



# **SEE HYDROPOWER**

**targeted to improve water resource management for a growing renewable energy production**

**Maximo A. Peviani**

***Project Coordinator  
RSE – Research on Energy Systems  
Milan, Italy***



# The SEE Transnational Cooperation Programme



**Mrs. Alessandra Pala (SEE\_JTS)**  
[www.southeast-europe.net](http://www.southeast-europe.net)

**Funding: 2.484.000 €**

**85 % SEE Programme**  
**15 % National / Own**

**Duration: 43 months**

# Partnership

12 Partners and 11 Observer Partners



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



Prefecture of Serres Province



REGIONE DEL VENETO

UNESCO-IHE  
Institute for Water Education



# Partnership



**RSE - Research on Energetic Systems (Italy)**



Agenzia Regionale per la Prevenzione e Protezione Ambientale del Veneto

**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

**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)**



**Association of Renewable Energy Producers (Italy)**



**Macedonian Power Plants (Rep. of Macedonia)**



REGIONE DEL VENETO

**Veneto Region (Italy)**



**European Small Hydropower Association (EU)**

UNESCO-IHE  
Institute for Water Education



**Institute for Water Education (The Netherlands)**



**National Association of Electric Utilities (Italy)**



**Sociedad Colombiana de Ingenieros (Colombia)**



**Energy Agency of Padrovje (Slovenia)**

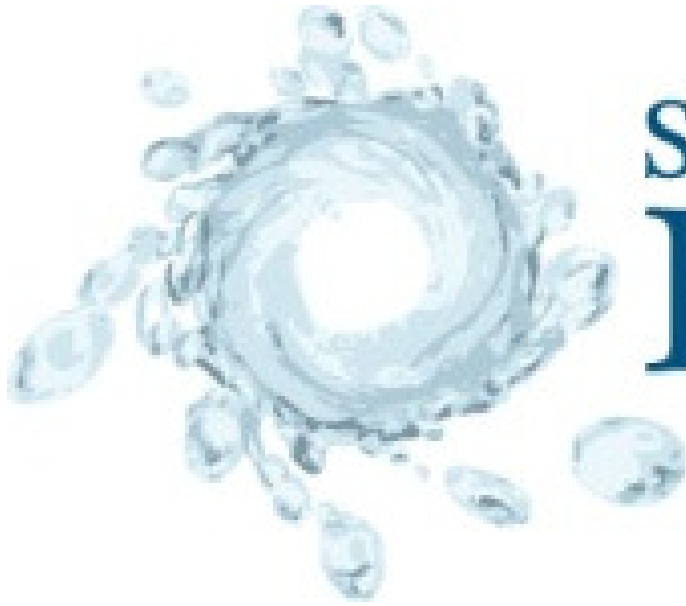


