

1st European Rivers Summit

Sarajevo, 27 September 2018

Hydropower in Italy: the "green" energy
threatening the last natural rivers

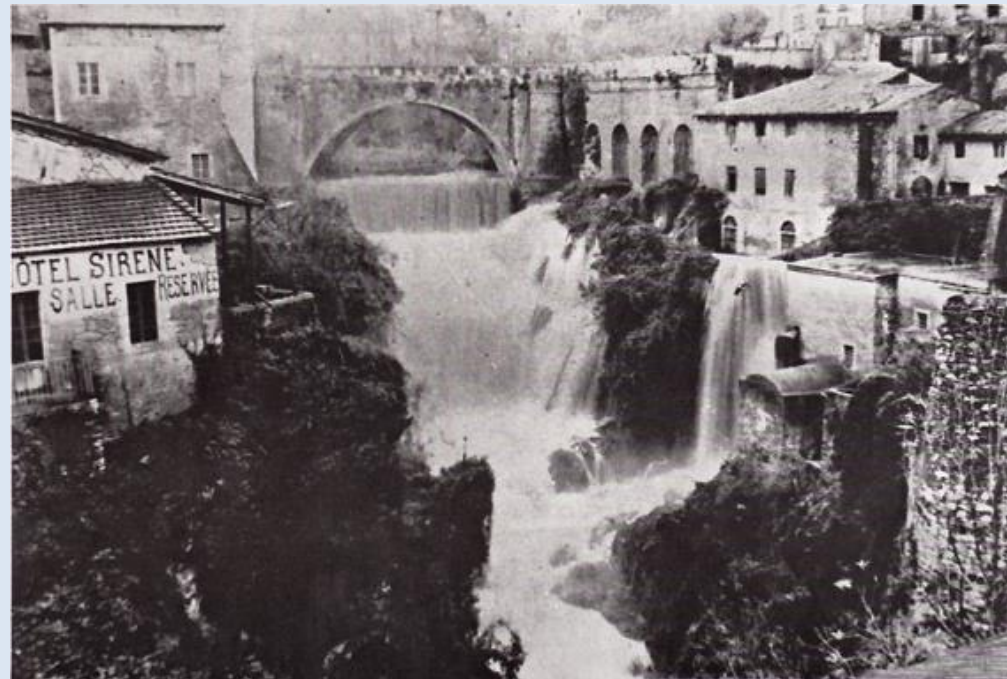
Andrea Goltara

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Hydropower development in Italy dates back to the 19th century!



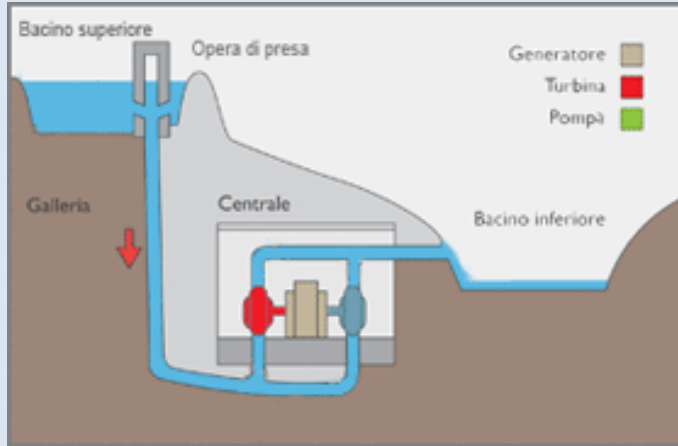
**1885 – First HPP
(Tivoli, near
Rome) 72 kW**



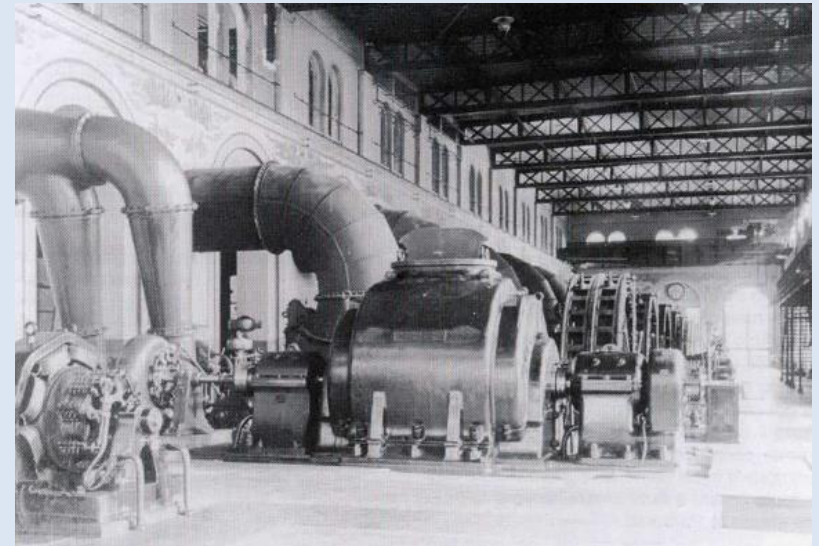
**1898 – Centrale Bertini
(Paderno, Adda river)
6 MW**



