WITH THE CONTRIBUTION OF THE LIFE FINANCIAL INSTRUMENT OF THE EUROPEAN COMMUNITY
LIFE16ENV/IT/000488-LIFE PHOENIX

A novel approach in risk management and governance of environmental pollutions: LIFE PHOENIX Project

Roberto Lava, PhD
Regional Environmental Protection Agency of Veneto (ARPAV)

ENSOR International workshop, Emerging policy challenges on New Soil contaminants
Brussels, 19-20 November 2018

REGIONE DEL VENETO
arpav Agenzia Regionale per la Prevenzione e Protezione Ambientale del Veneto
REGIONE DEL VENETO AZIENDA ZERO
IRSA CNR
UNIVERSITÀ DEGLI STUDI DI PADOVA

SUMMARY

- PFAS contamination in Veneto
- The idea of LIFE PHOENIX
- LIFE PHOENIX structure and objectives
- Reproducibility of results and transferability

PFAS CONTAMINATION IN VENETO (I)

2013: experimental investigation on potential **emerging contaminants** in the main Italian water bodies

MINISTERO DELL'AMBIENTE E DELLA TUTELA DEL TERRITORIO E DEL MARE

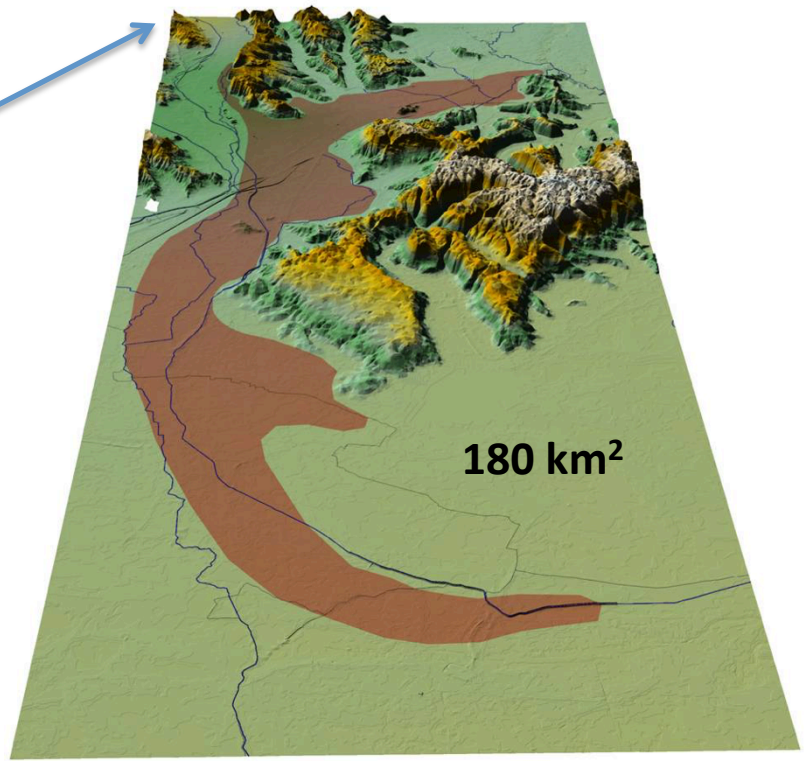
IRSA CNR

➔ discovered the contamination from perfluoroalkyl substances (**PFAS**) in **Veneto Region** affecting **groundwater**, **surface waters** and **drinking water**

PFOS (Perfluorooctane sulfonate)