**Insitute of Hydroelectric Studies and Design (Romania)**



**Facultad Nacional de La Plata (Argentina)**

## Main Objective



# SEE HydroPower

clear water clean energy



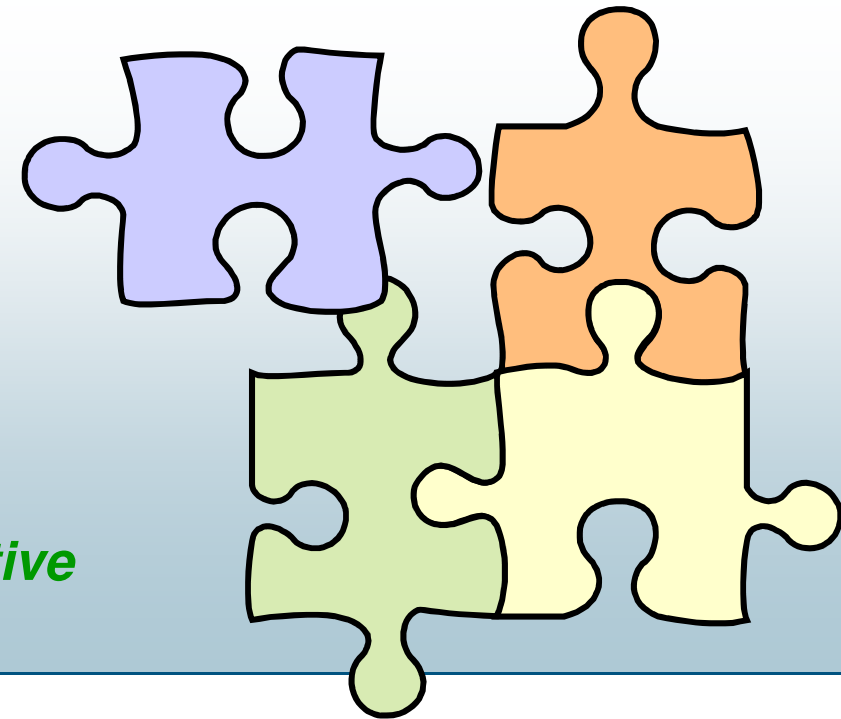
**Energy**

**RES-e Directive**



**Environment**

**Water Framework Directive**

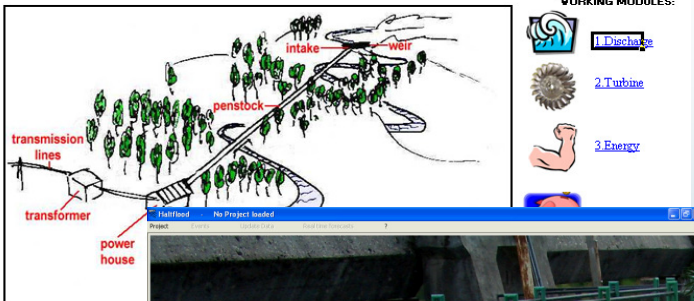


## TOOLS to support Public Administrations



## SMART Mini-Idro

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



## HALTFLOOD

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

RSE

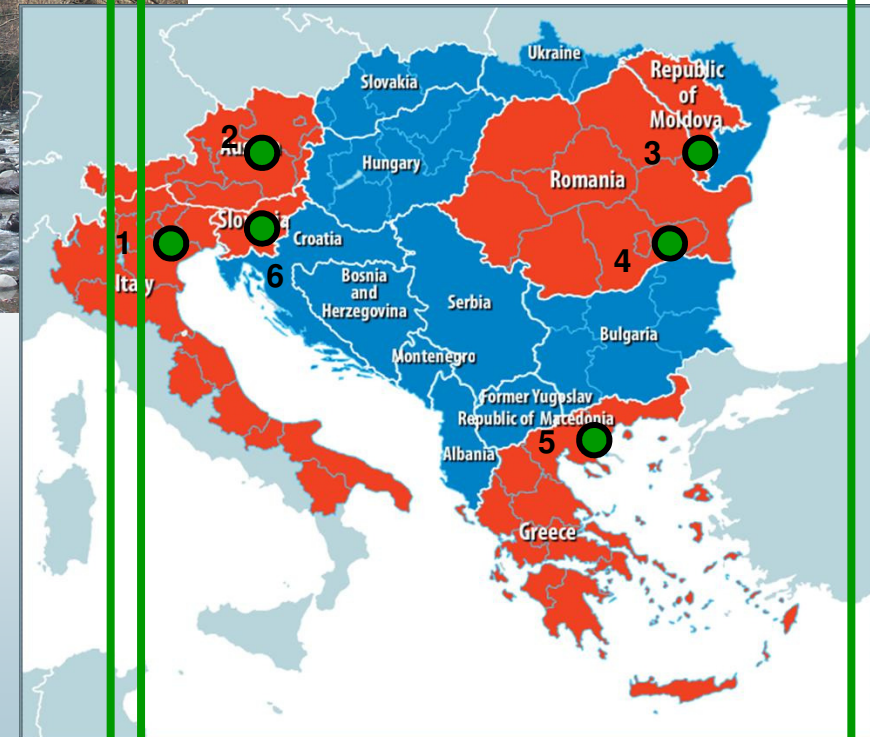
Version: June 2010

Alessandro Davitti

## METHODS to preserve downstream river quality



## APPLICATIONS testing methods & tools in 6 pilot areas



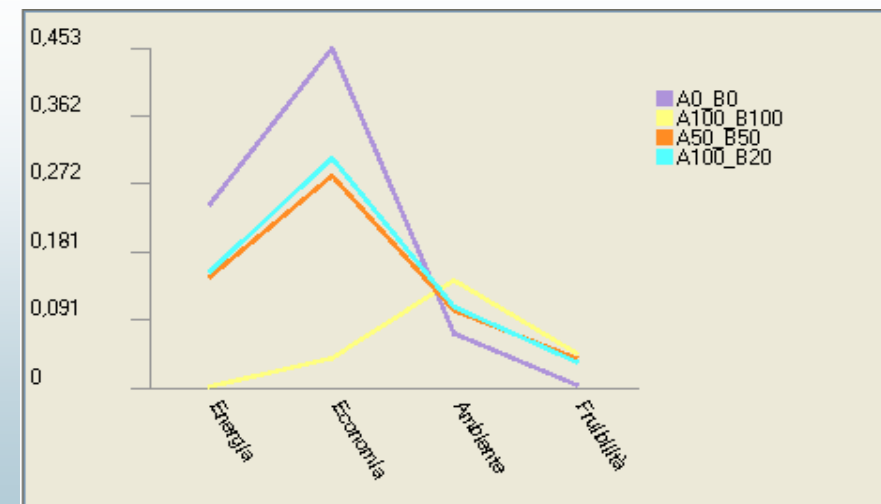
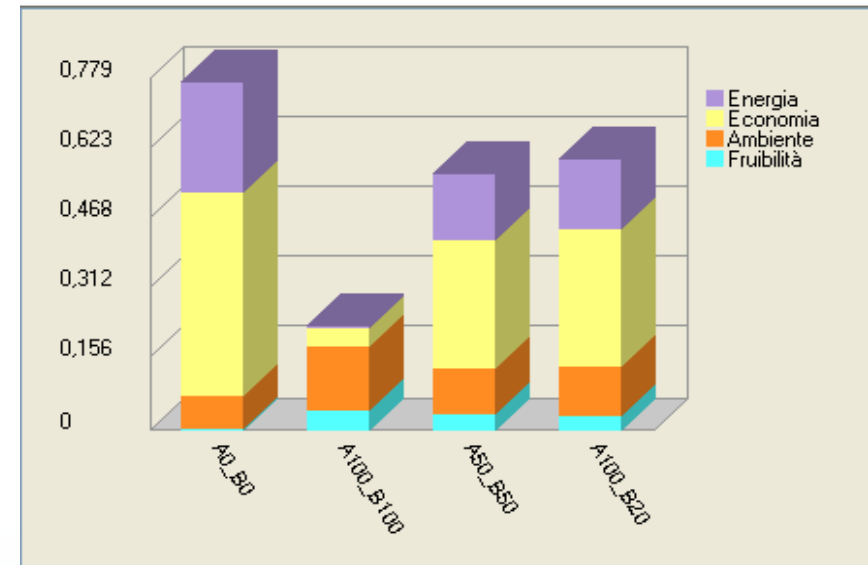
# MCA tool implementation for water management: **SESAMO** software

## Tools (1)

### Multi Criteria Analysis

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

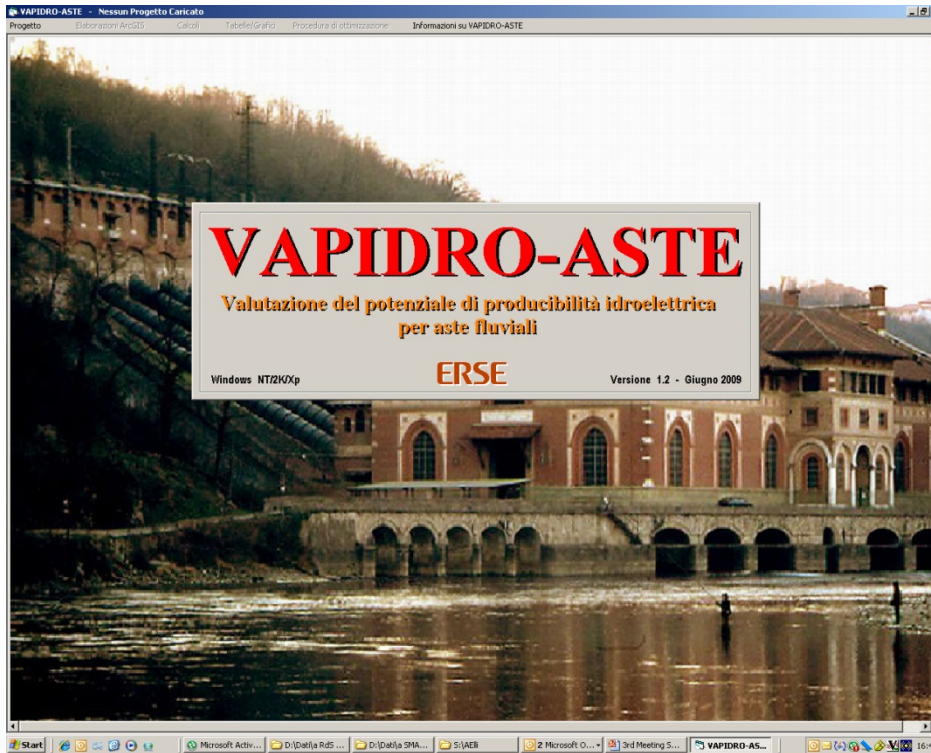
It does not decide, it supports decision makers  
It helps to make transparent decisions



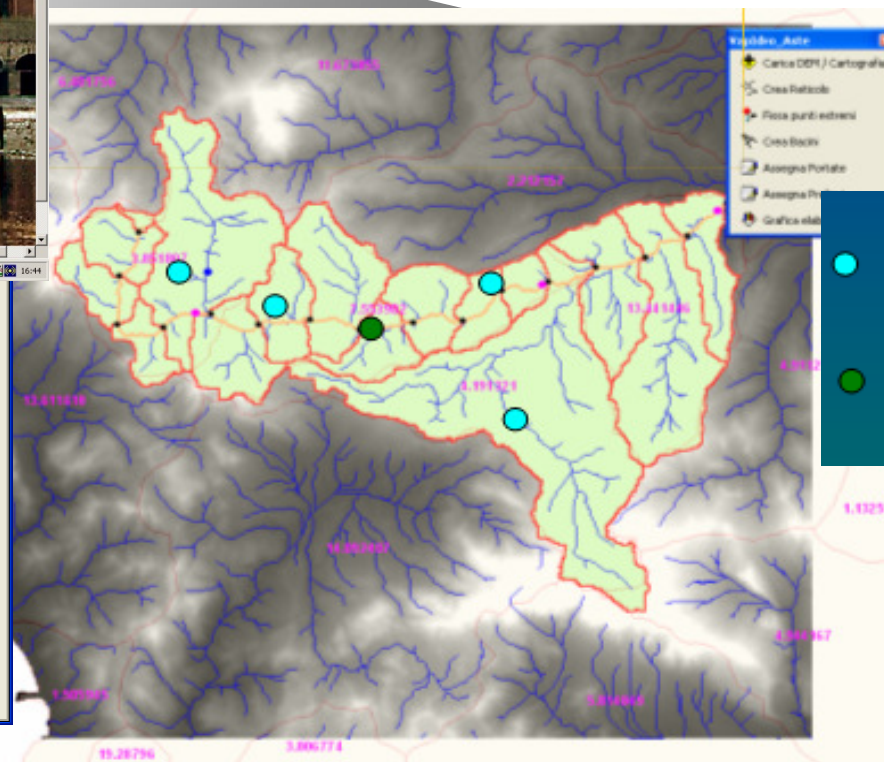


## Tools (2)

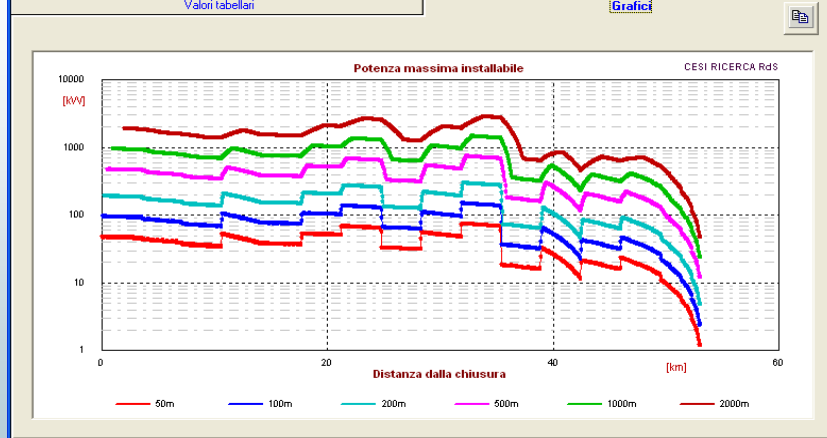
Model to determine the **optimal small hydropower exploitation** scheme and most **suitable sites**



