



Alpine space  
In Movement

# The project results translated to local problems: the web-GIS database

## Final Transnational Seminar in Italy

25<sup>th</sup> November 2014 – Mestre

Andrea Danelli

RSE – Research on Energy System

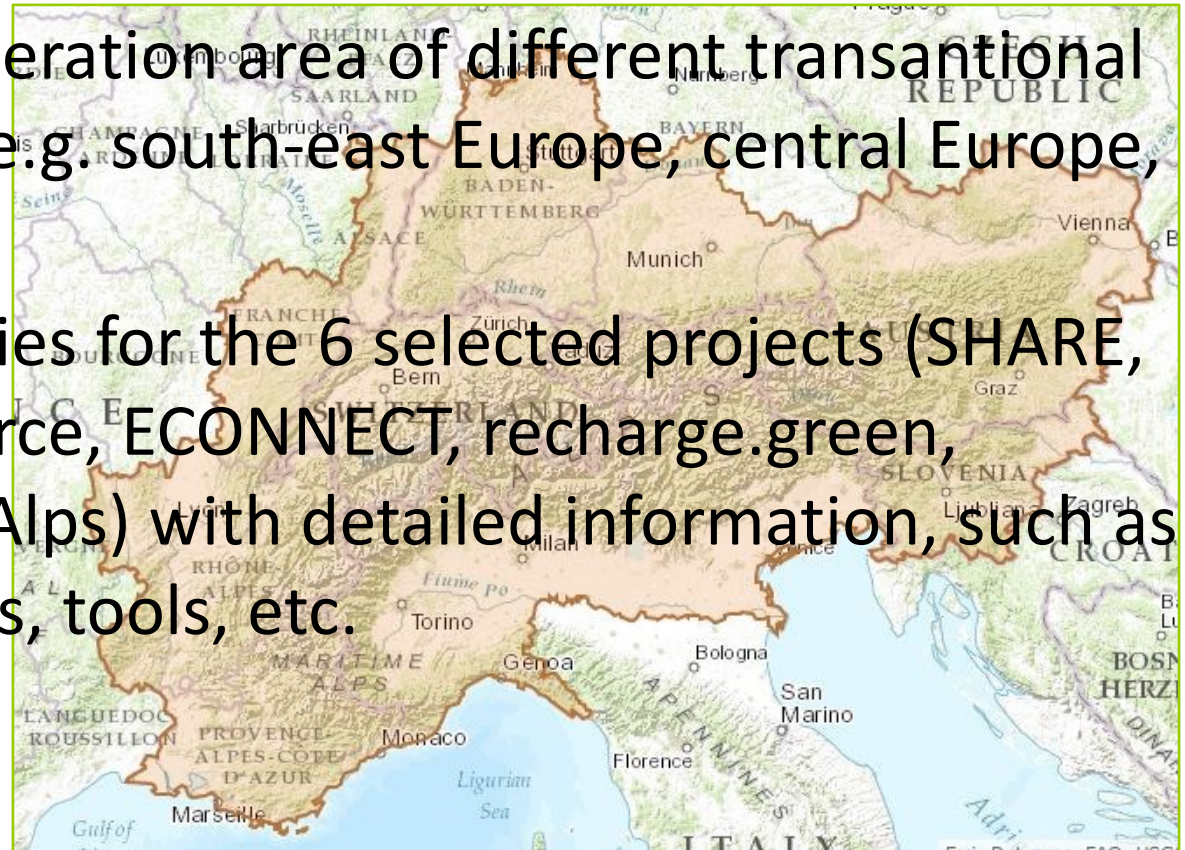


# Objectives

- Map and share online information about the pilot cases studies and results achieved by the Alpine Space Programme in the thematic field of water resource management optimization, and promotion of renewable energies
- Illustrate programs hot-spot areas and spatial gaps to identify the potential (spatial) synergies for the project generation 2014-2020
- Demonstrate how the developed products can be useful to solve problems in real cases

# Web-GIS structure

- Background, with the geographical context of the Alpine Space area
- Common cooperation area of different transnational programmes (e.g. south-east Europe, central Europe, etc.)
- Pilot case studies for the 6 selected projects (SHARE, Alp-Water-Scarce, ECONNECT, recharge.green, SedAlps, SEAPAlps) with detailed information, such as faced problems, tools, etc.



# Pilot cases database

Alp-Water-Scarce

Name of area	Activities on pilot area	Main Topic	Sub Topic	Tool applied in the pilot case
<b>Scrivia River Basin</b>	Interregional Strategy to Improve Integrated Water Management and Planning	Water and ecosystem management	Optimization of water management considering different water users	Hydrological models IHACRES, HYDRO
<b>Piave River</b>	Early Warning System development (prevent user conflicts between hydropower generation and agriculture)	Water and ecosystem management + Renewable energy focus on hydropower	Energy efficiency Optimization of water management considering different water users	WSI – Water Scarcity Index (an early warning system tool)
<b>Fersina</b>	Only for technical experiment (site testing) purposes	Water and ecosystem management	Optimization of water management considering different water users	
<b>Noce</b>	Re-use of an Agricultural Ditch Network	Water and ecosystem management	Optimization of water management considering different water users	Hydrological model GEOTRANSF
<b>Adige</b>	Only for technical experiment (site testing) purposes	Water and ecosystem management	Optimization of water management considering different water users	

The database includes 125 pilot cases from the selected projects!

