PAWA FINAL REPORT (Technical)

1. Description

1.1. Name of beneficiary of grant contract: ISPRA – Institute for Environmental Protection and Research

1.2. Name and title of the Co-ordinator: Dr. Stefano Mariani

1.3. Name of partners in the grant agreement (if applicable):

1. ARBA – Arno River Basin Authority (contact person: Lucia Fiumi)

2. EMWIS TU – Technical Unit of Euro-Mediterranean Information System on know how in the Water Sector / UT SEMIDE – Unité Technique de le Système Euro-Méditerranéen d'Information sur les savoir faire dans le Domaine de l’Eau (contact person: Eric Mino)

1.4. Title of the Action: PAWA – Pilot Arno Water Accounts

1.5. Number of the Grant Agreement: 07.0329/2013/671279/SUB/ENV.C.1

1.6. Start date and end date of the Grant Agreement: 01/01/2014–31/03/2015

2. Assessment of implementation of Action activities

2.1. Executive summary

Please give a global overview of the Action's implementation for the whole duration of the project. This executive summary may be used for communication purposes.

The PAWA project was composed of four successive technical activities dedicated to set-up the project action and vision, to collect all relevant datasets and populate an ad hoc geo-referenced database, to build SEEA-Water tables taking also into account climate change-based scenarios, and to define and evaluate water saving measures for the Arno River Basin Management Plan, and two horizontal activities necessary to report and assess outcomes to be delivered to Commission, water decision-makers, managers, and stakeholders, and to dissemination the project results.

Three sub-basins were identified over the Arno River Basin as priority areas in order to prepare water accounts on a monthly basis for the period 1993–2013. These sub-basins are:

- Chiana valley (1.373 km²);
- Bisenzio valley (320 km²);
- Pisa aquifer (407 km²).

The three sub-basins were identified using as criteria the vulnerability to drought and water scarcity, the data availability, and the operational governance structure.

A participatory approach was applied to each activity through the organisation of Stakeholder Workshops and regular concertation meetings with local stakeholders and data providers, in particular concerning data collection, estimations, validations, and measures assessment.

A Visual Basic Application for MS-Excel was produced by the PAWA Consortium to automatically compile the SEEA-Water “Physical Use & Supply” tables (PSUAT) and the “Asset Account” tables. This tool was useful, and it will be useful for the future application, to perform the compilation of tables and the production of thematic graphs, in a quick and reliable way, directly using the data stored in the PAWA geo-referenced database (which
can be easily updated) that was developed and populated for the project activities. The PAWA tool can be also used to support water decision-makers to find the best combination of measures to be implemented in the different territories, in order to reach specific water saving targets. In the future, economical assessment of measures implementation should be added as it is an important criterion for planning.

The water account approach together with prospective scenarios based on the application of a set of measures and various climate change hypotheses allowed the assessment of their potential impact compared to a reference situation (i.e., without applying any measure). Thus, the SEEA-Water tables appear to be a good decision support tool to define the most suitable water efficiency measures for a selected area. As the SEEA-Water tables do not take into account e-flows, such requirement can be considered during the optimisation of measures process by defining a specific target for the Water Exploitation Index Plus (WEI+) (which was set below 40% in the case of the simulation done for PAWA).

2.2. Activities and results

Activity 1 Setting the scene

Topics/activities covered:

The aim of this activity was to i) present the PAWA project (motivation/EU background, activities and foreseen outcomes) to local stakeholders and data providers; ii) make an inventory of data available in the pilot area suitable for the calculation of SEEA-Water tables; and iii) identify the sub-basins of the Arno river basin where water accounts will have the best potential.

In particular, concerning the first point, an inception workshop with a training session was successfully organized in Florence on March 20th–21st 2014 at the ARBA premises. The workshop was introduced by the representatives of local public institutions, namely the Secretary General of the Arno River Basin Authority and the Councillor for Environment of the Municipality of Florence. The two-days workshop saw the participation and active involvement of a considerable number of local and national stakeholders and local data providers – around 30 people per day – who participated to the project’s illustration and to a half day of specific training on the SEEA-Water tables. Presentations, pressbook, pictures and video of the event are available in the PAWA website (http://www.emwis.net/initiatives/pawa/meetings/Inception) and in the PAWA public FTP repository (ftp.isprambiente.it – User: pawapub / Password: PUB38h76).

Results of this activity:

- Inventory and description of data sources, which was achieved using a metadata Geonetwork catalogue compliant with the implementation rules of the INSPIRE Directive. This catalogue is described in the deliverable D1.1 Catalogue of data sources and tools.
- Identification of three sub-basins, namely the Bisenzio and Chiana valleys and the Pisa area, within the Arno river basin. A description of the Arno river basin and of the three selected sub-basins is available in the deliverable D1.2 Priorisation list of sub-basins.