## Residual potential hydropower



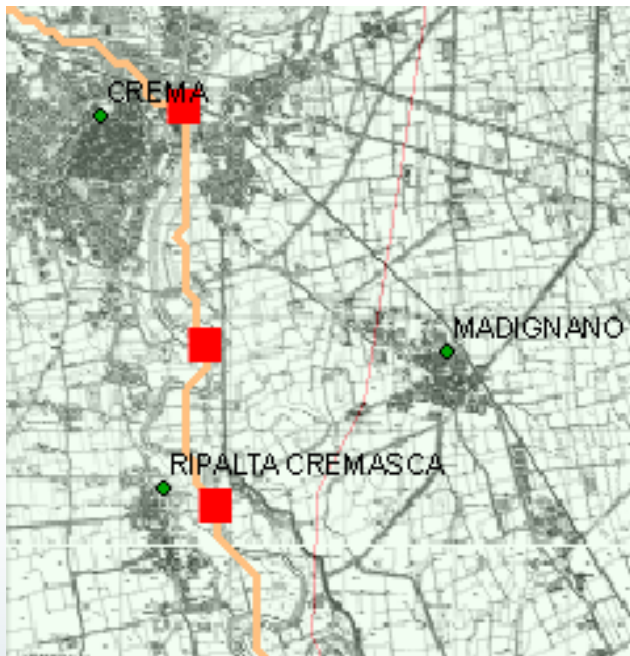
- User withdrawal points
- User restitution points



## Installable power of potential mini hydro plants

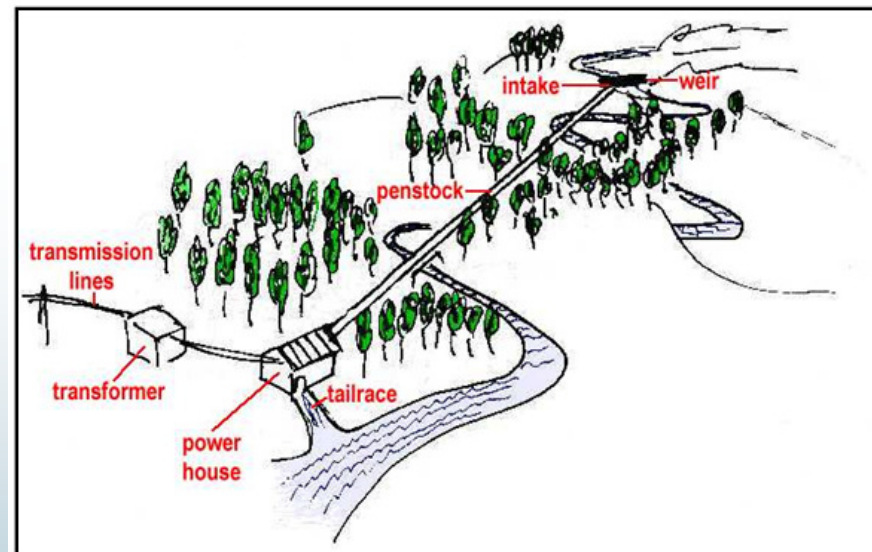
## Tools (3)

# SHP Cost / Benefit detailed analysis






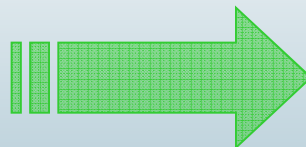
## **SMART Mini-Idro**

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



WORKING MODULES:

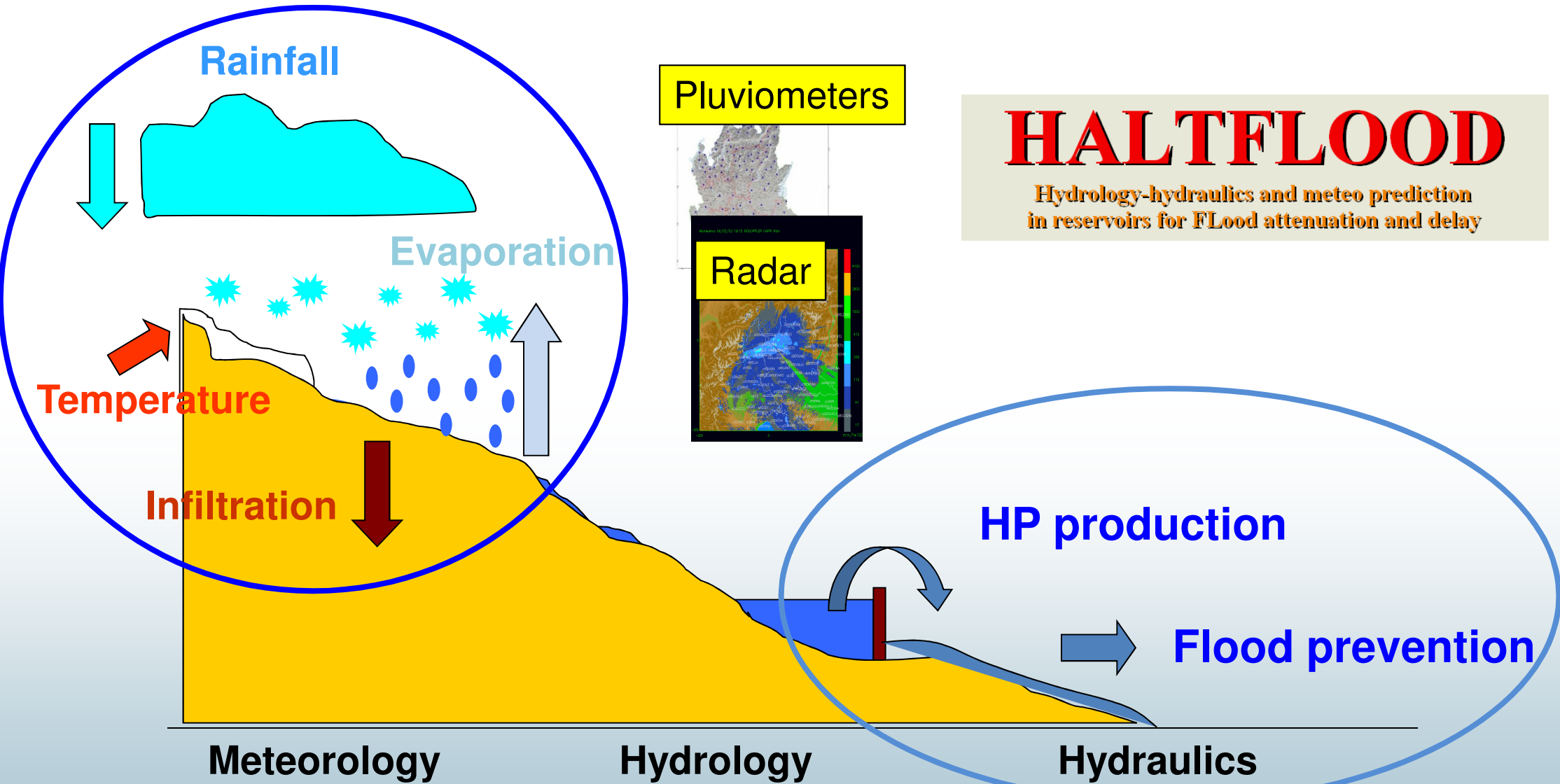
-  [1. Discharge](#)
-  [2. Turbine](#)
-  [3. Energy](#)
-  [4. Costs](#)
-  [5. Financial Analysis](#)
-  [User Guide](#)



**Optimized B/C solution**

# Dynamic operation of reservoirs

## Tools (4)



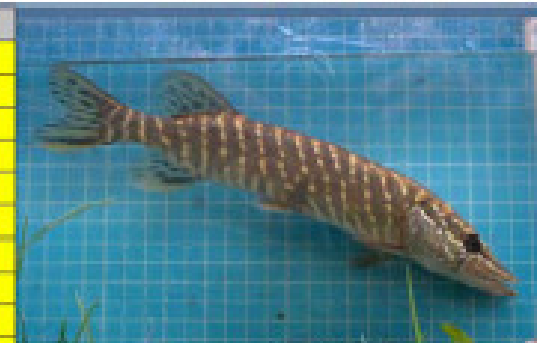
Security and optimal management of HP reservoirs