## TOPICS:

### RENEWABLE ENERGY

- New SHP plants implementation
- Maintenance and improvement of existing hydropower plants
- Energy efficiency

### WATER AND ECOSYSTEM MANAGEMENT

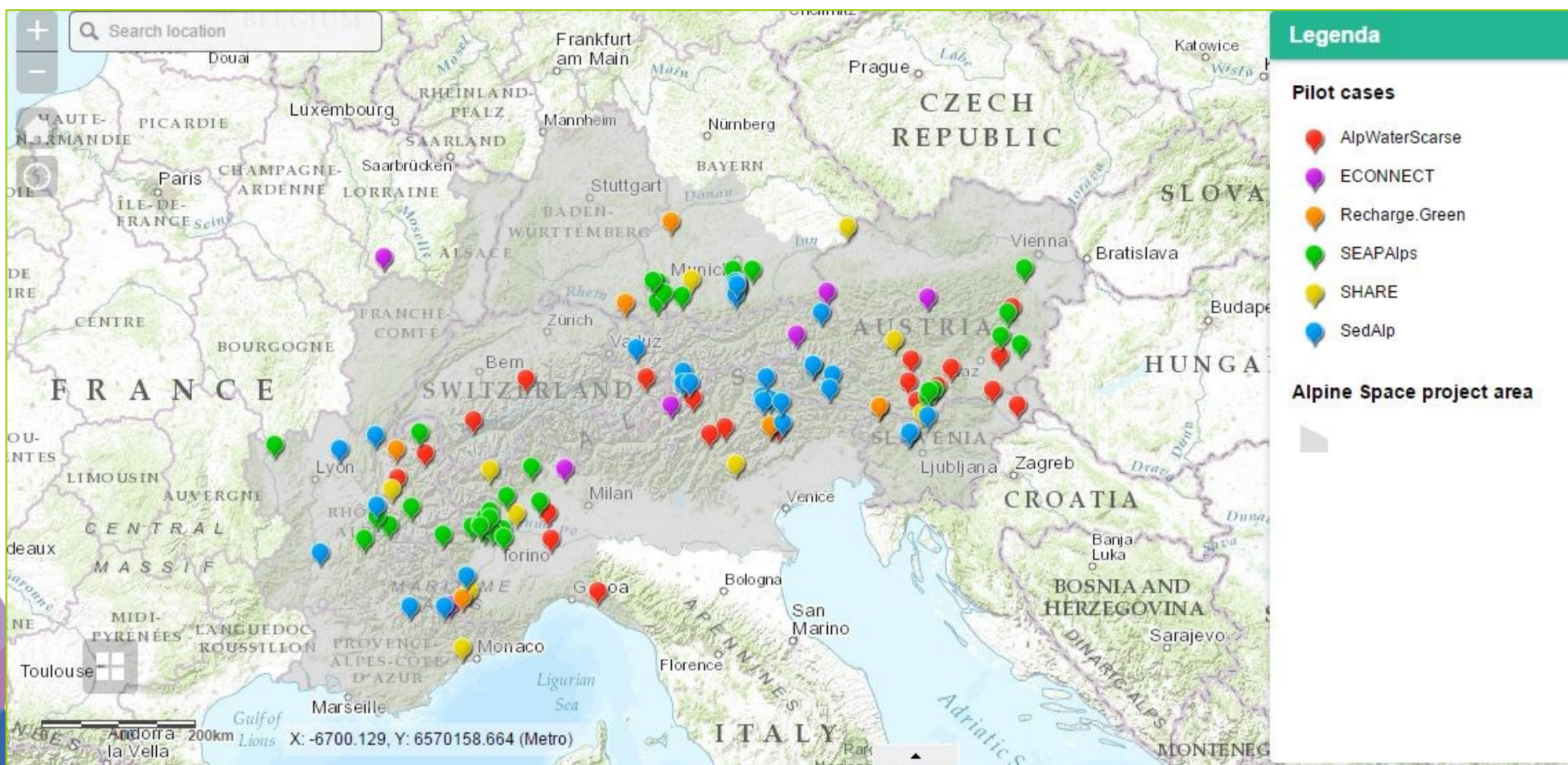
- Water quality
- Preserving ecosystems
- Optimization of water management considering different water users

## TOOLS:

- SESAMO
- HALTFLOOD
- VAPIDRO-ASTE
- SMART MINI-IDRO
- EFI+
- MORIMOR-GIS
- SEDIMENT CONNECTIVITY TOOLBOX
- WATERS SCARCITY INDEX
- SEAP\_ALP ACTION TOOL