In 1908 first pumped-storage HPP (Clanezzo, Bergamo)



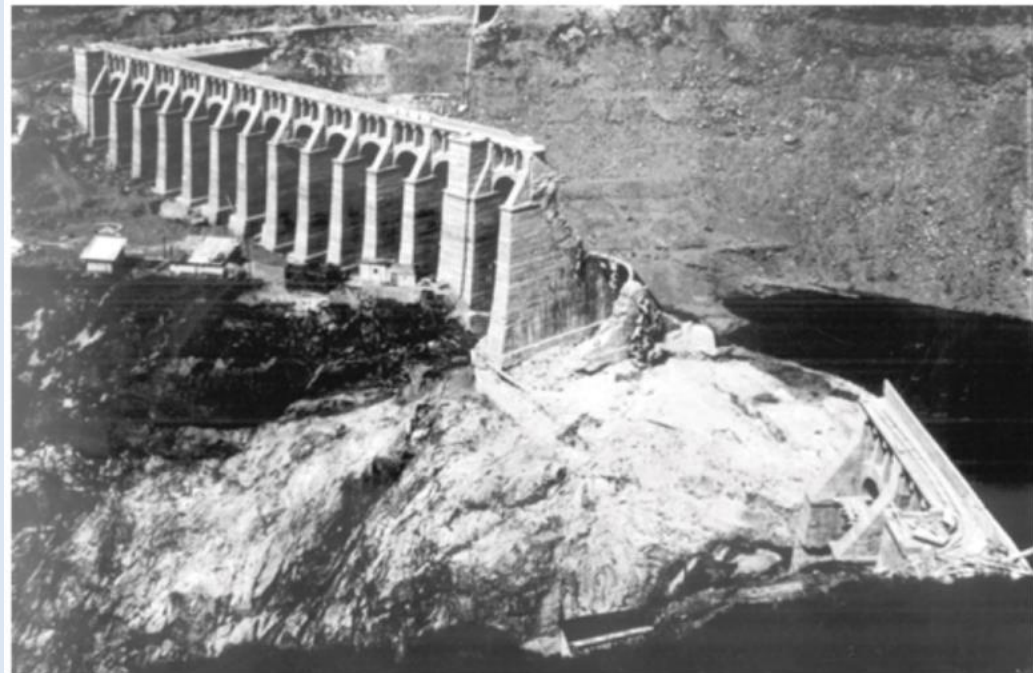
By 1918 216 HPPs built in Lombardia region alone!



In the 1920's already the first disaster



1923 – Collapse of the
Gleno dam (350-500
people died)



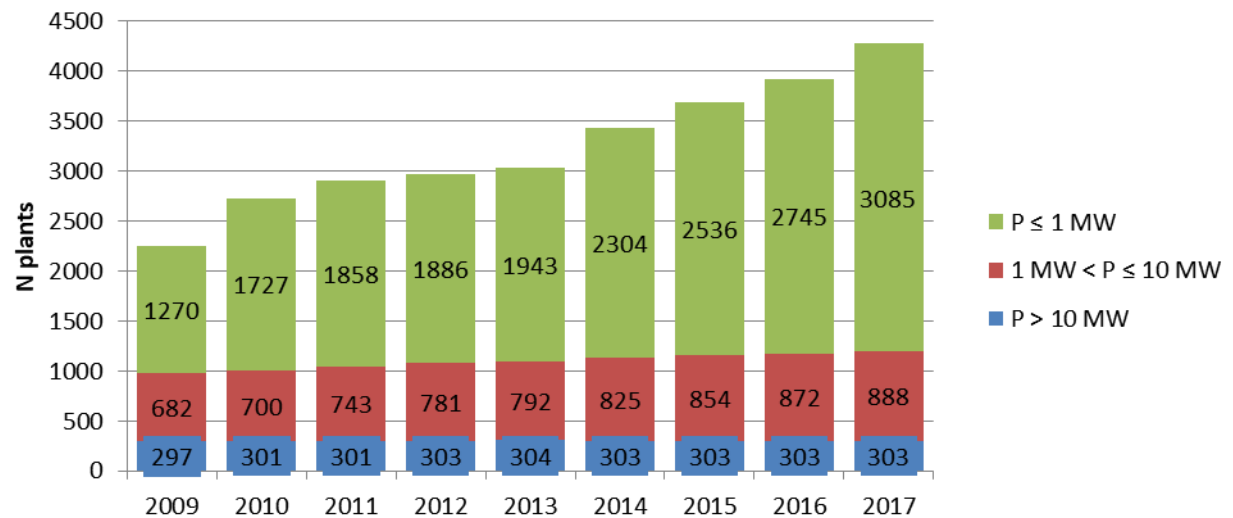
In the next 2-3 decades most of the large dams are built



Annual gross production (source: Terna historical data):
1948: 21 TWh; 1960: 46 TWh; 2015: 47 TWh

Between 2009 and 2010 the number of HPPs $P < 1$ MW + 36% (1270 \rightarrow 1727) but only + 0,3% (compared to total hydro in 2009) in terms of additional installed power!

