SOUTH EAST EUROPE
Transnational Cooperation Programme

SEE HydroPower
clear water clean energy

Programme co-funded by the EUROPEAN UNION

EGU Leonardo
Topical Conference Series
on the hydrological cycle
2012

SEE HydroPower
clear water clean energy

RSE
Ricerca Sistema Energetico

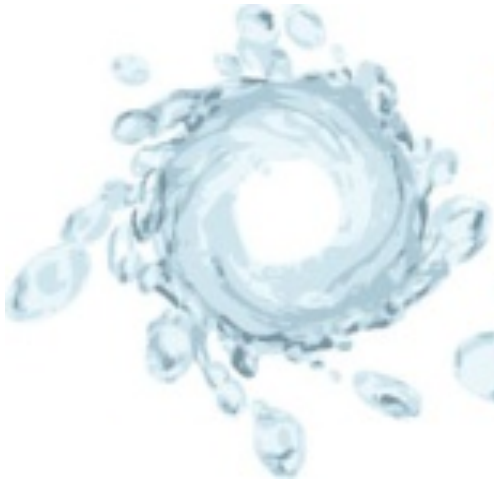
Seminar
Hydrology and Society

14th - 16th October 2012
Torino, Italy

Solutions to harmonize clear water & clean energy

Maximo Peviani

Project Coordinator
RSE – Research on Energy Systems
Milan, Italy



SEE HydroPower

clear water clean energy

- Challenges
- Main problems
- Main objective
- Tools & methods
- Applications
- Conclusion