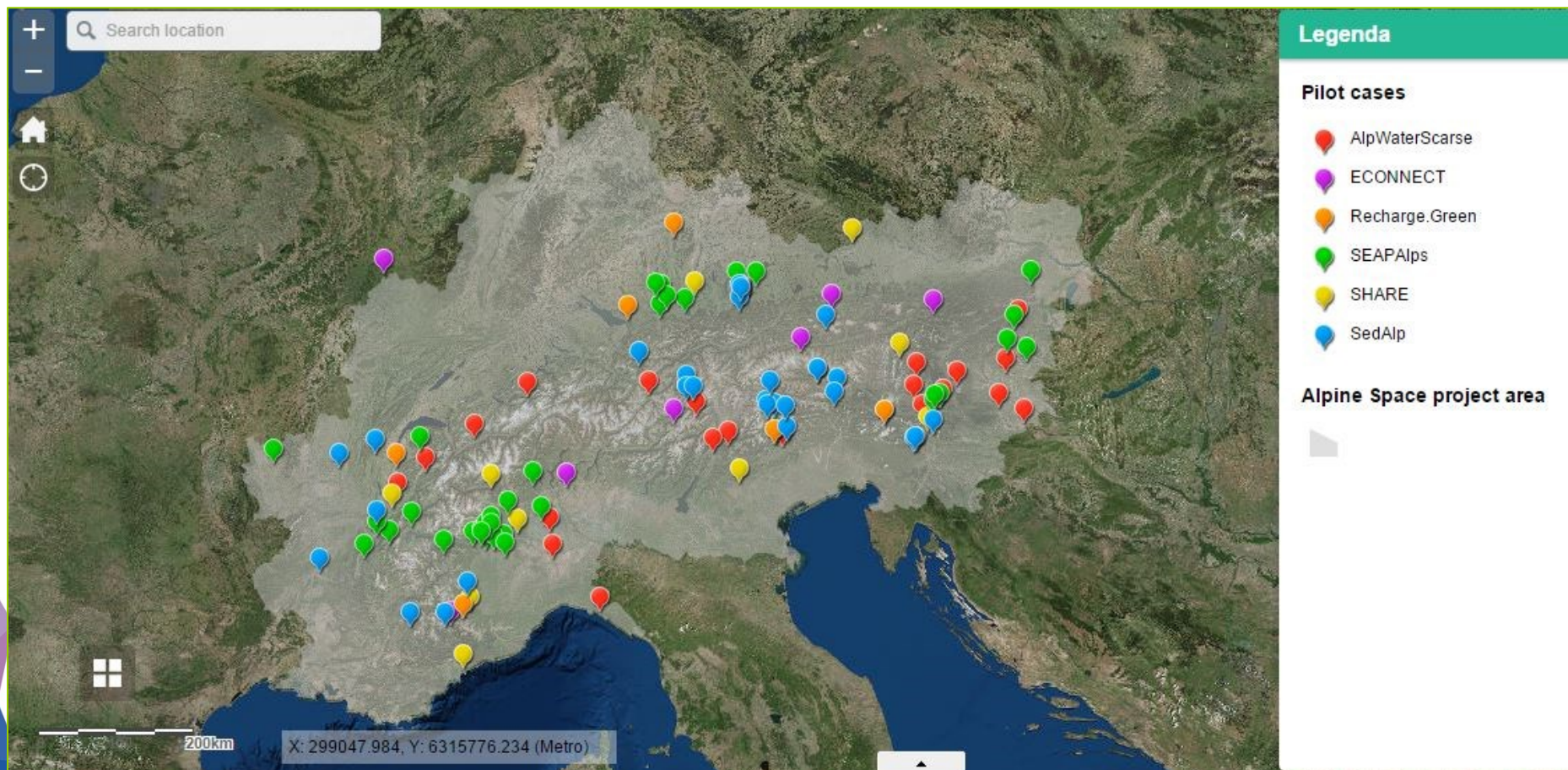


# Web-GIS implementation



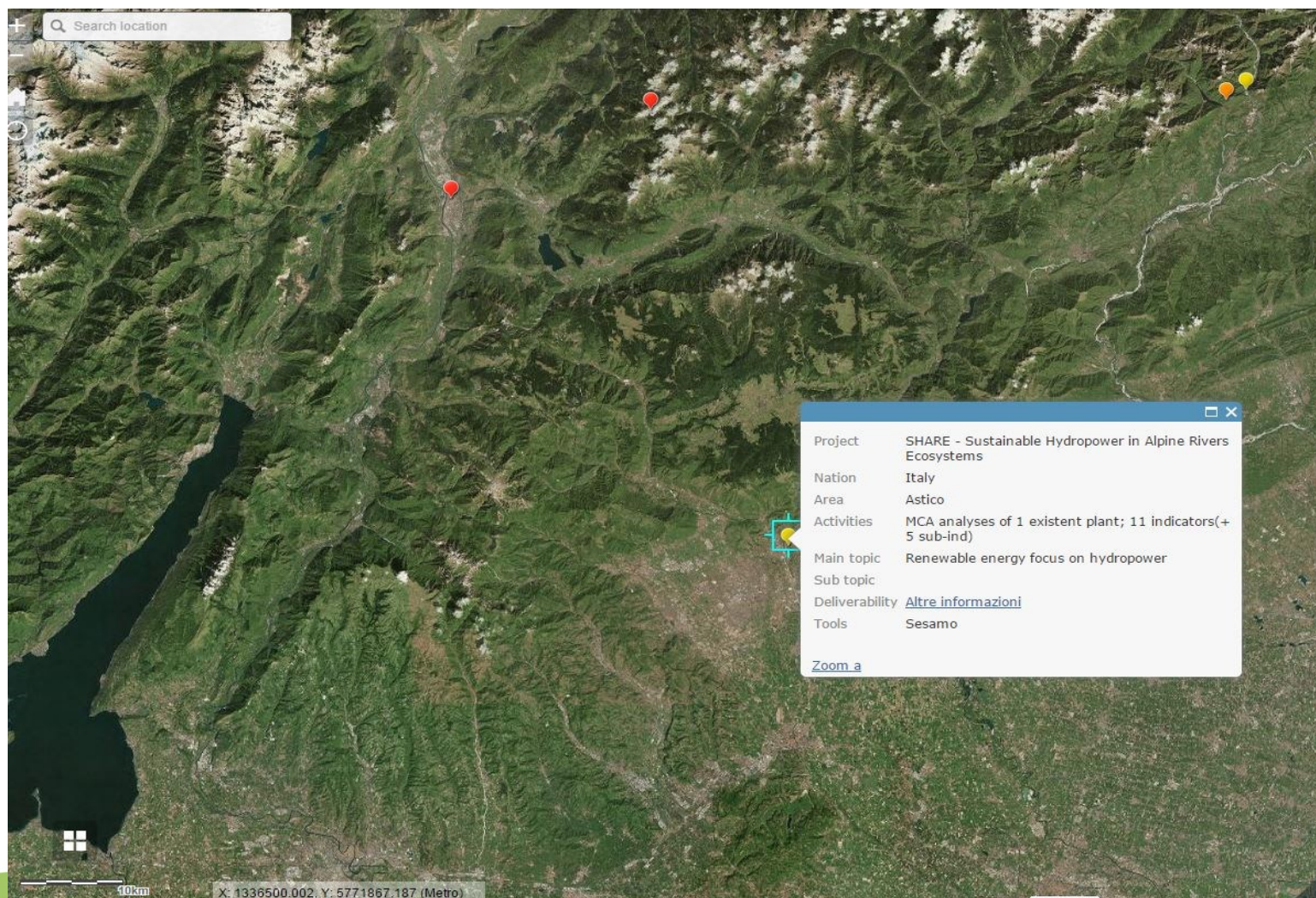


# Web-GIS implementation



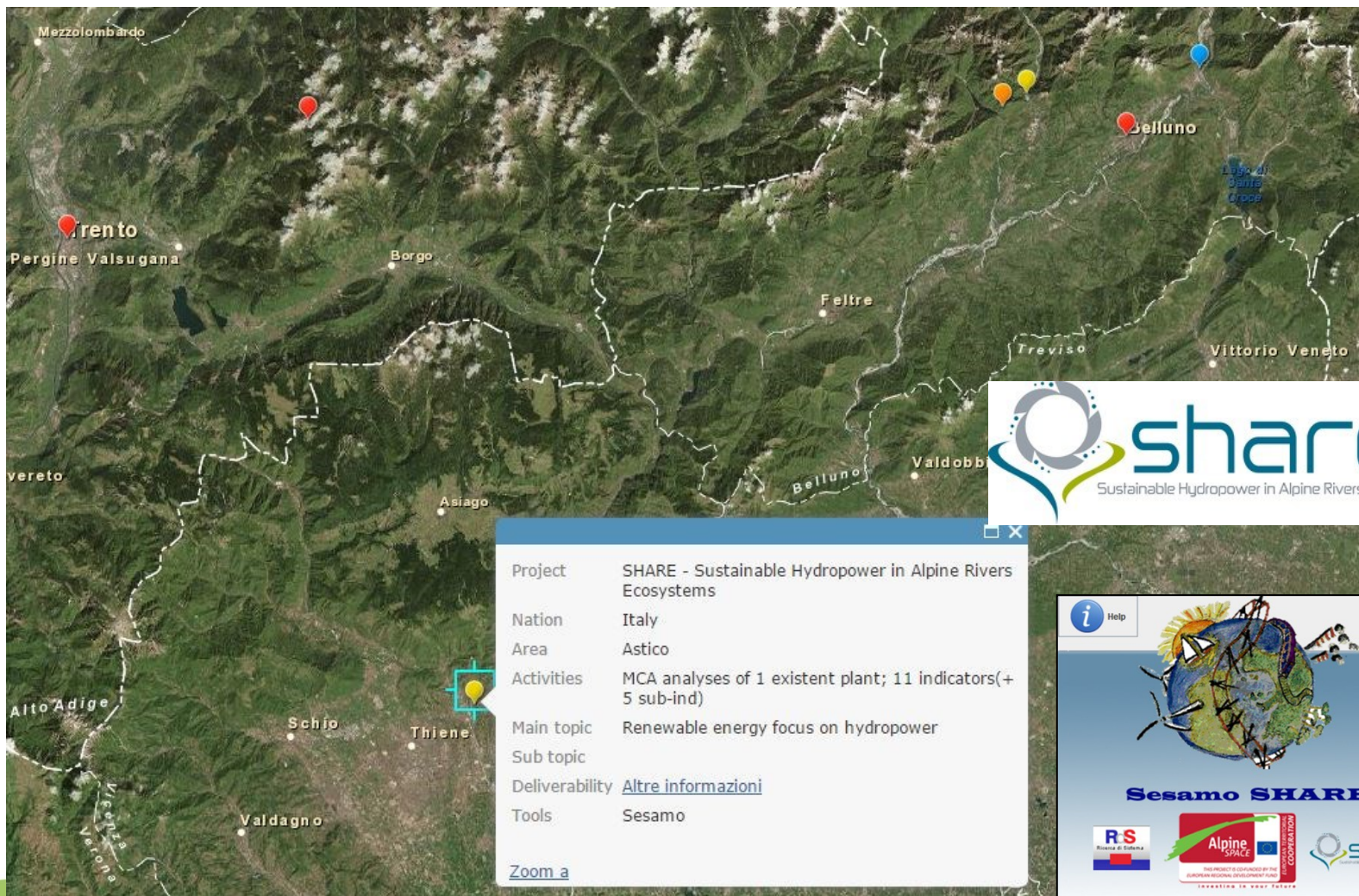


# Astico river case study





# Astico river case study



Mezzolombardo  
Trento  
Pergine Valsugana  
Borgo  
Feltre  
Treviso  
Vittorio Veneto  
Vereto  
Asiago  
Belluno  
Valdobbiadene  
Alto Adige  
Schiavon  
Thiene  
Valdagno

**share**  
Sustainable Hydropower in Alpine Rivers Ecosystems

Project	SHARE - Sustainable Hydropower in Alpine Rivers Ecosystems
Nation	Italy
Area	Astico
Activities	MCA analyses of 1 existent plant; 11 indicators(+ 5 sub-ind)
Main topic	Renewable energy focus on hydropower
Sub topic	
Deliverability	<a href="#">Altre informazioni</a>
Tools	Sesamo
<a href="#">Zoom a</a>	

**Sesamo SHARE**

**RS**  
Ricerca di Sistema

Alpine SPACE  
THIS PROJECT IS CO-FUNDED BY THE  
EUROPEAN REGIONAL DEVELOPMENT FUND  
Investing in your future

