



# PAWA – Pilot Arno Water Accounts

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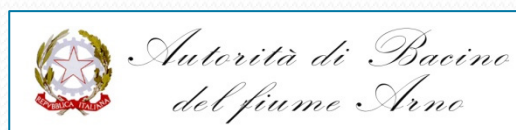
**3<sup>rd</sup> Stakeholder Workshop**  
**Rome, 1 December 2014**

**PAWA** is a 15-month pilot action in the **Arno River Basin** (NW Italy) aimed at:

- ✓ improving knowledge on water resources available and their use;
- ✓ assessing the potential impact of management, technological and economical measures to reduce the territory vulnerability against water scarcity and drought.

→ *implementation and testing at basin level of the **SEEA-Water** methodology*

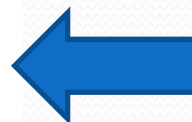
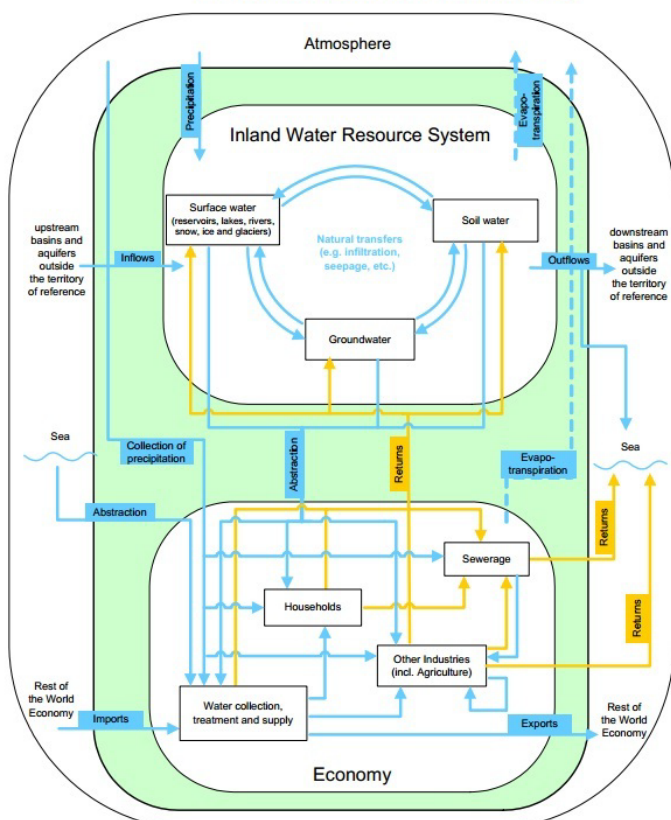
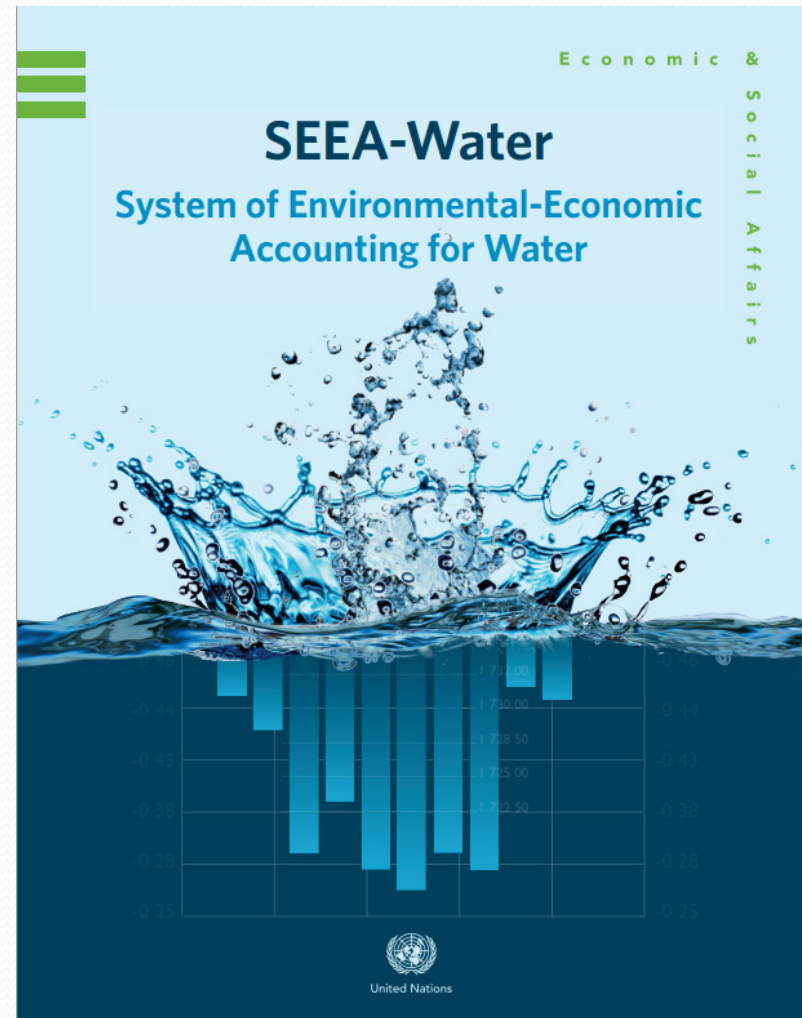
Co-operation, interaction & concertation at  
**basin/regional, Italian, EU** and **EUROMED** levels



Grant: **€ 150.011,00** (75% of the eligible costs: **€ 200.015,00**)