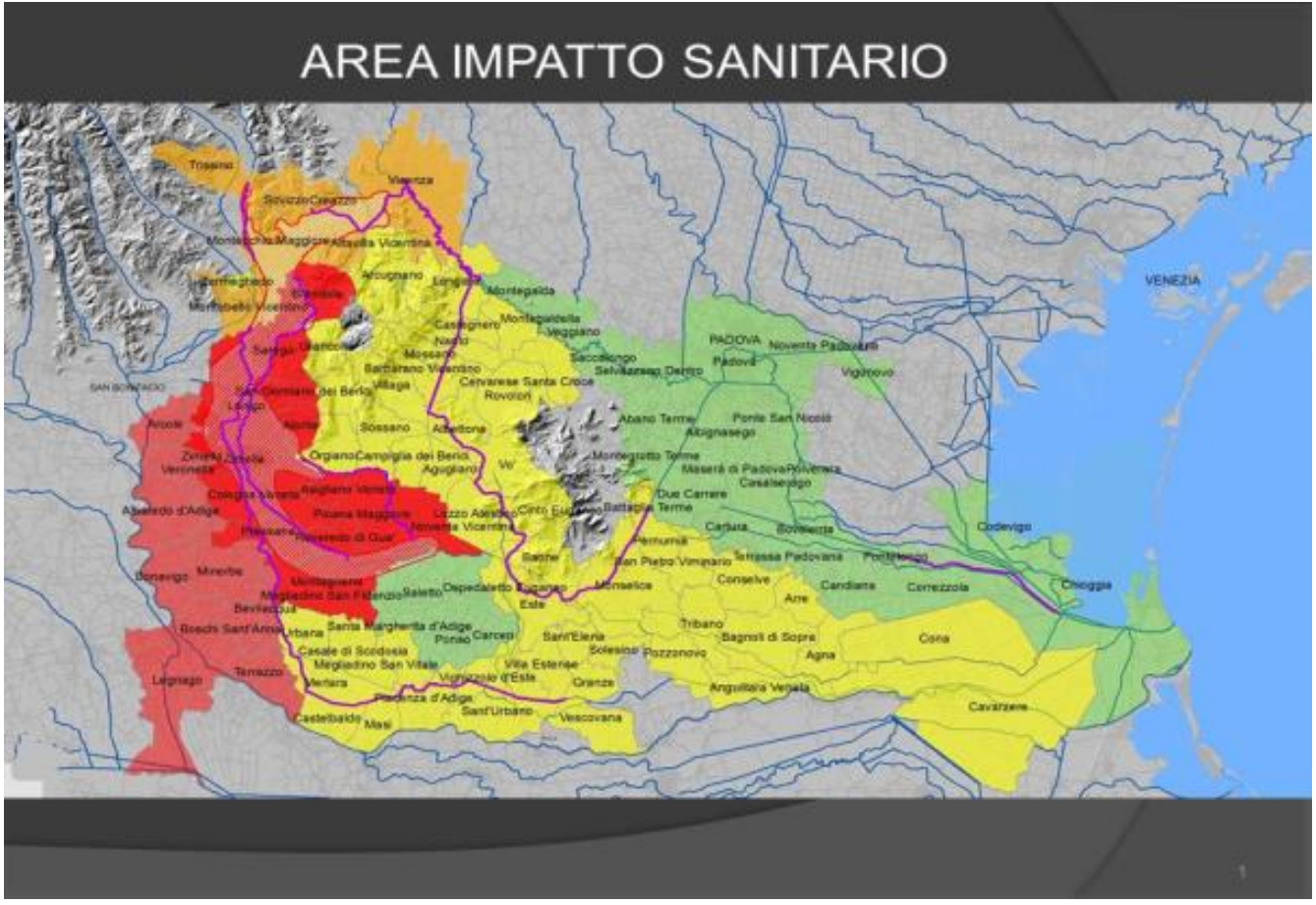
PFOA (Perfluorooctanoic acid)

PFAS CONTAMINATION IN VENETO (II)



PFAS CONTAMINATION IN VENETO (III) 2013-2017

- establishing an emergency plan (authorities, water public suppliers)
- identification of the source (fluorochemical plant)
- developing suitable analytical method for determination
- framing the contamination area (180 → 540 km^2, 10-25000 ng/L ΣPFAS)
- proposal of quality standards (environmental, drinking water, discharge limits)
- health/environmental monitoring
- health surveillance plan on population (apheresis)
- updated regional quality standards
- Agriculture issues (soil, crops, farm)
- OBBIETTIVO PFAS ZERO



Estimation of 350 000 people exposed to the contamination (930 km^2)

Acque contaminate, il Veneto indaga. Greenpeace: più di 800mila potenzialmente esposti a Pfas