**share**  
Sustainable Hydropower in Alpine Rivers Ecosystems

Ex-ante analysis

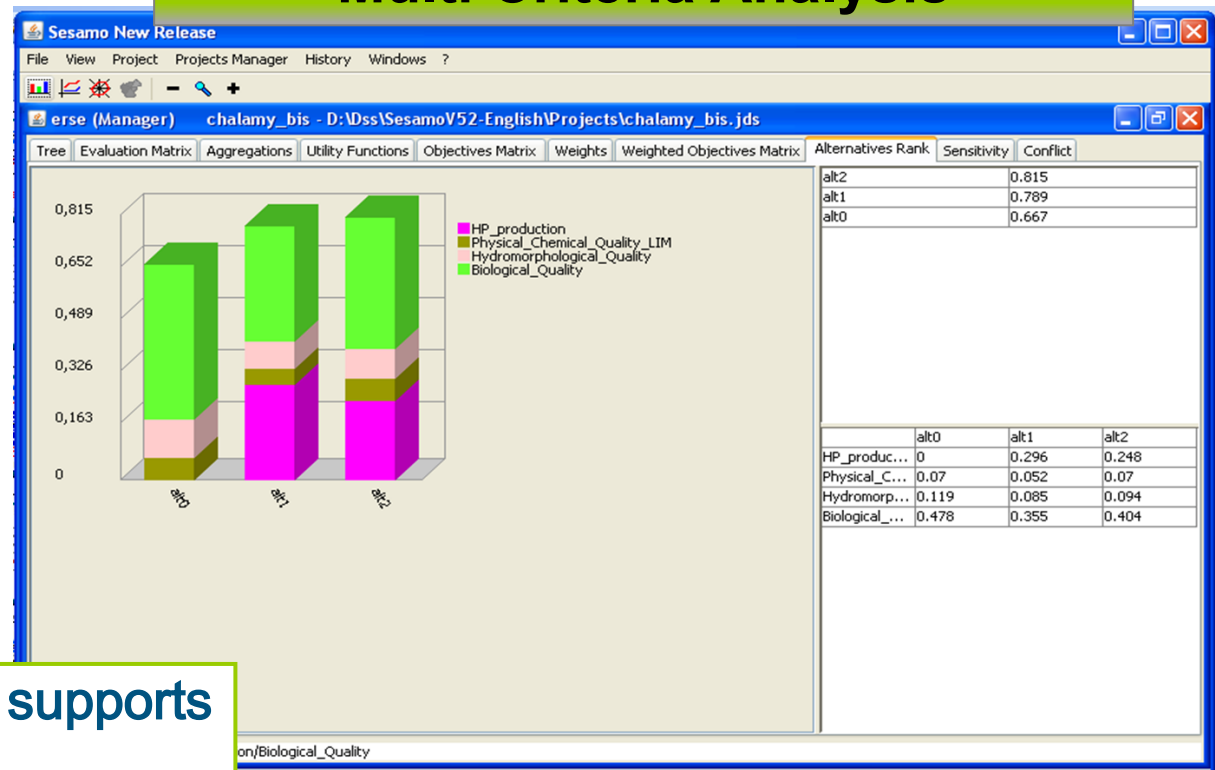
Ex-post analysis



# MCA tool for water management: SESAMO

## 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

# Astico river case study





# Astico river case study

**PROBLEM:** due to strong infiltration phenomena, the current MIF release is not always enough to ensure the presence of flowing water on the entire reach from the dam to the power plant outlet channel.

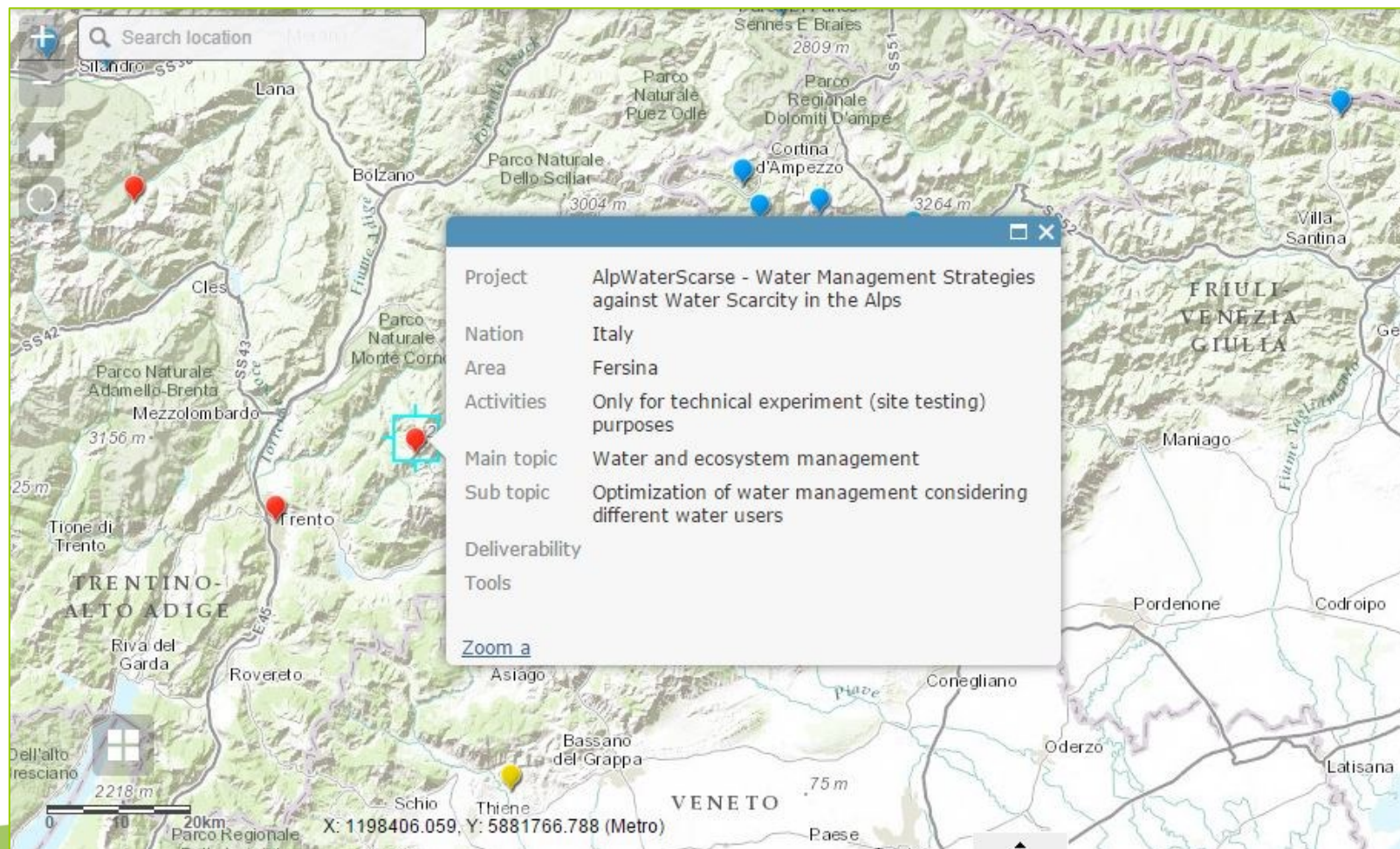
**SOLUTION:** increase the MIF discharge