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

## Tools (5)



Sitename	THE EFIS+	DEI USADO
Oroftiana Eastern Plainses	27	13
Bajura	12	15
Hersolubra	12	15
Radauti	24	13
Cotu Miculinti	32	13
Romanesti	22	15
Hernaciu	28	15
Sandrea	25	16
Uagheni	20	14
Opriveni U	24	13
Opriveni D	14	11
Cotu Salagari	30	13
Drancen	26	13
Poganesi Pontic Province	24	15
Beascostei	24	10
Bumbata	20	10
Fakla	22	16
Carja	22	13
Quincea	16	13
Feltesvi	20	9
Pietrosi	18	15
Giurgialesti Garla	12	12
Giurgialesti	28	16

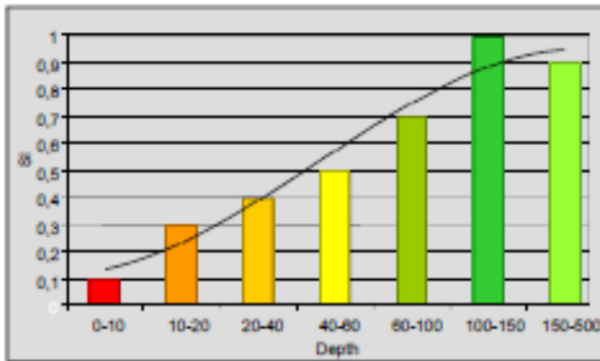


**University of Natural Resources  
and Life Science Vienna**

# Habitat modeling with preference curves

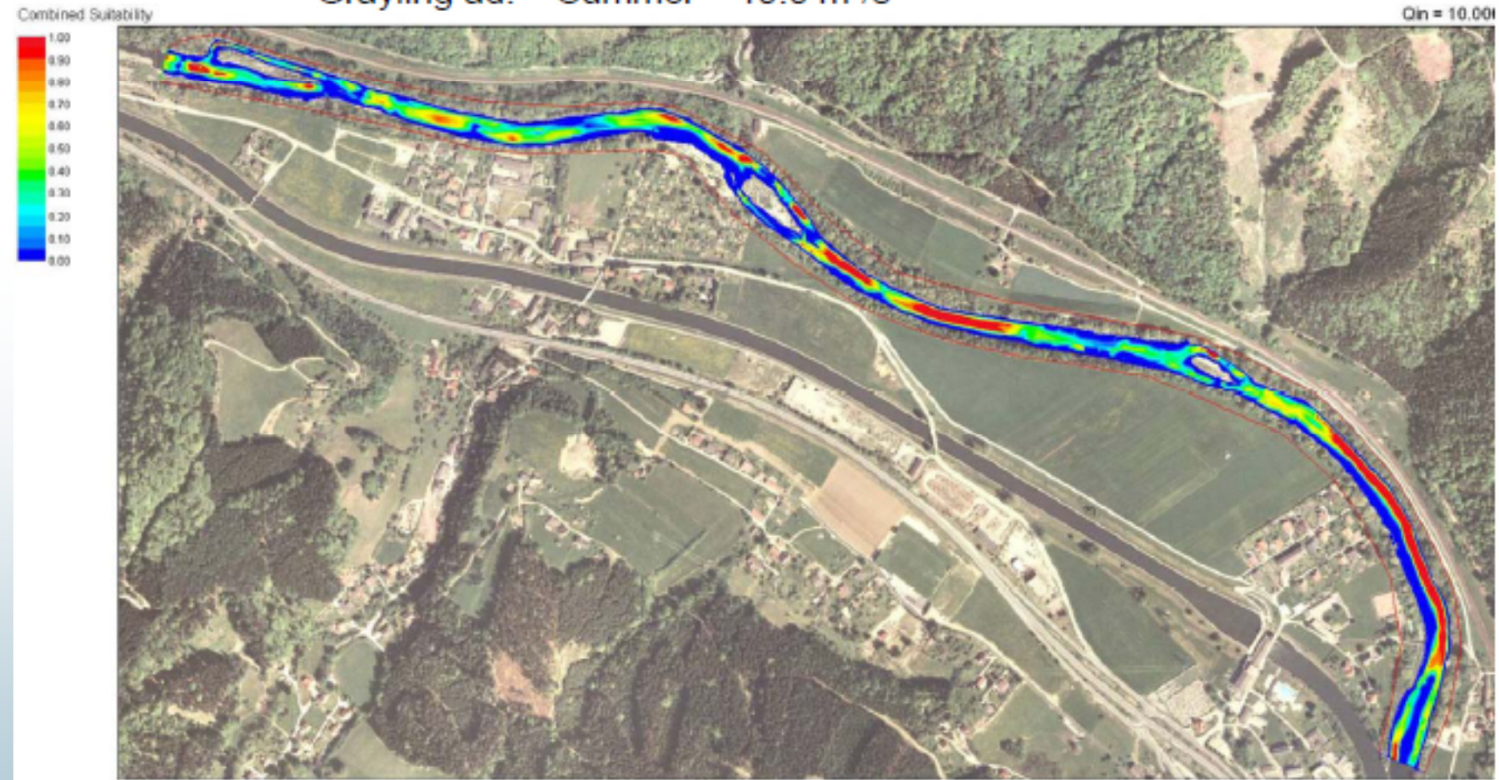
# Tools (6)