Sì del Consiglio della Regione a una commissione inchiesta. L'area interessata dall'immissione di queste sostenanze nell'ambiente si estende per circa 200 kmq, tocca quattro province venete (Vicenza, Verona, Padova e Rovigo) e coinvolge circa 350.000 abitanti

Allarme in Veneto, dopo il caso Pfas scoperto nuovo inquinante: "Il GenX è potenzialmente cancerogeno"

Il composto è stato trovato dall'Arpav nelle acque del Vicentino. La Provincia ferma la produzione. Greenpeace: "A Trissino lavorate cento tonnellate di rifiuti l'anno, provenienti dall'Olanda". L'azienda Miteni: "Nessun sversamento, così abbattiamo gli inquinanti"

di CORRADO ZUNINO

ABBONATI A Rep: | Lo leggo dopo | 13 luglio 2018

BASTA PFAS

L'ACQUA È UN BENE PRIMARIO
CHI INQUINA PAGHI

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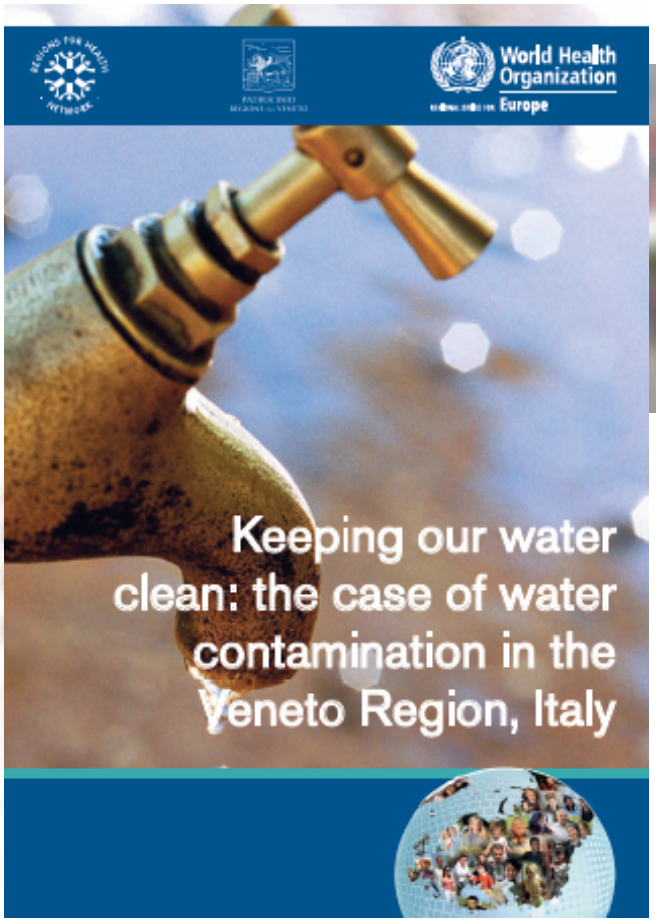
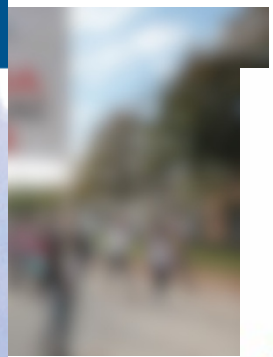
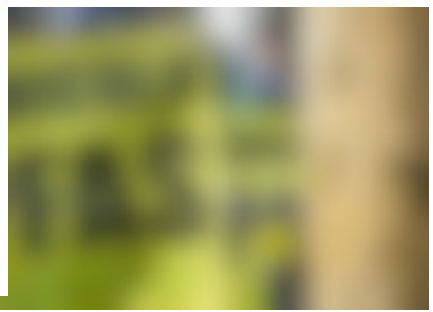
Life Phoenix

Perfluorinated compounds Holistic Environmental Interinstitutional eXperience







LIFE+ PROGRAMME

EU funding instrument for the environment, natural resources and climate action (Environment and Resource Efficiency sector)

General objective: contribute to the implementation and development of EU environment and climate policy and legislation by co-financing project with European added value

