LIFE06/ENV/IT/000255

A.S.A.P.

Actions for Systemic Aquifer Protection

The ASAP project is partially funded by the European Union
LIFE Programme

The ASAP project:final evaluation and lessons learned

ASAP - Actions for Systemic Aquifer Protection - Implementation and demonstration of a Protocol to scale down groundwater vulnerability to pollution due to overexploitation - Task 5.8 - Evaluate project results

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(i) Thanks

This report is the result of the ASAP Project Team work.

We thank all the partners who have supported the work and who have contributed to the final document creation.

A particular thank to Prof. Enrique Cabrera Marcet for his scientific validation contribution.

Thanks also to all those people who have contributed to the ASAP project activities.

Ing. Oberdan Cei
(o.cei@acqueingegneria.net)
Project manager

(ii) Summary

1- INTRODUCTION

This report is the deliverable *D5.9 The ASAP project; final evaluation and lessons learned"* projected in the *Activity 5.8 Evaluate project results of the Task 5 ASAP Protocol Evaluation and Validation* by the ASAP Project.

This document doesn't replace the final report (*D1.7 Final report*) that is the principal document of general evaluation of the project.

1.1- AIMS

This report has the aims of:

- to synthesize the monitoring and evaluation activities results, conducted during the project and to offer an organic vision at the end of the project;
- to gather together the lessons learned in order to make them useful both for the succession of the inherent activities, which will be continued on the project site and by the project partners, and for the utilization by other subjects who compare themselves or will compare themselves with analogous themes.

1.2- CIRCLE

This report has immediately been compiled at the end of the ASAP project activities.

Therefore, its circle is delimited by the acquisitions of data, facts, information and experiences collected until that moment. Possible impact evaluations of medium and long term will be possible only after a meaningful piece of time.
Anyway, the available information are sufficient in order to give an exhaustive vision of the project, of the results that it has produced, of its limits and of the potential of development and further improvement of the model and the protocol that has been created.
The reported lessons learned are the result of the internal discussion of the management group of the project, enriched by the comparison with the operators, the deciders and the carriers of the citizens appeals.

The reference documentation is the one produced through the deliverables of the Task 5 (*Protocol Evaluation and Validation*) and of the Task 1 (*Management and Reporting to the EC*).

1.3- EXECUTION AND RESPONSIBILITIES

This report has been prepared by Acque Ingegneria (ACQING) that is responsible of the report layout and the analysis, under the supervision of Fundaciòn Instituto Tecnologico de Galicia (FUNITG) and with the scientific contribution of ITA - Instituto Tecnologico de Agua of the Politecnica University of Valencia (ES).

All the partners have contributed with the revision and discussion of the data and the monitoring and evaluation reports. Acque s.p.a. (ACQSPA) has supported the work through revision and used data qualification activities.

2- THE ASAP PROJECT

The A.S.A.P. Project - Actions for Systemic Aquifer Protection (LIFE/06/ENV/IT / 000255) has partially been financed by the community program LIFE III Environment.

The project has been realized between the autumn of 2006 and the autumn of 2009.

They are partner Acque S.p.A. (the leader beneficiary), Acque Ingegneria S.r.l., the Instituto Tecnológico de Galicia and the Province of Pisa. To the ASAP project has actively participated the Instituto Tecnologico de Agua of the Valencia University in coordination with the Instituto Tecnológico de Galicia and with Acque Ingegneria.

2.1- THE CONTEXT IN WHICH IT WAS BORN AND IT HAS BEEN REALIZED THE ASAP PROJECT

The drinkable water request is increasing, with the background of the climatic change that alters unfavourably the reconstitution and water use sceneries.

In order to face the increasing request, water is withdrawn more and more and consequently the stratum levels of a lot of underground catchment areas are lowering. When the restoration ability is overcome, the resource is being over exploited. If the request is also highly variable and the distribution nets are not uniform, the breakups probability is increased, the water dispersion grows, the collecting increases. In these cases the preventive rehabilitation is of scarce help unless the dynamic efficiency of the net was not improved before.

Often the financial resources for remarkable maintenance interventions of the water net or for its modernization are not available: generally, the investments are scarcely sufficient to guarantee the ordinary maintenance of the infrastructures.

The pumping, the water purification and the partial distribution of water withdrawn in a not appropriate way, together with the loads for the reparations and the maintenance add environmental costs.

The solution proposed and shown by ASAP is to assemble the investments in a plan of effective actions in order to allow a losses reduction and a water collecting diminution.

