURA
imprese elettriche italiane

Terna

ANBI

AUTONOME PROVINZ BOZEN SÜDTIROL

PROVINCIA AUTONOMA DI BOLZANO ALTO ADIGE



Urgent measures for the management of water scarcity for the season 2017

In the Adige river basin

General addresses: Ing. Francesco Baruffi

Coordination and Development: Ing. Francesco Baruffi and Dr. Renato Angheben

Hydrological, hydraulic analysis, detection and analysis of cost of measures

ing. Daniele Rossi, ing. Roberto Veltri, ing. Giuseppe Fragola

Collaborations:

legal-administrative : dott. Antonio Ziantoni

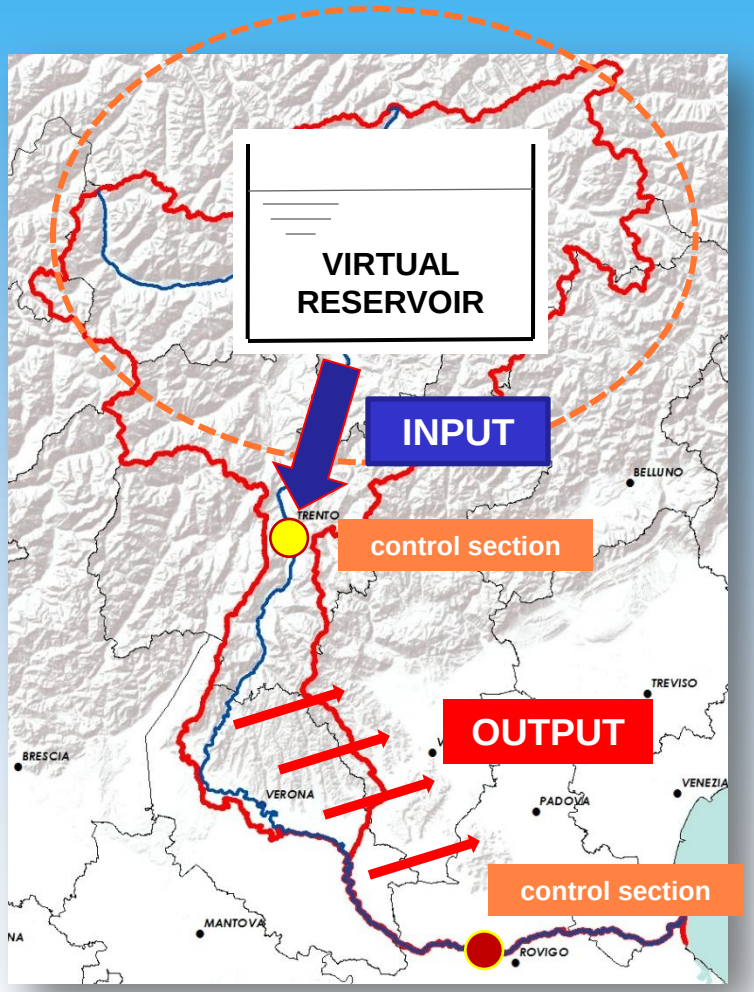
informatics: dott. Fabio Lazzeri

technical-administrative : ing. Donato Iob

Urgent measures for the management of water scarcity for the season 2017

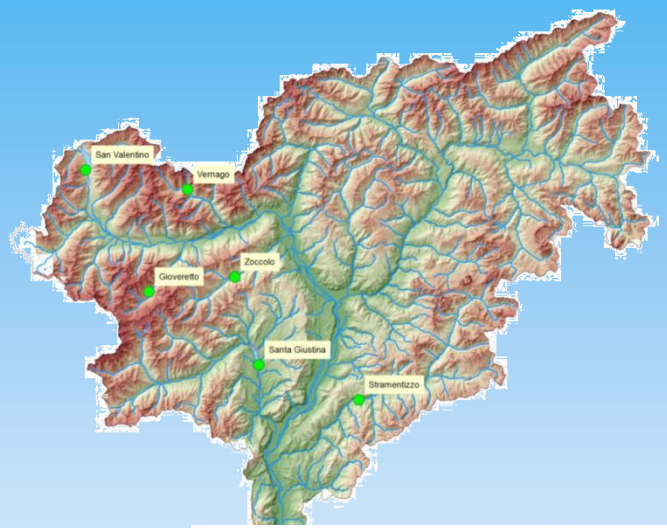
Hypothesis of the plan

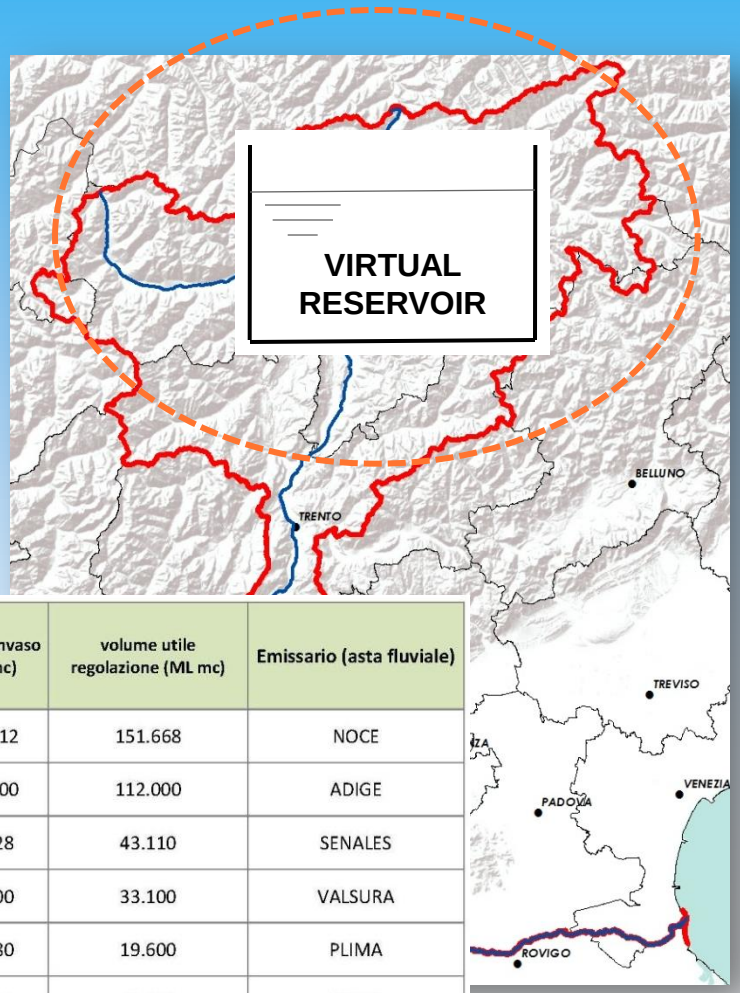
1. Valid fron giune to september 2017;
2. All hydrological inputs and artificial reservoirs were considered upstream of Trento;
3. The actions to modify the inputs could only be made by the virtual reservoir managers (hydroelectric operators);
4. The actions of thydroelectric operators could not, however, affect the hydraulic safety within the basin;
5. The main outputs (irrigation and drinking) were considered in Veneto Region;
6. The Veneto Region adjusts the demands to the INPUT receipts, guaranteeing the minimum flow rates in the control section at Boara Pisani;
7. The flow is refered to the daily average;
8. The validity of the system was checked by weekly reports that identify the flow rate in the two control sections, the volumes available in the virtual reservoir;
9. Weekly meetings of the observatory were held to monitor the evolution of the situation



