



Addressing water scarcity in the Alpine region: lessons learned and planned measures

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Contents of the presentation

How the Alpine region is increasing its preparedness to face drought periods and avoid water scarcity situations?

An international comparison of plans and strategies that the Alpine Countries and Regions has put in place in the last years to tackle this "new" issue helps avoiding conflicts and managing future situations of potential water scarcity in transboundary and demand-intensive river basins.

Mittlere jährliche Niederschlags-
höhen im europäischen Alpen-
raum 1971-1990

Hauteurs annuelles moyennes
des précipitations dans la zone
alpine européenne 1971-1990

Author: Hans
Müller (ETHZ), Catherine Durr, Olivier Trötschel
(ETHZ)

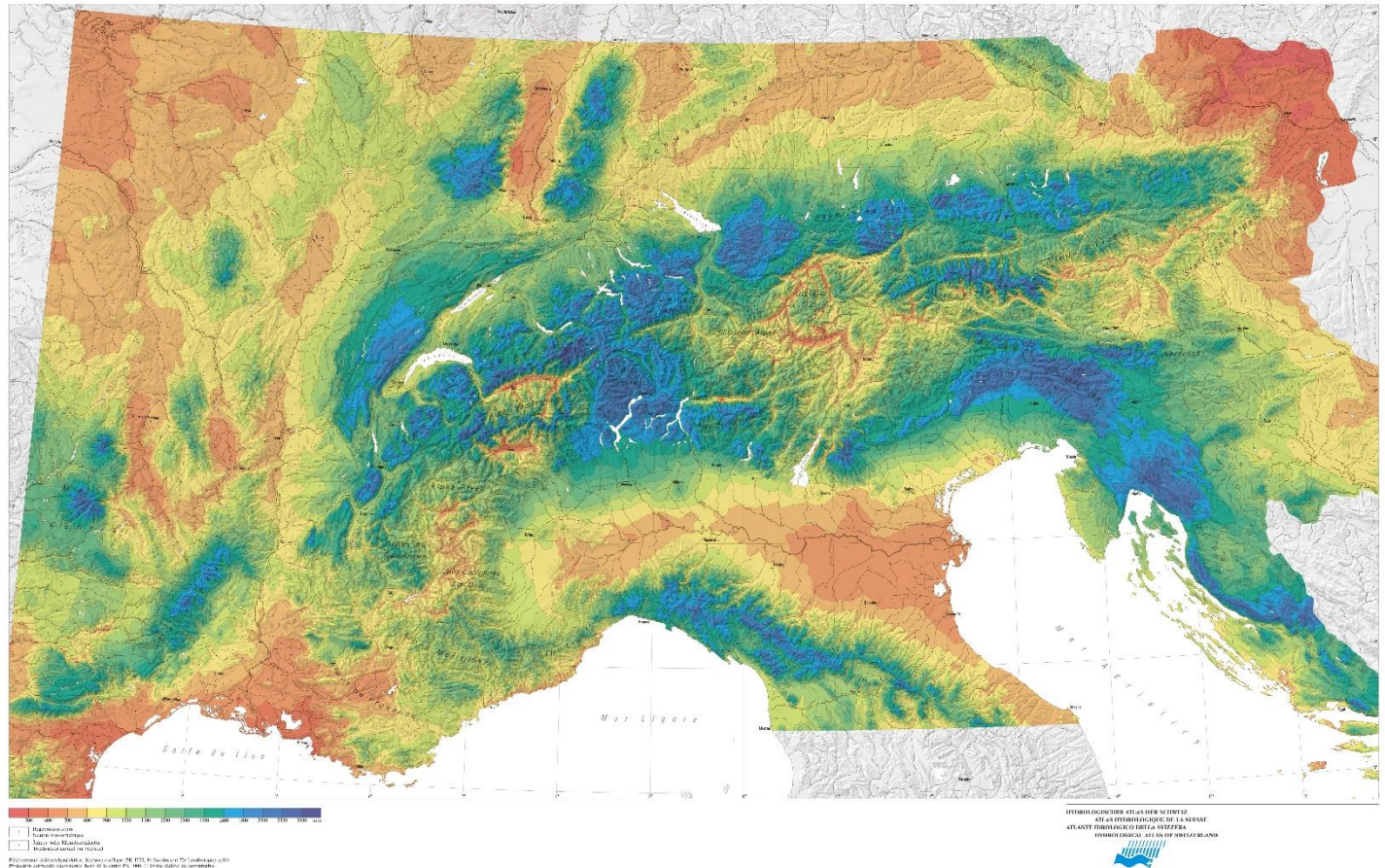
Metriken der Schweizer Eidgenossenschaft 2010
Biosphärenreservat Biosphäre der Alpen