The logic is to have a dynamic control of the pressure founded on a model of net that allows to develop a management directed to the losses diminution; in this way a good service is assured also to forehead an highly fluctuating request and directed to the smaller collecting.

The diminution of the pumping necessity united to a valid model of the aquifer makes it possible to locate in the best way the scarce water resources.

An appropriate reduction of the stratum collecting allows to increase the piezometer pressure allowing the aquifer regeneration. Besides, the pressure growth limits the aquifer permeability, reducing the risk of intrusions or infiltrations, that exposes the stratum water to the pollution risk.

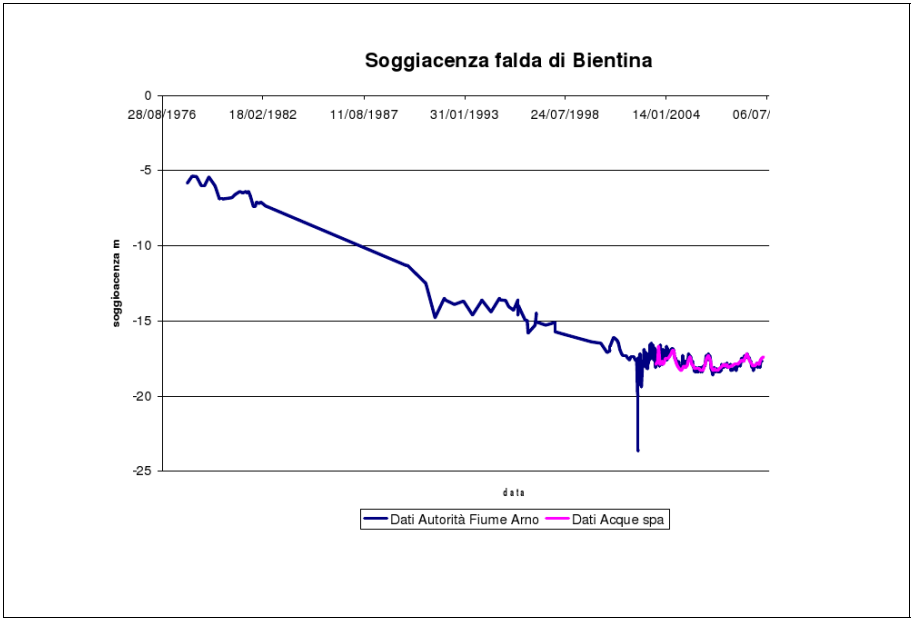
But it is not sufficient to demonstrate that the solution is good and practicable: it is necessary to publicize it and to make available the essential knowledge in order to appraise its applicability under different conditions.

In order to do it, A.S.A.P. has defined of a Protocol and of the guide lines and it makes available a demonstrative site for the aquifers protection, the catchment levels demolition, the optimization of systems of drinkable water distribution under real conditions.

2.2- WHY TO INTERVENE: A RESOURCE AT RISK

The system of the underground strata of the area included among Porcari-Cerbaie-Bientina in the provinces of Pisa and Lucca (Tuscany, IT) is intensely used for drinkable purposes and it is denominated Aquifer of the Bientina.

The society Acque spa, born at the end of the year 2001 by the fusion of 5 manager subjects, since the beginning of its own activity had to face in an unexpected way a serious environmental problem: the collapse of the "Bientina" stratum, the over-exploitation of the stratum from which it is taken the water to feed 9 municipalities of the province of Pisa (Bientina, Pontedera, Calcinaia, Cascina, Castelfranco di Sotto, Santa Croce sull'Arno, Vicopisano, Santa Maria a Monte e San Miniato) provoked the sudden depression of the piezometric level of the aquifer such as it results by the data published by the Basin Authority of the Arno River.



2.3- THE WATER SERVICE AND THE ENVIRONMENTAL MATTER NEED AN INTEGRATE VISION

Surely, the phenomenon was not entirely caused by the drainages by the Water Service that withdrew around 20 million mc, but by the whole catchment system in action on the stratum.

In fact, the collecting on the aquifer are both industrial and for drinkable use; in order to act on the industrial collecting field it would be necessary to intervene on the existing normative picture, option that is out of the orders and of the ability of the proponents.

Instead, for these it is possible to intervene on the field of their own competence, having to assure in any case the service to the citizens. Then, Acque spa was in front of a new problem, and for this reason it had to activate an innovative strategy different from those effected until that moment.