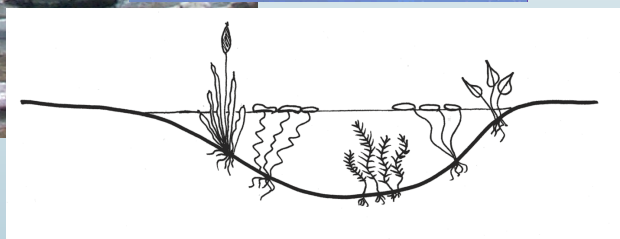
Challenges

Water Framework Directive
implementation issues

Downstream river environmental quality

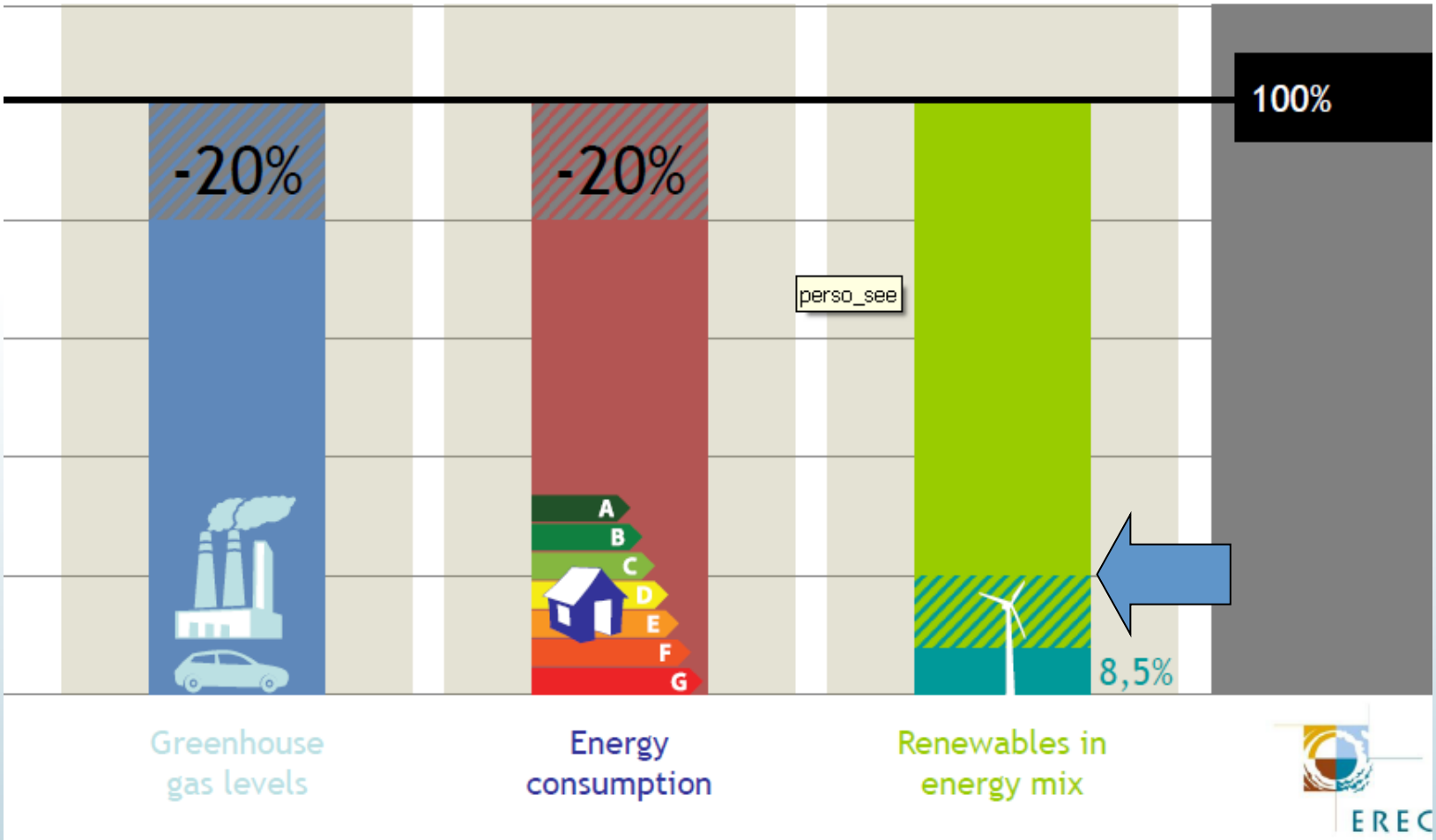
Minimum environmental flow

- PERIFLUVIAL ZONE
- PERIPHYTON
- ICHTHYIC FAUNA
- B E I I C S
  MACROINVERTEBRATES
- AQUATIC MACROFITS



Challenges

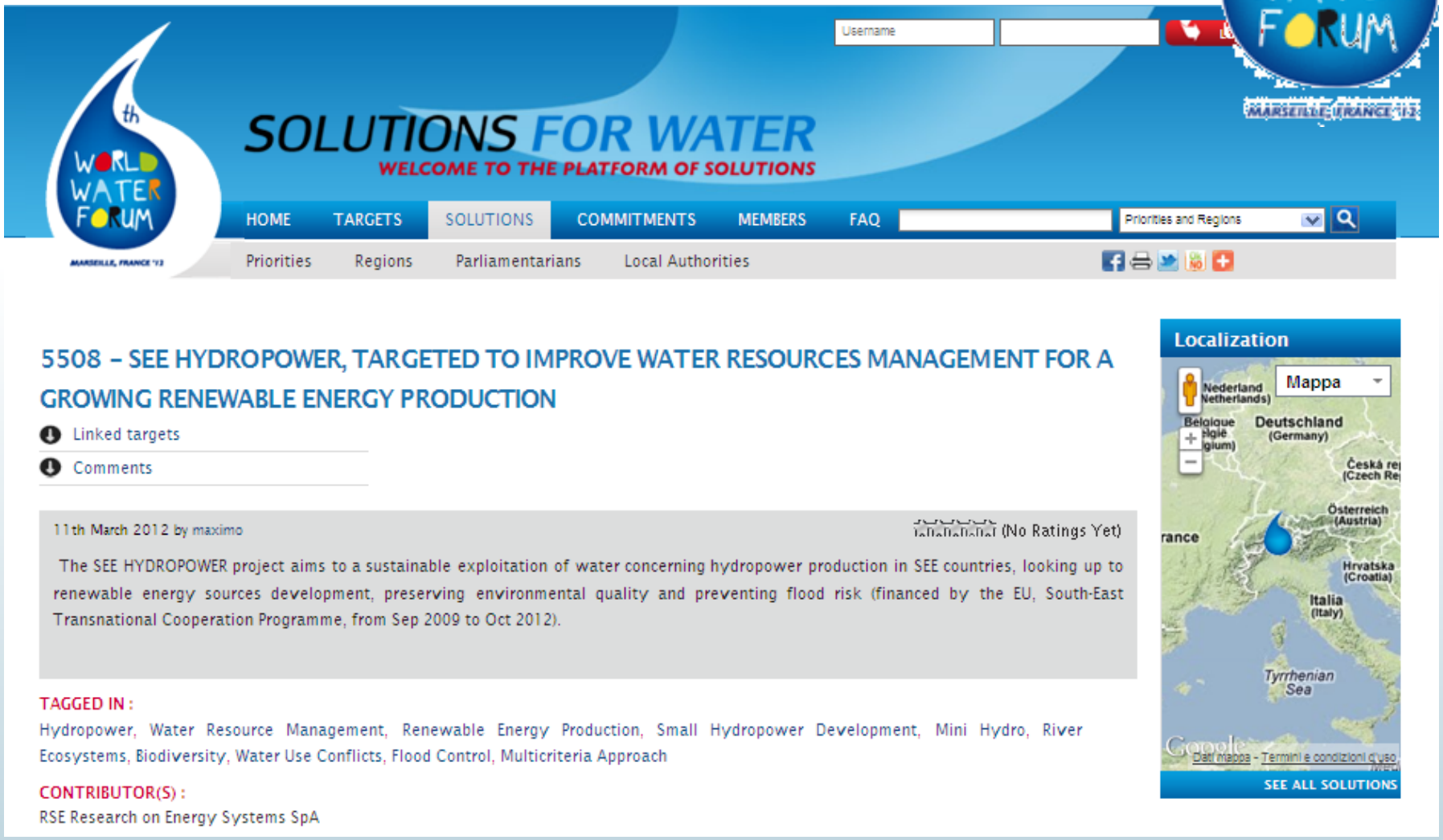
The 20-20-20 EU policy by 2020



Challenges

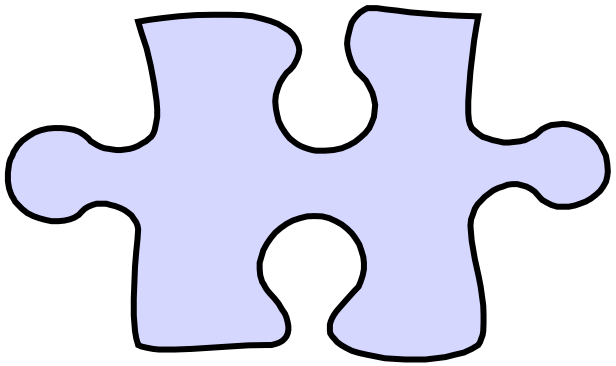
SOLUTIONS to harmonize Water and Energy !

6th World Water Forum - Marseille, March 2012

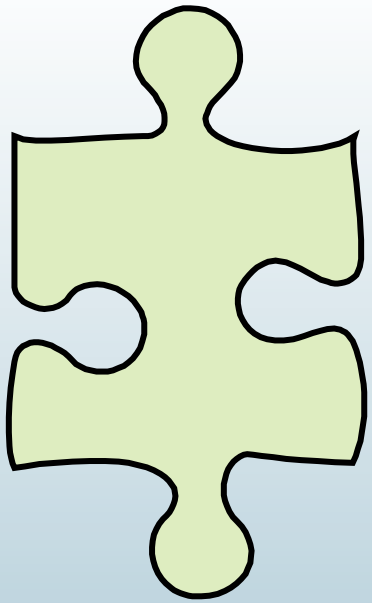


Main problems

Issues to be addressed



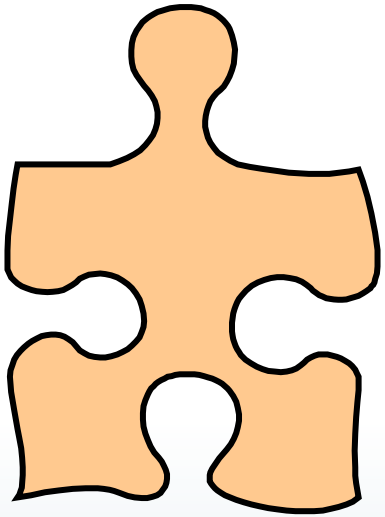
Hydropower is the ***most important renewable resource*** for electricity production in the *EU* countries



Hydroelectric ***production*** has to be ***maintained*** and even ***increased***, reaching the share of renewable electricity production according to ***2001/77/CE RES-e Directive***.

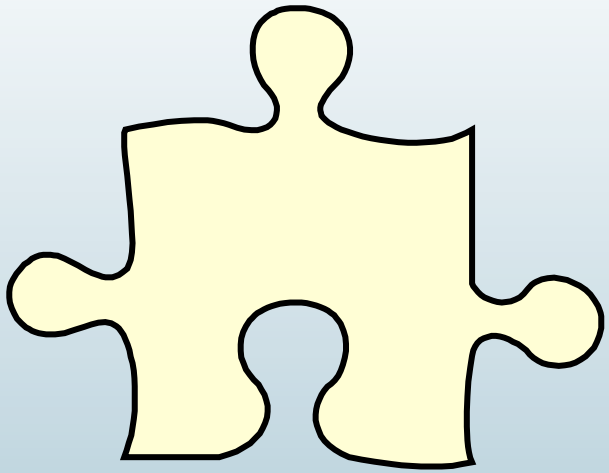
Main problems

Issues to be addressed



The ***2000/60/CE Water Framework Directive*** obliges member States to reach good ecological status in their water bodies.

Public Administrators face an ***increasing demand*** of water abstraction, but lack reliable tools to evaluate the effects of water withdrawal on the river system.



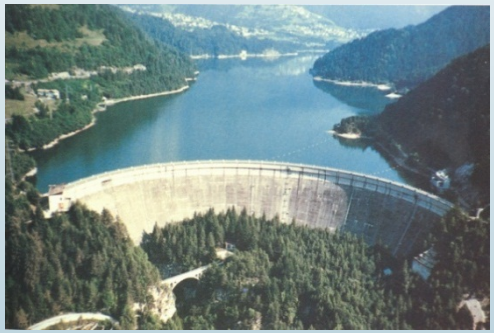
Competition between ***water users*** (for drinking, irrigation, industrial, power, etc.) is becoming a serious problem, and there is a strong need of a more accurate ***planning*** and ***management*** of the resources.

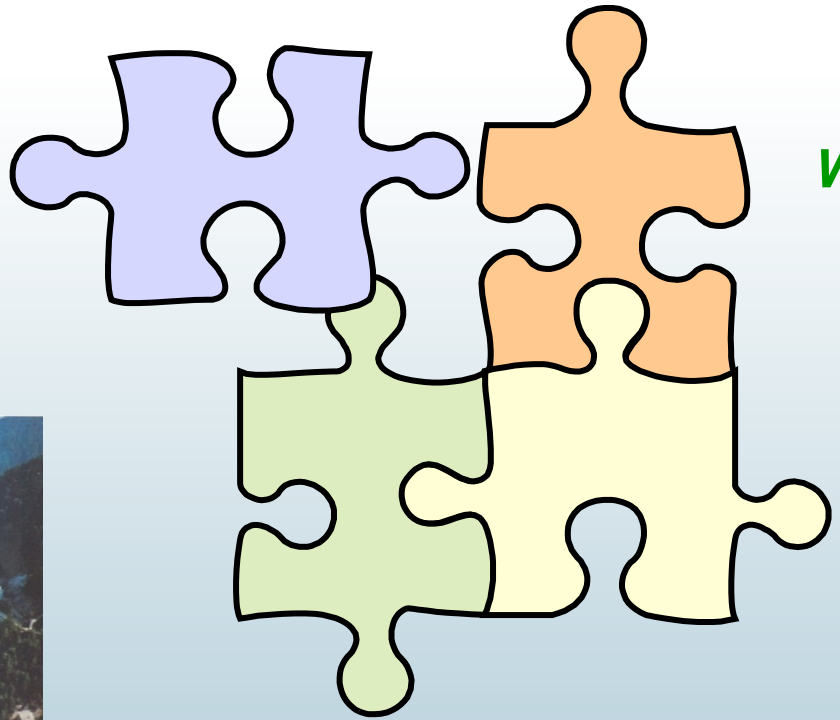
Main Objective

SEE HydroPower
clear water clean energy

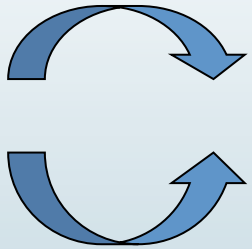
Environment

Energy





Water Framework Directive



RES-e Directive

Partnership

12 Partners and 11 Observer Partners

Italy – Austria – Slovenia – Romania - Greece
Republic of Moldova – The Netherlands - EU

Prefecture of Serres Province

Coordinator

RSE Ricerca Sistema Energetico

Research on Energetic Systems

Milan, Italy

- Established at the end of 2005 as a separate company currently 100% owned by the ***GSE***.
- The mission is to take over funded research programs and contract research at national and international level
- Research activities are centered on the electricity and energy sector with emphasis on experimental pilot applications

Partnership

RSE - Research on Energetic Systems (Italy)

ARPAV - Regional Land Safety Department (Italy)

Province of Belluno (Italy)

TUG – Graz University of Technology (Austria)

Government of Styria – Department of water resource management (Austria)

University of Ljubljana (Slovenia)

Ministry of Environment and Spatial Planning (Slovenia)

University "Politechnical" of Bucharest (Romania)

National Water Administration "APELE ROMANE" (Romania)

Prefecture of Serres Province (Greece)

Technical University of Moldova (Republic of Moldova)

University of Natural Resources and Life Science of Vienna (Austria)

Observer Partners

Austrian Hydro Power (Austria)

Macedonian Power Plants (Rep. of Macedonia)

European Small Hydropower Association (EU)

National Association of Electric Utilities (Italy)

Energy Agency of Padrovje (Slovenia)

Association of Renewable Energy Producers (Italy)

Veneto Region (Italy)

Institute for Water Education (The Netherlands)

Sociedad Colombiana de Ingenieros (Colombia)