Urgent measures for the management of water scarcity for the season 2017

Definition – Virtual reservoir

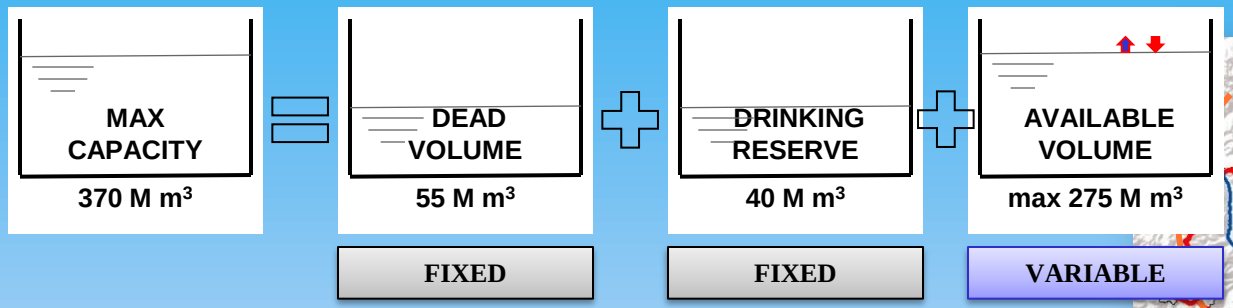


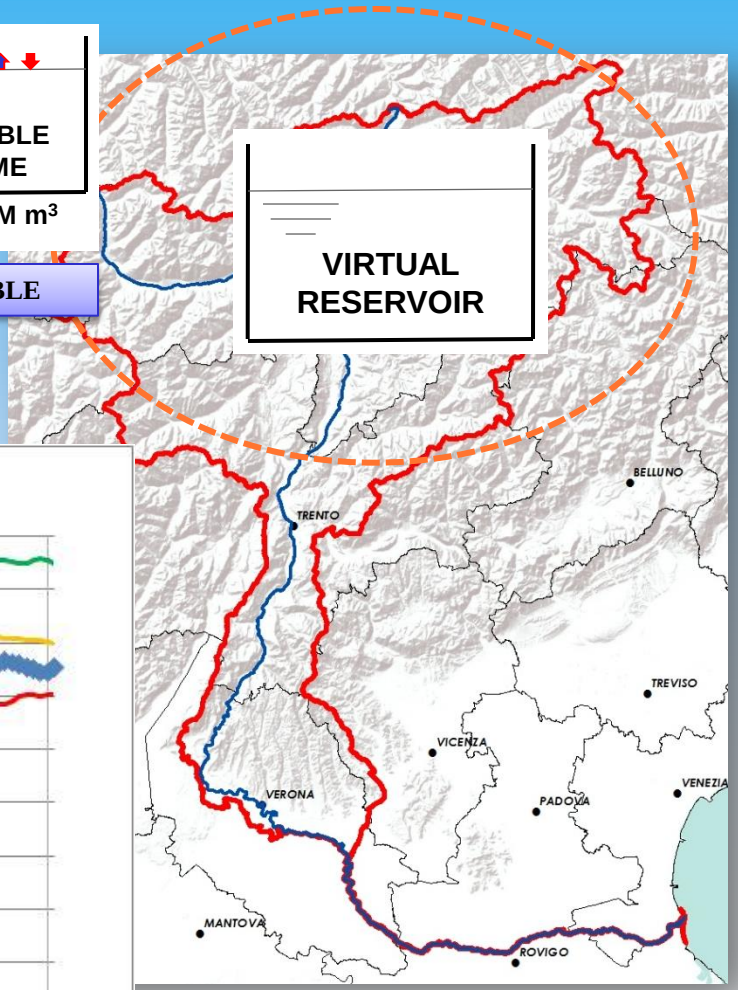


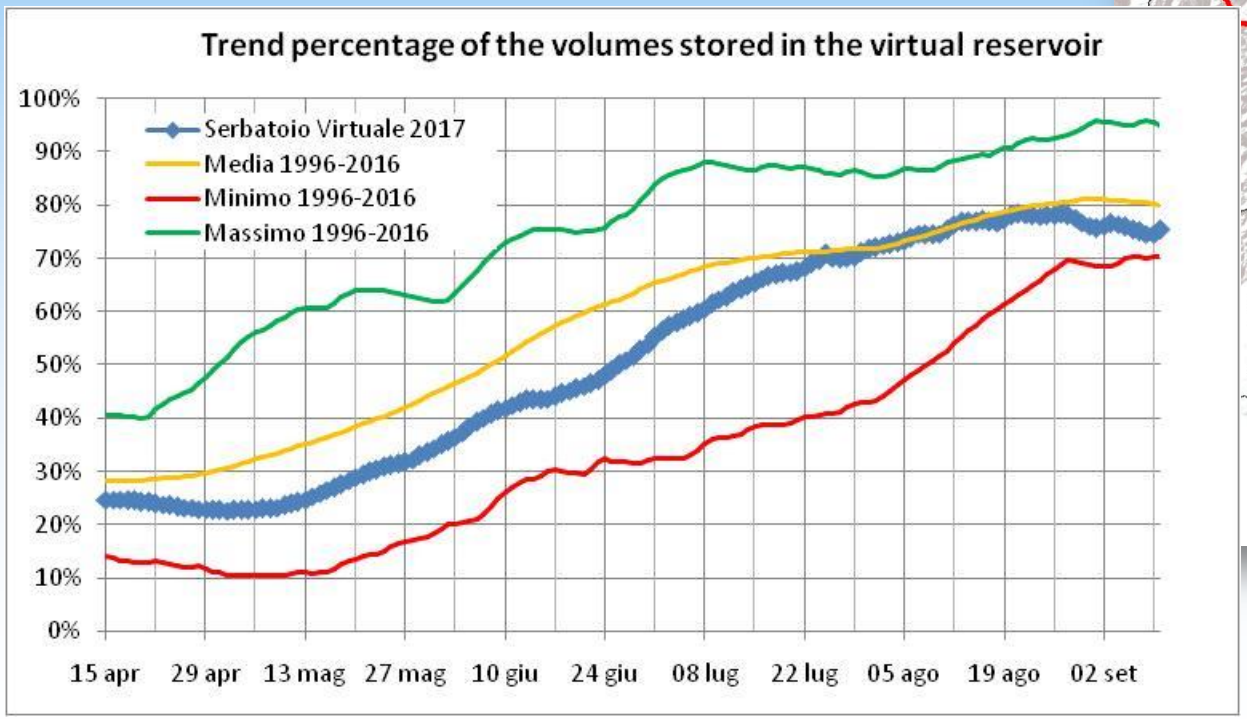
Ambito amministrativo	Descrizione	Provincia	Comune	volume invaso (ML mc)	volume utile regolazione (ML mc)	Emissario (asta fluviale)
PAT	S. GIUSTINA	TN	Tassullo e Taio	182.812	151.668	NOCE
PAB	S.VALENTINO	BZ	Curon Venosta	116.000	112.000	ADIGE
PAB	VERNAGO	BZ	Senales	43.928	43.110	SENALES
PAB	ZOCCOLO	BZ	Ultimo	33.500	33.100	VALSURA
PAB	GIOVERETTO	BZ	Matello	19.980	19.600	PLIMA
PAT	STRAMENTIZZO	TN	Castello di Fiemme e Anterivo	11.500	10.000	AVISIO