Activity 2 Data collection

Topics/activities covered:

Data collection started together with the metadata collection within the Geonetwork catalogue; a data inventory table matching the SEEA-Water main elements with existing data was prepared and filled in. The necessary datasets were shared on the private PAWA FTP repository, analysed and validated to identify gaps and possible alternative sources for data gaps. It was also tested the use of the Hydrologic Modeling System (HEC-HMS), version 4.0 for providing additional data. The data collection activities closed at the end of July in order to take in account any possible feedback and suggestions on data coming from
the local stakeholders and data providers who attended the 2nd Stakeholder Workshop (2 July 2014, Florence, IT). This extension of the data collection had no effect on the overall project workflow since the Activity 3 Building SEEAW started as planned in June 2014.

Results of this activity:

- The description of how the collected data are organized in the Geonetwork platform and an FTP repository is provided by the deliverable D2.1 Repository of data sets.
- Information on analysis and validation of the data collected for building the water account tables is reported in the deliverable D2.2 Assessment of data availability.

Activity 3 Building SEEAW

Topics/activities covered:

A MS-Excel based database and a Visual Basic Application (VBA), called “Arno Water Accounts”, have been developed to test the calculation of SEEA-Water tables and potential indicators. SEEA-Water tables for the three sub-basins of the Arno river basin (Bisenzio, Chiana and Pisa) have been populated on the basis of water flow diagrams discussed and agreed with local stakeholders. Limitations on the results have been analysed and recommendations and possible modifications (e.g., incl. new/additional data series) have been proposed. A preliminary list of potential indicators was also drafted and finalized during the 2nd Stakeholder Workshop held in Florence, IT, at the ARBA premises, on 2 July 2014.

Results of this activity:

- As planned, it has been produced the deliverable D3.1 1st draft water flow diagrams and associated SEEA-Water tables that contains:
  - the analysis of the flow diagrams for the three sub-basins (Bisenzio, Chiana, and Pisa);
  - a description of the PAWA VBA (a “step-by-step” guideline for internal use has been also produced and it is also available in the public FTP repository).
- SEEA-Water tables and summary statistics for the three sub-basins – preliminary results.
- The PAWA Geo-referenced database that has been designed, developed and populated for the calculation of the SEEA-Water tables. A description of the PAWA DB is reported in the deliverable D3.2 Geo-referenced database for water accounts.

Activity 4 Optimisation of measures

Topics/activities covered:

Scenario-generation options based on measures and climate change parameters has been added into the Arno Water Accounts VBA. This new version, called “PAWA Scenario Tool V.1”, generates dynamic datasets taking as reference either the real/current database (for the three target sub-basins: Chiana, Bisenzio and Pisa) or one of the climate change databases. The impacts of the measures and water demand increase are then applied upon the database selected by the user as reference. This tool uses water accounts to support the selection of measures that can be implemented to improve water efficiency in the target sub-basins. Climate change scenarios have been prepared based on the outcomes of the latest IPCC “Climate Change 2014 Report”.

Results of this activity:

- Downscaling over the target sub-basins of climate change scenarios modelled by several Global Climatic Models.
- The scenario-generation options implemented in the PAWA tool, with an overview of the issues highlighted by these options, is reported in the deliverable D4.1 Water efficient targets for future revisions of the Arno RBMP.
Activity 5 **Assessment and reporting**

Topics/activities covered:

The aim of this activity was to provide an assessment of the water accounts for the three sub-basins selected in the Arno river basin, and to compare them – where applicable – against the water balances developed at EU level with SEEA-Water tables using the ECRINS reference system.

In addition, it was foreseen the preparation of progress reports – quarterly interim reports at T0+3, T0+6, T0+9 – with the status of the activities and outcomes, and a final report (the present one) containing a synthesis of the project activities and final results.

Results of this activity:

- The water account tables for the Chiana, Bisenzio and Pisa areas have been reported in the deliverable **D5.1 Final Water Account Tables**. They integrate all the comments received from the local stakeholders; updated water flow diagrams are also presented to explain the calculation of the data items for the three sub-basins studied during the PAWA project. This report comes together with the latest version of the PAWA database and the developed “PAWA Scenario Tool V.1”, allowing the calculation of the Physical Supply and Use Accounts table (PSUAT) and Water Assets table, generation of indicators and graphical analysis. As planned in the PAWA proposal, this MS-Excel file includes datasets for the period 1993–2013, including datasets generated taking into accounts different climate change scenarios. However, according to the data quality assessment performed during the project, the most realistic datasets are available only for the period 2006–2013.