1:1 700 000

4 20 40 60 80 100

Quelle: und teilgeographische Bearbeitung
Biosphäre der Alpen, Eidgenössische Anstalt für
Landschaftforschung und Naturerbe, 1998, S. 10
1:1 700 000, Blatt 34
Karte: topographische Karte, Blatt 34

Quelle: Hans Müller
Biosphäre der Alpen, Eidgenössische Anstalt für
Landschaftforschung und Naturerbe, 1998, S. 10
1:1 700 000, Blatt 34
Karte: topographische Karte, Blatt 34



**A
picture
of the
Alps...**

Do abundance of precipitations and winter snow coverage mean that Alps are rich of water?

Yes but...

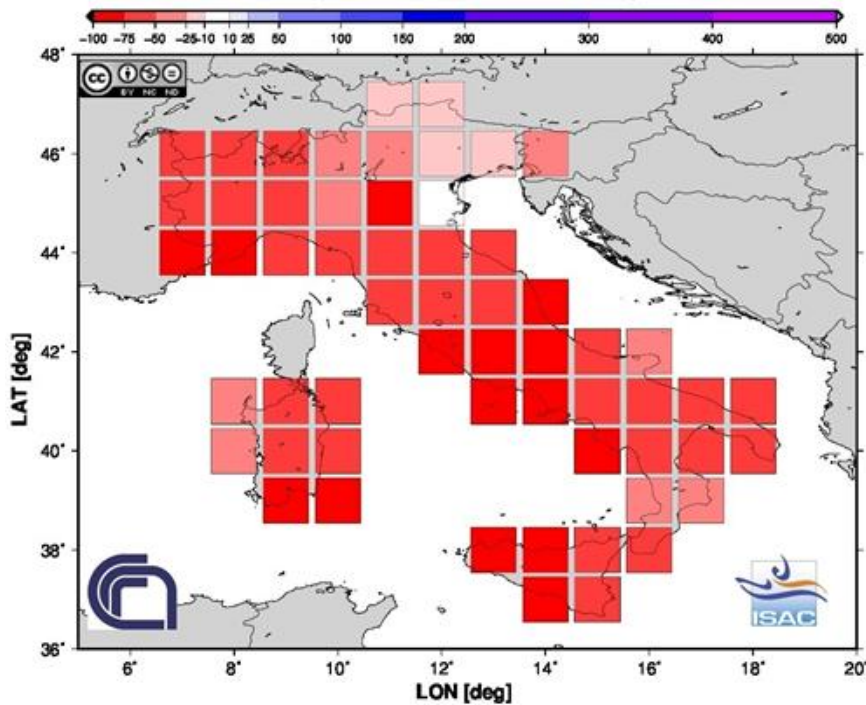
Elements of pressure



Alps widely contribute to the runoff of several relevant transboundary European river basins: Danube (incl. Inn, Mur, Sava), Rhine, Rhone, Po, Adige

European society has an intensive water demand in multiple sectors

[% deviation from the 1971–2000 mean value]



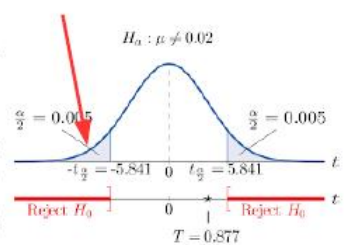
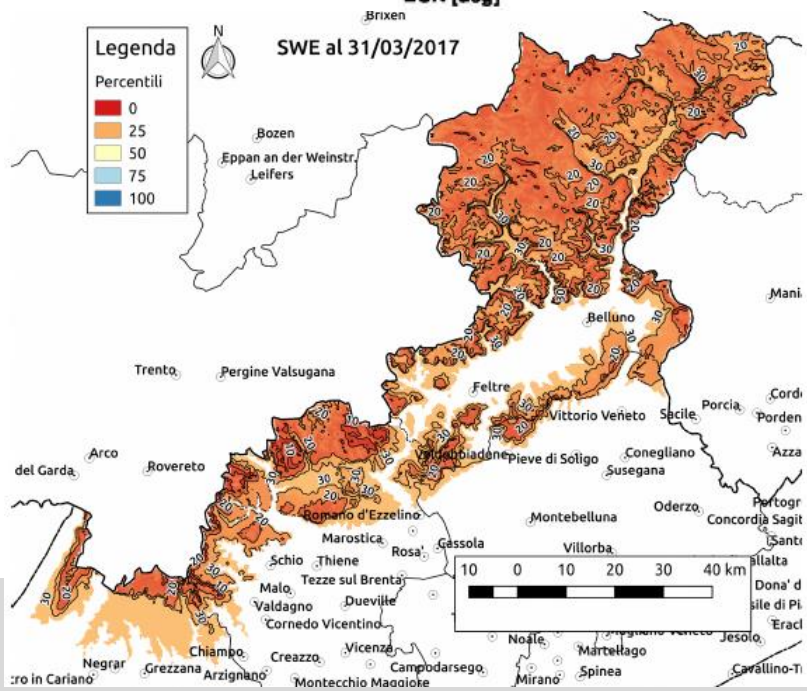
Climate changes