Urgent measures for the management of water scarcity for the season 2017

Definition – Virtual reservoir







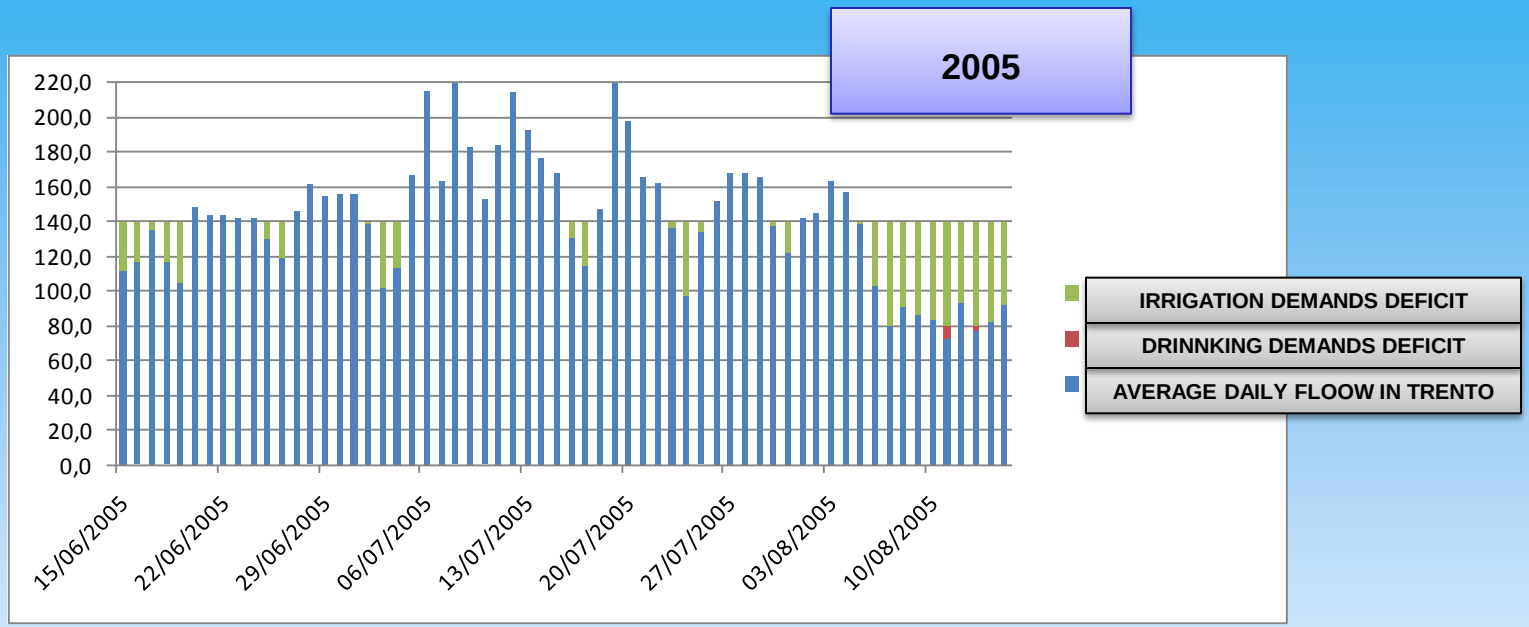
Urgent measures for the management of water scarcity for the season 2017