The progressive water request by the water distribution nets had always been faced with the increase of the resource production and therefore with the increase of the drainages also through the realization of new wells; so that from that moment the attention focused itself on the quantity of water really used and that instead dispersed.

Therefore, the only solution to reduce the pressure on the aquifer is to reduce the collecting because it is necessary less water to supply the service, that is acted on the wastes and on the ineffectiveness.

The losses represent the most important factor of the net ineffectiveness as it regards the collecting; for the losses the age of the pipelines and the functioning pressure are determining factors.

To act in order to decrease sensitively the net age means to make investments whose intensity in time is not in the managers ability.

Therefore, it is necessary to act on the functioning efficiencies, eliminating the greatest possible number of losses and reducing their formation through the pressures optimization.

2.4- THE EUROPEAN ADDED VALUE

The situation which the ASAP project is compared with, is common to many territories of the Union: the coastal zones, the zones at high variability of the tourist pressure, the regions at risk of important climatic alterations.

Moreover, since the beginning ASAP set itself as systemic plan, in which they are related all the principal environmental factors (included those energetic and of emissions) and social ones (occupation quality and quantity, work conditions).

For this reason it has assumed a transnational dimension that is leaded in a draft of agreement memorandum for the prosecution of the collaboration between ITG and Acque Ingegneria at the end of the project.

The principal European added value in any case is given by the availability to put at system the ASAP approach in all the cases in which water is drained from underground strata potentially or really at risk, but also in all the cases in which the distribution occurs through nets which required some lifting.

2.5- THE PARTNERS

The choice of partnership has been originated by the complementarity motivations of the orders, competence and resources to achieve the objectives:

- Acque Spa, as principal beneficiary because of manager and because of equipped by the technical and financial point of view to be able to conduct the project;
- Acque Ingegneria Srl, as technological arm with ability and human resources to answer to the challenges set by the innovations;
- the Province of Pisa, both for the environmental competences in whose river bed they revert a lot of the activities, and for the competences related to the modifications in occupation and work conditions;
- Instituto Tecnologico de Galicia (in collaboration with the Technological Instituto de Agua of the Universidad Politecnica of Valencia) for the transnational integration aspects (transferability analysis) and of the technical-scientific validation.

3- SYNTESIS OF THE EVALUATION REPORTS

They are brought here in synthesis the conclusions of each evaluation report.

3.1- THE AQUIFER CONDITIONS

The evaluation of the aquifer conditions has been the principal object of attention in the monitoring and in the evaluation, because of it is a question of the principal environmental objective.

In order to investigate the aquifer conditions they have been produced three principal documents:

D5.1 - Technical report about the initial aquifer conditions

D5.3 – Aquifer conditions after the ASAP application: analysis report

D5.4 – Evaluation report: the ASAP effect on the aquifer level, quality and vulnerability.

About the initial aquifer conditions the baseline is summarized in the document (D5.1):

"The investigations have evidenced as in the south sector of the plain of Lucca, that is in the zone of pertinence of the confined and in pressure stratum, where the storing coefficient is sensitively reduced, with equal number of collecting, a strong accentuation of the depressions is had, induced by the pumping in comparison to what happens in the northern portion, at free stratum.

This has caused phenomena of apparent subsidence in the area next to the territories of the Municipalities of Porcari and Altopascio, in a place at south of the highway Florence-Sea. In some circumscribed areas situated in correspondence of the drawings for drinkable use (Pollino) the total lowering of the stratum in the last 15 years has overcome 7 meters and the annual excursion is passed by 2 to 4 meters. Lowering equally consistent have been relieved in correspondence of the drawings for industrial use, assembled in the south-oriental sector of the plain (pole distributed along the motorway axle among the localities of Carraia and Turchetto).

More at south, entering in the hydro geological circle of the Orentano-Staffoli – Bientina area, the strong depression induced by the draining in the centrals Cerbaie 1 and Cerbaie 2 reaches values of over 12 meters under the level of the sea in some wells in proximity of the central 2 (C2).

This quota is next to the one of the top of the Artesian aquifer, so that further lowering risk to depressurize the stratum in pressure, with possible effects of further and rapid decline of the piezometric, particularly in the less deep wells, as it has already happened in the past (July 2002). This depression is rejoined with the one that is observed in the most western area of wells in the aqueduct of Staffoli, where it goes down to values next to 9 meters under the level of the sea.

It means that in all these areas with draining in act it has been reached and overcome the local potentiality of recharge and that it is in presence of an excessive exploitation of the stratum, with lowering that are particularly accented in the summer period.