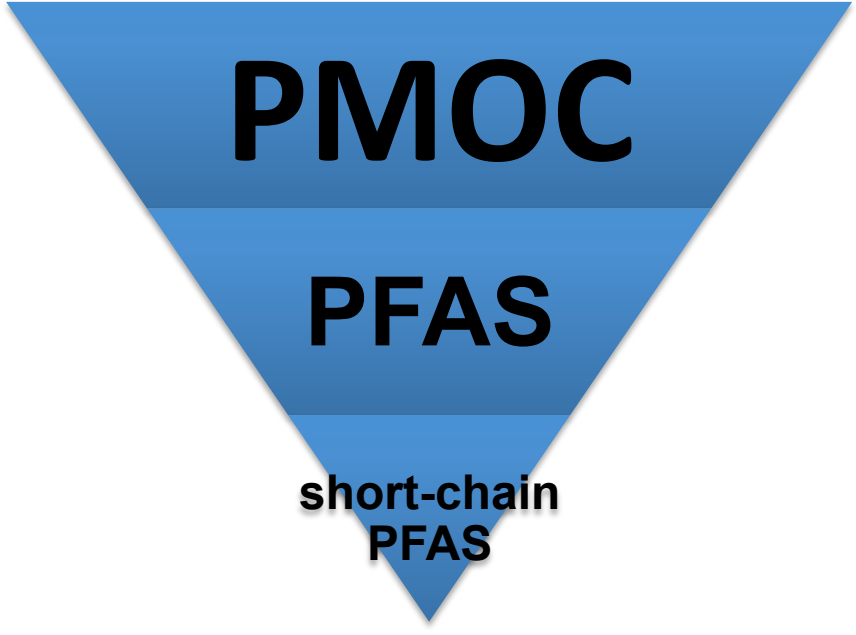
WATER
NATURAL RESOURCE

HUMAN HEALTH

25 YEARS 1992 - 2017

PMOC AS NEW CONTAMINANTS

Persistent Mobile Organic Compounds



Environmental Science & Technology

Feature

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Mind the Gap: Persistent and Mobile Organic Compounds—Water Contaminants That Slip Through

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ABSTRACT: The discharge of persistent and mobile organic chemicals (PMOCs) into the aquatic environment is a threat to the quality of our water resources. PMOCs are highly polar (mobile in water) and can pass through wastewater treatment plants, subsurface environments and potentially also drinking water treatment processes. While a few such compounds are known, we infer that their number is actually much larger. This Feature highlights the issue of PMOCs from an environmental perspective and assesses the gaps that appear to exist in terms of analysis, monitoring, water treatment and regulation. On this basis we elaborate strategies on how to narrow these gaps with the intention to better protect our water resources.

AIM OF PHOENIX

Demonstrate how a new *interinstitutional governance system* can manage risks related to the diffusion of **PMOC** (**Persistent Mobile Organic emerging Contaminants**) in/from WATER matrix

- focus on **short-chain PerFluorinated Alkyl Substances** (C_4 – C_6 PFAS, subclass of PMOC)
- supported through INNOVATIVE FORECAST TOOLS and MITIGATION ACTIONS
- this system will help **to avoid or at least reduce public expenditure** on damages caused by persistent emerging pollutants (environment → human health)

prevent or limit problems related to contamination from PMOC

PARTNERS

Project leader: **REGIONE DEL VENETO**

Associated partners:

- **ARPAV (Regional Environmental Protection Agency of Veneto)**
- **AZIENDA ZERO**
- **IRSA CNR (Italian National Research Council, Institute of Water Research)**
- **Università degli Studi di Padova (Industrial Engineering and Biology Department)**