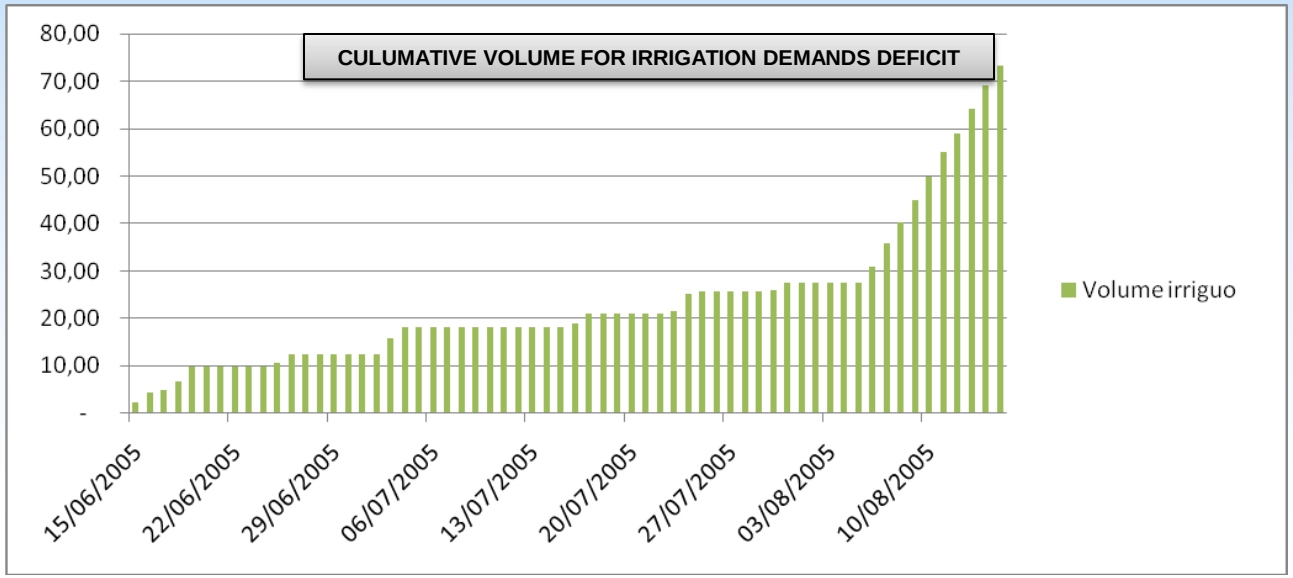
Action to mitigate the water scarcity

Average daily flow in Trento		**180**	**140**	**80**
VIRTUAL RESERVOIR		=	↓	↓↓
ACTION OF HYDROELECTRIC OPERATORS	**FREE TO USE THEY RESERVOIR**	**TURBINE WITHOUT INCREASING RESERVOIR**	**TURBINE TO COME BACK AT 140 REDUCING RESERVOIR**	**TURBINE TO COME BACK AT 80 REDUCING RESERVOIR**
DEMANDS 	**AS GRANTED**	**IRRIGATION REDUCED FROM 0 TO 40 m^3/S**	**IRRIGATION REDUCED FROM 40 TO 0 m^3/s**	**IRRIGATION INTERRUPTED TO GUARANTEE THE IN BOARA PISANI SECTION**
FLOW GUARANTEED AT THE BOARA PISANI SECTION	**80**	**80**	**80**	**80**
	NO ACTION	***ACTION1***	***ACTION 2***	***ACTION 3***

Urgent measures for the management of water scarcity for the season 2017

Backtest of the actions based on previous irrigation season

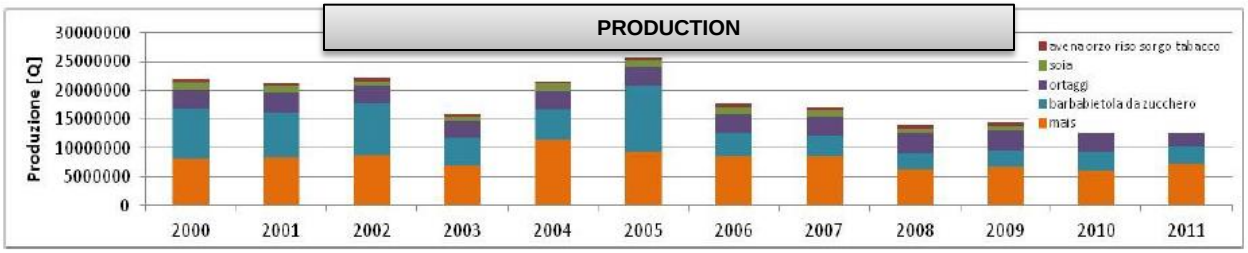




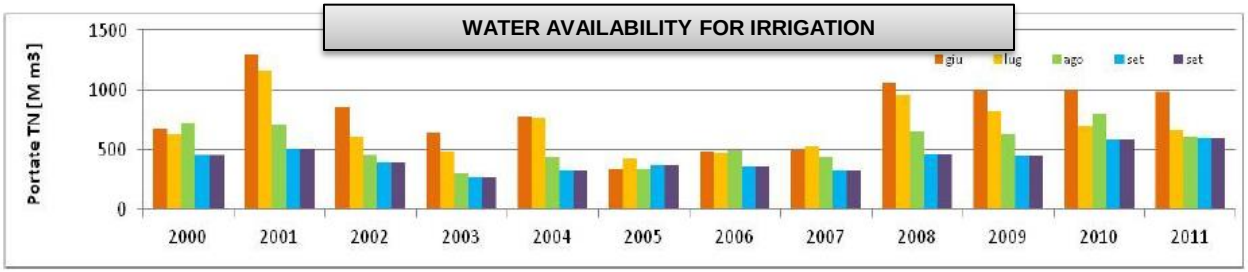
Urgent measures for the management of water scarcity for the season 2017