**TOOL:** SESAMO software to compare 4 different alternatives:

- |               |  |
|---------------|--|
| ALTERNATIVE 0 | historical management until 2008 (not MIF released)            |
| ALTERNATIVE 1 | hydrological MIF release                                       |
| ALTERNATIVE 2 | increase the water released up to 150% of the hydrological MIF |
| ALTERNATIVE 3 | increase the water released up to 200% of the hydrological MIF |

MCA to quantify the environmental advantages and the economic drawbacks consequent to MIF regulation.

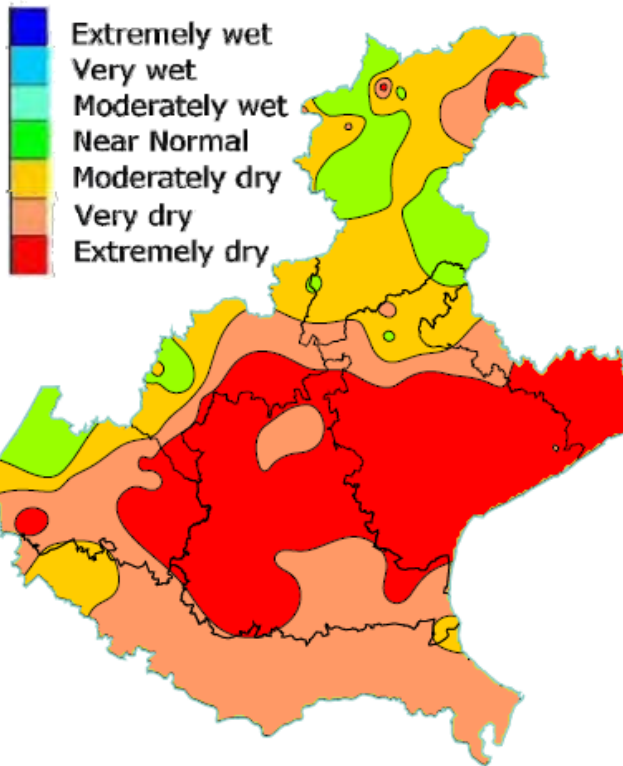
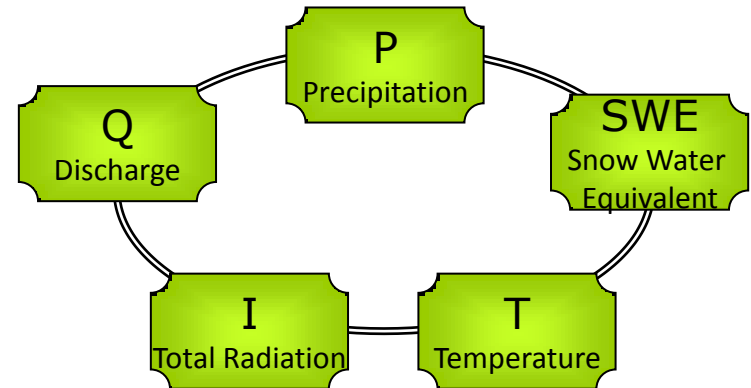
# Fersina river case study