Cumulated number of installed plants



L'energia "verde" che fa male ai fiumi

Qualità dei corsi d'acqua e produzione idroelettrica in Italia: un conflitto irrisolto

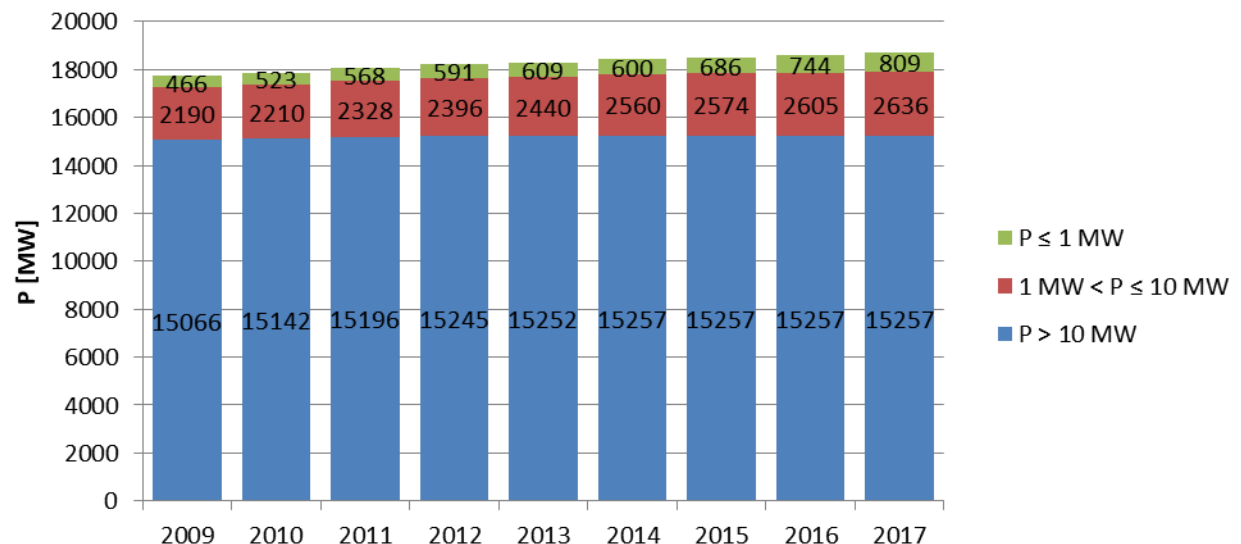


Settembre 2014

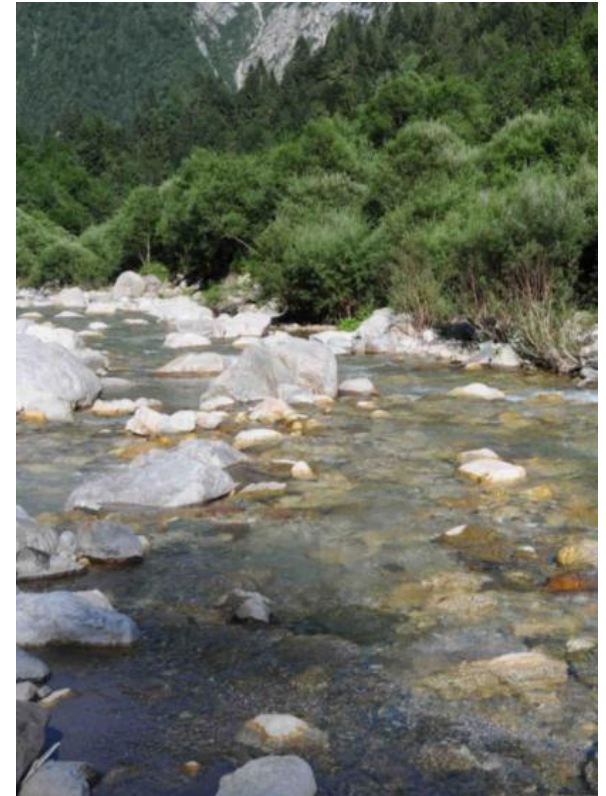


CENTRO ITALIANO PER LA RIQUALIFICAZIONE FLUVIALE

Cumulated power installed

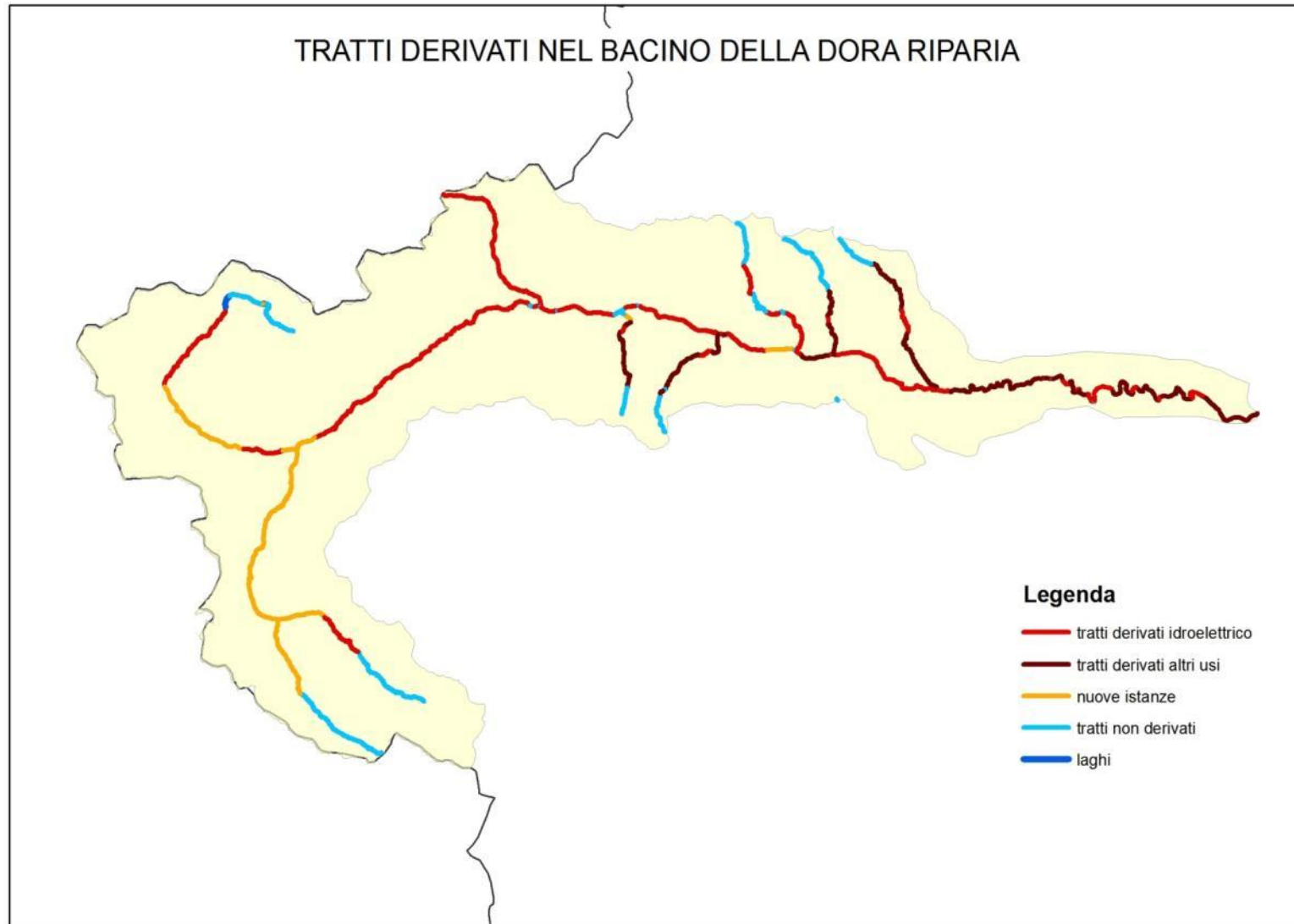


Massive increase of demands for new HPPs (over 2000 pending!), almost only due to incentives



New plants are SMALL (mostly $< 0,5$ MW) and located at increasingly high altitudes and in increasingly smaller streams

Typical situation in Alpine catchments (and increasingly often also in the Appennines)



**TOP PRIORITY: STOP THE
CONSTRUCTION OF NEW PLANTS !**

**Fighting against them
with the support of
WFD tools?**



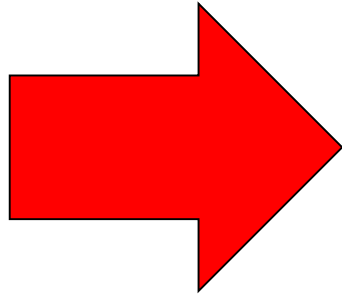
- **Insufficient adequacy of WFD biological metrics in Alpine rivers;**
- **Insufficient consideration of hydromorphology;**
- **Too long water bodies;**
- **Lack (or too superficial) EIAs...**
- **... non-explicit assumption that...**