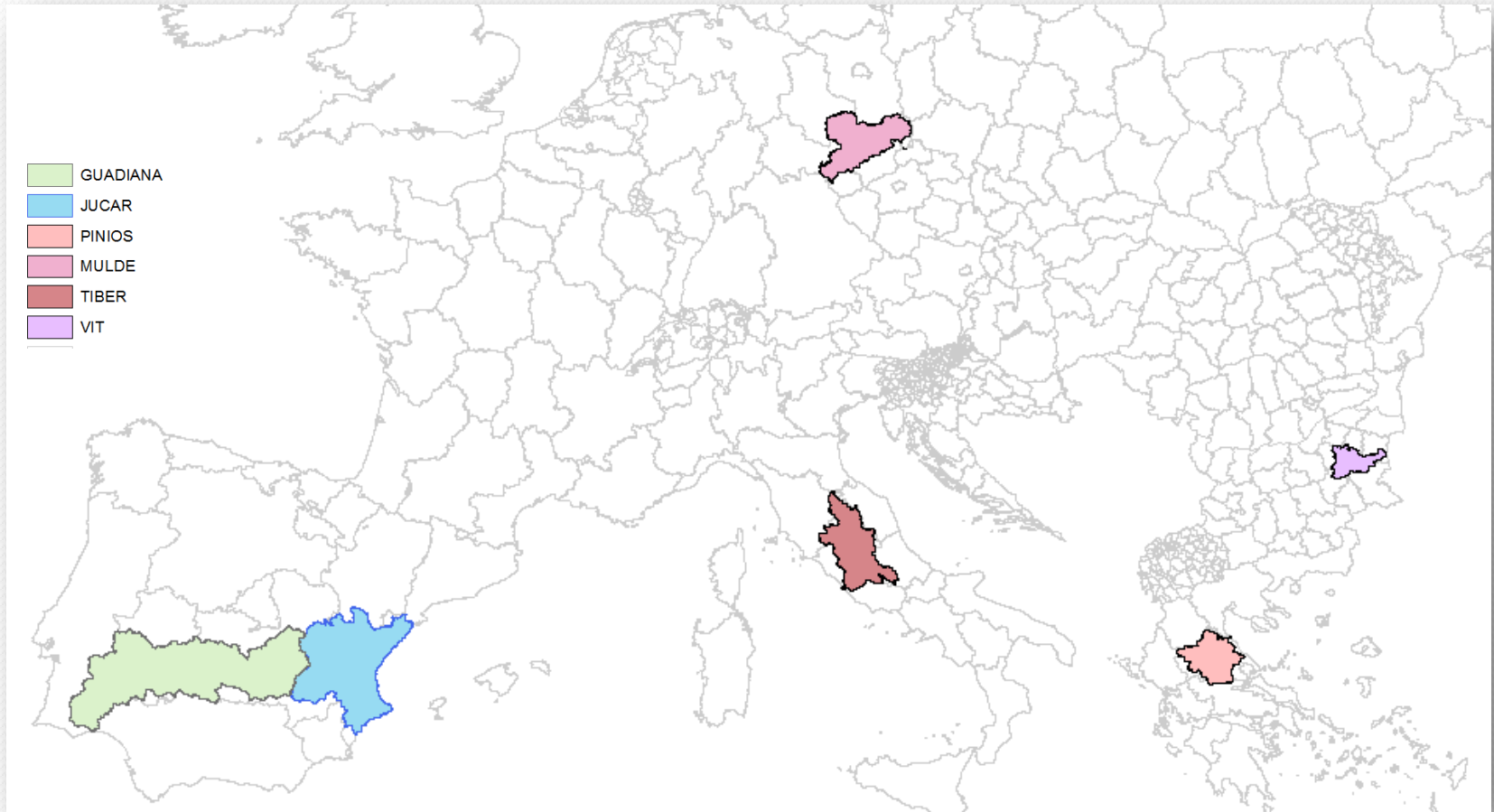
## System of Environmental-Economic Accounts for Water

Sub-system of the *System of Environmental-Economic Accounting* (SEEA) that provides a conceptual framework for organizing the hydrological and economic information in a coherent and consistent manner, following international standards



Main flows within the environment and the economy

# Pilot basins for the 1<sup>st</sup> DG ENV call



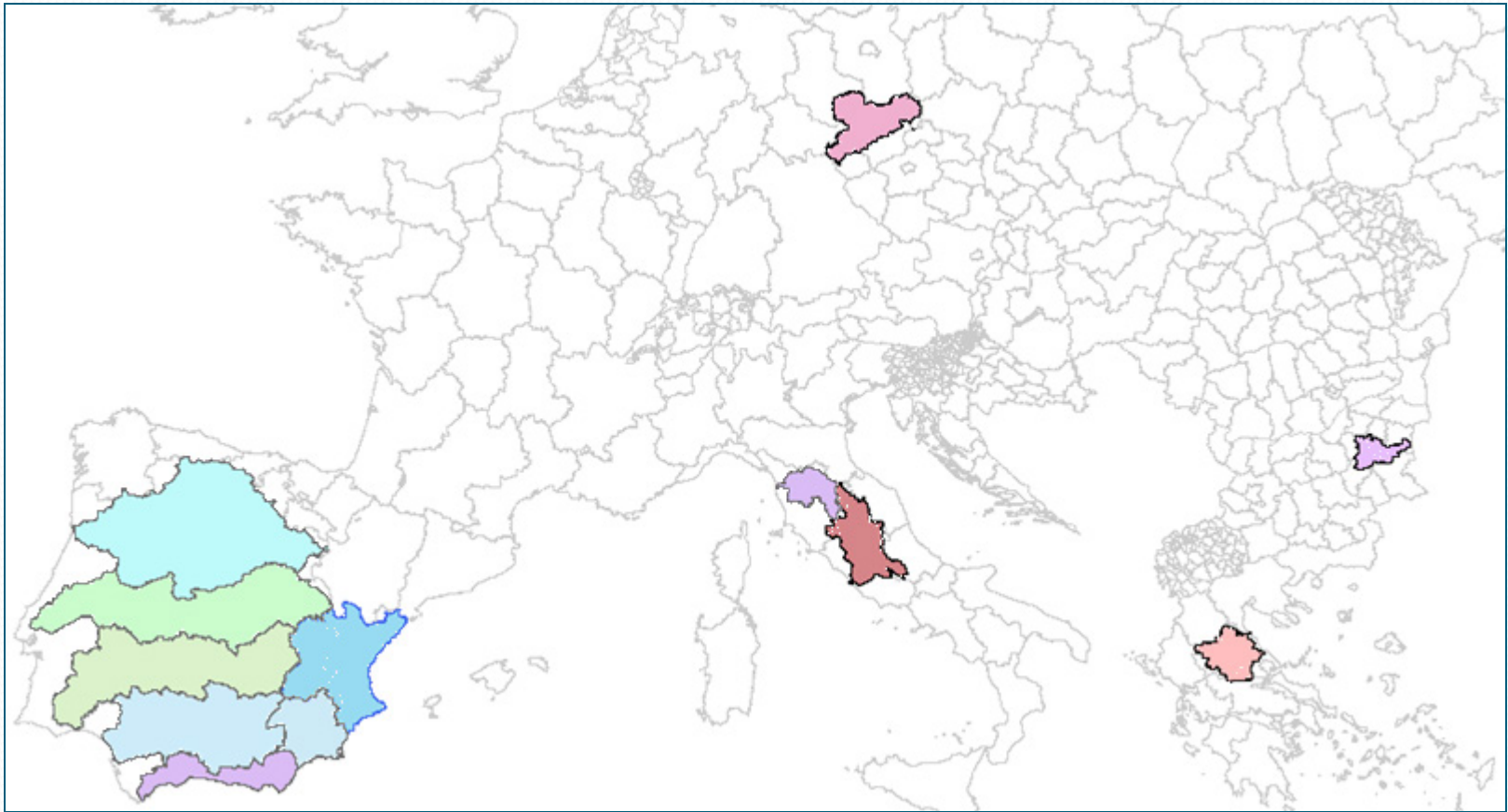
After Lara Fernandez's presentation  
@ 2<sup>nd</sup> WG Water Accounts Mtg