- Final technical report.

Activity 6 **Dissemination**

Topics/activities covered:

During the project lifetime, a series of initiatives was carried on to promote and disseminate the project aims and results to policy makers, stakeholders, (local) data providers, and general public.

At the beginning of the project an official web page was created. This page, which will remain available after the end of the project, is hosted in the EMWIS website at [http://pawa.emwis.net](http://pawa.emwis.net). In addition, ISPRA and ARBA is hosting in their web sites two web pages (in Italian) dedicated to the project tasks and results: [http://www.isprambiente.gov.it/it/progetti/pawa](http://www.isprambiente.gov.it/it/progetti/pawa) and [http://www.adbarno.it/adb/](http://www.adbarno.it/adb/).

A request of information on PAWA can be addressed to the official email address pawa@isprambiente.it or through the official PAWA Facebook page ([https://www.facebook.com/pages/Pilot-Arno-Water-Accounts/767539079938950](https://www.facebook.com/pages/Pilot-Arno-Water-Accounts/767539079938950)). The email address and the Facebook page will be also maintained after the end of the project.

Information bulletins, press agencies and newsletters, such as the EMWIS electronic news flash or those managed by ISPRA (e.g., the quarterly PRU€ bulletins, the Water JPI newsletters) and ARBA (e.g., the Northern Apennine District newsletters) were also used to circulate information and short stories about PAWA and relevant activities and events. Dissemination was also performed by participating to meetings, workshops and conferences at international, European, national, and local levels.

Results of this activity:

- A project leaflet was circulated during relevant events. The first version of the leaflet was prepared at the beginning of the project in March 2014, whereas the updated version was prepared for the Final Workshop in March 2015. Both leaflets are available at: **D6.1 Project leaflet**.
• The deliverable *D6.2 Compendium of lessons learnt* reports the summary of the main activities performed during the project lifetime. This document will be used to disseminate the project outcomes after the end of the project.

• A list of the dissemination action is reported in the deliverable *D6.3 Detailed list of dissemination activities, including project presentations during events*.

2.3. If applicable – Activities that have not taken place

All planned activities have taken place.

2.4. What is your assessment of the results of the Action? Include observations on the performance and the achievement of outputs, outcomes, impact and risks in relation to specific and overall objectives, and whether the Action has had any unforeseen positive or negative results. (Please quantify where possible).

• Metadata catalogue and a geo-referenced database for the three target sub-basins (Bisenzi valley, Chiana valley, and Pisa area) covering the period 1993–2013.

• Positive results: A Visual Basic tool for an easy compilation of SEEA-Water tables.

• Several dissemination activities covering different sectors and levels, including water governance institution, local and national stakeholders, research institutes and universities, plus concertation with DG ENV and the other pilot grantees.

• Active interest from other Italian national River Basin Authorities (including their participation to the project stakeholder workshops and training sessions).

• Possible integration of the project outputs on the quantitative management of water resources, and inclusion in the update of the Arno River Basin Management Plan (2nd cycle).

• Active participation and involvement of local stakeholders and data providers to the different project phases.

2.5. Describe if the Action will continue after the support from the European Union has ended. Are there any follow up activities envisaged? What will ensure the sustainability of the Action?

Yes, the action will continue. For instance, the outcomes of PAWA will be used for the update of the Arno River Basin Management Plan (2nd cycle). The sustainability of the action will be guaranteed by the availability of the VB tool developed by the PAWA team that will be used and regularly updated by the ARBA technicians.

2.6. How and by whom have the activities been monitored/evaluated? Please summarise the results of the feedback received.

All activities and deliverables were internally reviewed the by implementing partners with a final validation from the coordinator. Regular physical and virtual team working meetings were organised to monitor and plan the project activities, and to evaluate the use of the project financial resources.

An important assessment was carried out by implementing a participating approach with a selected group of local stakeholders (including local data providers) through workshops organised during the main phases of the project. They were first trained to the SEEA-Water methodology with two ad-hoc training sessions organized during the first two stakeholder workshops, participated in the data collection and assessment, provided estimations when data were not available, and finally gave feedback on the proposed measures as a result of
the optimisation process carried out using the SEEA-Water. The participation of these stakeholders was on a voluntary basis.

Feedback was also provided by other Italian River Basin Authorities who took part in several PAWA workshops. They were quite positive and interested in applying the methodology as well as using the tool developed during the project. Unfortunately, the resources available within the PAWA project were not sufficient to set-up a tool and its related documentations suitable for potential use outside the PAWA project in different Italian river basins.