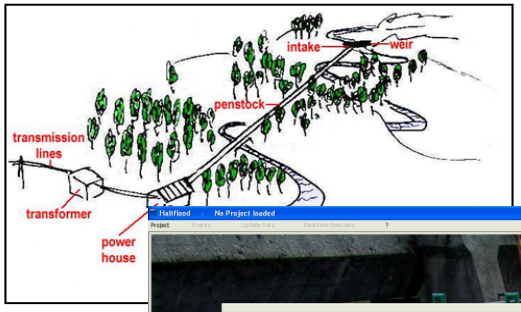
Insitute of Hydroelectric Studies and Design (Romania)

Facultad Nacional de La Plata (Argentina)

TOOLS
to support Public Administrations

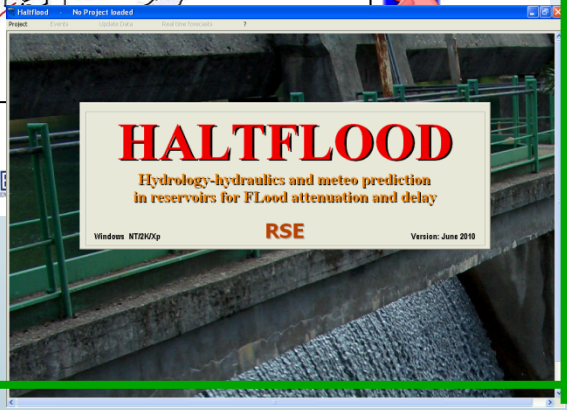
SMART Mini-Idro

Software for the technical-economic feasibility analysis of small hydropower plants in fluent water courses



WORKING MODULES:
1 Discharge
2 Turbine
3 Energy

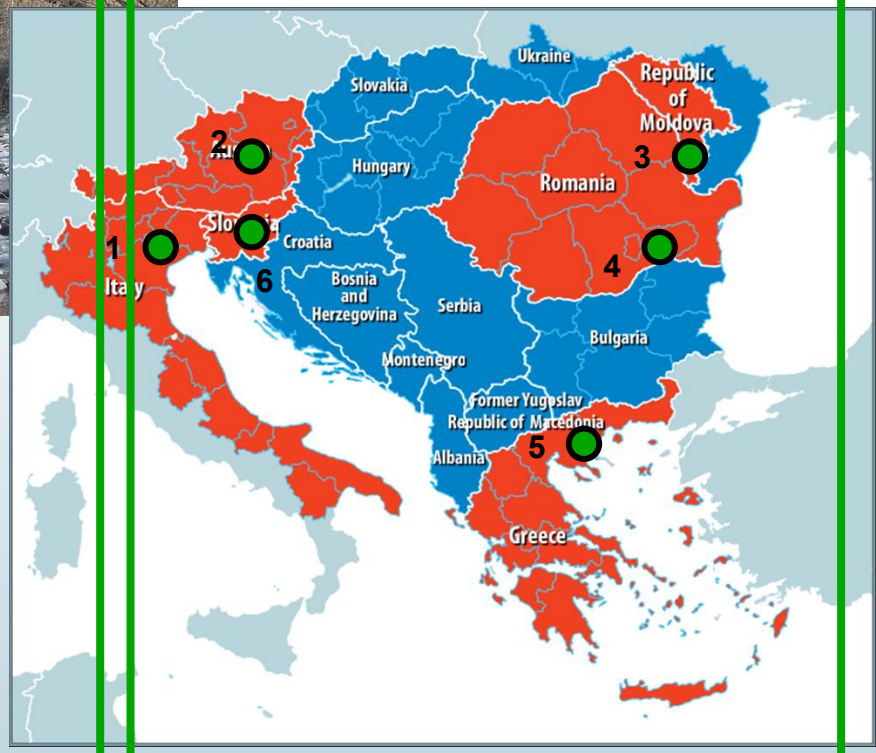
Alessandro Davitti



METHODS
to preserve downstream river quality

EFIF

APPLICATIONS
testing methods & tools in 6 pilot areas



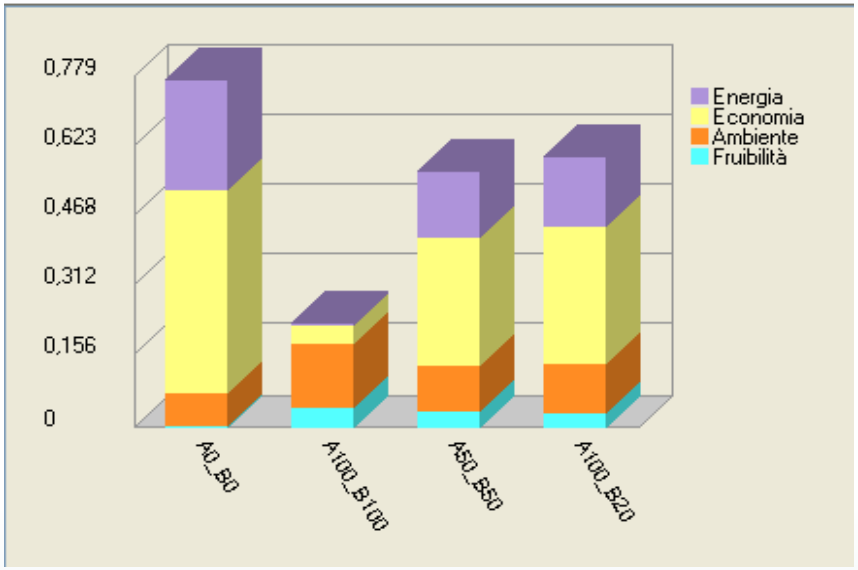
RSE Ricerca Sistema Energetico

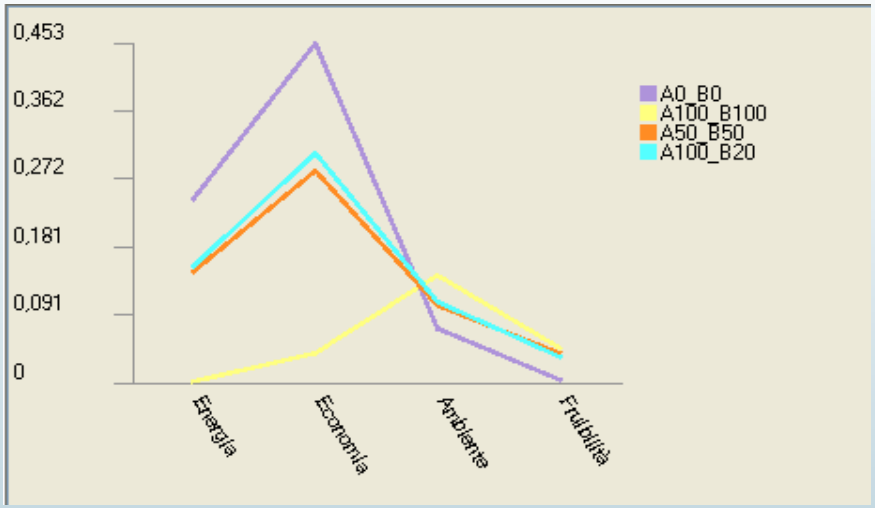
MCA tool implementation for water management: SESAMO software

Tools (1)

Multi Criteria Analysis

- Comparison among alternatives
- Pro and cons of each alternative
- One ranking for each stakeholder
- Comparison among rankings