~~**Small is
beautiful**~~



**EU pilot
6011/14/ENVI**

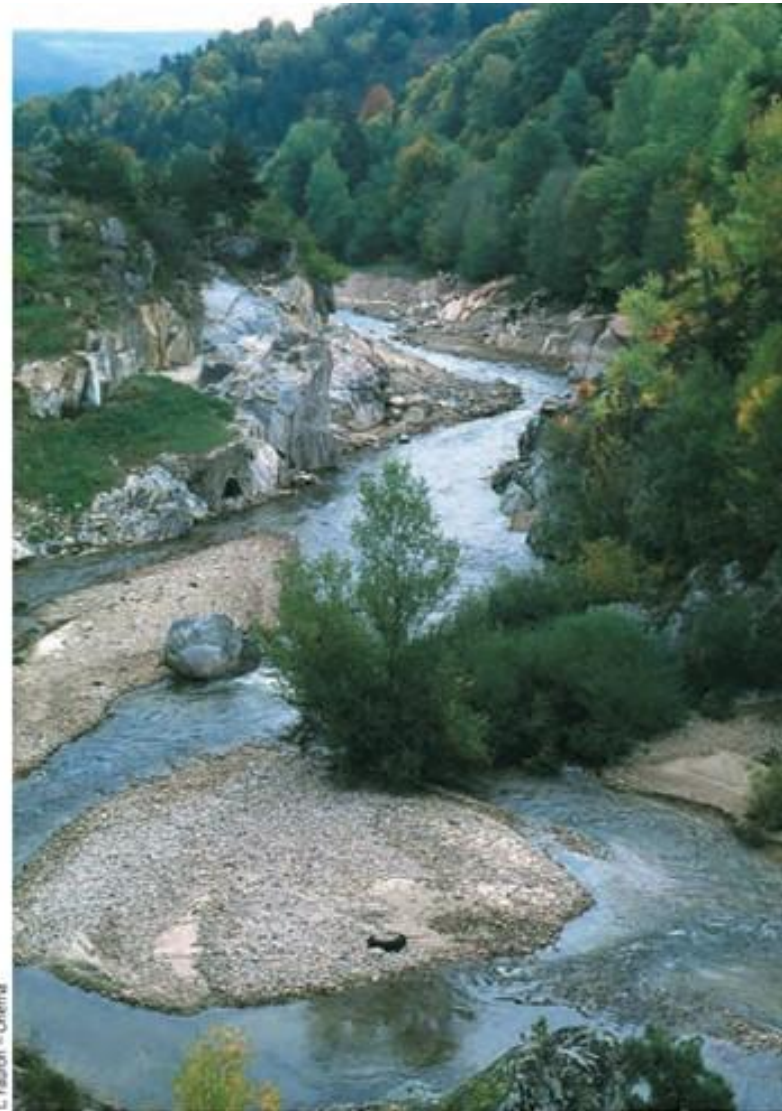




**We need to
stop the flow
of incentives !**



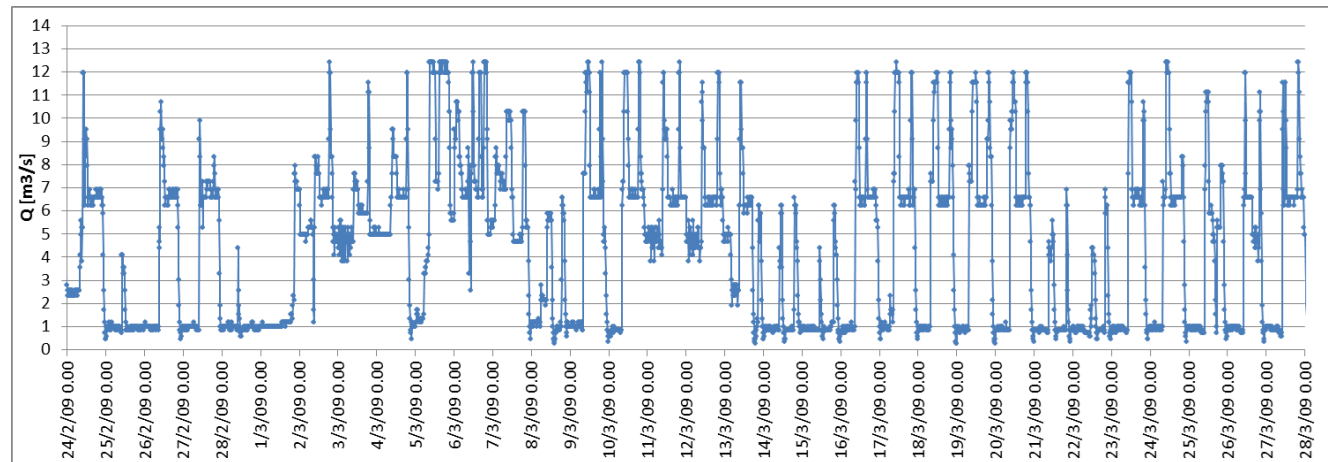
Remove dams/HPPs (at the end of a licencing period re-licensing is NOT the only option!)