It has to be considered that the aforesaid depressions don't result stabilized yet and the stratum, consequently, tends progressively to lower with a maximum speed of 35 cm / year in the area of the Pollino and of 75 cm / year in the area of the two wells fields of Le Cerbaie.

The absolute reference on the sea level theoretically used by the manager is that of the well 2 C2s (ex well 14) that since years has not been used and where the piezometric level results less disturbed by the draining levels.

At the actual state the piezometric level in the considered point is of -9,30 m with a measured depression in comparison to the head of the well (quota 9,60 m) of 18,90 m."

In the **piezometric reliefs effected during the 2008** it has to be considered a variability consistent in the pluviometry:

- in the semester preceding the measures effected at the end of May - beginning June 2008 they have been recorded comprehensively 683,0 mm of precipitations against a 90 years average, on the same period, of 636,3 mm, value that points out a surplus in comparison to the average of 7,3%.
- contrarily, in the semester preceding the measures effected in October 2008, they have been recorded 362.00 mm of precipitations against a 90 years average, on the same period, of 426,1 and therefore with a deficit in comparison to the average of 15%.

Therefore, these data point out that the relief of May is inserted in a context of recharge quite superior to the average while the relief of October offers a picture of the piezometric in a phase of low-water particularly sustained. Besides, it has to be also observed that the general picture appears, if compared to the preceding years, substantially in resumption, in relationship to the increase of the precipitations had in 2008 in comparison to the two preceding years.

In addition, the period November 2008 - February 2009 has made to record precipitations of extraordinary intensity (775,2 mm against an average of 525,1 mm - 47,6% surplus!) and the effects of this precipitations abundance have been recorded in all the plain of Lucca, with the stratum that in the central zone of this area results to be constantly on levels of abundant recharge since December 2008.

By the piezometric comparison between the situation related to the piezometry indicated in the D5.1 -Technical report about the initial aquifer conditions and the one related to the monitoring company of the piezometry effected in October 2008, they are emerged the confirmations of the presence of meaningful piezometric depressions in correspondence of the North portion of padule, of the wells fields of Le Cerbaie and in correspondence of the wells field of Staffoli.

At the end of the **analysis of the data of the last useful company** (August 2009) it is noticed that

"since the first months of 2007, it has been assisting to a trend interruption of piezometric lowering with a small recovery of the levels in the zone of Pollino and a substantial stasis of the same in the zone of Le Cerbaie.

If this phenomenon is certainly to join to a 2008 characterized by precipitations above the average, it is also undeniable the local effect that they have had some of the concrete interventions effected by the various corporate body. (...)

The same ASAP project that, with the reduction of the losses on the net in the interested area, has furnished a further contribution to the recovery of the piezometric levels.

Besides, it has to be confirmed as the aquifer was nowadays extremely vulnerable both from the quantity and the quality point of view.

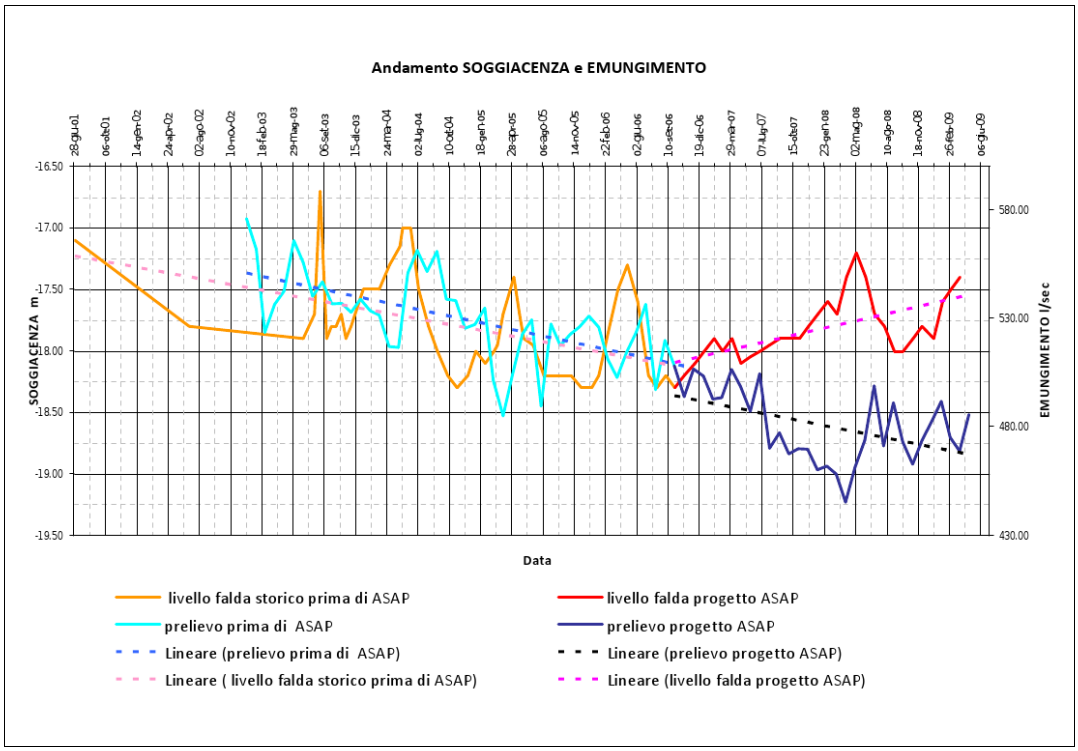
The effected investigations have shown as the system feels the effects of the pumping in a marked way also regarding the qualitative deterioration of the stratum waters, with a progressive worsening of the same in correspondence of the principal collecting points.