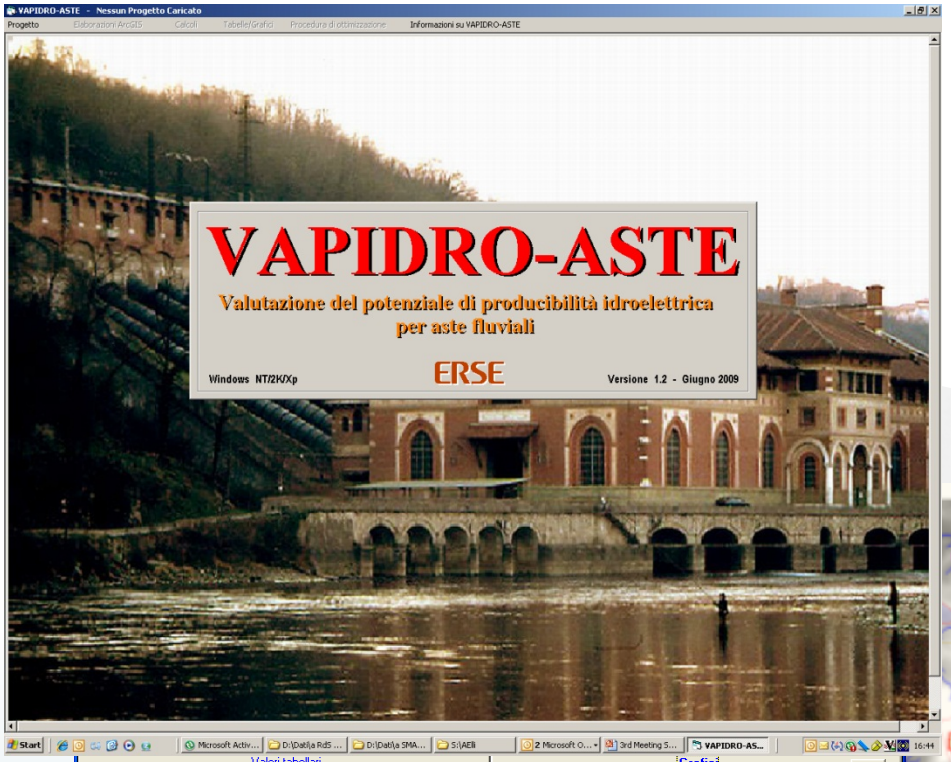


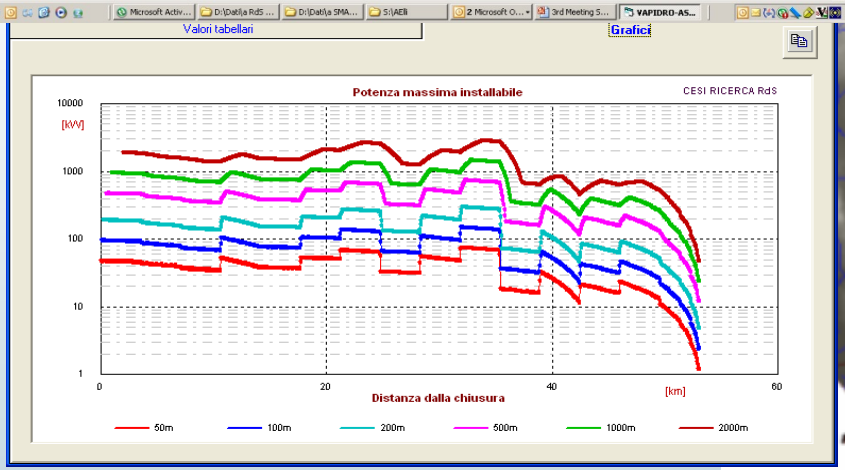
It does not decide, it supports decision makers

It helps to make transparent decisions

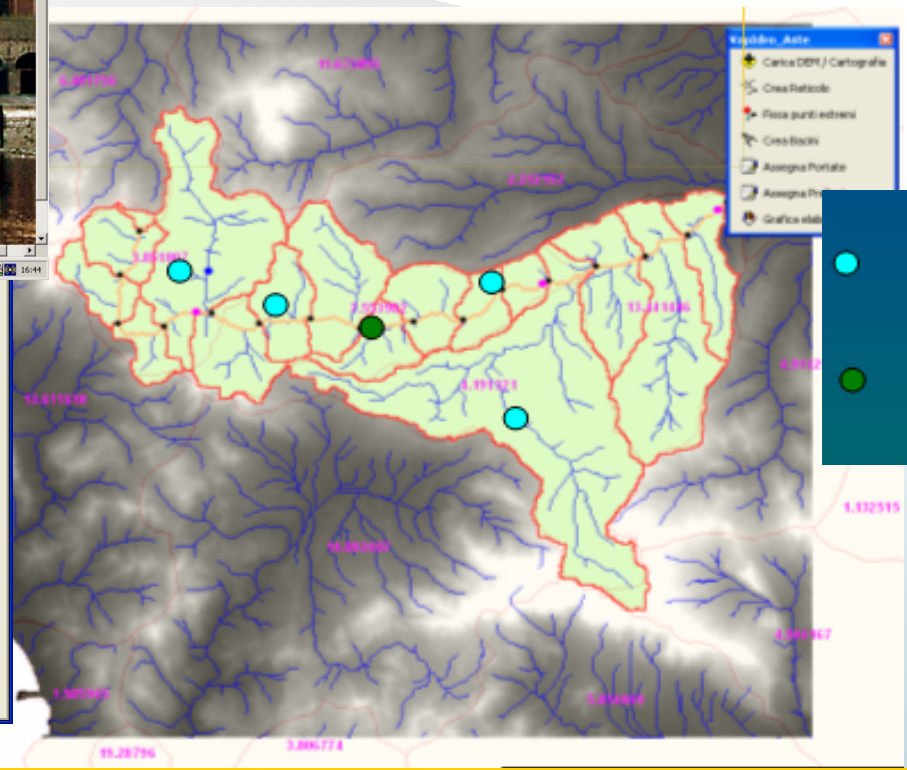
Tools (2)

Model to determine the **optimal small hydropower exploitation** scheme and most **suitable sites**





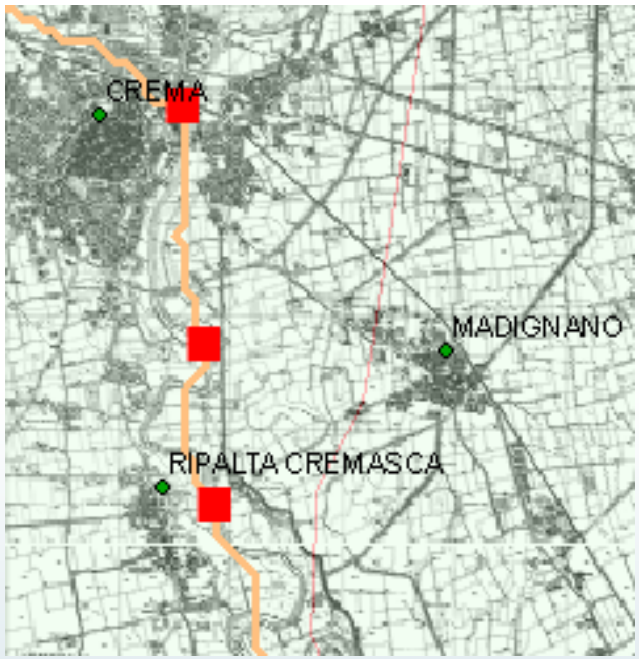
Residual potential hydropower



Installable power of potential mini hydro plants

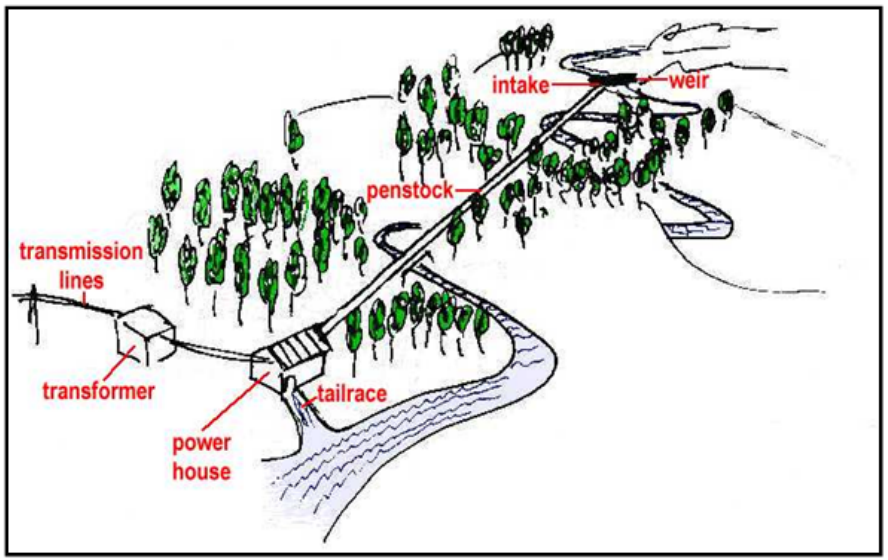
Tools (3)

SHP Cost / Benefit detailed analysis



SMART Mini-Idro

Software for the technical-economic feasibility analysis of small hydropower plants in fluent water courses



WORKING MODULES:

1. Discharge
2. Turbine
3. Energy
4. Costs
5. Financial Analysis

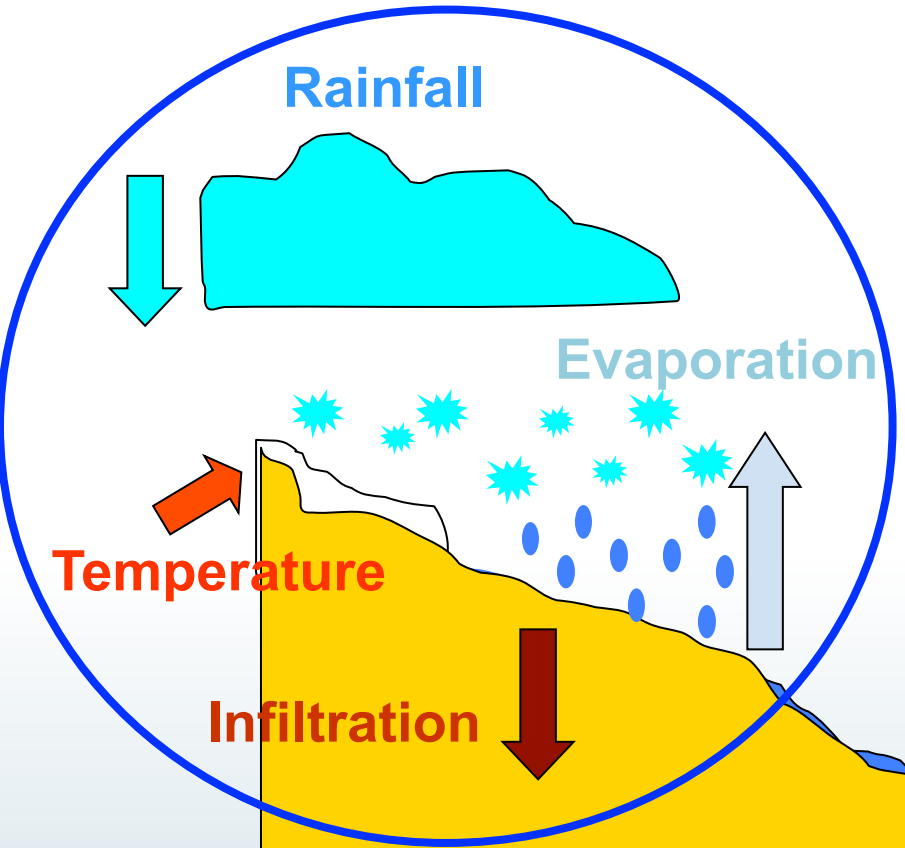
User Guide

Optimized B/C solution

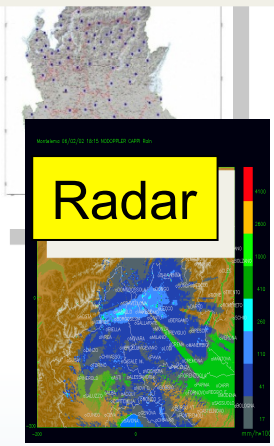
ERSE ENEA-Ricerca sul Sistema Elettrico
SMART
RdS Ricerca di Sistema

Dynamic operation of reservoirs

Tools (4)



Pluviometers



HALTFLOOD

Hydrology-hydraulics and meteo prediction in reservoirs for FLood attenuation and delay

Security and optimal management of HP reservoirs

Tools (5)

The "European Fish Index +"
a numerical tool for
Ecological Status Assessment

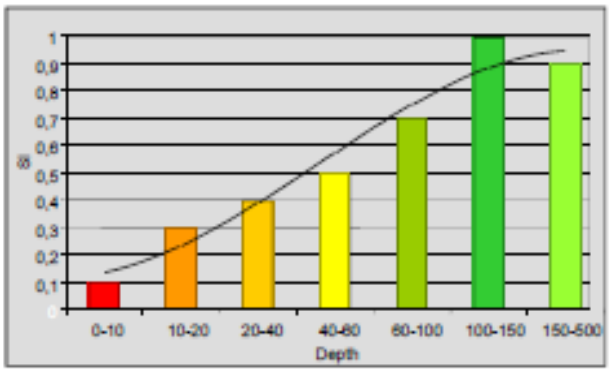
Sitename	IBI FR96	IBI USA00
Orăștiana Eastern Plaines	22	12
Bajura	32	15
Herodistea	32	15
Radauti	24	13
Cotu Micalinti	32	13
Romanesti	22	15
Hermeziu	28	15
Sendreni	25	16
Ungheni	28	14
Opriseni U	24	13
Opriseni D	14	11
Cotu Salageni	30	13
Draneeni	26	13
Poganesti Pontic Province	24	15
Broscosesti	24	10
Bumbata	20	10
Falciu	22	16
Carja	22	13
Oancea	16	13
Foltesti	20	9
Pietrosu	18	15
Giurgiulesti Garla	12	12
Giurgiulesti	28	16

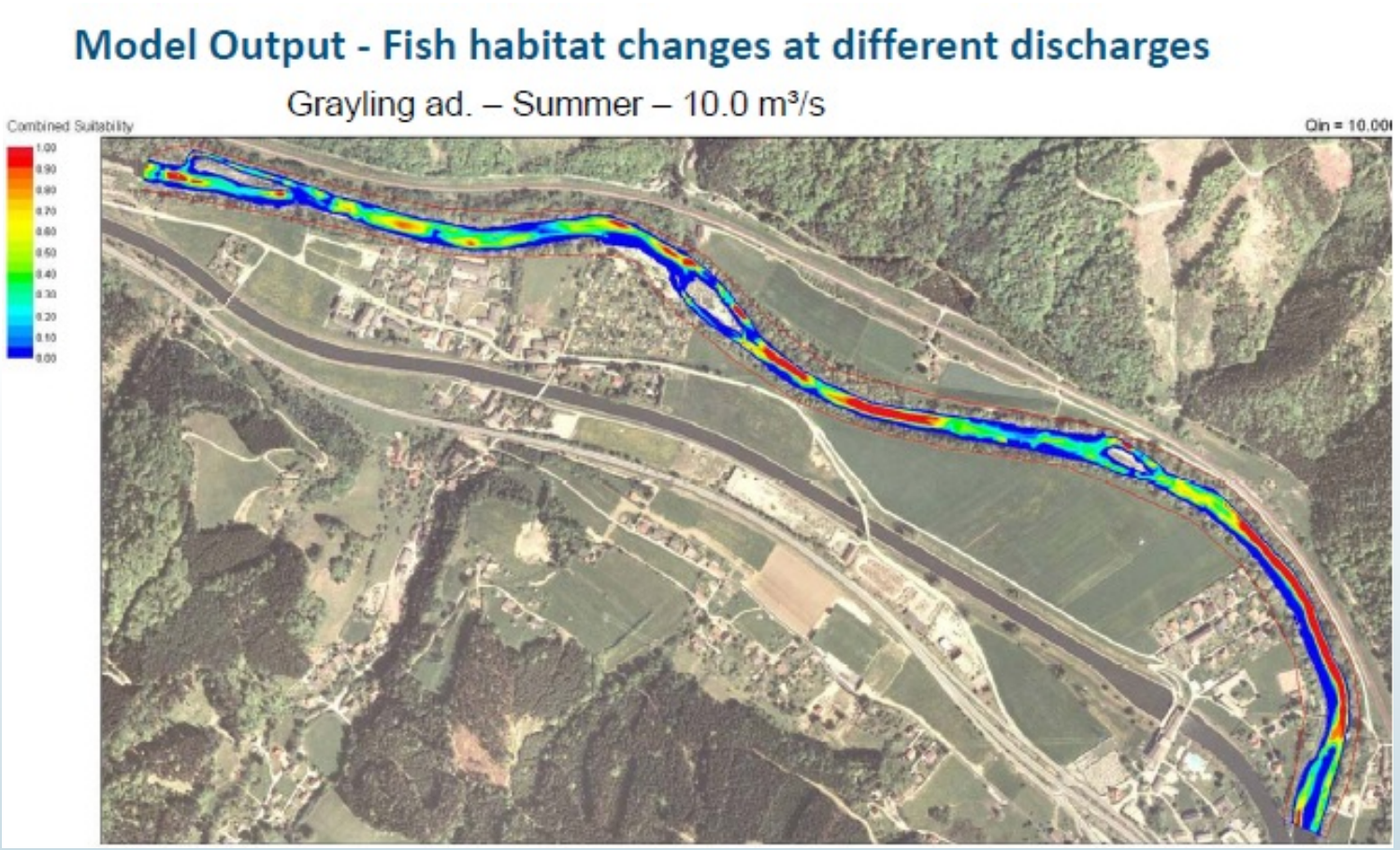
University of Natural Resources and Life Science Vienna

Habitat modeling with preference curves

Tools (6)

Univariate suitability curve for key species/-life stage





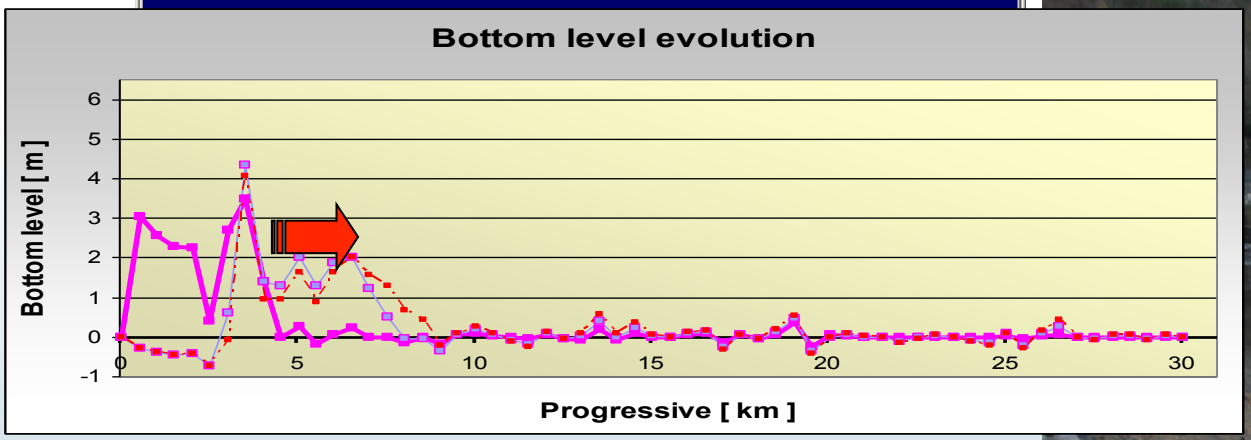
University of Natural Resources and Life Science Vienna

Sediment transport and river morphology

Tools (7)