Univariate suitability curve for key species/-life stage



## Model Output - Fish habitat changes at different discharges

Grayling ad. – Summer – 10.0 m<sup>3</sup>/s



University of Natural Resources and Life Science Vienna

# Sediment transport and river morphology

## Tools (7)

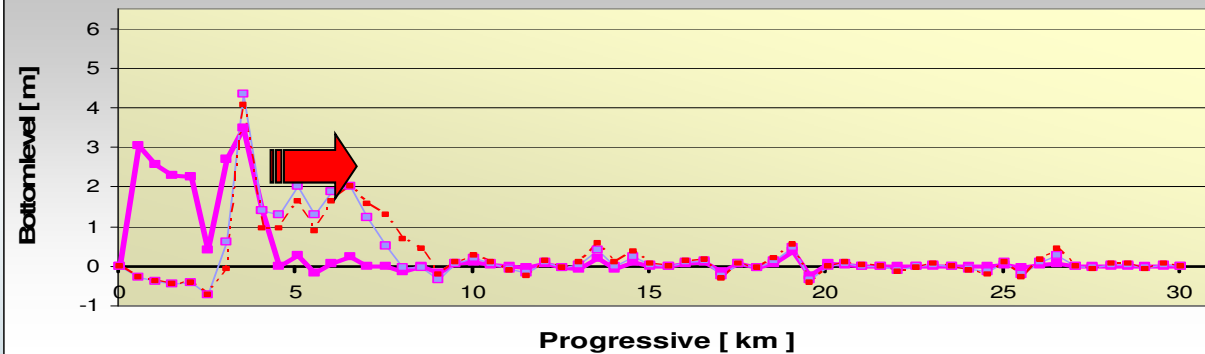


Mathematical model GIS integrated

**Controlled FLUSHING OPERATION  
of HP reservoirs**



Bottom level evolution

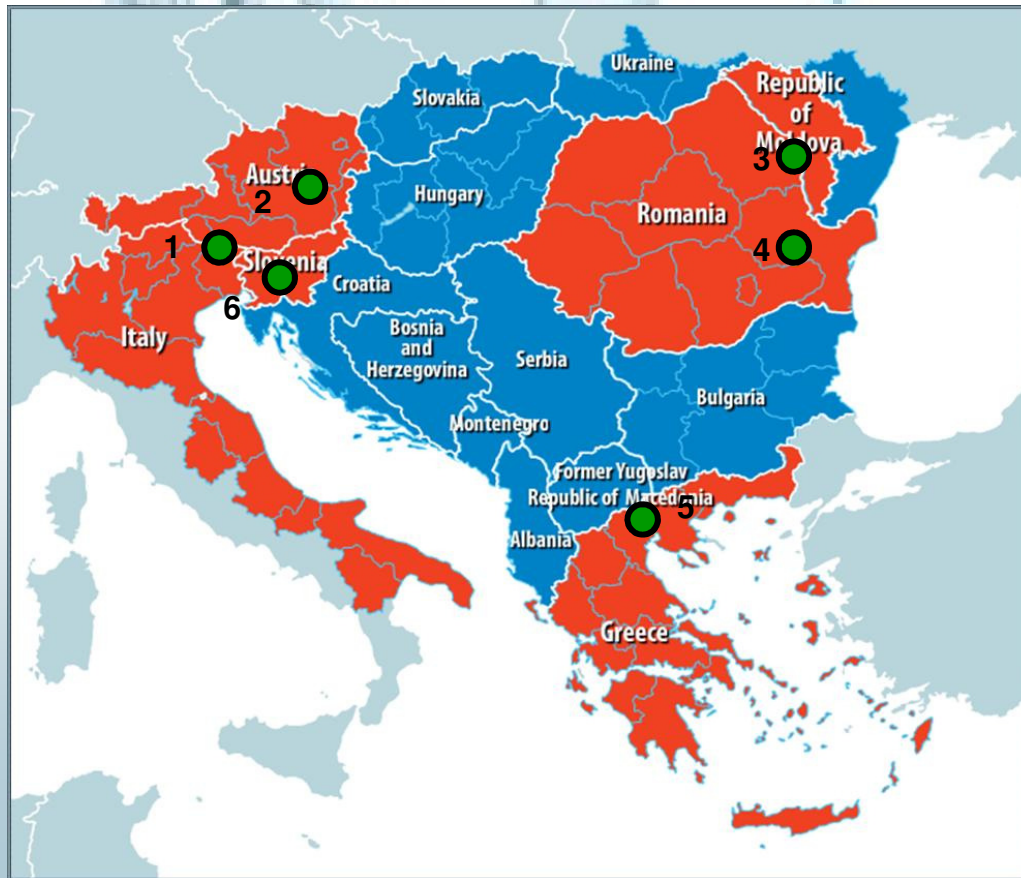


- **Suspended concentration**
- **Embeddedness**
- **Aggradation level**

## 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)**

# Website

# www.seehydropower.eu

**Download reports**

Project Partners **Download Deliverables** Meetings & Seminars Events Contacts Links

**SEE HYDROPOWER - Project, targeted to improve water resource management for a growing renewable energy production**

The three years **SEE HYDROPOWER** project started on June 2009, financed by the South-East Transnational Cooperation Programme (EU), aims to a sustainable exploitation of water concerning hydropower production in SEE countries, looking up to renewable energy sources development, preserving environmental quality and preventing flood risk.

**SEE HYDROPOWER** defines specific needs and test methodologies & tools, in order to help public bodies to take decisions about planning and management of water and hydropower concessions, considering all multi-purposes uses, taking into account the environmental sustainability of natural resources and flooding risks.

Competition between water users (for drinking, irrigation, industrial processes, power generation, etc.) is becoming a serious problem, and there is a strong need of a more accurate planning and management optimization of the resources. **SEE HYDROPOWER** aims to be the solution!

**Reserved Area**

**News**

- 28/02/2012 test test test
- 23/02/2012 prova
- 01/01/2012 Seminar addressed to stakeholders of hydropower target groups in Slovenia