Reduced snow cover → less and early snow melting

Longer drought periods and heatwaves → more evapotranspiration

More severe events → less groundwater recharge, quicker surface water flows

Increasing water demand in case of drought periods



Drought

Drought episodes

2003 drought was extremely severe for all the Alpine Countries: precipitation deficit range from -20% of Austria (on yearly basis) to -50/-60% of France, Italy and Slovenia in the 8 driest months; losses in agriculture for hundreds million €.

Several other meaningful droughts have been recorded with increasing frequency:

2005 (Italy and France), **2006** (Slovenia), **2007** (Italy and Slovenia), **2009** (Slovenia), **2011** (Bavaria), **2012** and **2013** (Slovenia), **2015** (Bavaria -the most significant in the last 40 years- Slovenia, France and Austria -both in summer and in November-December-), **2016** (France and Italy), **2017** (France, Slovenia, Austria, Italy – extremely severe)

Time to take action

Alpine region and central Europe discovered themselves vulnerable vs droughts.

Ministers of the Alpine Countries decided to include drought risk management in the programme of work 2017-2018 of the Platform „Water Management in the Alps“ of the Alpine Convention.

EUSALP's Executive Board has included in the 2016-2019 programme for the Action Group 6 the objective of drafting a „strategy for water-demand and supply management in order to prevent conflicts among sectors and actors also in case of peaks of demand and/or regional droughts“

* Work is still ongoing and some data from CH, FL and MC are still missing in the sources on which the next slides are based

Planning climate change adaptation

Most of the Alpine Countries have adopted national climate change adaptation strategies.

In France, Germany and Italy also regional strategies are under preparation/prepared.

Special sections on the Alpine area are generally included.

Different climate change scenarios are considered, as well as different climate change models are used. On a regional level the newest generation of EURO-CORDEX models are appreciated by more than one Country.

Droughts risk is considered in all the strategies, even where is likely affecting more the downstream areas outside of the Alps.

Future trends

During summer months (especially JJA) extreme drought periods will increase considerably. For winter periods, climate models show regional differences: in areas south of the Alps drought periods could increase also in winter periods, but less severe than is summer.

Vulnerable areas to hydrological droughts are generally outside of the alpine areas, but some decreases in spring runoff are likely to be observed in the Alps as well.

From drought to water scarcity?

Did past droughts led to water scarcity situations?

Austria, Slovenia and Italy registered important losses in agriculture production (up to 128 mln € in Slovenia with 2003 drought, up to 175 mln € in Austria with 2015 drought).

Less meaningful impacts have been recorded with the hydropower sector, with the tourist sector (artificial snowmaking production) and with water supply for non-domestic uses.

During extreme droughts, drinking water supply for households have been locally affected for few days in Italy (2017, in the lower Adige basin), Bavaria (2003, 2015, few small providers), Austria (2003) and Slovenia (2003) but outside of the alpine perimeter.

Lessons learned

Six categories of measures depending on the situation:

1. setting up commissions of institutions and stakeholders agreeing on compromises between sectors and introducing procedures linked to threshold values;
2. increasing resilience of water supply systems (investing in alternative sources, pumping from other regions, linking distribution networks);
3. improvement of irrigation efficiency and/or limitations to agricultural withdrawals;
4. stimulating reduction of the exposure to drought in agriculture (diversification of crops, sowing of more drought-tolerant hybrids etc.);
5. helping runoff with planned water releases from reservoirs;
6. increasing natural water retention measures.

Prioritization of uses

Highest priority is always given to freshwater supply to households.

Secondly other uses of higher public interest (e.g. other public water uses or water uses for fire-fighting) could be prioritized.