BUDGET AND TIMING

Environment and Resource Efficiency

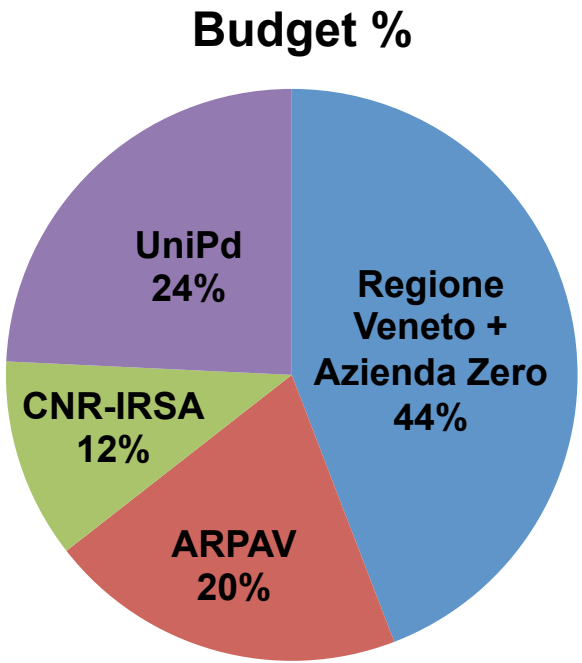
TOTAL BUDGET: **2.176.493 €**

EU CONTRIBUTION: **1.264.369 €**

(60 % contribution of EU Commission)

Starting date: September 2017

End of project: September 2020 (➔March 2021)



PHOENIX STRUCTURE

Operative/Implementation actions:

- **B1** Organising a control and risk analysis system
- **B2** Implementing an informative and statistic system
- **B3** Technological innovation and development
- **B4** Innovative and integrated forecast tools to support decision-making

Monitoring actions:

- **C1** Environmental monitoring
- **C2** Socio-economic impact

Public awareness and dissemination of results:

- **D1** Communication and dissemination to general audiences
- **D2** Communication and dissemination to technical audience and stakeholders

Project management

1 - CONTROL AND RISK ANALYSIS SYSTEM

REGIONE DEL VENETO

Development of an interinstitutional system that control and manage all issues caused by the presence of PMOC in both environmental and health relevance matrices

1) Identification and settlement of **EXPERT PANELS** that will define tasks, plans, roles and responsibilities, methods, networking (lesson learned from the already established experience on long-chain PFAS)

2) Settlement of the **Permanent Regional Commission**
definition of the decision-making strategy / implementation of policy measures

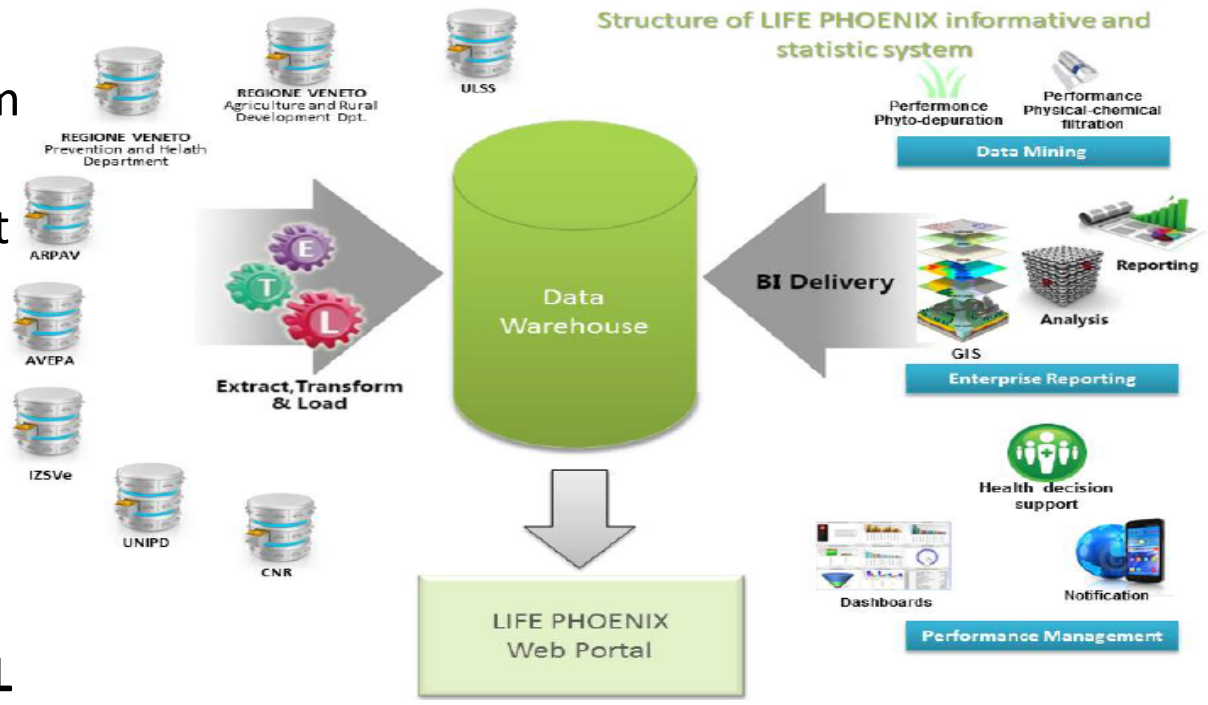
3) Drafting **procedures and guidelines** in support to local authorities
and institutions for an effective and immediate mitigation action of the problem