**Download tools**

- SMART Mini-idro
- VAPIDRO-ASTE

**Download tools**

- SMART Mini-idro
- VAPIDRO-ASTE

**RSE** Ricerca Sistema Energetico

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00200

Free download

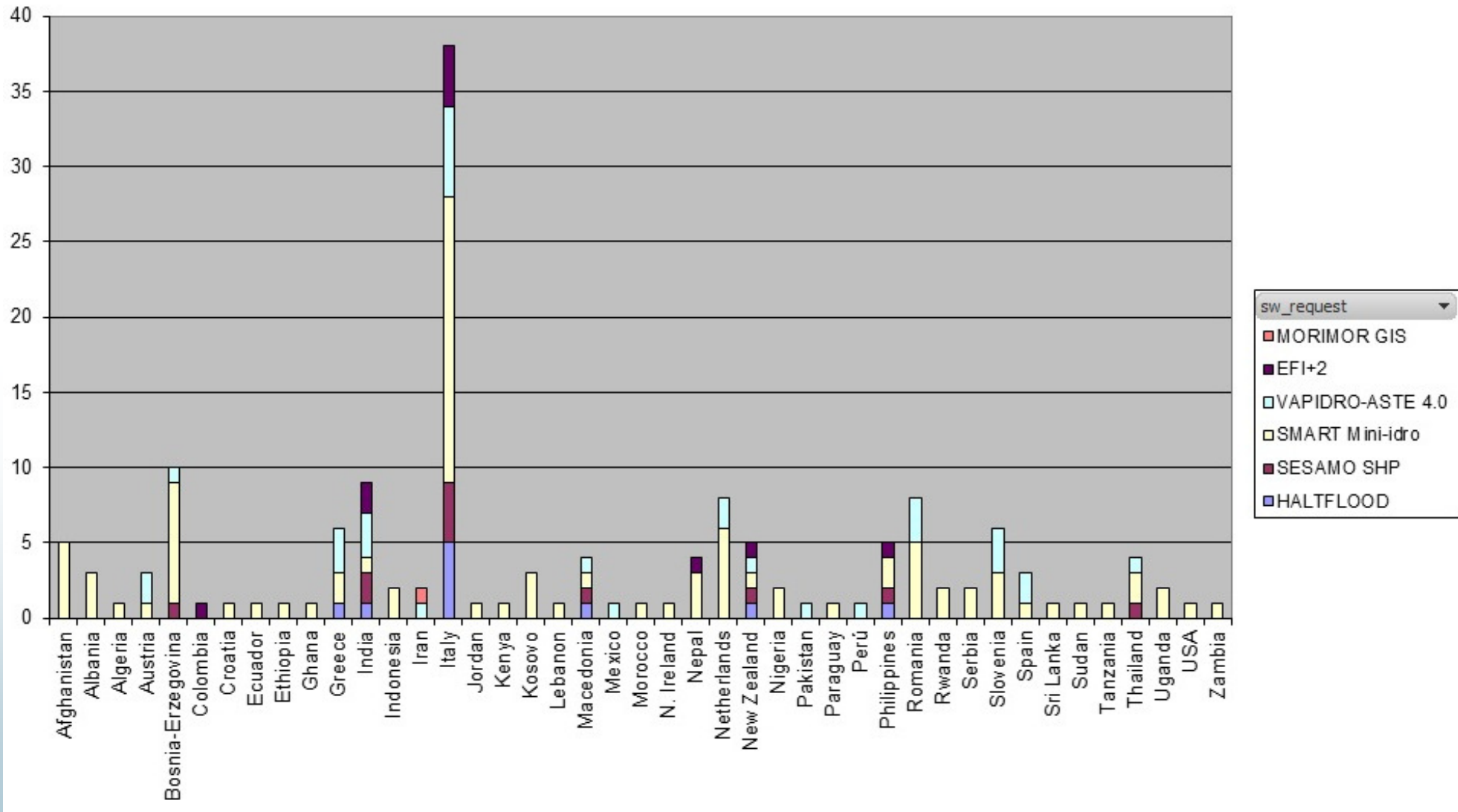
Download Tools

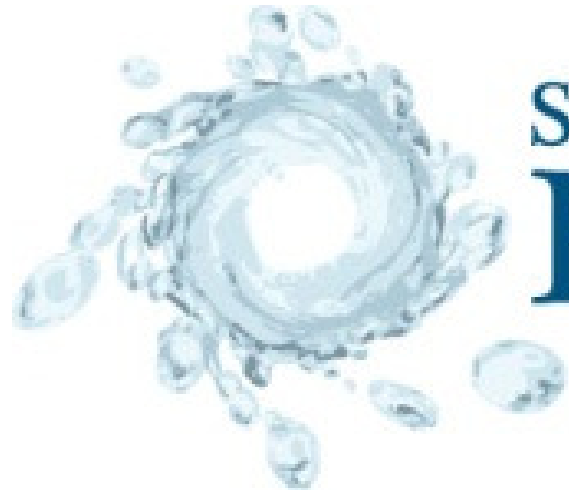
Download pilot case studies



# Tools download

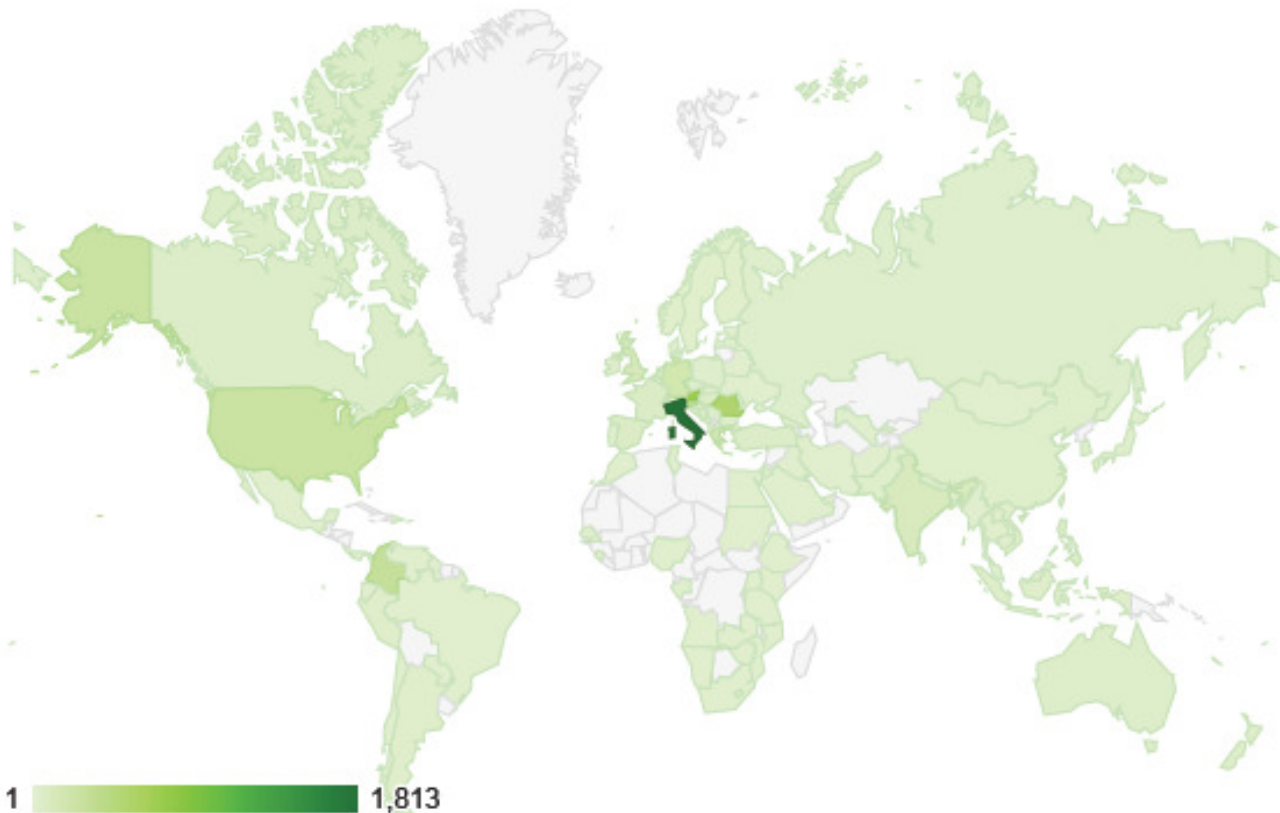
## Requests from 43 countries





# SEE HydroPower

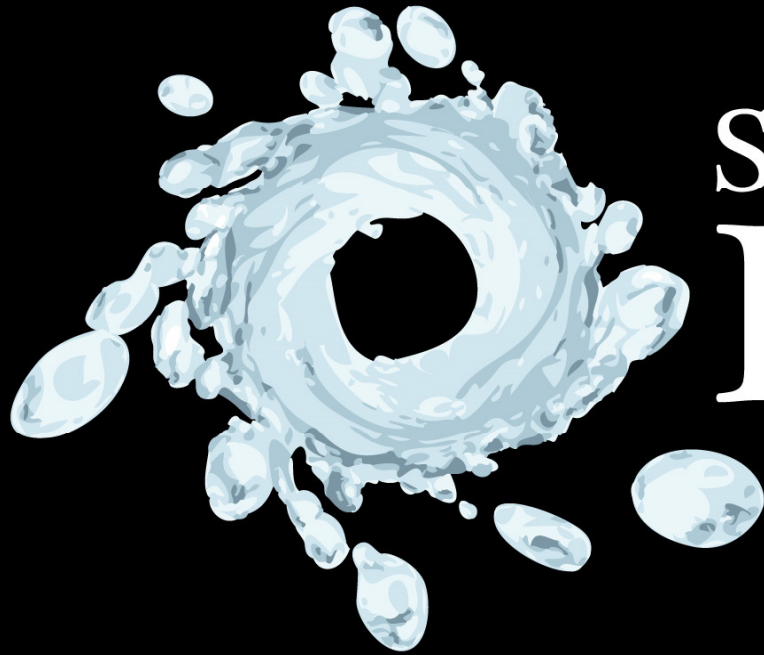
clear water clean energy



## Website hits

**5.417** Visits  
**117** 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 our community !**

**[www.seehydropower.eu](http://www.seehydropower.eu)**



# Final Transnational Seminar in Italy

Tuesday, November 25<sup>th</sup> 2014

NH Laguna Palace, Mestre (Venice)



## target to water & energy capitalization

*Maximo Peviani, Andrea Danelli*  
**RSE – Research on Energy System**  
*Lead partner*



INŠTITUT  
ZA VODE  
REPUBLIKE  
SLOVENIJE





Programme co-funded by the EUROPEAN UNION

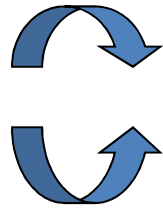


## European Territorial Cooperation Alpine Space Programme

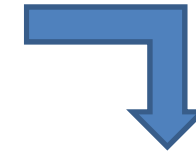
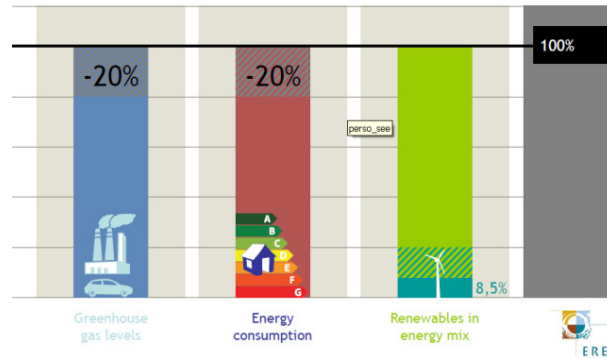
## European Regional Development Fund



**Energy**  
**RES-e Directive**



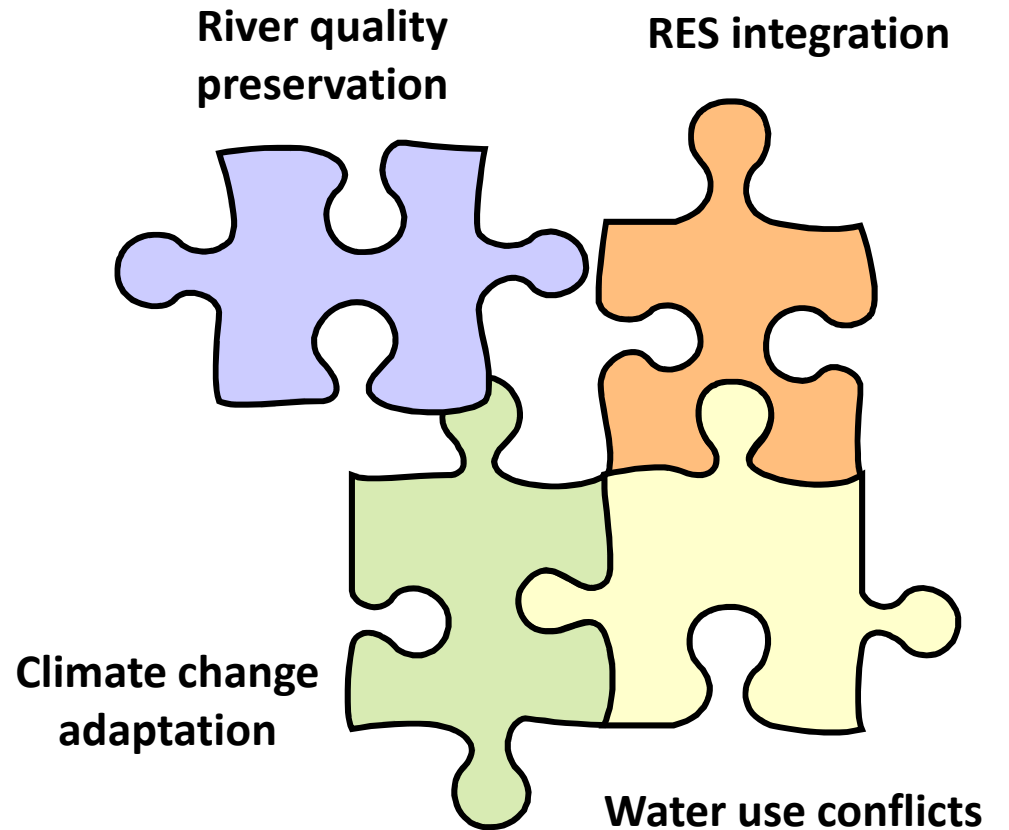
**The 20-20-20 EU policy  
 by 2020**



**Environment**  
**Water Framework Directive**



**Good ecological status  
 of water bodies**



# MEGAPHONE of tools & good practices !

investing in your future

Greetings from the  
Alpine Space Programme

AIM

The programme is co-funded  
by the European Regional  
Development Fund

## Partners



**RSE - Research on Energy Systems (Italy)**



**BOKU – Institute of Hydrobiology and Aquatic  
Ecosystem Management  
University of Natural Resources & Life Science  
Vienna (Austria)**