One clear message given by both the local stakeholders and the other River Basin Authorities is the need to go further with the implementation of SEEA-Water approach by completing hybrid economical accounts as well as validation and demonstration on other territories.

2.7. What has your organisation/partner learned from the Action and how has this learning been utilised and disseminated?

- Deeper knowledge on the implementation of SEEA-Water and how to use this approach to derive indicators and to support the choice of the most appropriated measures to be implement to reach specific water saving targets in the analysed territories.

- Pro and cons on selecting sub-basins or the entire basin for a further application of SEEA-Water in other river basins.

- The application of SEEA-Water was useful to validate data also as regards to economic sector.

- On the basis of the data collection activity, ARBA has pointed out the need to get a continuous and two-way feedback from data provider on quality and reliability of data used for the calculation of water accounts.

3. Project Management, Co-ordination and other Co-operation

3.1. How do you assess the project management?

The monitoring of the project management was carried out on a quarterly basis according to the methods underlined on the project proposal. In this way, accurate details on the status of the activities were provided both in the interim technical reports and in the project website (e.g., with the publication of the project deliverables). As mentioned in point 2.6, this assessment was, in addition, supported by a continuous communication and feedback among partners through emails, phone calls, Skype calls and/or during Team Working meetings.

As indicated in the proposal, for each activity of the pilot action **Deliverable D6.3** as follows.

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<thead>
<tr>
<th>Activity</th>
<th>Indicators</th>
<th>Results</th>
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<tbody>
<tr>
<td><strong>Activity 1: Setting the scene</strong></td>
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<td>Fulfilment of the workshop’s organisation.</td>
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<td>Number of people attending the workshop.</td>
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<td>Compliance level of metadata catalogue.</td>
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<td>Number of data providers involved.</td>
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<td>Organization of:</td>
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<td></td>
<td>o Kick-off meeting to set-up the project activities;</td>
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<td></td>
<td>o Four Stakeholder Workshops (three a local level and one a national level);</td>
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<td>o Two Training Sessions on SEEA-Water with the participation of local data providers and stakeholders;</td>
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<td>o Several Team Working meetings.</td>
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<td>Number of people who attended the PAWA workshop:</td>
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All the description of data sources were registered in the ARBA catalogue and can be harvested into a Mediterranean metadata catalogue maintained by EMWIS. The open-source software solution GeoNetwork, which supports both ISO19139 and INSPIRE profiles, was used to implement these two metadata catalogues.

16 main data providers:
- Nuove Acque SpA.
- Publiacqua SpA.
- Acque SpA.
- Gida SpA.
- Province of:
  - Firenze;
  - Arezzo;
  - Prato;
  - Pistoia;
  - Pisa;
  - Siena;
  - Livorno;
  - Lucca.
- Autorità Idrica Toscana.
- ARBA.
- Tuscany Region.
- Italian National Institute of Statistics (ISTAT).

### Activity 2: Data collection
- Repository implementation.
- Degree of data providers involved.
- Two FTP repositories were created at the beginning. One repository – with private access – was used by the PAWA consortium to share documents, including drafted and final reports and deliverables, metadata and data. The second repository has a public access (although password protected) and it is used to share the PAWA db, deliverables and outcomes (e.g., the PAWA VB tool).
- All data providers were actively involved during the entire project, including their participation to stakeholder workshops and their feedback on water flow diagrams for the pilot sub-basins and on water resource efficiency measures.

### Activity 3: Building SEEAW
- Stability (low rate of critical tickets).
- Quality of outcomes (effectiveness).
- Completion report.
- No critical tickets.
- The involvement of the relevant local stakeholders and presence of ARBA in the PAWA Consortium, which is responsible of the ARBA River Basin Management Plan, guaranteed the assessment of the outcomes and, as consequence, their quality.
- Production of the Deliverables D3.1 and D3.2.

### Activity 4: Optimization of measures
- Number of proposed measures.
- Degree of interest.
- Completion report.
- A catalogue of sixteen potential measures to improve water efficiency and their adaptation to the local context – in compliance with the Programme of Measures of the Arno River Basin.
Management Plan.
- The selection of these potential measures was done in cooperation with local stakeholders.
- Production of the Deliverable D4.1.