# Pilot basins for the 2<sup>nd</sup> DG ENV call



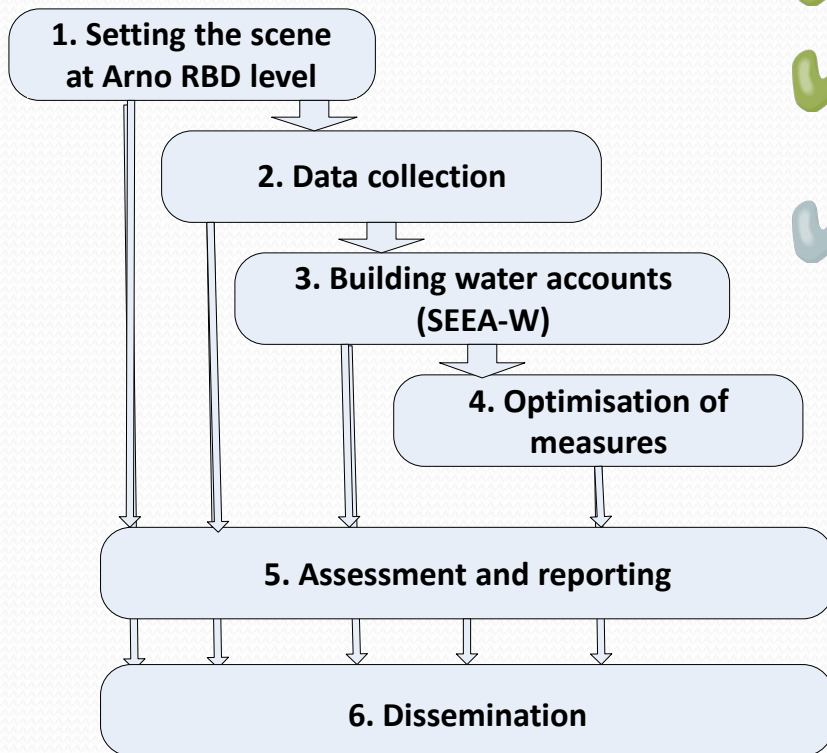
After Lara Fernandez's presentation  
@ 2<sup>nd</sup> WG Water Accounts Mtg