**IzVRS – Institute for Water of the Republic of  
Slovenia (Slovenia)**



**AEM - European Association of elected  
representatives from mountain regions (France)**



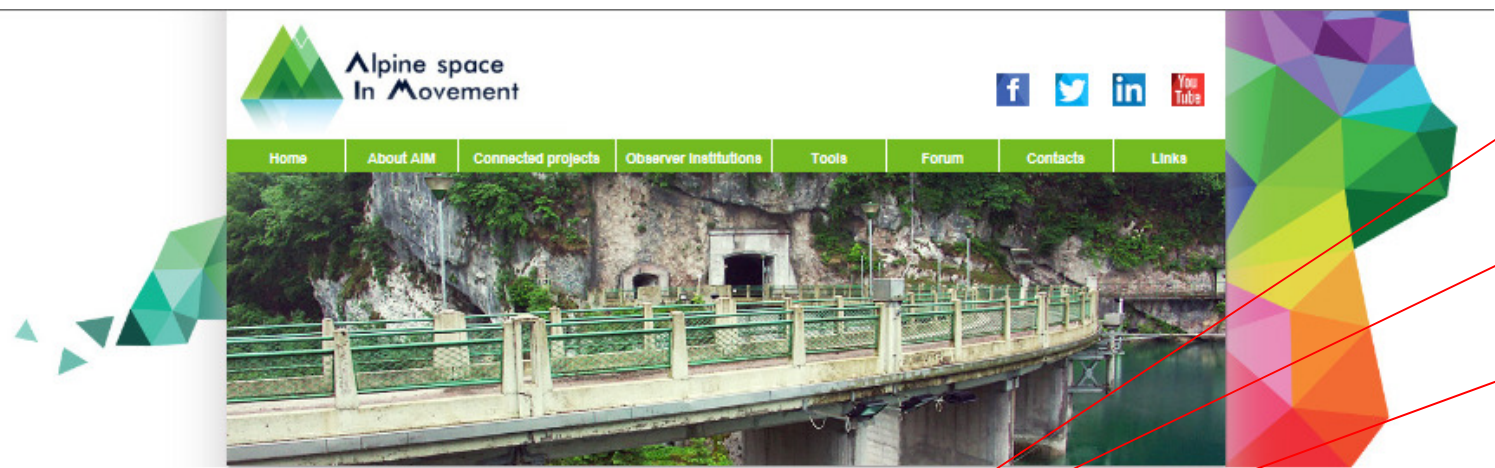
# 25 Observer partners

Observers	Institution	Country
1	Permanent Secretariat of the Alpine Convention	Austria - Alpine Region
2	Schneider & Jorde Ecological Engineering	Germany
3	University of Stuttgart	Germany
4	European Commission Joint Research Centre – Institute for Environment and Sustainability (Ispra)	Italy - Europe
5	UNESCO-IHE Institute for water education	Europe
6	Compagnie Nationale du Rhône	France
7	Association of Renewable Energy Producers	Italy
8	ARPAV Regional Land Safety Department	Italy
9	Veneto Region	Italy
10	Italian National Committee on Large Dams	Italy
11	Soča Valley Development Centre	Slovenia
12	Soške Elektrarne Nova Gorica, Hydropower producer on the Soča River	Slovenia
13	Institute of the Republic of Slovenia for Nature Conservation	Slovenia
14	Fisheries Research institute of Slovenia	Slovenia
15	Ministry of the Environment, Territory & Sea Preservation	Italy
16	ASCONIT Consultants on environmental issues	France
17	International Commission for the Protection of the Danube River	Austria - Danube region
18	Kyoto Club	Italy
19	Torino Province	Italy
20	Arpa Valle d'Aosta	Italy
21	POLE4 Municipality of 18th District of Budapest, Thematic Pole Low Carbon Communities	South East Europe
22	WWF Austria	Austria
23	University of Veterinary Medicine Vienna, Research Institute of Wildlife Ecology	Austria
24	Austrian Federal Ministry for Agriculture, Forestry, Environment and Water Management	Austria



## Stakeholder Panel

[www.aim2014.eu](http://www.aim2014.eu)



**SMART Mini-Idro**

**SESAMO\_MCA**

**VAPIDRO-ASTE**

**Water Scarcity Index**

**SEAP\_Alps Action Tool**

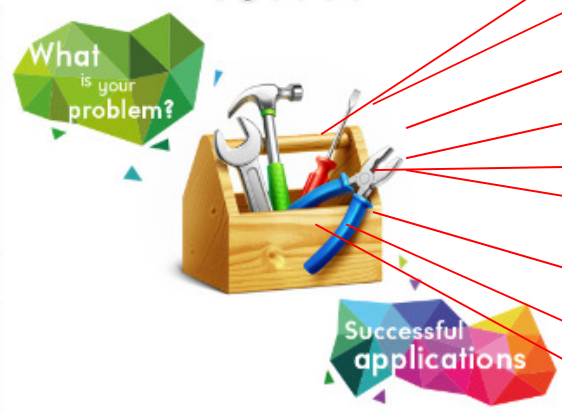


**Habitat modeling**

**Partners**

- RSE Ricerca Sistema Energetico SpA
- BOKU University of Natural Resources and Life Sciences, Vienna
- IZVRL Institute for Water of the Republic of Slovenia
- AIEM European association of the

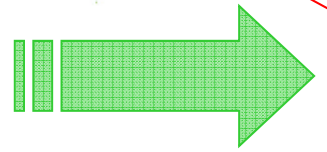
Alpine SPACE  
 THIS PROJECT IS CO-FUNDED BY THE  
 EUROPEAN REGIONAL DEVELOPMENT FUND  
 INVESTING IN YOUR FUTURE