2 - INFORMATIVE AND STATISTIC SYSTEM

Implementation of a support system for an efficient and effective communication between the expert panel and all the involved actors

➔ efficient management of the health- environmental system

DATA WAREHOUSE **WEB PORTAL**



3 - TECHNOLOGICAL INNOVATION (I)

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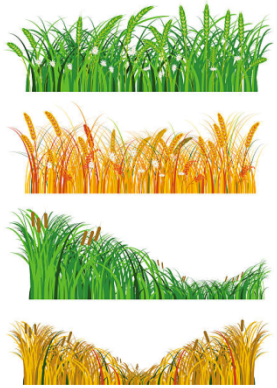
Propose innovative **MITIGATION STRATEGIES**: - drinking water (DW)
- irrigation water (IW)

DRINKING WATER	IRRIGATION WATER
Pilot plant based on INNOVATIVE TECHNOLOGY	Pilot plants based on NATURAL SOLUTIONS
ION EXCHANGE RESINS	**PHYTOREMEDIATION**



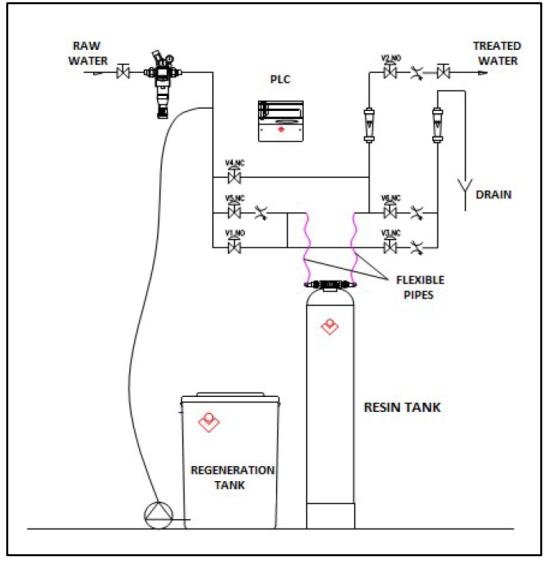
Demonstration of efficiency on an higher scale scale systems

3 - TECHNOLOGICAL INNOVATION (II)

Physical-chemical (filters) pilot plant for **drinking water**

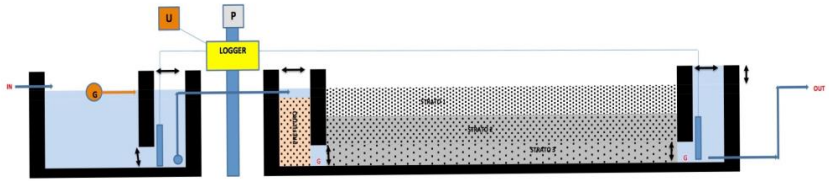
The application of ion exchange resins has proven to be a viable alternative for the removal of PFAS from waters

Resins are regenerable in situ. This alternative is much cheaper compared with the off-site regeneration of activated carbon



→ propose to the water supplier companies to upscale

3 - TECHNOLOGICAL INNOVATION (III)



Phytodepuration pilot plant
for **IRRIGATION water** using *Phragmites*

Constructed wetland: artificial wetland created for the purpose of treating anthropogenic discharge using the natural functions of vegetation, soil and organisms to treat different water streams removing sediments and pollutants like heavy metals from the water

Pilot plant (3 m^2) filled with water pumped from polluted wells → adsorption capacity of the plant to remove PFAS

3 - TECHNOLOGICAL INNOVATION (IV)