# Pilot basins for the 1<sup>st</sup> & 2<sup>nd</sup> DG ENV calls



# PAWA activities & expected results

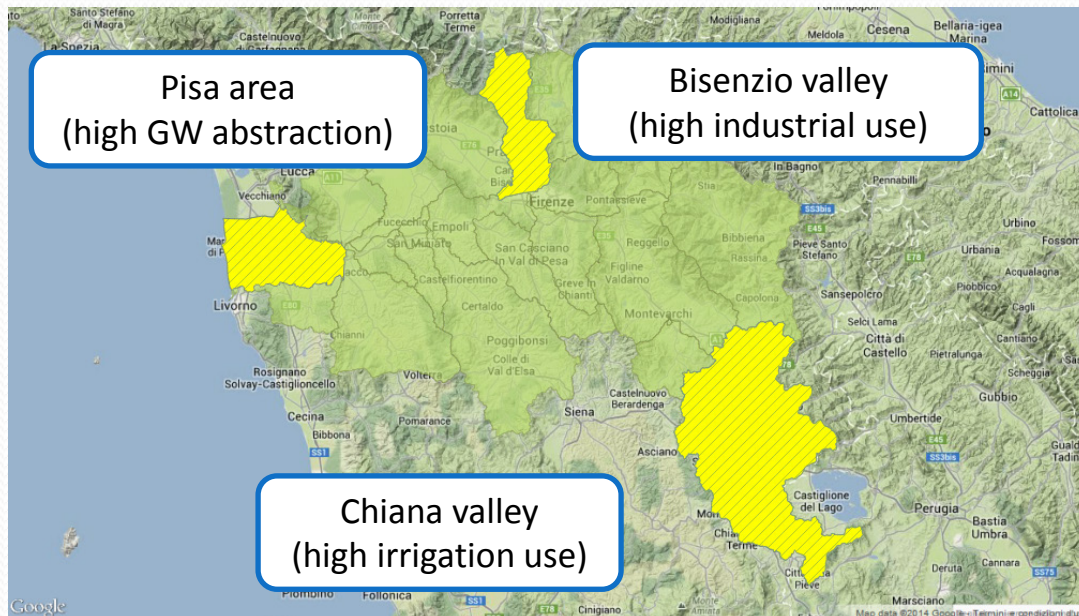
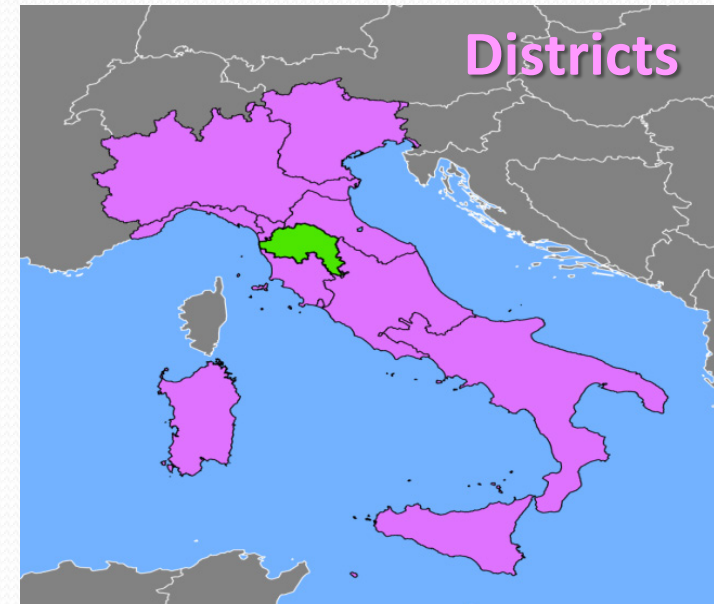
## Six interconnected activities



| Act. | Deliverables   | When                   |
|------|--|------------------------|
| ✓ 1  | D1.1 Catalogue of data sources and tools<br>D1.2 Priorisation list of sub-basins   | T0+3<br>T0+3           |
| ✓ 2  | D2.1 Repository of data sets<br>D2.2 Assessment of data availability   | T0+6<br>T0+6           |
| ✓ 3  | D3.1 1 <sup>st</sup> draft water flow diagrams and associated SEEA-W tables<br>D3.2 Geo-referenced database for water accounts                             | T0+8<br>T0+9           |
| 4    | D4.1 Water efficient targets for future revisions Arno RBMP  | T0+12                  |
| 5    | D5.1 Water account tables<br>D5.2 Final report   | T0+15<br>T0+15         |
| 6    | D6.1 Project leaflet<br>D6.2 Compendium of lessons learnt<br>D6.3 Detailed list of dissemination activities, including project presentations during events | T0+3<br>T0+15<br>T0+15 |

# The Arno River Basin & the target sub-basins

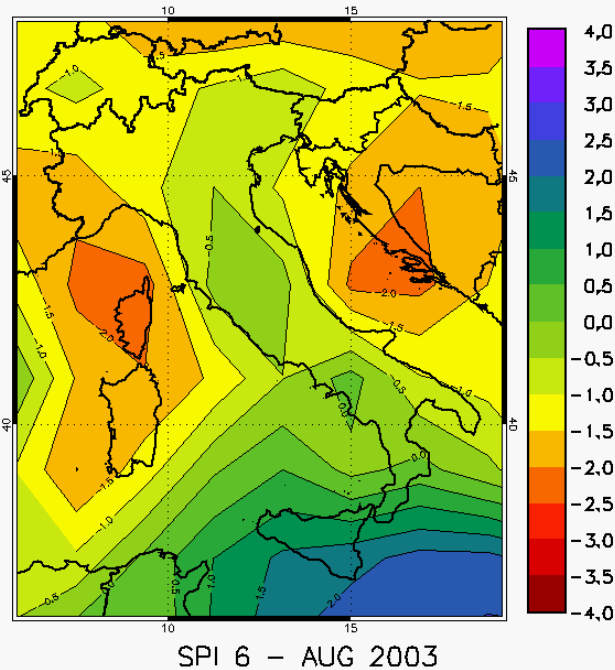
- ❑ River length of **241 km**
- ❑ Surface area of **8.228 km<sup>2</sup>**
- ❑ 98% belongs to Tuscany Region;  
2% belongs to Umbria Region
- ❑ The basin comprises 171 municipalities and 8 provinces (Arezzo, Florence, Pistoia, Pisa, Siena, Lucca, Livorno and Perugia)



Identification of 3 sub-basins  
where water accounts will  
have the best potential