Also appraising positively what it has been done since the present, it is necessary to continue in this improvement action with the auspice that what has been realized was maintained in efficiency and, where it is possible, enlarged.

In this optic, it is believed that they will certainly have to continue the piezometric controls in act with the elaboration of further difference papers, the graphs analysis, the evaluation of the course of the waters quality of the time."

ASAP has produced a reduction of the 15% of the total losses, passed by 9milions and 370.000 of meters3 to 7milions and 930.000 of meters3, between the 2005 and the 2008. In the same period, the collecting from the stratum is decreased of the 8,3% or 1milion and a half of meters3 for year, equivalent to the annual medium consumption of 11.000 families.

It is useful also to underline as the trend inversion of the piezometric levels is strictly correlated with the draining reduction (starting from the first ASAP actions on the losses reduction at the end of 2006).



A further worry about the application of the ASAP approach was the influence that the pressure control would have practiced on the volumes delivered to the users; the most meaningful answer is given by the following table:

Year	Volume collected by the environment (m3/year)	Invoiced water (m3/year) in the ASAP area
2005	19,348,901	9,434,987
2006	19,345,162	9,496,820
2007	18,439,415	9,369,961
2008	17,871,439	9,472,670

The reason of this result is essentially caused by the fact that the protocol has allowed to reduce the losses levels both through the pressure regulation and especially with the individualization of 246 hidden losses which have allowed to recover the pressure in the consumption moments in a lot of terminal net zones, which otherwise would have been under such conditions to not satisfy fully the users water request.

3.2- OTHERS ENVIRONMENTAL ASPECTS

The ASAP project effects have been examined in relationship to the environmental components:

- atmosphere
- water environment
- ground and subsoil
- public health
- landscape
- energetic resources

Considering that a petroleum central introduces in the **atmosphere** about 725 grams of C02 for Kw hour product it can be esteemed that in the period 2007 and 2008 ASAP has contributed with a reduction of about 1400 tons of C02 in the environment.

For **water environment** it has to be intended the stratum of the Bientina in proximity of the principal wells fields (central 1 and 2 of Bientina, Orentano, Staffoli) of which it has been tried to characterize the hydrologic and hydraulic conditions in order to establish the environmental compatibility of the quantitative variations induced by the intervention of collecting reduction.

The variation of the annual water collecting has been evident and it is quantifiable in about 1,5 million of meters cubes/year (comparison 2005-2008), with a general saving of water resource, in the three years of the project, of about 2,4 millions of meters cubes.

The large duration of the project and the annual cyclicity with which the rains provide to the recharge of the strata, force to a quantitative evaluation of the advantages in reason of the values joined on annual base.

Year	Collected volume reduction	Stratum level raising	Energy reduction (aqueduct +purification)	Net performance	Water delivered to the users reduction (A.S.A.P./ not A.S.A.P.)
U.M.	Mc/year	M/year	Kw-hour/year	ILI	Mc/year
2006	- 3,739 (-0.02%)	-0.01	-813,696	0.09	+0.66 %/-0.04%
2007	- 909,486 (-4.70%)	0.04	-620,854	2.43	-0.69%/-1.31%
2008	-1,477,462 (-7.64%)	0.29	-1,301,520	3.53	+0,40%/- 1,45 %

At the moment of the editing of this report it is not still possible to evaluate the datum joined for the year 2009. In order to evaluate its advantages and disadvantages, as reference base it has been taken the situation of 2005 when the project activities have not been started yet; in fact, the A.S.A.P. project started to be active only after the October of 2006.