Mathematical model GIS integrated

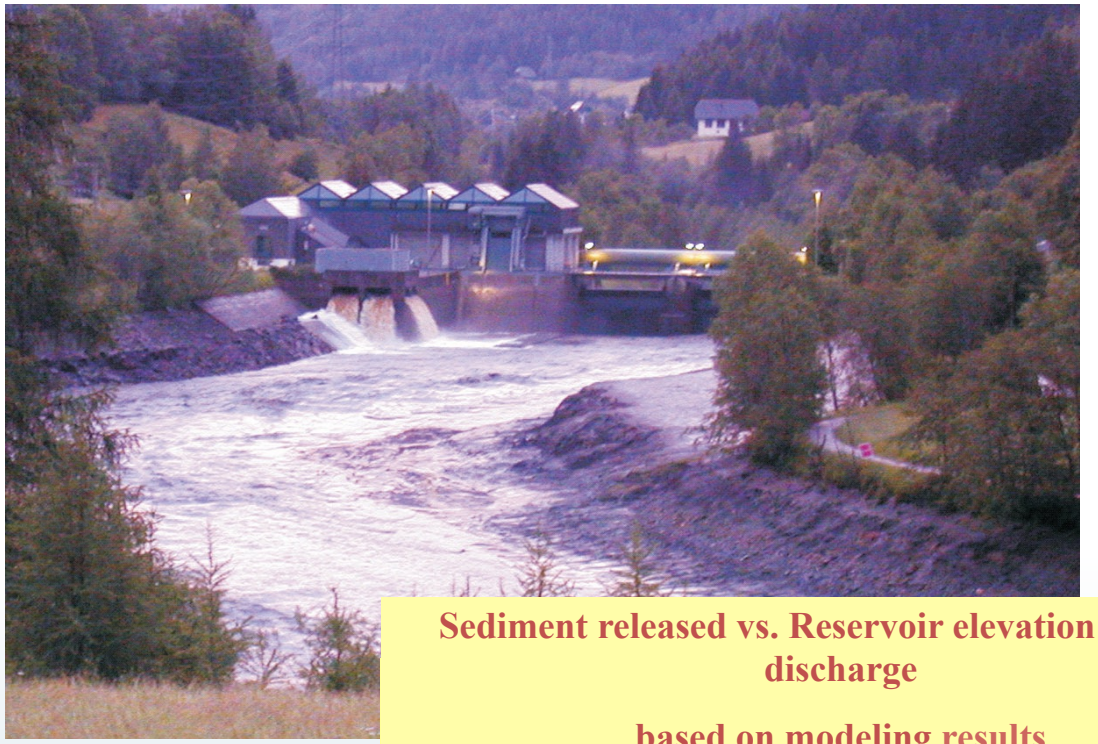
Controlled FLUSHING OPERATION of HP reservoirs

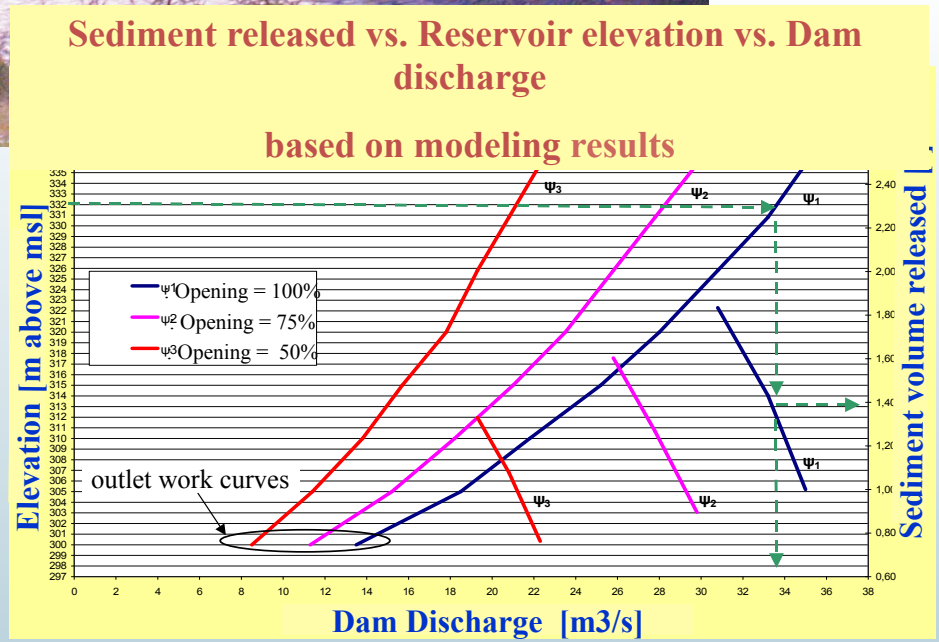


- Suspended concentration
- Embeddedness
- Aggradation level

Sediment management of reservoirs

Methods (1)





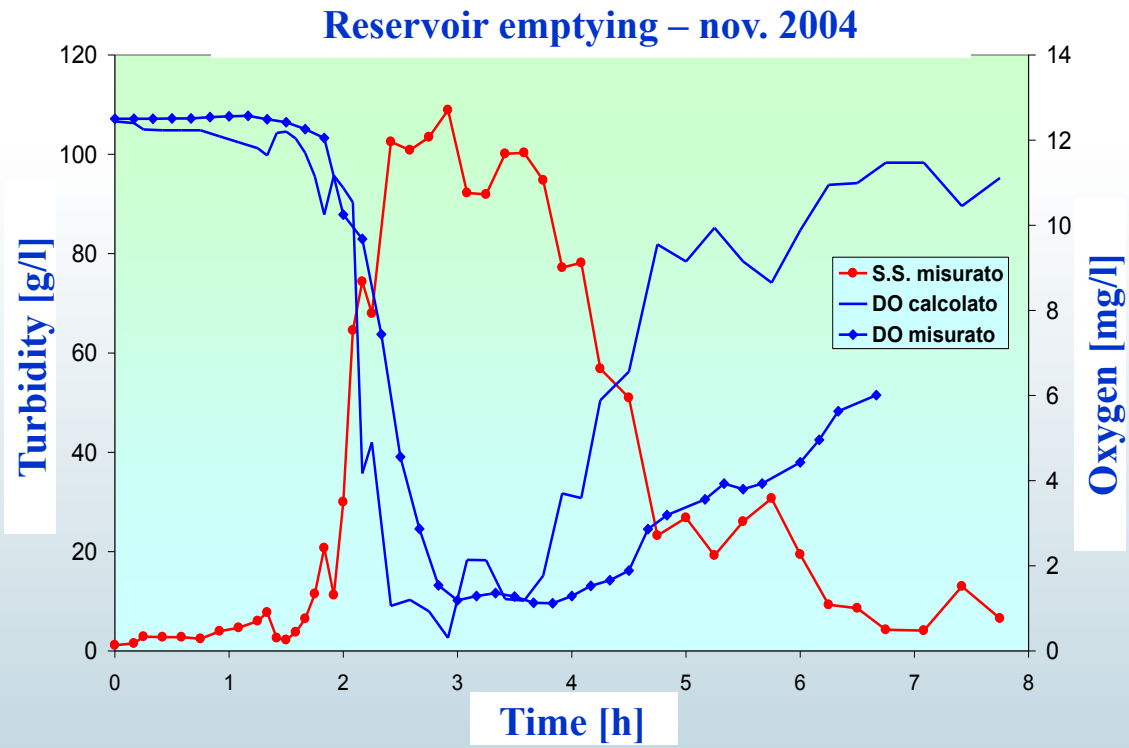
TU Graz

Optimal reservoir disaltation

Downstream river quality preservation

Methods (2)

- **Flushing operation of reservoirs:**
  - Evaluation of sediment concentration
  - And water dissolved oxygen depletion



Water and biological continuity

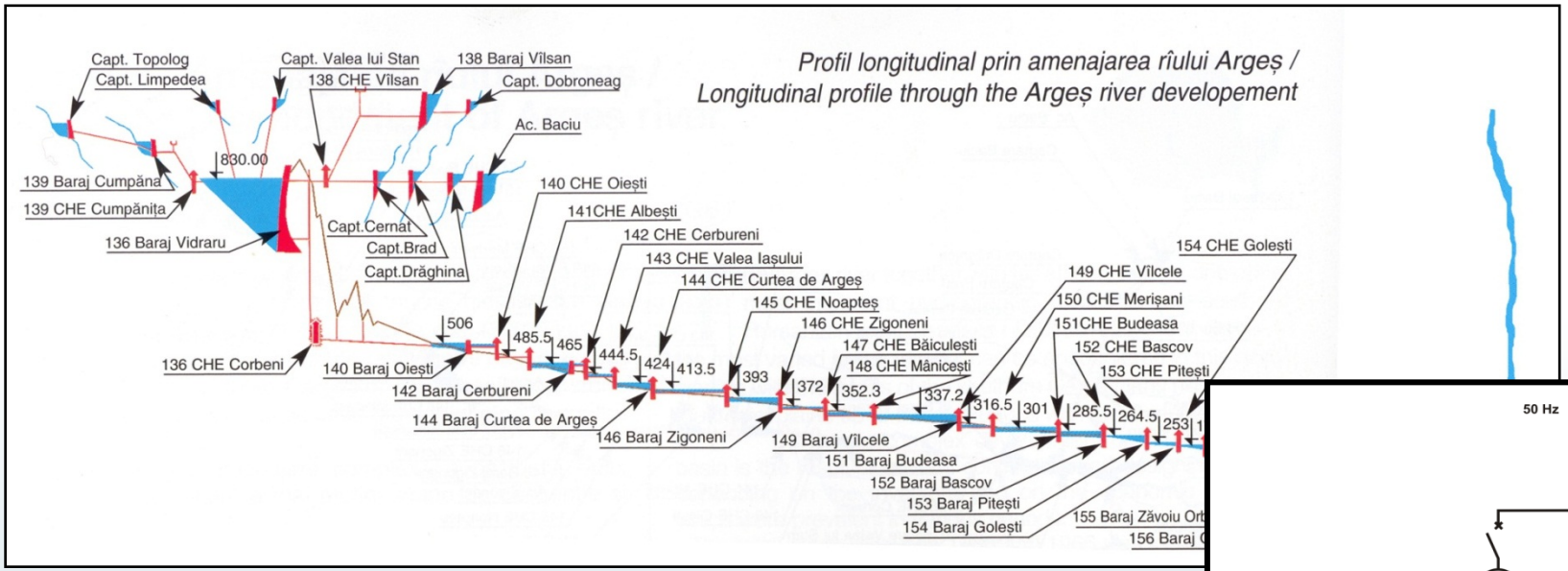
Methods (3)