River Léguer before and after (Oct 1998) the removal of the Saint-Étienne-du-Vigan dam

BUT thousands of HPPs will anyways remain for a long time...

It's a priority to improve the mitigation of the impacts of existing HPPs !!!



HyMoCARES

HydroMorphological assessment and management at basin scale for the
Conservation of Alpine Rivers and related Ecosystem Services

**The HyMoCARES logical
framework and toolbox:
how do management
actions affect ecosystem
services? How to improve
management of water and
sediments? How to assess
these improvements?**



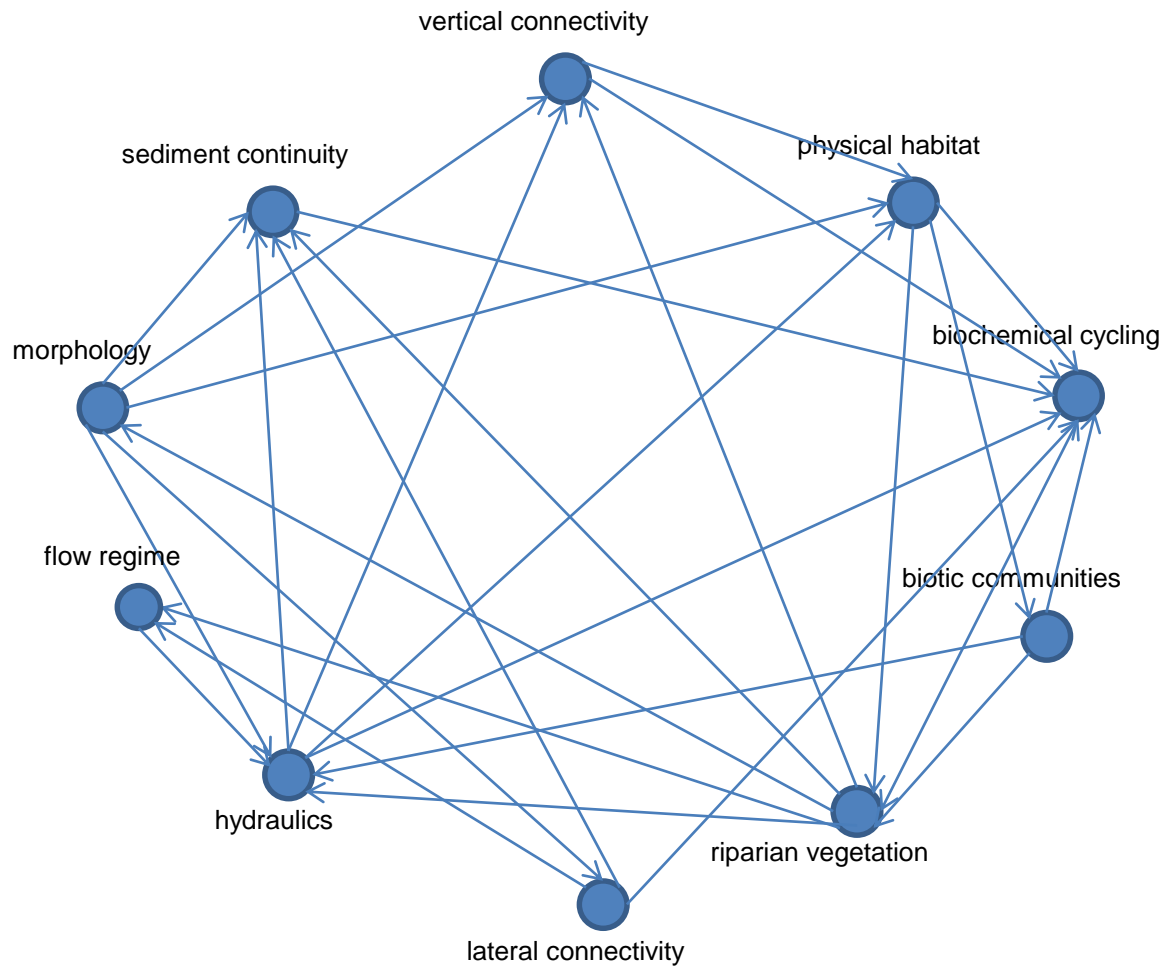
Weir
removal

Sediment
recharge/
restoration
of
sediment
continuity

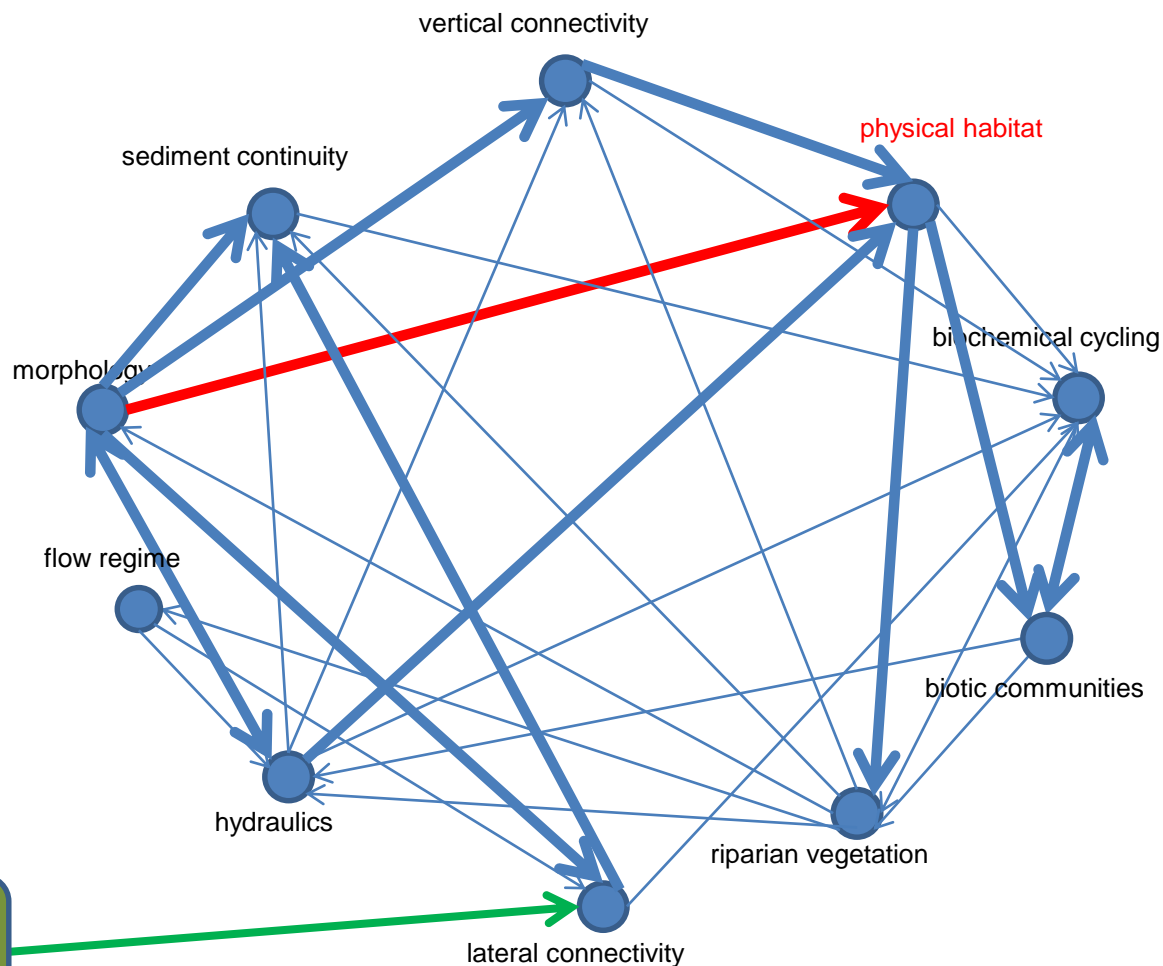
Removal
of bank
protection

Removal/
retreat of
levees

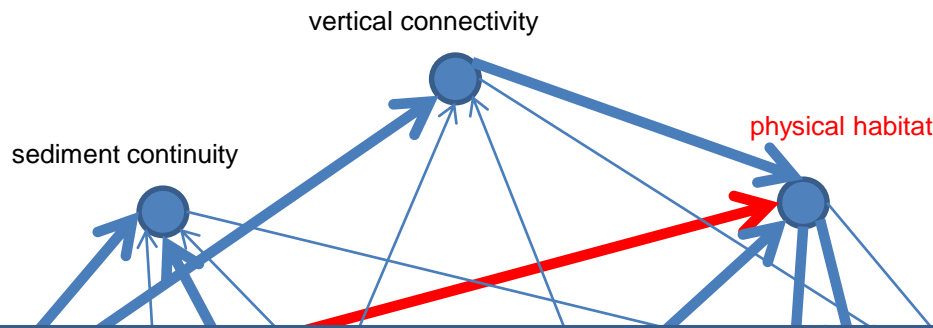
...