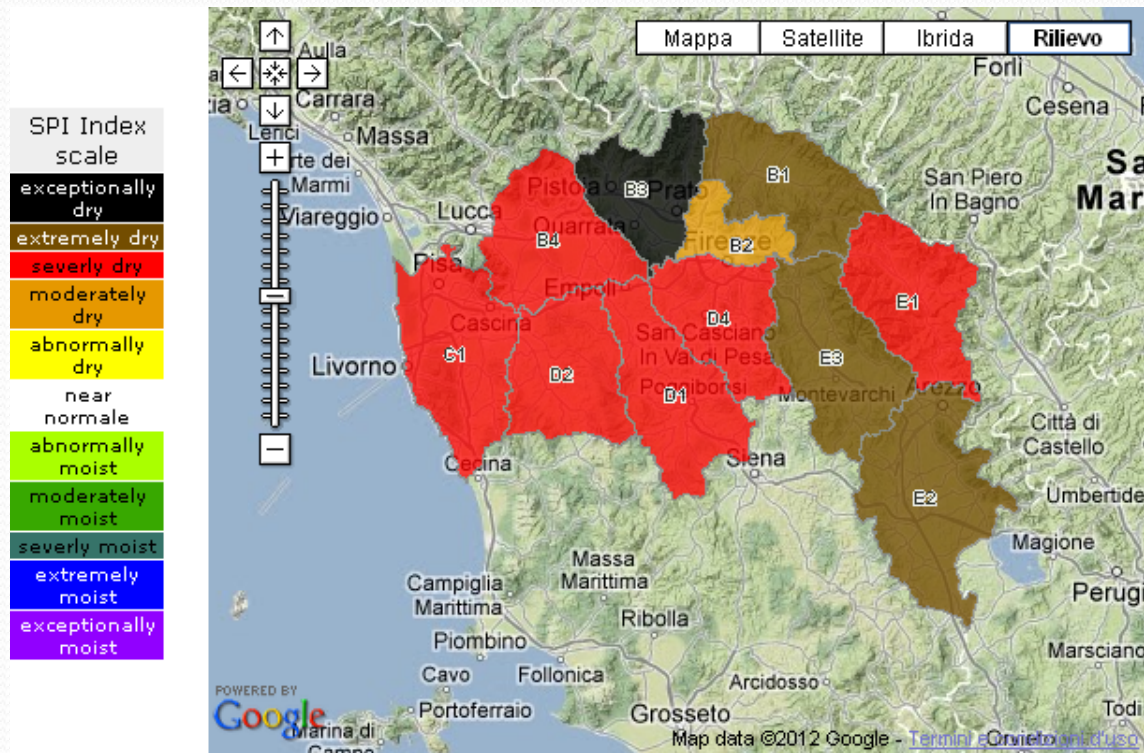
# Drought in the Arno River Basin during the last 10 years



*6-month SPI index in August 2003 – based on the 2.5° NCEP/DOE reanalysis.*

**2003 & 2007** – Serious summer drought in the basin; many decentralized aqueducts remained without direct water supply.

**2011-2012** – Anomalous autumn drought in the basin that lasted till Spring. It was characterized by not only the total absence of flow peaks (very common in late autumn) but also new absolute minimum recharge rates (registered between Oct. and Mar.), with reference to the available time series of rain gauge data (last 90 years).



*SPI index in the different sub-basins 180-days in July 2012 – based rain gauge data.*

# Water scarcity and management of critical conditions

## What are we doing?

- In 2008 a Water Balance Plan for the Arno River Basin was adopted in accordance with Legislative Decree 152/2006 and its provisions managing withdrawals and releases are binding on the territory including granted volume reduction which aims to ensure environmental protection (i.e., respect of EF) and optimization water uses
- A draft version of a “drought management plan” was included in the PoM of Northern Apennines District RBMP
- Plans are based on a 10-year experience of "drought management" provided by a special Water Protection Commission, which includes representatives from local administrations, municipalities, water management companies, and government representatives.

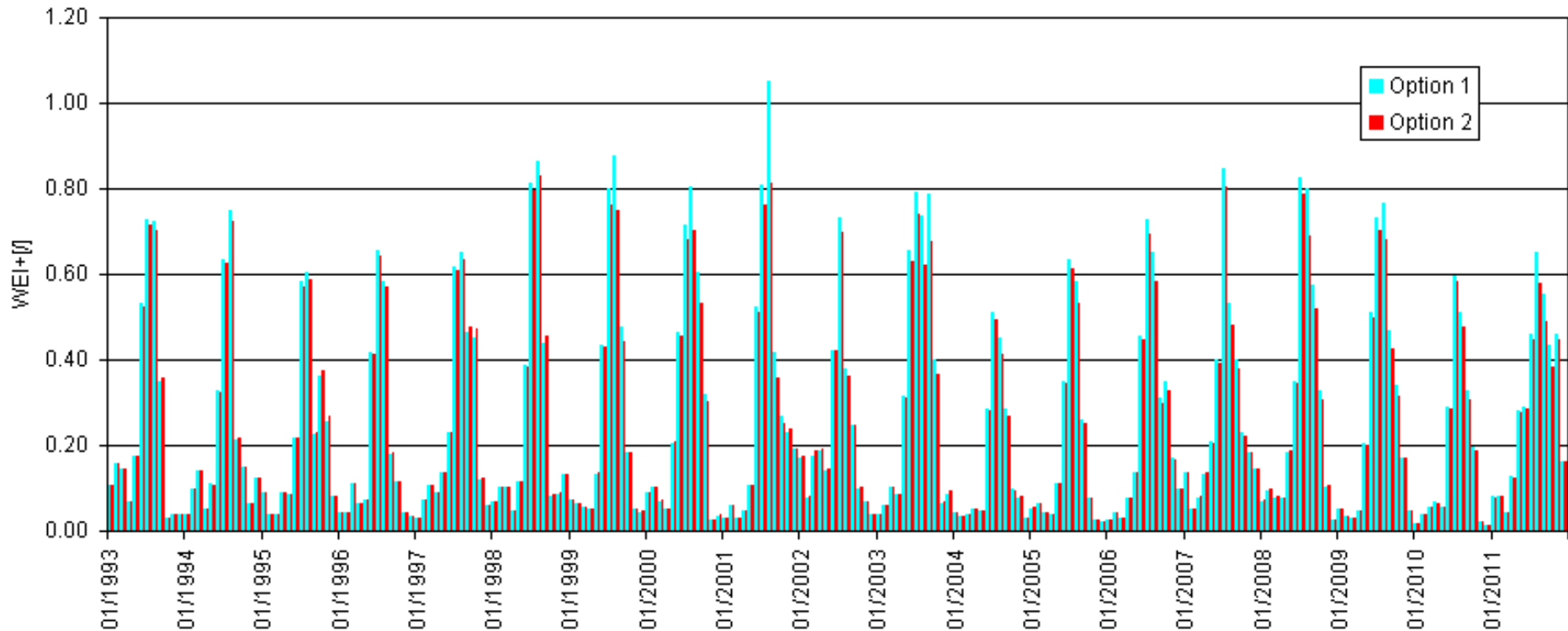
This Commission monitors and manages droughts by the means of:

- Mid- and long-term meteo forecast analysis, regarding ground- and superficial water body recharges; and
- Implementation of participative policy for the management of water reservoirs and limitation of withdrawals.

