

# NORTH WEST MILANO PILOT ACTION (IT)

Pilot actions (including investment, if applicable) 10.2019

Project index number and acronym	CE32 - AMIIGA
Lead partner	Central Mining Institute (Główny Instytut Górnictwa)
Output number and title	O.T2.3 - Separation of hot spot & multiple point diffuse contamination in Milan FUA (IT)
Investment number and title (if applicable)	Output O.I4.1.1 - Wells for distinguishing between diffuse and site-specific contamination in Milan FUA (IT)
Responsible partner (PP name and number)	Lombardy Region (PP6) and Polytechnic of Milan (PP7)
Project website	<a href="http://www.interreg-central.eu/Content.Node/AMIIGA.html">http://www.interreg-central.eu/Content.Node/AMIIGA.html</a>
Delivery date	01.2019

## Summary description of the pilot action (including investment, if applicable) explaining its experimental nature and demonstration character

In 2017, Lombardy Region delimited the first area affected by diffuse pollution and approved reclamation measures and the discipline for remediation procedures. The area, which is North - East of Milan (including the City of Milan), is interested by diffuse contamination of Chlorinated Hydrocarbons (CHC).

During the development of the reclamation measures, emerged that several plumes that originate North-Western of Milan have a significant effect on the deterioration of the groundwater quality in Milan and affect some water supply station in the upper part of Milan city. Moreover, in the same area there is background level of low concentrations of chlorinated hydrocarbons not immediately linked to a point source. For these reasons, the area has been selected in AMIIGA Project as pilot action (PA) area (157 km<sup>2</sup> and 12 Municipalities involved).

The aim of the activities carried out with the PA was to investigate the characteristics of the groundwater pollution, distinguishing between contamination from point sources (hot spots and plumes) and diffuse contamination, also developing new scientific procedures and models more suitable to represent and separate the two sorts of contamination.

The following activities were done to assess the groundwater contamination:

- Collection and integration of the hydrogeological/groundwater monitoring database with the data of the PA and extension of the time series till 2017 (MIND project funded by LR to the Regional Environmental Agency)

- implementation of a Web-GIS platform
- integration/optimization of the existing network with the drilling of 6 new piezometers (4 shallow and 2 deep), of which 5 were paid with the project financial resources. The new piezometers were located close to the external contour of the two plumes to define accurately with the aim of separate the diffuse background from the concentrated contamination within the plumes. This activity was realized within AMIGA through a specific investment
- 3 qualitative/quantitative and isotopic monitoring campaigns were realized to study in higher detail and define the extension of the CHC plumes (PCE, TCE) involving the water supply stations north-west Milan.

On the dataset tuned thanks to the above listed activities, innovative modelling tools were applied. First, a flow and a transport model have been implemented. The hydrogeological data collected were used to define the conceptual model of the area, the groundwater integration to calibrate the model and simulate both point sources and plumes and also the presence of diffuse pollution. The more detailed vertical discretization of the numerical model helped to clarify the contaminant travel into the semi-confined aquifer.

The developed decisional tree will be useful to apply the additional tools depending on the problem to face; in these tools, we can find inverse transport modelling, exploratory data analysis and multivariate/geostatistical analysis, which were applied to distinguish plumes from a diffuse contamination.

The methodology is innovative and experimental as it is able to treat both diffuse contamination (approaching with the statistical tool and inverse modelling) and point source (approaching with the statistical tool and transport model).

### NUTS region(s) concerned by the pilot action (relevant NUTS level)

*NUTS 2 ITC4, NUTS 3 ITC4C, Milano*

### Investment costs (EUR), if applicable

€ 34.846,34 (I4)

### Expected impact and benefits of the pilot action for the concerned territory and target groups and leverage of additional funds (if applicable)

The first benefit of the pilot action activities is that the data collected, and the studies carried out through the modelling for the pilot area confirmed concentrations of PCE and TCE in line with that of the North-East area of Milan, and thus, the absence of sanitary risk due to PCE and TCE for the population living and/or working in the area can be assumed also for the pilot area.

Further positive impacts of the activities carried out with the pilot action are that the data collected settled a common knowledge framework that will be on the premises for future definition of:

- more suitable strategies and planning of groundwater remediation: the more accurate knowledge of the distribution of the contamination in the area will improve the possibility to better finalize its management and the recovery of the groundwater quality
- detailed small-scale modelling aimed to identify sourced of pollution and plumes evolution

Moreover, specific benefit will be for:

- Municipalities: interested to monitor the quality of groundwater to highlight quickly the presence of any risk for human health
- Owners of polluted sites: to monitor the contamination evolution and the effectiveness of the remediation measures enacted
- Regional Environmental Agency: modelling and monitoring data to define a the extension of the plumes, and monitor their evolution
- Provinces: monitoring data for the identification of the contamination sources to activate administrative procedure for remediation.