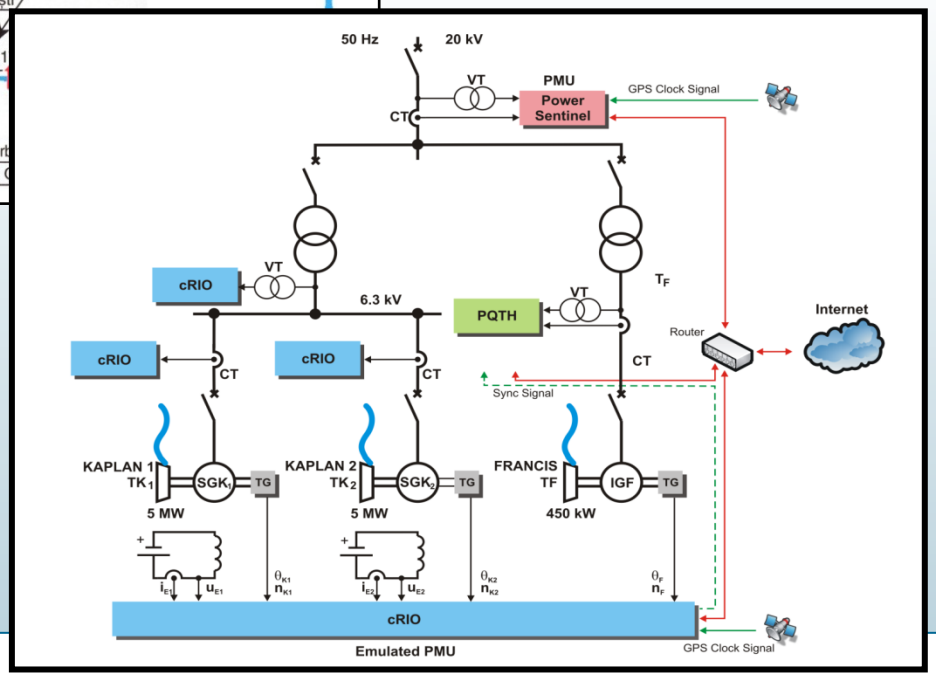
- Fish migration
- Refuges
- New river areas
- Nutriment
- Reproduction zones
- Environmental flow
- Improve water quality
- Temperature, O_2

SCADA Application

Methods (4)

Monitoring of hydropower unit (mechanical and electrical parameters, voltages, currents) through the web





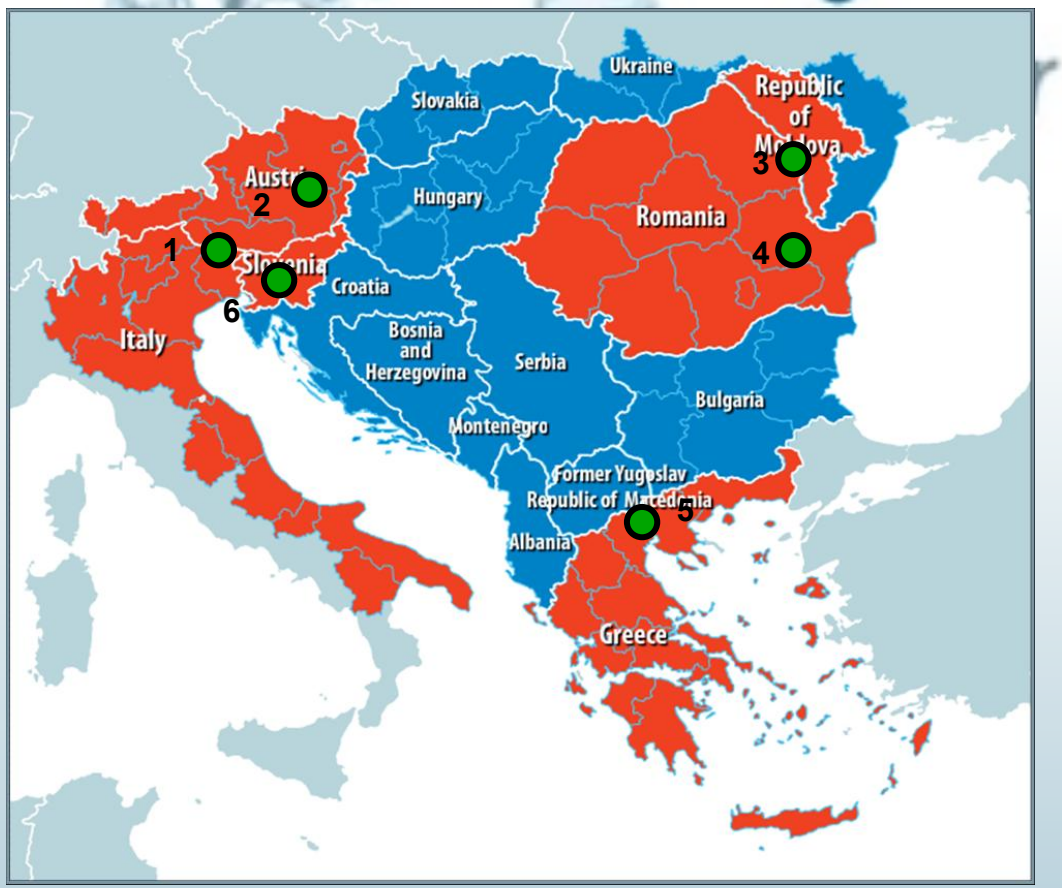
University "Politechnical" of Bucharest (Romania)

Prof. Razvan Magureanu

Pilot case studies

SEE HydroPower

clear water clean energy

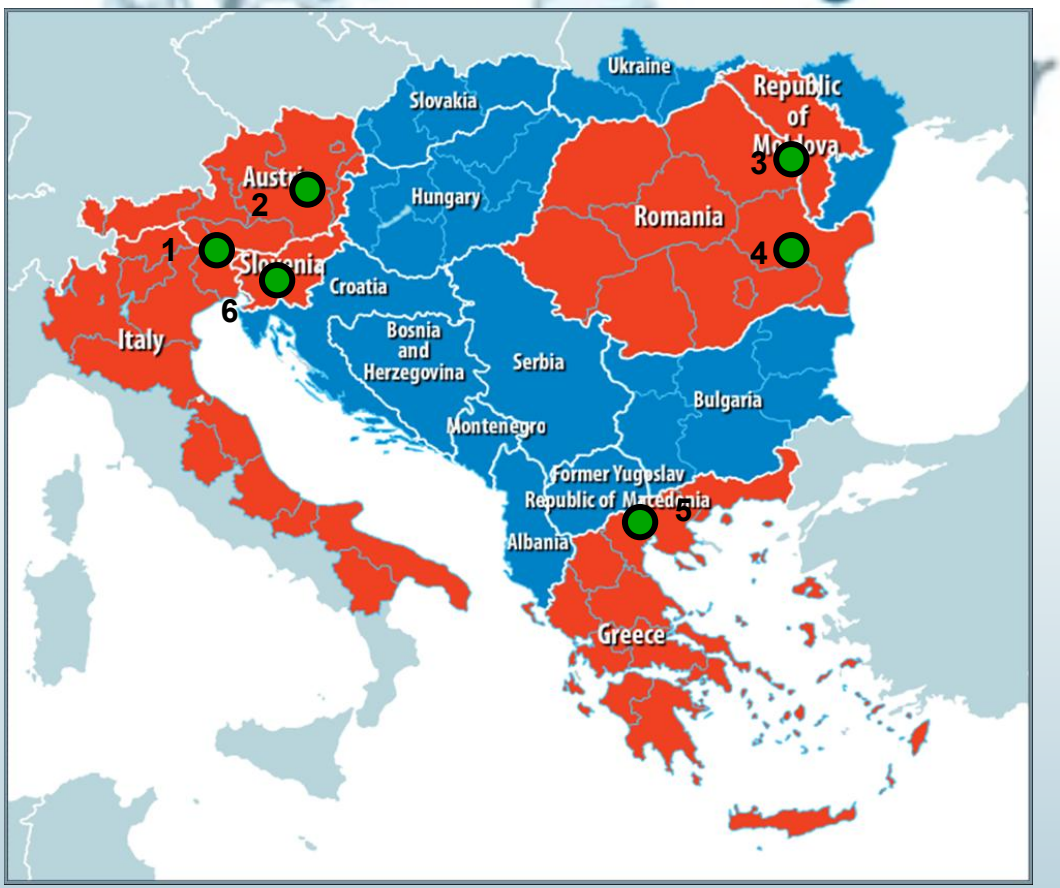


- Piave Basin (Italy)
- Mur Basin (Austria)
- Prut Basin (Moldavia-Romania)
- Ialomita Basin (Romania)
- Strymonas Basin (Greece)
- Drava Basin (Slovenia)