# Water scarcity and management of critical conditions

In the framework of the 2010–2012 activities of the CIS “Water Scarcity & Drought” Expert Group, ARBA and ISPRA tested the application of a modified Water Exploitation Index for the Arno River Basin on a monthly basis.

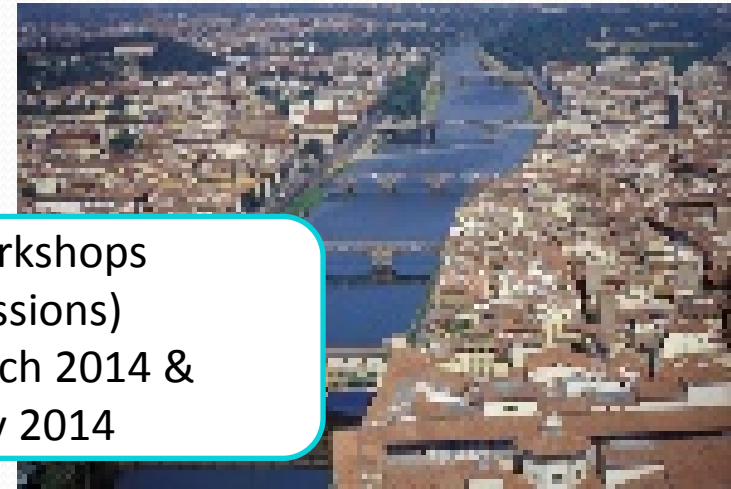
In the example below, option 1 includes Environmental Flow (EF), option 2 excludes EF. The more critical years are well highlighted by WEI+ values close to 1.0.



# 1. Setting the Scene at Arno RBD Level

Inception workshop and training on SEEA-W and ECRINS

2 Stakeholder Workshops  
(incl. Training sessions)  
Florence, 20-21 March 2014 &  
Florence, 02 July 2014



Inventory and description of existing data sources and tools

Distribution point  
Spatial and time extension  
Quality level  
Supplementary info  
...

Identification of sub-basins where water accounts will have the best potential

## 2. Data Collection

Matching of the existing datasets  
with SEEA-W data structure

Repository of all necessary datasets and pre-  
processing of data

Metadata catalogue  
INSPIRE/ISO 19115 compliant

Two repositories on <ftp.isprambiente.it>  
one for internal use and one for public  
dissemination (pawapub / PUB38h76)

### A. Physical use table (*physical units*)

|                      |   |
|----------------------|---|
| From the environment | <ol style="list-style-type: none"><li>1. Total abstraction (= 1.a + 1.b = 1.i + 1.ii)<ol style="list-style-type: none"><li>1.a. Abstraction for own use</li><li>1.b. Abstraction for distribution<ol style="list-style-type: none"><li>1.i. From Inland water resources:<ol style="list-style-type: none"><li>1.i.1. Surface water</li><li>1.i.2. Groundwater</li><li>1.i.3. Soil water</li></ol></li><li>1.ii. Collection of precipitation</li><li>1.iii. Abstraction from the sea</li></ol></li></ol></li></ol> |
| Within the economy   | <ol style="list-style-type: none"><li>2. Use of water received from other economic units<br/><i>of which:</i><ol style="list-style-type: none"><li>2.a. Reused water</li><li>2.b. Wastewater to sewerage</li></ol></li><li>3. Total use of water (= 1 + 2)</li></ol>  |

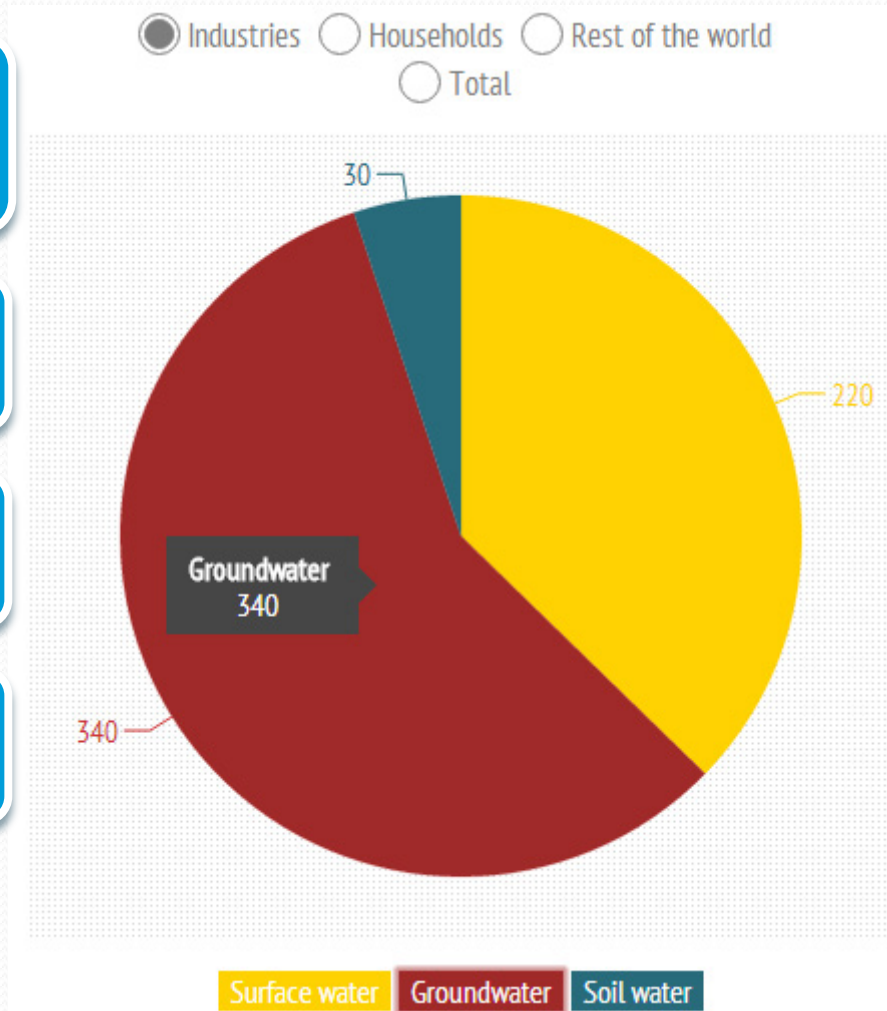
### 3. Building Water Accounts (SEEA-W)