In Italy the agricultural sector is considered as a second priority as established by law.

Filling domestic swimming pools, private car washing and irrigation of private gardens are generally the first activities restricted in case of severe water scarcities.

Use of water from reservoirs and other limitations

The use of reservoirs for improving water discharge for different uses has been experienced in all the member States, but seems more consolidated in Italy (2017 - as a result of a structured negotiation, even if a public forced right on releases is planned by law).

The more diffused measures in case of drought and decrease of drinking water levels are the reduction of water uses for private irrigation, car wash and other activities like filling swimming pools.

These measures are planned to be replied in the next events.

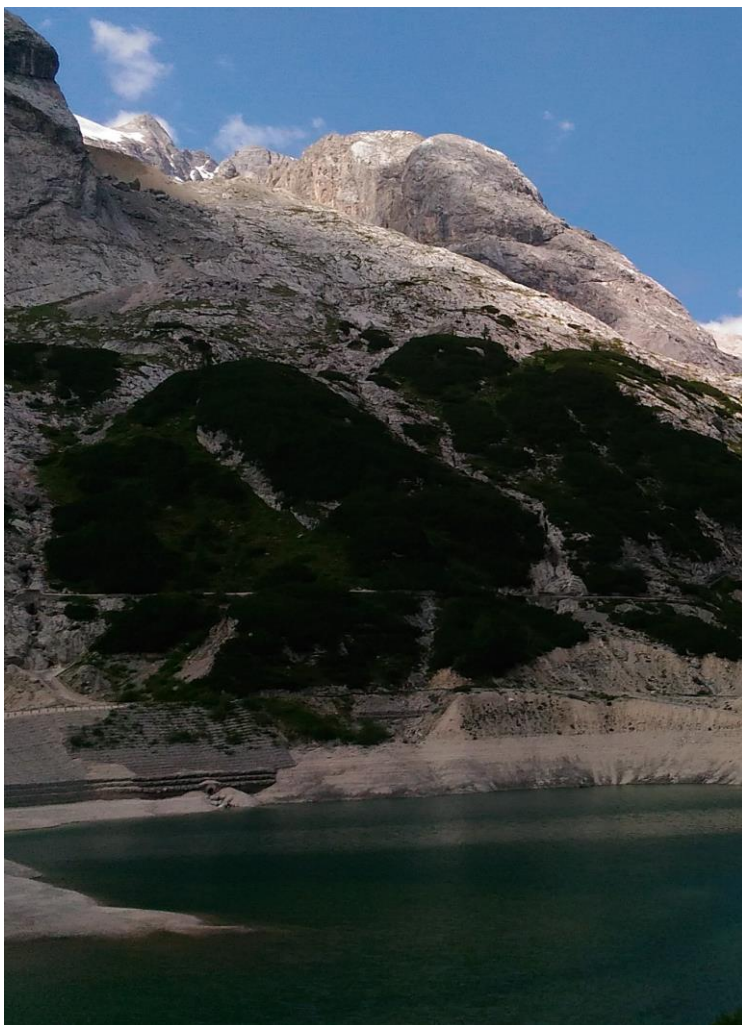
Procedures in case of severe droughts (1)

Procedures differ quite substantially among the member States:

- Austria: due to regional and time-limited relevance of droughts, the establishment of Country-wide drought risk management plans is not considered as necessary; as lessons learned from 2003 drought measures to improve the resilience of public water supply were introduced in vulnerable areas and measures to enhance natural water retention in catchments and strengthen the sustainability of different water uses are promoted.
- France: there are water resources management plans at sub-basin scale addressing the unbalanced situation between water availability and abstraction; there are also “drought framework order” that define how to manage crisis situation, also defining threshold values that are associated with restriction levels.

Procedures in case of severe droughts (2)

- Slovenia: there are no specific plans to limit water uses in case of drought events established yet but a specific measure from RBMP is in progress of preparation and will establish indicators for early warning of different levels of intensity and thresholds of droughts (both on surface- and ground-waters).
- Italy: IMELS launched in 2016 the “Permanent Observatories on Drought” at District level, commissions of institutions and stakeholders called to agree on the smarter solutions and tradeoffs in order to better manage water resources in case of scarcity; in a second phase, these commissions are expected to work on the basis of plans with standardized procedures.
- Bavaria: outside the Alps a pilot programme has been started to develop concepts for sustainable irrigation; in the Alps there is no need for that yet.



Thank you for the attention

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