Conclusions

SEE HydroPower

clear water clean energy



- Non technological barriers
- R&D strong help to harmonize
- Involvement of all parts
- Transparency
- Regulatory framework
- SHP remaining potential
- New role of HP in storage

Website

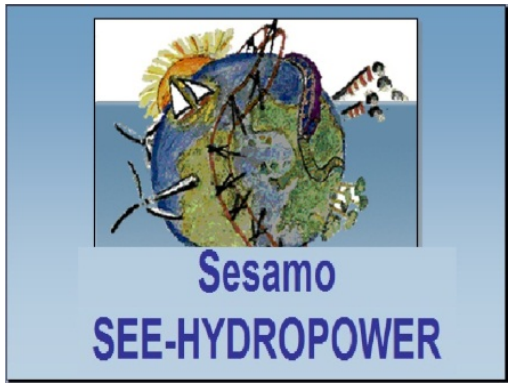
www.seehydropower.eu

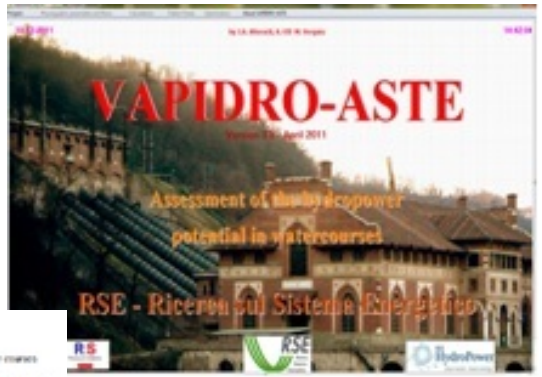
Free download

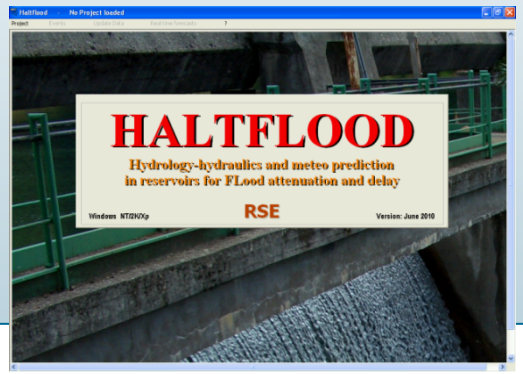
Download Tools

Download pilot case studies

Tools download





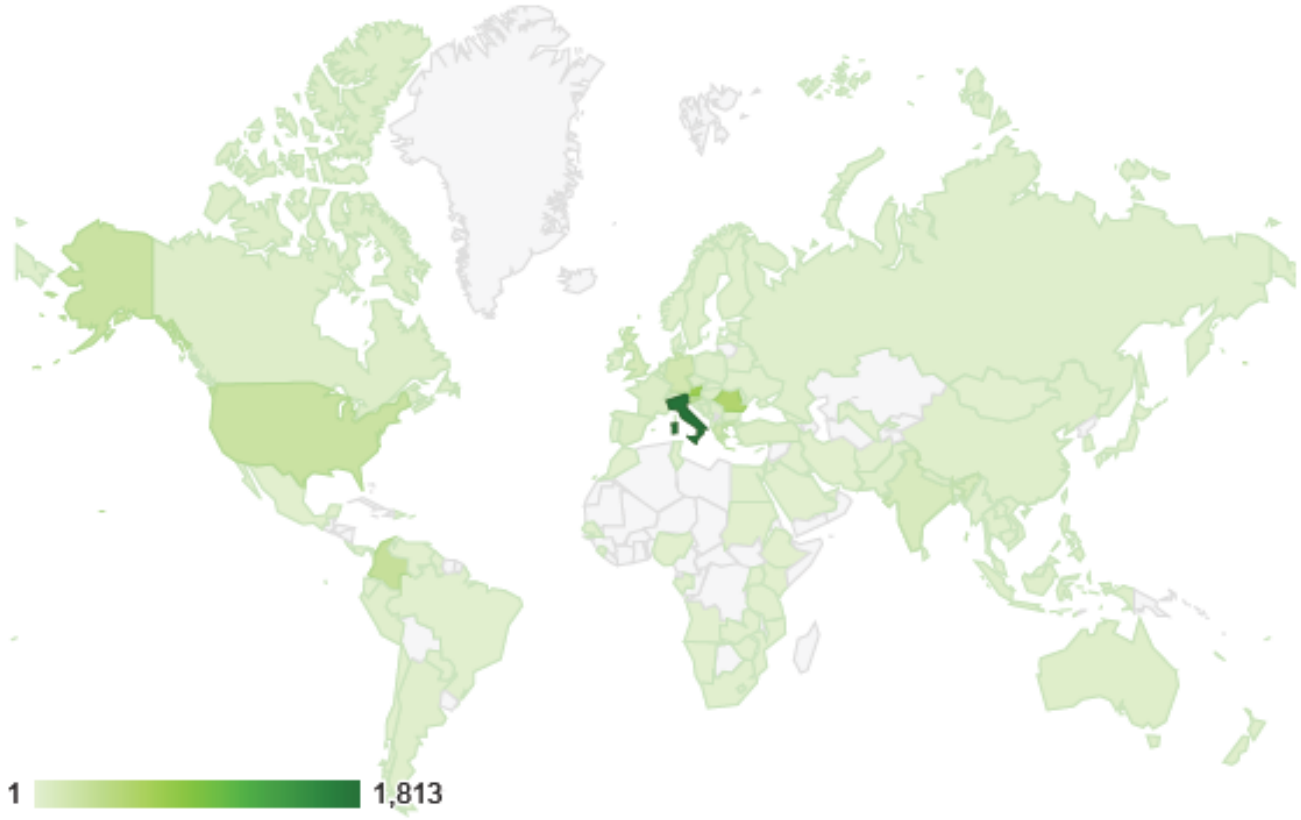


SEE HydroPower

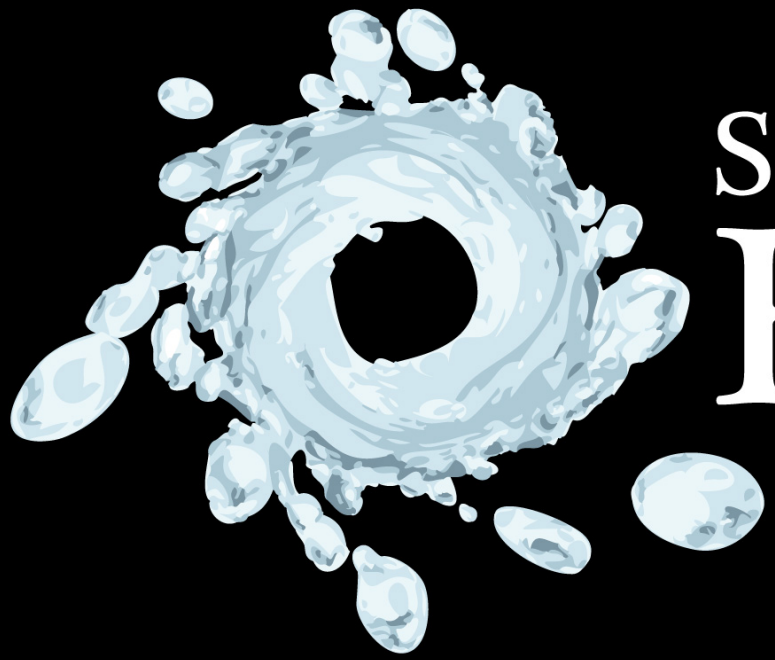
clear water clean energy

> 5,500 visits (117 countries)

> 150 tool downloads (43 countries)



	Paese/zona	Visite
1.	Italy	1.813
2.	Austria	701
3.	Romania	524
4.	Colombia	287
5.	Slovenia	281
6.	United States	249
7.	Germany	159
8.	Greece	145
9.	United Kingdom	114
10.	India	91
11.	Netherlands	61
12.	France	45
13.	Spain	43
14.	Hungary	39
15.	Bosnia and Herzegovina	33



SEE HydroPower

Be part of the harmonizing community !

Thanks !

www.seehydropower.eu

maximo.peviani@rse-web.it