Production of water flow diagrams for each sub-basin in cooperation with local stakeholders

Building a georeferenced database (water resource availability and use)

Processing SEEA-W visualization outputs

Computing and validating SEEA-W tables (1999-2013)



## 4. Optimisation of Measures

Identify suitable measures for the selected sub-basins and estimate water savings and implementing costs

Elaborate prospective *scenarii* based on various combinations of measures and preparing the visualization outputs for each scenario

Define water efficiency targets during a participatory workshop with local stakeholders using the output of proposed scenario

Reduction of licensed abstractions

Sustainable water use

Optimization of water allocation



## 5. Assessment and Reporting

Provision of water accounts tables computed

Preparation of progress reports

Preparation of the final reports

Comparison of water balanced developed at EU level with SEEA-W tables developed during the project





## 6. Dissemination

Leaflet

Dedicated web space on ARPA, ISPRA and EMWIS

Circulating information on activities & results using several communication channels

Coordination and concertation meetings organized by DG ENV

Attendance to national and international workshops

Compendium of good practices

<http://pawa.emwis.net>, plus pages on ISPRA & ARBA websites

- PRU€ bulletins
- SEMIDE/EMWIS newsletters
- [PAWA @ facebook](#)
- IDRA14, OECD, etc.



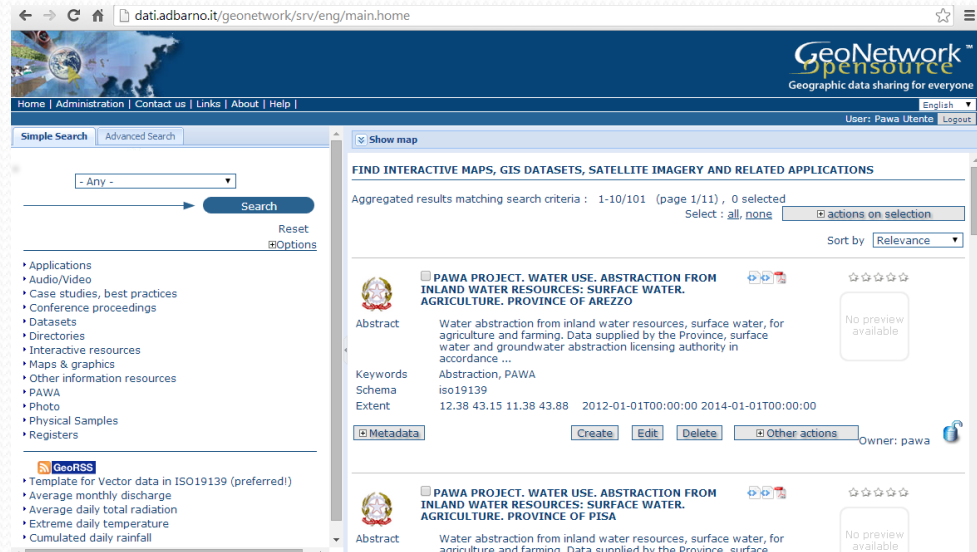
## Problems faced

- Necessary datasets spread-out among a wide range of stakeholders
- Availability of homogeneous time series with monthly breakdown, in particular for water abstraction and return
- Ecological flows not integrated into SEEA-Water
- Difficulty in collecting socio-economic data at river basin level
- Exploitation of water accounts tables by water resource managers / stakeholders
- Building scenarios for supporting the optimisation of measures

# To summarise... solutions tested by PAWA

Wide range of data producers

Metadata catalogue INSPIRE compliant



The screenshot displays the GeoNetwork metadata catalogue interface. The browser address bar shows the URL: [dati.adbarno.it/geonetwork/srv/eng/main.home](http://dati.adbarno.it/geonetwork/srv/eng/main.home). The page header includes the GeoNetwork logo and the tagline "Geographic data sharing for everyone". The user is logged in as "Pawa Utekte".

The main content area is titled "FIND INTERACTIVE MAPS, GIS DATASETS, SATellite IMAGERY AND RELATED APPLICATIONS". It shows aggregated results matching search criteria: 1-10/101 (page 1/11), 0 selected. The results are sorted by Relevance.

The first result is for the "PAWA PROJECT. WATER USE. ABSTRACTION FROM INLAND WATER RESOURCES: SURFACE WATER. AGRICULTURE. PROVINCE OF AREZZO". The abstract describes water abstraction from inland water resources, surface water, for agriculture and farming. Data is supplied by the Province, surface water and groundwater abstraction licensing authority in accordance with the PAWA project. The keywords are "Abstraction, PAWA". The schema is "iso19139". The extent is "12.38 43.15 11.38 43.88". The creation date is "2012-01-01T00:00:00" and the update date is "2014-01-01T00:00:00". The owner is "pawa".

The second result is for the "PAWA PROJECT. WATER USE. ABSTRACTION FROM INLAND WATER RESOURCES: SURFACE WATER. AGRICULTURE. PROVINCE OF PISA". The abstract describes water abstraction from inland water resources, surface water, for agriculture and farming. Data is supplied by the Province, surface water and groundwater abstraction licensing authority in accordance with the PAWA project. The keywords are "Abstraction, PAWA". The schema is "iso19139". The extent is "12.38 43.15 11.38 43.88". The creation date is "2012-01-01T00:00:00" and the update date is "2014-01-01T00:00:00". The owner is "pawa".