- Cultivated crops
- Surface water for drinking/non drinking uses
- Groundwater for drinking/non drinking uses
- Retention of nutrients
- Reduction of GHG
- Flood risk mitigation
- Drought risk mitigation
- Habitat related services
- Regulating T
- Education/science
- Aesthetics of landscape
- Water related activities
- Natural and cultural heritage
- Sediments (for construction)
- Hydropower
- Ecological status



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-  Flood risk mitigation

Explanation of the connection

Changes in morphological configuration and physical stream channel features directly and indirectly (through the interaction with water flow) affect the features that make up physical habitats, at different scales, such as substrate type and size distribution, water depth, flow velocity, water temperature, etc. In other terms, changes in morphology determine a change in type and distribution of hydromorphological units, thus of habitats.

Useful assessment and predictive tools

- Comparison of different **habitat models** and **habitat suitability indicators**

[link to guidelines](#)

[literature](#)



13 CASE STUDIES



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- 1) BUECH
- 2) DRAC
- 3) MAGGIA
- 4) ADIGE
- 5) AVISIO
- 6) ISARCO
- 7) TALVERA
- 8) WERTACH
- 9) LECH
- 10) DRAU
- 11) DRAVA
- 12) MUR
- 13) SALZACH
- ALPINE SPACE COOPERATION AREA



River Buëch (EDF hydropower plant)

- Mechanical reintroduction of gravel (berms)
- Flushing when $Q > Q_{lim}$
- Monitoring and evaluation



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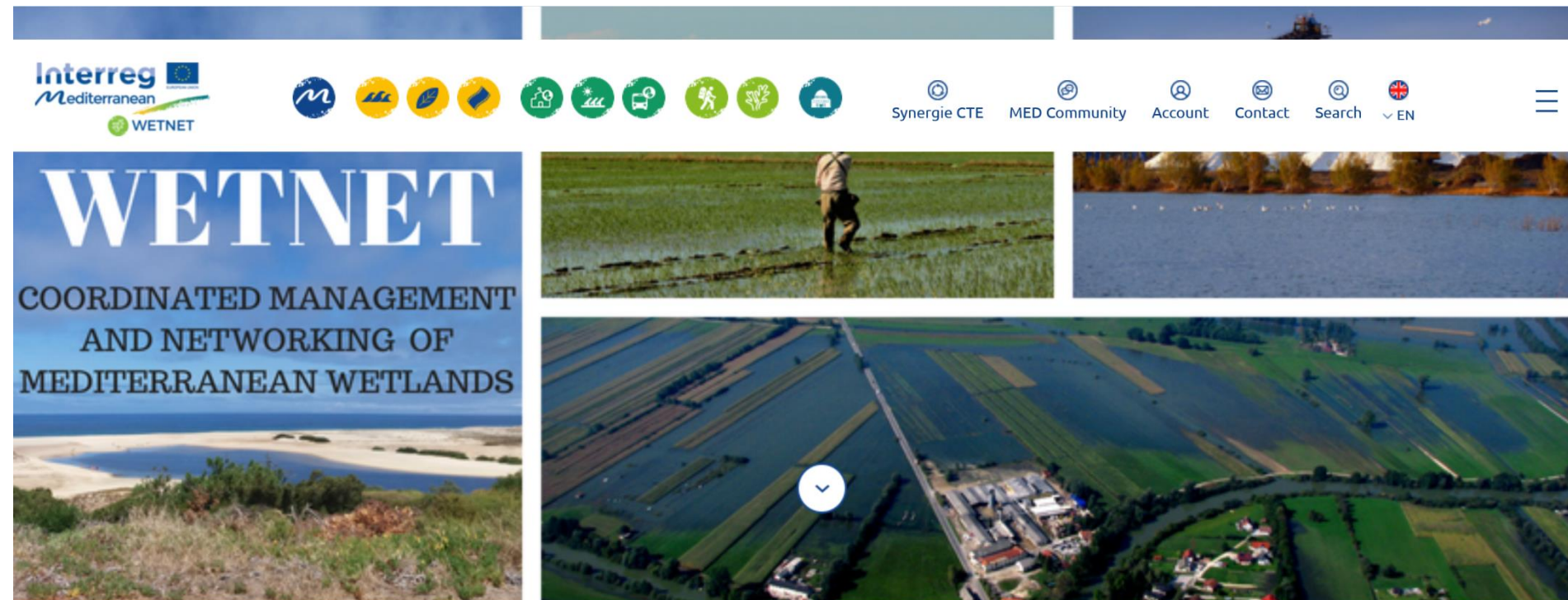
Contact



Integrating the ES approach in planning and operational activities affecting river hydromorphological processes

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THANK YOU FOR YOUR ATTENTION !

Andrea Goltara