In the evaluation of the impact on the **ground and subsoil** it has to be considered that in reason of a piezometry increase it can be surely sustained that it has been reduced one of the causes which have determined a deep and acclaimed subsidence situation of the Bientina plain.

The subsidence component quantification, not projected in the project, can be considered as an indirect benefit, in any case reached (See D.5.3).

Related to the comfort and to the **human health**, it has verified the compatibility of the direct and indirect consequences of the works realized with the project and of their exercise with the standards concerning the human health at brief,

medium and long period and particularly the availability of a primary thing for the community health which is the water.

For this reason it has been considered the availability of water for hydro-drinkable use nearby the users involved in the project as the correspondent indicator.This indicator, quantifiable in the value of the invoiced volume, has recorded a small positive increase, maintaining itself around a constant value of 9,4 millions of meters cubes/year (see Tab.1), with an increase in the 2008 of around half a point percentage (in comparison to the value of the 2005). In the municipalities where it has not operated with the project, it has been recorded a small reduction of the water delivered to the users equal to about - 1,45% of the volume delivered in the 2005.

ASAP has interested in the landscape quality only referring to the aspects joined to the visual perception of some hydraulic works, and particularly the manufactured articles realized for the installation of the automatic valves and/or of the tele-control peripherals that, even if they have been correctly realized according to the standards and the urban prescriptions of the corporate body preceded to the authorization release, they are "additional" landscape elements that otherwise would not have been realized.

3.3- RESULTS ON THE OCCUPATION AND ON THE WORK CONDITIONS

The social and occupational effects are object of the evaluation report D5.6.

The principal examined aspects are:

- the revaluation, updating, and consolidation of the professional competences of the workers which have participated to the implementation of the A.S.A.P. Project;
- the smaller exposure at risk, better prevention, safety and quality of life in the work place as a result of the ability acquired by the workers in the use of work innovative instruments and procedures;
- new occupation.

By the examination of the collected information it emerges that:

- the workers perceive to have contributed to the attainment of the project results and the project management believes that the obtained results depended also on the specialization of competences and intervention by the mostly active workers in the activities in matter.
- The professional position of the workers more actively involved in the project activities has had a meaningful passage in terms of recognition of the acquired competences specialization.
- The specialization and effectiveness of the competences acquired by the work team involved in the analysis, results to be recognized and required also out of the local district.
- The comparison between the pre and the post A.S.A.P. points out the happened transformation and the acquired specialization: the change appears concentred on competences of purely technical professional nature, such as on competences of "transversal" nature. The ability to collect data and information finalized to the work planning, distinguishes the way of each involved worker delineating a way of growth and enrichment expressed in unanimous manner.
- The ability to operate with awareness about the general operation of the aqueduct system, to interpret and to compare some measurement and course data, relieved autonomously with the tele-control data, such as the ability to resolve problems and to individualize creative solutions put the

contribution of each worker on an autonomous professional plan and at the same time integrated in the general context, representing quality elements both for the performance of the single one, and for the actions effectiveness in the business optic.

- The passage by technical and reparation activities to harvest and data analysis activities related to the net operation has induced the use - and in some cases the use consolidation - of the computer instruments favouring the acquisition of competences in that sense and accompanying in all the cases a great presence in office, rather than on the field. In fact, the preliminary activity of analysis and information comparison facilitates the contemplated and programmed planning of interventions at hoc favouring the preventive analysis of the risks and the objective - knowledge on the intervention context. That results to be a meaningful element in comparison to the reduction of the exposure to potential risks by the workers which believe in unanimous way that the acquisitions and transformations of competences and methods happened through A.S.A.P. influence positively on the risks prevention in work places and guarantee greater safety.

The acquisition of the method and the ability to apply it in a flexible way in comparison to the emergent necessities and to the contexts in which it is manifested the problem, offers great possibilities to the professionals competences, both inside the reference company, and inside the sector market appeared besides, since the beginning, interested and necessitous of the technical competences in question.

Just the acquisition of a method, for its nature, exportable together with the acquired abilities of analysis, diagnosis and planning allow to believe that the participation to A.S.A.P. has concretely favoured the growth, specialization and exploitation of the competences of the involved workers.