Analysis of the irrigation, production and economic aspects of the agricultural sector

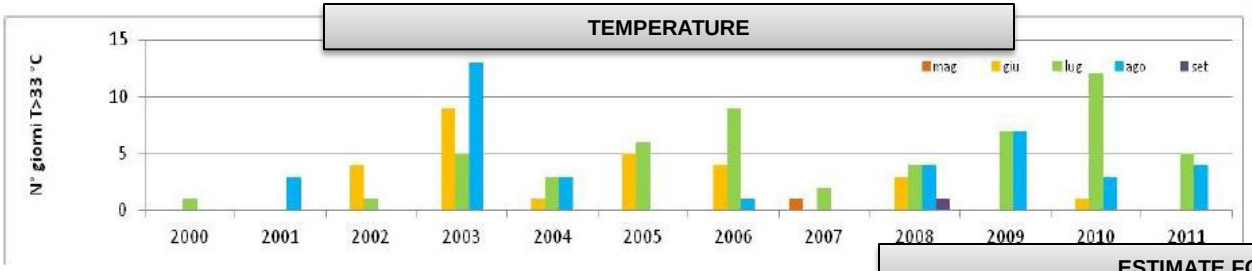
PRODUCTION



WATER AVAILABILITY FOR IRRIGATION



TEMPERATURE



ESTIMATE FOR 2003

Variazione della produzione per l'anno 2003 Q/ha

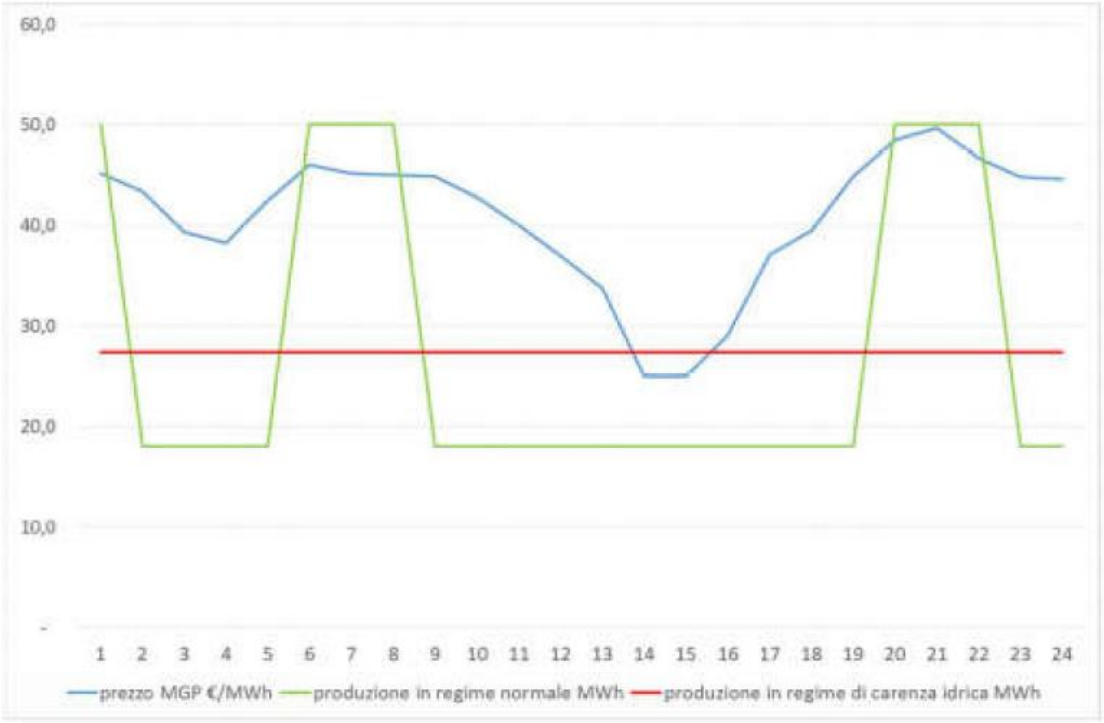
➢Mais	- 55,0 Q/ha	-31%	- 530€/ha
➢Barbabietola	- 365,0 Q/ha	-30%	-1110€/ha
➢Ortaggi	- 47,0 Q/ha	- 9%	-2400€/ha
➢Soia	- 20,0 Q/ha	-28%	- 278€/ha
➢Avena, Orzo, Riso Sorgo, Tabacco	- 51,0 Q/ha	-12%	- 273€/ha