| Activity 5: Assessment and reporting | • Quality control of the outcomes delivered to the Commission and the stakeholders.  
• Coherence of action and vision.  
• Decision making and conflict resolution capacity.  
Each drafted deliverable was checked several times before being published online and delivered to the Commission in order to assess readability, technical and scientific contents and coherence with the project action and vision. Outcomes were always presented and discussed during project workshops and thematic seminars to get feedback from Commission, stakeholders and the other grantees.  
• No significant deviation from the project action and vision with respect to what was defined in the proposal. The impact of climate changes, not envisaged at the beginning of the project, was in addition tested to assess water accounts under different possible scenarios.  
• No conflicts were observed during the project and the decision making process was done in agreement with the two co-beneficiaries. |

| Activity 6: Dissemination | • Completion report  
• Production of:  
  o Four interim technical reports at T0+3, T0+6, T0+9 and T0+12.  
  o One final technical report (the present one).  
  o One final financial report.  
  o Five updates at T0+3, T0+6, T0+9, T0+12 and T0+15 of the Deliverable D6.3 containing the list of the dissemination activities. |

3.2. How do you assess the relationship between the formal partners of this grant agreement (if applicable)?

Not applicable. The partners present in the PAWA Consortium had a continuous collaboration, hence it was not necessary to set-up any indicators for the relationship assessment.

3.3. Is the partnership to continue? If so, how? If not, why?

Two partners (ISPR A and ARBA) have institutional relationships at national level and this will of course continue. The experience gained on PAWA being relevant for the current development of water accounts at national level by ISPR A, but also for other Italian River Basin Authorities that expressed their interests during the several workshops organised.

This pilot action was also useful to strengthen the co-operation between EMWIS and the two Italian partners and to share experiences and knowledge on water accounts at European and Mediterranean levels.

The future continuation of the partnership is desired by all partners and, if possible, it will be extended within the context of projects co-financed by the European Union.
3.4. Where applicable, describe your relationship with any other organisations involved in implementing the grant agreement:

The PAWA consortium had a fruitful collaboration with the local data providers since from the beginning of the project. As a consequence, the local data providers were actively involved in the activities concerning data collection and validation, and the assessment of the water flow diagrams envisaged for the three pilot sub-basins.

3.5. Where applicable, outline any links and synergies you have developed with other actions.

PAWA attended in Mid-June the First Spanish National SEEA-Water Meeting that was organized by the Spanish Ministry of Environment together with the Spanish pilot actions. The synergies with the other pilot actions were maintained during the entire project life by supporting the grantees representative at the 2nd meeting of the CIS Working Group on “Water Accounts” with an ad hoc presentation on the PAWA progress and outcomes. A representative of PAWA was also present at International Meeting on “Improving water accounting at the basin scale”, which was organized by the ASSET consortium.

In addition, the PAWA consortium provided a contribution to the Water Balance Guideline drafted by the CIS Working Group on “Water Accounts”, by illustrating the practical application of the SEEA-Water methodology to the Arno river basin management planning.

4. Visibility

How is the visibility of the EU contribution being ensured in the Action?

The European Commission may wish to publicise the results of Actions. Do you have any objection to this report being published on DG ENV website? If so, please state your objections here.

The EU support to the PAWA project has been mentioned on all the reports and publications prepared during the implementation, including on the various web pages set-up in the partner websites that will be maintained in the future.

The PAWA consortium agrees that the final technical report of PAWA project is published on DG ENV website. This report includes web links to all the project deliverables.

5. Comments on Financial implementation

This part of the technical report should include the following points: overview of cost incurred and any relevant issues from the partnership agreements (if applicable). Please give sufficient detail to establish a clear link between technical activities and costs declared in the financial report and attach a copy of the completed Consolidated Cost Statement table from your Final financial report.

The total costs incurred during the PAWA action were €188,619.11 – see the Consolidated Cost Statement for the Action reported in the following page. This figure was less than the estimated total budget (€200,015.00) reported in the Amendment N° 1 to the PAWA Grant Agreement.

The difference of €11,395.89 (about 5.7% of the estimated budget) is mainly due to a reduction of the actual costs incurred for “Travel and subsistence” and for “Other direct costs”. This reduction did not have any significant impact on the coordination and dissemination activities conducted at national and EU levels. In some case, coordination among partners occurred also through Skype conferences.

The costs for “Personnel” and “External assistance” reflect, instead, the budget estimated for these categories. Activity 3, which referred to the production of the SEEA-Water tables for the three pilot sub-basins, and Activity 5, which referred to the assessment of the SEEA-Water results
and to the preparation of the interim and final reports to monitor the action status and progress, had a high impact in terms of working times of the personnel involved in the PAWA action.

Since climate change is a pivotal factor that can strongly affect water scarcity and drought conditions, a qualified “External assistance” was also required under Activity 5 to carry out complex climate change scenarios, based on the outcomes of the latest IPCC “Climate Change 2014 Report”, to be used in the calculation of SEEA-Water tables and water efficiency measures.