From the creation of employment places point of view the result is that a specific unity of modelling and loss research has been structured, for the moment in the Acque Spa field, with:

- 4 new employment places occupied by 4 engineers of new insertion;
- 4 (further) employment places of greater qualification in which they have been moved 4 re-qualified workers of Acque Ingegneria.

This group is the nucleus from which possibly it will detach a specific spin-off.

3.4- THE ASAP PROTOCOL AND THE RESULTS AND KNOWLEDGE DIFFUSION

The specific evaluation of the actions of the results diffusion has been exposed in the report D5.7 "A.S.A.P. Dissemination Actions – Evaluation perspective Report".

The dissemination actions of the A.S.A.P. Project have been conducted starting from a detailed analysis of the groups of target recipients identified in the section of Master Plan (D1.1) produced at the beginning of the activities and that has served as guide to the actions implementation.

Basing on the collected objective data and a common reflection among the partners, it is believed that the impact of the dissemination actions has been quite strong in its complex, at least for what it regards the territories involved in the A.S.A.P. Project activities.

During the project the partners have also seen rather radically some communicative approaches, preferring the digital communication (mailing, web site, video) to the traditional communication on paper (posters, brochure) that has also been focused and diversified for each target.

Objective difficulties have been recorded in the participation to some of the most traditional events and directed to a most undiversified publics which have not seen a particular adhesion in terms of participants, despite of the efforts profuse and documented – made by all the partners, and some flexibility tempts in the organization which in fact have also had a notable impact in terms of activity. Probably, also some timetable organizations projected by the project have not helped.

Decidedly better it has been the involvement of specific targets (as the professionals) caused by both the involved reporters "appeal" as it regards the target (we want to remember for example that the professor Enrique Cabrera Marcet, professorial of Spain who has actively participated to the project in the validation phases of the Protocol, is considered one of the principal experienced of hydraulic engineering of Europe) and the great number of occasions created (besides those initially anticipated: conferences, fairs, publications, etc.).

The most direct approaches have probably brought further information to the citizen: for example, it has been decided to enlarge the number at first decided of the flyers sent with the bills in order to touch a greater number of users (305.000), such as (without additional costs charged to the project) it has been decided to activate a channel You Tube and to produce some video (some with over than 500 visualizations), rather than to open an album of photo on Flickr. Also the meetings in the schools seemed an useful mean to reach the citizen.

Probably, the "technical" aspect of the project has not produced great interest to the participation to the A.S.A.P. debate by the Environmental Associations which even if solicited many times, they have not responded in a particularly active way.

Instead, the public administrators front has been involved in punctual manner (both in Italy, and in Spain): the best result has been reached, also in this case, in public occasions at first not projected (meetings with the mayors) rather than in those canonicals.

Decidedly good it has also appeared the result collected through the project portal: a definite restyling of the home page, decided within the last year of the project activity, has brought a greater number of visits (the datum of June 2009 brings about 37.000 general visits and more than 150.000 visualized pages).

3.5- IF A.S.A.P. HADN ‘T BEEN: MANAGEMENT CONSIDERATIONS

The inherent thematic have been valued in a deepened manner in the reports D5.2 "Value for Money - ASAP versus alternative approaches – Evaluation perspective Report" and D5.5 "Effects on the environment: disadvantages and benefits".

3.5.1- RESULTS ON THE PIPELINES DEGRADATION

In general, we can affirm that the good operation of an aqueduct net is joined to the maintenance state of the pipelines. The nets with an elevated level of degradation are mostly subjected to breakups sudden and often not immediately individualized with inevitable repercussions on the service furnished to the users.

In order to be able to contain the effects of the structural degradation of the net, lacking a suitable plain of substitution of the pipelines, it is necessary to intervene both on the causes (raised pressure with frequent jumps) and on the consequences (breakups) through a more rational and effective management, as it is projected by the A.S.A.P. protocol in its two principal components: hidden losses research and reparation, districts division and pressure regulation.

The protocol application has allowed, in comparison to the ordinary management of a water net, to obtain a double result at medium and brief term.

To have pressures levels lower and more regular it means to submit the pipelines to inferior mechanical solicitations, delaying the aging and the frequency with which the breakups are produced.

3.5.2- RESULTS ON THE ENERGETIC CONSUMPTIONS

The A.S.A.P. system, is a closed system composed by many alimentation points, by balance and accumulation reservoirs and by numerous fittings of mechanical lifting necessaries to the direct nets alimentation and the correct operation of the adduction system.