Additional funds have been leveraged for:

- MIND project (Regional Environmental Agency) to adjourn the available datasets (2015-2017,
- Cooperation Agreement with Politecnico of Milan for the implementation of research activities to study the contamination of groundwater in Milan area (SIAM C.A.) (139.000 €),
- tender for the experimental application of innovative reclamation technologies for a contaminated site suspected of being one of the sources of plumes identified for the north-west Milan area (39.500 €).

### Sustainability of the pilot action results and transferability to other territories and stakeholders.

The pilot action results are sustainable for the following reasons:

- the monitoring and hydrogeological data collection is essential both for the assessment of the contamination and the implementation of the modelling, the work done within AMIIGA is sustainable because the database implemented will be the basis for the assessment of the contamination trend and the effectiveness of the Management Measures enacted. Moreover, the use of a Web-GIS will ease the data adjournment and sharing
- the rationalization and optimization of the monitoring network is an essential step for the understanding and modelling representation of the contamination phenomena. The enhanced monitoring network (that comprises the 6 new piezometers) will be the reference for the monitoring of the contamination evolution in the next years, the monitoring campaigns will be performed by the Regional Environmental Agency within its institutional activities
- the procedure defined to assess diffuse contamination is structured in clear and consecutive steps that can be performed also separately depending on the aim of the application: evaluate the evolution of diffuse contamination and/or plumes trends; for this reason it will be used also in the future as reference method for further evaluations
- CSIA is able to find the presence of different sources/polluters and allocate responsibilities and to determine the progress of biological degradation after substrate addition or impact of the selected remediation methods on indigenous microflora and stable isotope composition of the target contaminants to determine the efficacy of enhanced biodegradation

The technical procedures and methodologies adopted, although complex, have a general value and then they can be transferred profitably to other areas or territories. Technical approaches are although general, they just need to be calibrated for the specific area.

### Lessons learned and added value of transnational cooperation of the pilot action implementation (including investment, if applicable)

The development of pilot action involved the use of the WPT1 tools (exploratory data analysis, groundwater modelling and multivariate/geostatistical analysis). The transnational cooperation of the pilot action implementation was done in order to share with main partners the administrative procedure to drilling new piezometers, to develop groundwater numerical model and to design the sampling campaign in each Pilot Action. Moreover, the development of the conceptual hydrogeological model was done by sharing information, knowledge and technical expertise with partners from GIG and Stuttgart. A significant cooperation with PP2, PP3, PP4, PP8 about isotope analysis in order to share the discussion about the specific analysis conducted in each FUA was developed. Furthermore, the Expert Panel gave some indications on the preparation of the documentation to share with the members of the local RIG and the stakeholders: simplified versions of the documents should be prepared to ease the reading of the modelling and statistical procedures for non-technicians.

**Contribution to/ compliance with:**

- relevant regulatory requirements
- sustainable development - environmental effects. In case of risk of negative effects, mitigation measures introduced
- horizontal principles such as equal opportunities and non-discrimination

The results of the activities carried out with the pilot action will contribute to discern the contributions of different types of pollution (punctual, from plume, diffuse) in order to plan more suitable management actions consequently more efficient, especially for:

- the pursuit of standard objectives set by law
- allow more sustainable actions by optimizing economic resources respect given objectives
- disseminate good practices as examples of approach and feasibility for similar situations in different territorial and administrative contexts.

**References to relevant deliverables (e.g. pilot action report, studies), investment factsheet and web-links**

If applicable, additional documentation, pictures or images to be provided as annex

[D.C.5.2 Final Brochure](#)

*D.T2.3.1 Hydrogeological and groundwater monitoring data collection*

*D.T2.3.2 Database realization and publication through WEB-GIS Tool*

*D.T2.3.3 Chlorinated hydrocarbons transport model: report including the implemented results*

*D.T2.3.4 Report on "pilot area" selection for the application of methodologies and tools developed in WP1*

*D.T2.3.5 Monitoring network improvement: design and documentation preparation*

*D.T2.3.6 Monitoring network improvements*

*D.T2.3.8 Report on statistical analysis and inverse iterative simulations application*

*D.T2.3.9 Summary report on GW pollution assessment including diffuse/site specific contamination separation*