# EWS – Water Scarcity Index (WSI)

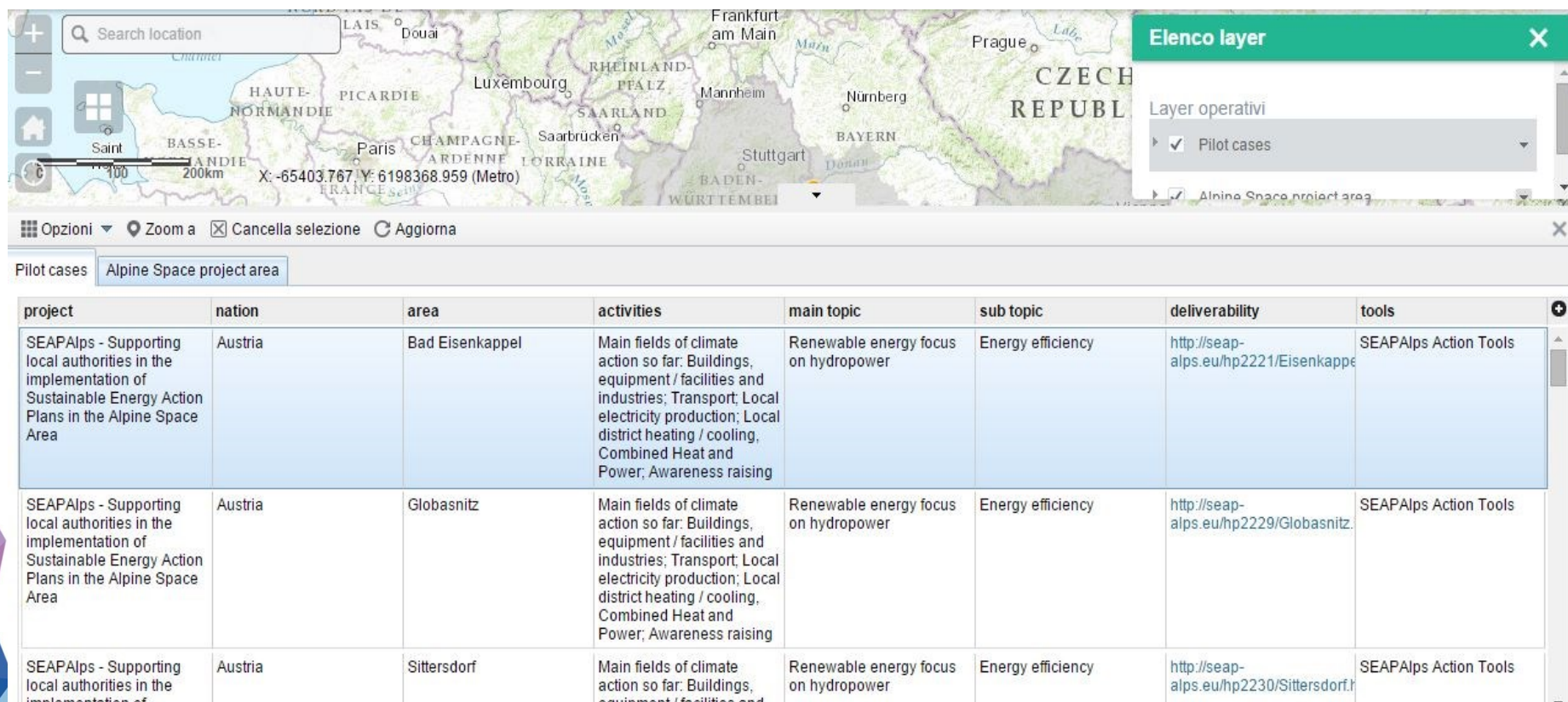
- Evaluation of the percentiles of P, SWE, T, I, Q
- Applications of weights and WSI calculation
- Weights and threshold value are calibrated using past data (critical years)



situation at: 31 January 2013													
Hydrological year (1 Oct - 30 Sep)	percentiles									WSI	Predicted water scarcity (Yes / No)	Real situation of water scarcity (Yes / No)	Indicator reliability
	rainfall		discharge			temperature		snow					
	cumulated rainfall from 1 Oct	cumulated rainfall from 1 Dec	mean discharge from 1 Oct	mean discharge till now	cumulated water volume drained from 1 Jan	mean temperature from 1 Oct	mean temperature from 1 Mar	snow pack - mean value of 10 days before now	cumulated snowfall till now				
<b>weight:</b>	<b>0.05</b>	<b>0.15</b>	<b>0.20</b>	<b>0.10</b>	<b>0.10</b>	<b>0.05</b>	<b>0.10</b>	<b>0.15</b>	<b>0.10</b>	<b>0.50</b>	<b>WSI threshold</b>		
1990 - 1991	0.82	0.67	0.41	0.69	0.59	0.00		1.00	0.87	0.74	N	?	-
1991 - 1992	0.52	0.52	0.61	0.39	0.49	0.35		0.69	0.54	0.60	N	?	-
1992 - 1993	0.50	0.12	0.56	0.43	0.51	0.58		0.30	0.74	0.49	Y	?	-
1993 - 1994	0.75	0.50	0.94	0.69	0.71	0.37		0.19	0.37	0.64	N	Y	failed alarm
1994 - 1995	0.05	0.33	0.59	0.61	0.58	0.55		0.61	0.41	0.54	N	Y	failed alarm
1995 - 1996	0.00	0.20	0.38	0.15	0.18	0.23		0.11	0.00	0.29	Y	N	false alarm
1996 - 1997	0.72	0.03	0.78	0.75	0.74	0.83		0.57	0.20	0.56	N	N	OK
1997 - 1998	0.25	0.57	0.28	0.65	0.57	0.80		0.65	0.49	0.53	N	Y	failed alarm
1998 - 1999	0.62	0.75	0.54	0.48	0.38	0.17		0.34	0.66	0.60	N	N	OK
1999 - 2000	0.10	0.30	0.64	0.66	0.63	0.52		0.00	0.04	0.44	Y	N	false alarm
2000 - 2001	1.00	0.87	0.93	0.93	0.97	0.85		0.92	0.91	0.89	N	N	OK
2001 - 2002	0.38	0.93	0.16	0.18	0.13	0.92		0.15	0.08	0.36	Y	N	false alarm
2002 - 2003	0.88	0.02	0.81	0.90	0.87	0.67		0.07	0.29	0.54	N	Y	failed alarm
2003 - 2004	0.80	0.52	0.33	0.39	0.41	0.13		0.96	0.95	0.65	N	N	OK
2004 - 2005	0.22	0.15	0.36	0.38	0.35	0.38		0.53	0.25	0.41	Y	Y	OK
2005 - 2006	0.37	0.28	0.47	0.16	0.14	0.07		0.42	0.62	0.46	Y	Y	OK
2006 - 2007	0.15	0.83	0.05	0.12	0.09	1.00		0.03	0.16	0.28	Y	N	false alarm
2007 - 2008	0.35	0.75	0.15	0.29	0.22	0.67		0.73	0.70	0.51	N	N	OK
2008 - 2009	0.95	1.00	0.65	0.76	0.72	0.60		0.88	1.00	0.83	N	N	OK
2009 - 2010	0.53	0.72	0.32	0.46	0.66	0.15		0.84	0.83	0.66	N	N	OK
2010 - 2011	0.55	0.45	0.72	0.82	0.88	0.67		0.50	0.79	0.68	N	N	OK
2011 - 2012	0.08	0.15	0.38	0.21	0.25	0.93		0.23	0.45	0.33	Y	Y	OK
2012 - 2013	0.77	0.39	0.96	0.89	0.86	0.72		0.92	0.95	0.81	N	N	OK