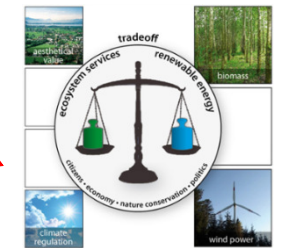
**News**

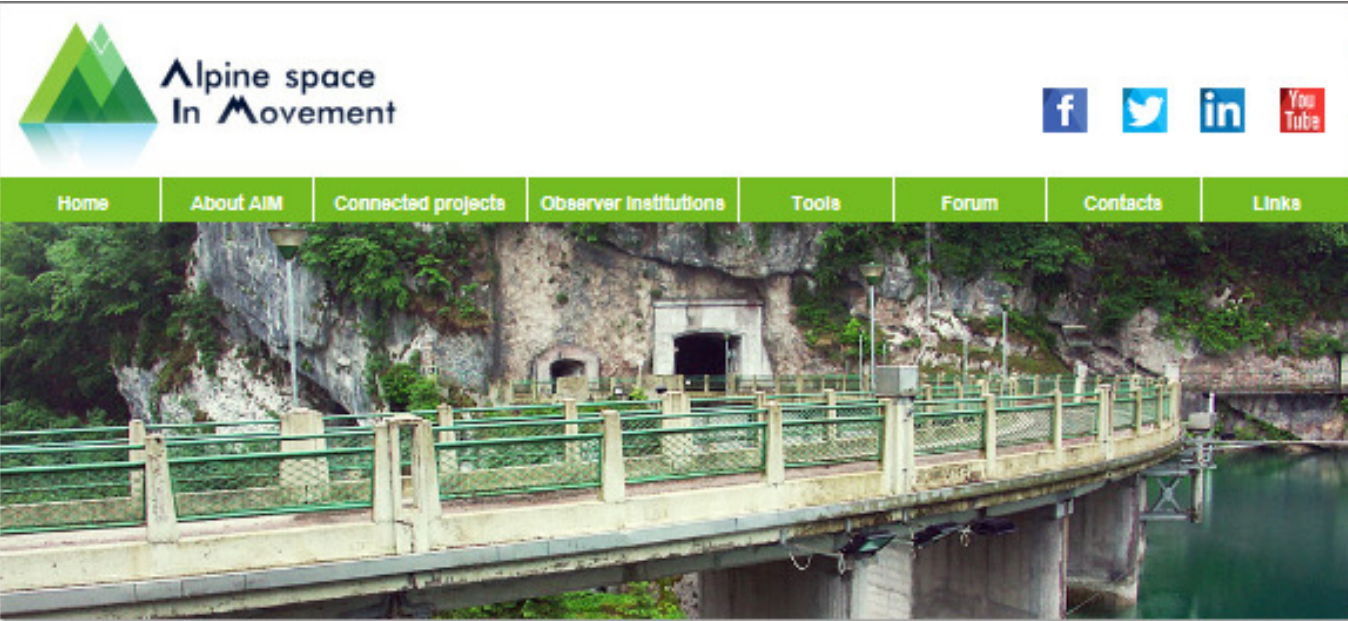
- Meeting with Kyoto Club (Milan, Italy, 18 February 2014)
- Brainstorming seminar with stakeholders in Slovenia (12-13 February 2014)
- Experiences and perspectives of territorial cooperation in the Alps: the Alpine Convention and the Alpine Space Programme (Gazzade Schiano, Italy, 26 November 2013)
- Kick-off meeting and Brainstorming seminar with

**TOOLS BOX**

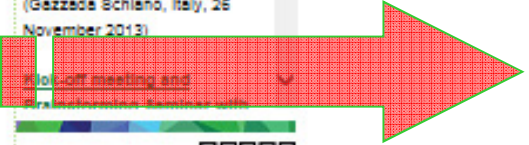
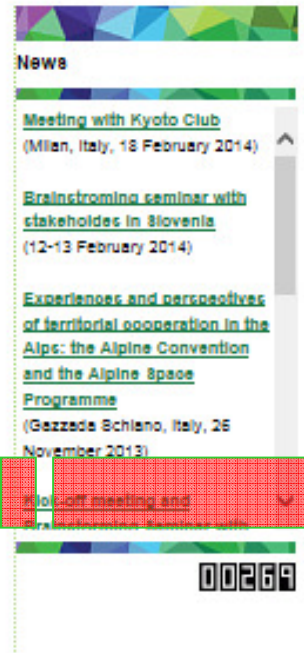
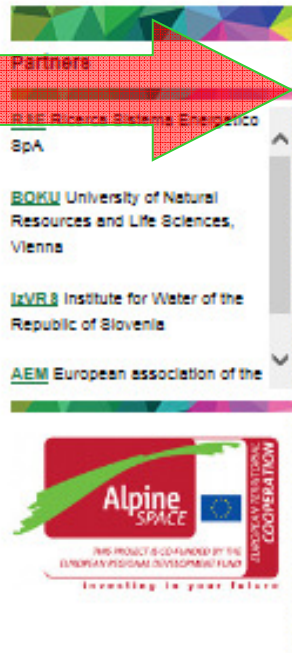
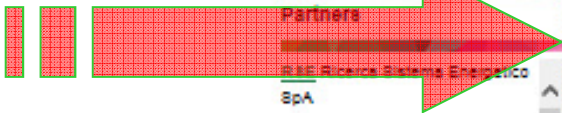


**MORIMOR**





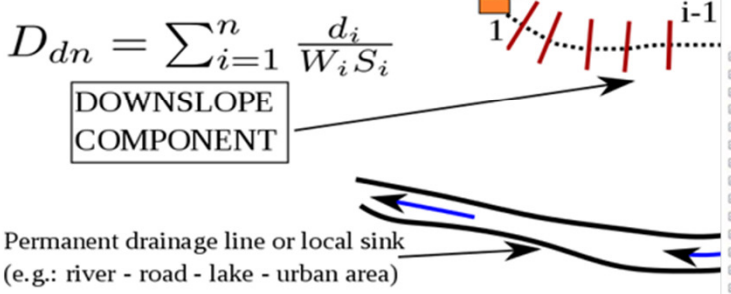
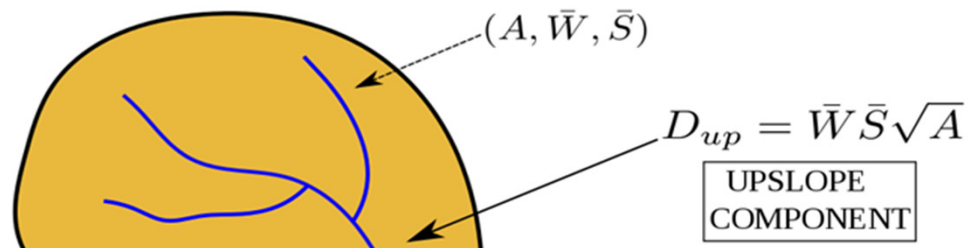
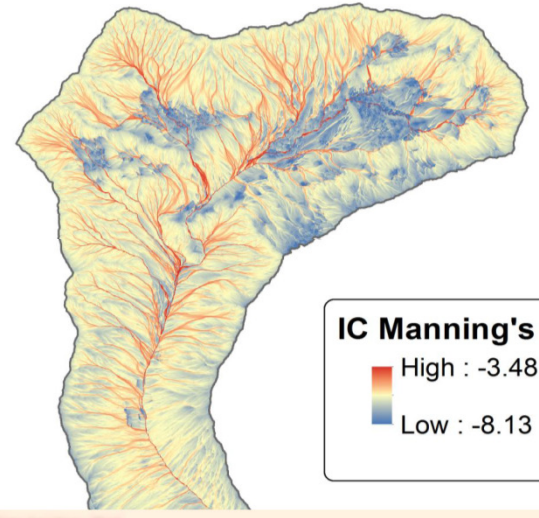
# PROBLEM



# TOOL



# Sediment Connectivity Tool



Connectivity.mxd - ArcMap

ArcToolbox

- 3D Analyst Tools
- Analysis Tools
- Cartography Tools
- Connectivity index
- Connectivity index (targets)
- Surface Roughness
- Conversion Tools
- Data Interoperability Tools
- Data Management Tools
- Editing Tools
- Geocoding Tools
- Geostatistical Analyst Tools
- Linear Referencing Tools
- LWmodel
- Multidimension Tools
- Network Analyst Tools
- Parcel Fabric Tools
- Schematics Tools
- Server Tools
- Spatial Analyst Tools
- Spatial Statistics Tools
- TauDEM Tools
- Tracking Analyst Tools

**GIS-based sediment connectivity model**

# JECAMI, Joint Ecological Continuum Analyzing and Mapping Initiative



http://gis.nationalpark.ch/arcgisserver\_app/econnect/jecami.htm

Adventure | Blogothèque | Brompton | MerckVM | [Monocle] | Outside | Blog\_Rapha | Mongabay | DirtbagD | Nau | FB | MobileMe | PatBlog | Biblio\_VMU | FIWI | VUW | G-Scholar | netbank

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Restoring the web of life

Karte Satellit Hybrid Gelände

CSI SMA PAM CARL

CSI Service (v.8)

Legend

- Pilot areas
- Municipality borders
- Protected areas
- Landuse LAN
- Landuse Planning LAP
- Population POP
- Infrastructure INF
- Altitude Topography TOP
- Fragmentation FRA
- Patch Cohesion COH
- Edge density ED
- Environmental Protection ENV
- Ecological Measures ECO
- CSI

Activate function and display Indices by clicking in the map

Search

Search a municipality inside a pilot region:

Search pilot region:

Search Place or Address

1 Search 2 Select & Upload 3 Calculation Chart Table Report

Impressum

# AIM 2014+

Alpine Space in Movement

## Brainstorming seminar for stakeholders in Austria





# Panel discussion with key stakeholders in Slovenia





**Panel discussion  
with key stakeholders  
in France  
targeted to water & energy capitalization**





# The secret... transparency and cooperation



**Coraggio !!**



# Alpine space In Movement

Be part of our community !

[maximo.peviani@rse-web.it](mailto:maximo.peviani@rse-web.it)



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