The left sidebar contains a search bar with a dropdown menu set to "- Any -" and a "Search" button. Below the search bar are links for "Reset" and "Options". A list of categories is provided, including Applications, Audio/Video, Case studies, best practices, Conference proceedings, Datasets, Directories, Interactive resources, Maps & graphics, Other information resources, PAWA, Photo, Physical Samples, and Registers. A "GeoRSS" section is also visible, listing various data types such as "Template for Vector data in ISO19139 (preferred)", "Average monthly discharge", "Average daily total radiation", "Extreme daily temperature", and "Cumulated daily rainfall".

# To summarise... solutions tested by PAWA

Wide range of data producers

Metadata catalogue INSPIRE compliant

Training and concertation with stakeholders



# To summarise... solutions tested by PAWA

Wide range of data producers

Homogeneous data time series

Exploitation of water accounts tables

Metadata catalogue INSPIRE compliant

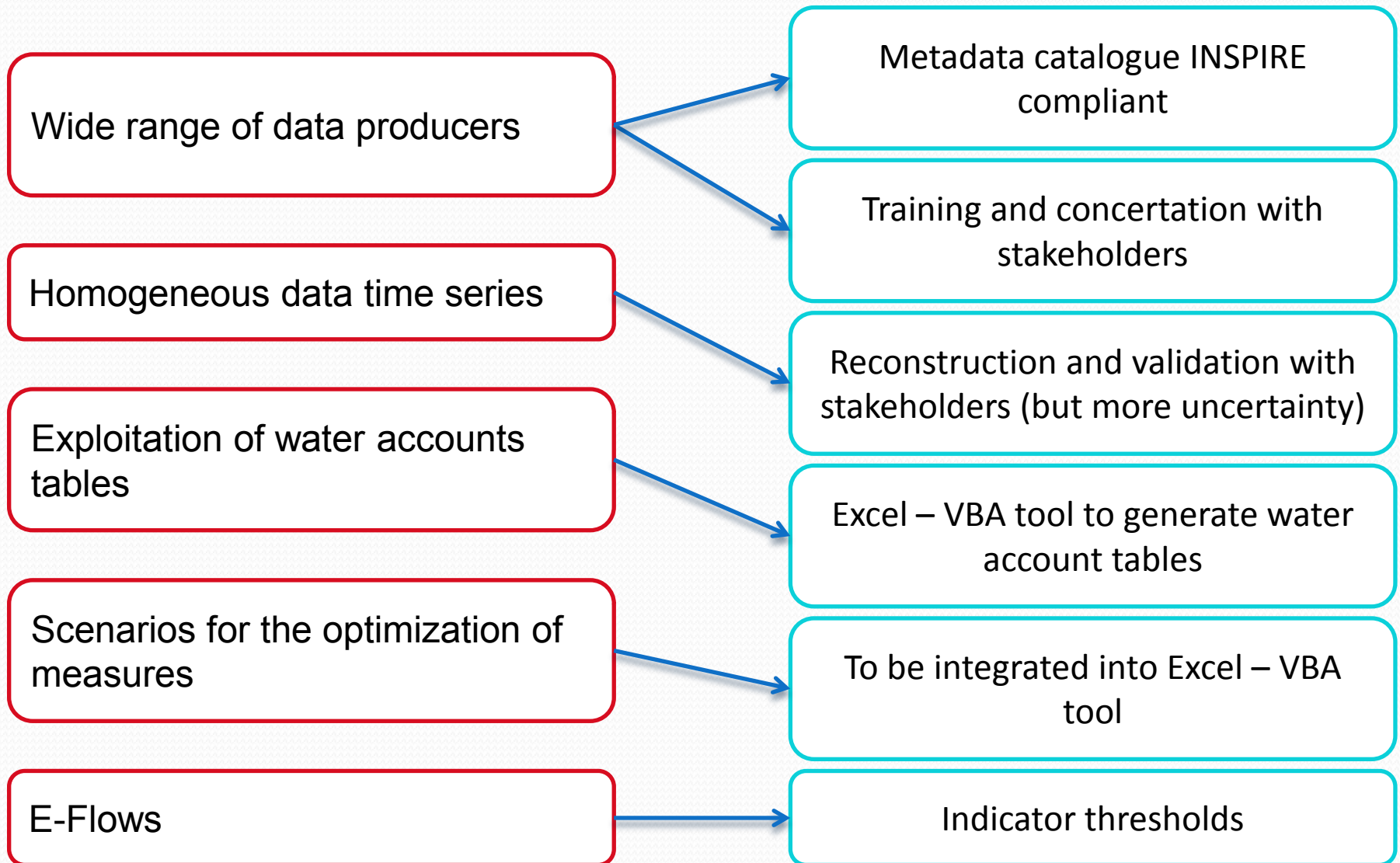
Training and concertation with stakeholders

Reconstruction and validation with stakeholders (but more uncertainty)

Excel – VBA tool to generate water account tables

The screenshot shows a software window titled "Arno Water Accounts". The interface has a blue background and contains several input fields and buttons. The fields include "Subbasin" (a dropdown menu), "SEEA-W Table" (a dropdown menu), "Year [1990-2013]" (a text input field), and "Month" (a dropdown menu showing "January"). The buttons include "Initialize", "GetOpenings", "ShowTable", "Exit", and "Get Balance".

# To summarise... solutions tested by PAWA



# Some proposals for improvements

E-Flows

Exploitation of water accounts tables

Homogeneous data time series

Socio-economic data at river basin level

Scenarios for optimisation of measures

WA guidance could propose an integration into WA tables

EU wide tool could be proposed (DB structure and processing of WA)

For water stress areas, measures will be proposed to improve knowledge on water abstraction & use

For water stress areas, measures will be proposed to collect additional data (e.g. survey, research)

Reference guidelines and case studies at EU level would be useful for benchmarking



**Thank you for your kind attention!**

**For any further details:**  
**[pawa@isprambiente.it](mailto:pawa@isprambiente.it)**