From the energetic point of view, the diminution of the resource which has to be introduced in the net, involves a smaller use of the lifting systems, from the wells to the pusher pumps of the principal lifting plants, with an immediate saving on the electric energy consumption.

Considering also the preceding year as regards the one in which the A.S.A.P. project becomes operative and taking as reference the 2006, in the two following years the electric consumption in kWh / year has been inferior of about the 9.38% and of the 12.81%.

3.5.3- FINDING OF NEW RESOURCE

The other economic aspect joined to the water request diminution by the system is the lack of the necessity to retrieve new resource that, given the lack of alternative sources, would have to come through the construction of new wells external to the Bientina stratum.

Keeping on managing the system with the traditional methodology and anyway wanting to reduce the collecting from the Bientina stratum until values analogous to those ones obtained with the A.S.A.P. protocol application, necessaries in order to have the level course inversion, it would have been necessary to retrieve $\overline{Q}_{pre-asap} - \overline{Q}_{asap} = 50.01 \frac{l}{\sec}$ a year, through the construction and the entry into service of new wells. Approximately, the ability of a well in the Bientina aquifer area is evaluated in about 15 l/sec, therefore they would have served around 3.33 wells more than those ones existing.

4- LESSONS LEARNED

They are here reported the principal observations that the ASAP partnership believe that they have to be evidenced such as lessons learned.

4.1- PROJECT MANAGEMENT

The principal lessons learned regarding the project management concern:

- Planning
- Control
- Communication and Information distribution
- Cost estimating, solicitation and procurement
- Administration and reporting

During the initial phase of the project realization it is verified a drought condition that has forced to an extraordinary works acceleration, but while there was an emergency plan in order to react to possible delays, there was any plan for a march at forced phases. The result has been that some developed activities and some employed equipments have not been included in the project, dimensioning it a little in comparison to the real commitment by the partners.

1 **It has also to be considered a planning scenery forcedly anticipated.**

The activities control in the field has been correctly delegated to the opportune levels, nevertheless it has not been also delegated the task to document the developed work. Therefore, it has been necessary a fatiguing work of information transfer and reconstruction.

2 **When the control of an activity is delegated, it is also necessary to delegate the documentation tasks.**

The people don't consult the web sites to take information, above all if it has not been explained to them how and where to find the information and which advantages they can obtain. For a few times the people have asked that they were sent them the documents which were available on the project portal.

3 **It is not sufficient that there was a project portal, it is necessary to teach how and why use it.**

If the people have not been used to make web-meeting, they won't make them, unless it was easy and there was also the Big Head.

4 **It is necessary to assure that the web-meeting systems work without problems for everybody and that sometimes he also participates the Big Head.**

The costs estimate risks to be particularly biased by errors when it is added a meaningful delay (> 18 months) between the estimate moment (proposal) and the purchase moment and when there are public competitions.

5 It is necessary to prepare themselves to costs variations with alternatives for the optimal employment of the assigned resources or with the budgets reduction.

In the big structures the separation of the administrative tasks from the operational ones is very big, with the result that it is difficult to obtain what it is necessary to document administratively the project.

6 The taller directional levels should always assure that inside the administrative functions of the beneficiaries there was always an interlocutor with decisional ability who knows the project and its rules.

4.2- RELATIONSHIP WITH DECIDERS AND PLANNERS

Against an expectations amplification there is the choices distortion risk.

It can be possible that the deciders opportunistically exploit the project expectations in order to stop to do what they were doing or that they would have to do: doing in this way they alter the scenery in which it was projected to effect the project and they risk to jeopardize the success.

7 In all the communication levels the assumed people should have the same rank, attention and clarity of the objectives.

In the results diffusion and in the promotion of the Protocol adoption we have sometimes noticed that the barriers to the acceptance were justified with the declaration: "We have a different situation".

8A self-diagnosis tool to evaluate the method applicability and convenience avoids to have to be compared in a competitive way.

4.3- THE PEOPLE, THE FORMATION, THE CONTINUOUS INNOVATION

When a person has new competences it is easier that he/she was called by another department or by another company and he/she goes.

9 It always forms a more person, never a less one.

The continuous innovation: if it is not controlled what it happens out of the project there the risk to not have a true evaluation of the advantages. In ASAP we have often made comparisons during the project execution, and we have already some idea about it will have to be the "next ASAP".

10 You have to compare the project with the art state also at the end.

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