# Web-GIS Query

- Variable thematization
- Spatial-enabled research and analysis



The screenshot displays a Web-GIS interface. At the top, there is a search bar and a map of Central Europe. A green sidebar on the right, titled 'Elenco layer', contains a 'Layer operativi' section with two checked items: 'Pilot cases' and 'Alpine Space project area'. Below the map, there are buttons for 'Opzioni', 'Zoom a', 'Cancella selezione', and 'Aggiorna'. A tabbed interface shows 'Pilot cases' and 'Alpine Space project area'. The 'Pilot cases' tab is active, displaying a table with the following data:

project	nation	area	activities	main topic	sub topic	deliverability	tools
SEAPAlps - Supporting local authorities in the implementation of Sustainable Energy Action Plans in the Alpine Space Area	Austria	Bad Eisenkappel	Main fields of climate action so far: Buildings, equipment / facilities and industries; Transport; Local electricity production; Local district heating / cooling, Combined Heat and Power; Awareness raising	Renewable energy focus on hydropower	Energy efficiency	<a href="http://seap-alps.eu/hp2221/Eisenkappel">http://seap-alps.eu/hp2221/Eisenkappel</a>	SEAPAlps Action Tools
SEAPAlps - Supporting local authorities in the implementation of Sustainable Energy Action Plans in the Alpine Space Area	Austria	Globasnitz	Main fields of climate action so far: Buildings, equipment / facilities and industries; Transport; Local electricity production; Local district heating / cooling, Combined Heat and Power; Awareness raising	Renewable energy focus on hydropower	Energy efficiency	<a href="http://seap-alps.eu/hp2229/Globasnitz">http://seap-alps.eu/hp2229/Globasnitz</a>	SEAPAlps Action Tools
SEAPAlps - Supporting local authorities in the implementation of	Austria	Sittersdorf	Main fields of climate action so far: Buildings, equipment / facilities and	Renewable energy focus on hydropower	Energy efficiency	<a href="http://seap-alps.eu/hp2230/Sittersdorf">http://seap-alps.eu/hp2230/Sittersdorf</a>	SEAPAlps Action Tools

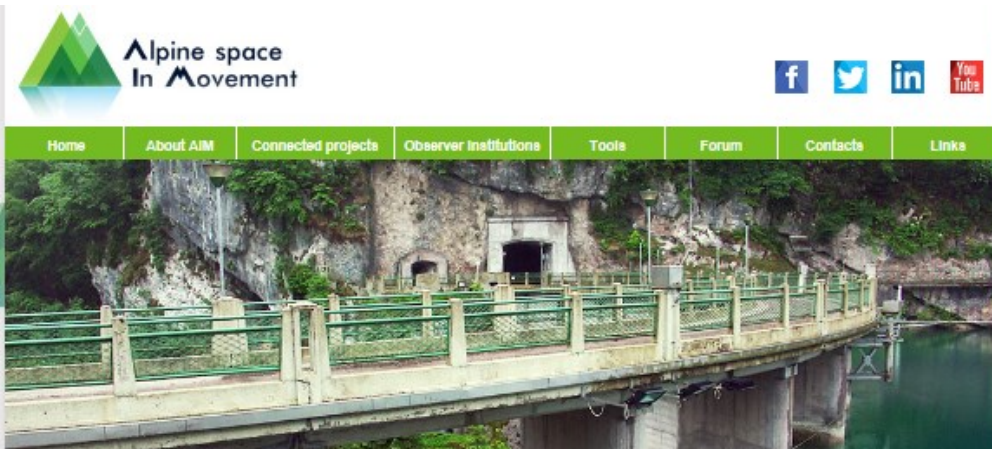


# Web-GIS Technology

- ArcGIS Online; cloud platform for creating and sharing maps, apps, data, and geographic content
- Access to a rich collection of geographic databases with worldwide coverage



www.aim2014.eu



SMART Mini-Idro

SESAMO

VAPIDRO-ASTE

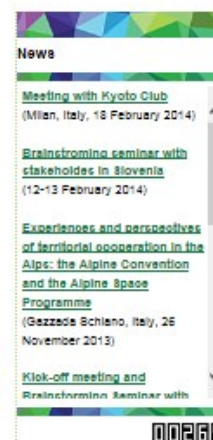
Water Scarcity Index



What  
is your  
problem?



Successful  
applications



SEAP\_Alps Action Tool



Habitat modeling

Product oriented website

MORIMOR







Alpine space  
In Movement

Be part of our community !

Thanks for your attention

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