- 99 M€

Urgent measures for the management of water scarcity for the season 2017

Evaluation of possible losses for the hydroelectric sector

The use of hydroelectric tanks for irrigation can lead to economic losses for hydroelectric operators. For this reason in the plan is proposed a compensation of this losses to avoid the low production in agriculture.



Some criteria were suggested by the association of Italian hydroelectric operators.

In the first approximation, it can be admitted that the losses for the hydroelectric operators are a magnitude less than in the agricultural.

$$h_{eq} = \frac{E_{pg} - E_{base}}{P_{max} - P_{base}}$$

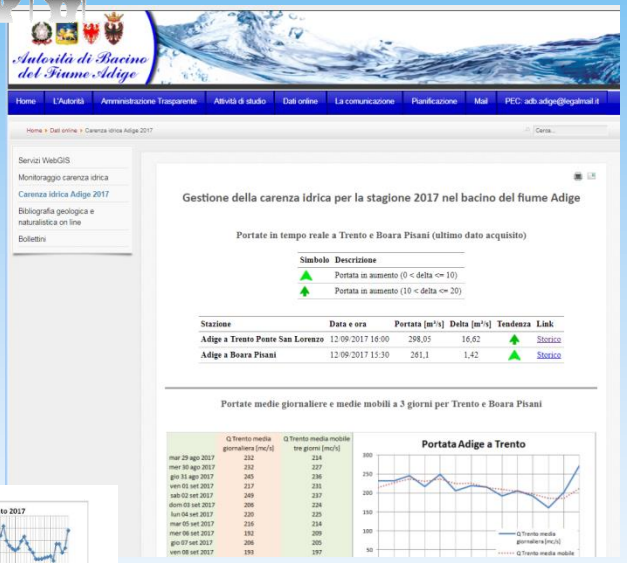
Urgent measures for the management of water scarcity for the season 2017

How we managed the water scarcity in 2017

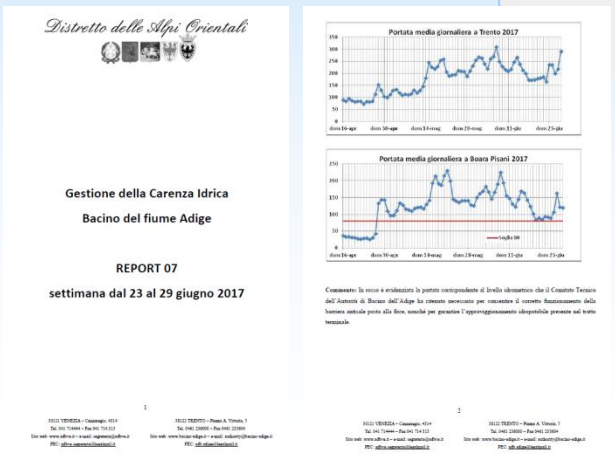
From January to August: 26 meeting of the **Permanent Observatory** (in May , June and July once per week)

Dedicated web page to the information about availability in the virtual reservoir, daily average flow in the two control sections, daily average demands in agriculture in Veneto Region

http://www.bacino-adige.it/sito/index.php/dati-online-web/carenza-idrica-adige-2017



A **weekly report** about the state of water resources in the a river basin



Thank you for your attention

Distretto idrografico delle Alpi Orientali

www.alpiorientali.it