First efficiency report almost ready

upscale at real size → full scale plant (wetland system) for irrigation water during 2019 and 24 months PFAS removal monitoring plan

Ca' di Mezzo
(Wetland area)

Monselice
(Wetland area)

Monastero
(Wetland area)

4 - INNOVATIVE AND INTEGRATED FORECAST TOOLS (I)

provide well-timed and innovative environmental tools for the estimation of contaminant distribution and risks in support of the risk analysis and management

- ✓ estimate and predict short-chain PFAS contamination

1) Forecast **NUMERICAL MODEL** of flow and transport of the examined contaminants

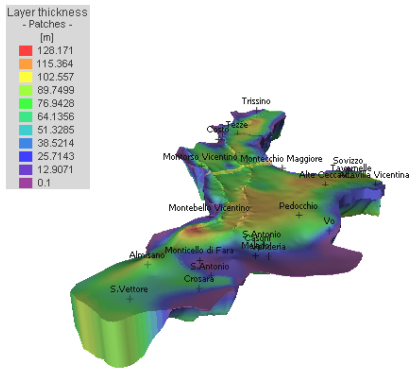
2) Biological and eco-toxicological systems (**EARLY-WARNING**)

4 - INNOVATIVE AND INTEGRATED FORECAST TOOLS (II)

arpav

1) Production and validation of the flow and transport **NUMERICAL MODEL**

A water flow model and a 3D groundwater flow model of the aquifer sedimentary basin in phase of development and will be tested for modelling of all relevant flow and mass transport process



Allow understanding all processes related to water quantity and quality

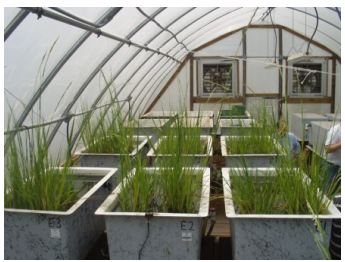
1. Estimation and predict transport and distribution of PFAS in groundwater and surface waters

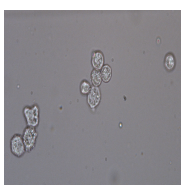
2. Evaluate and quantify at same time the interactions of the different environmental and anthropogenic factors in the diffusion of the contamination

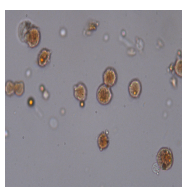
4 - INNOVATIVE AND INTEGRATED FORECAST TOOLS (III)

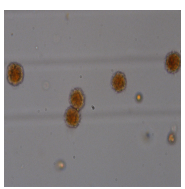
Biological and eco-toxicological systems (**EARLY-WARNING**): development of useful methodologies to define correlation between biodiversity levels and environmental stress

Use of **BIOMARKERS** based on invertebrates ubiquitous both for the natural and agricultural environments (field and lab work, two mesocosm facilities will be created in the pilot wetland, check PFAS contamination)









Investigation of some biological parameters (physiological and biochemical) on model organisms to assess the heath status of some important cellular components (oxidative stress/lysosomal membrane stability)

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Perfluorinated compounds Holistic Environmental Interinstitutional eXperience

10 sample points within the project areas (including also the three phytoremediation sites)

Analyzed matrices

- Water
- Soils
- Plants
- Animals

- **D1 Communication and Dissemination to general audience**
  - Website, brochures, posters, Layman's report
  - Environmental educations for a SUSTAINABLE USE OF WATER RESOURCE (schools, educational kit for students, informative video)

REGIONE DEL VENETO

- **D2 Communication and Dissemination to technical audience and to stakeholders**
  - Periodic newsletter, workshops to update stakeholders, scientific publications and technical reports, participation at seminar/workshop/congress, final conference

TRANSFERABILITY

- production of a "**self-analysis checklist**" in order to design a customised program, adopt project methodology, implement the tools (i.e. numerical model suitable and flexible to different contamination scenarios)

- **knowledge transfer** of know-how and the project approach/solutions to other geographical EU areas characterized by episodes of similar environmental contamination

- involve local/national/European stakeholders to organise specific **capacity building**

- rise awareness of population on the **importance of water quality preservation**

DECLARATIONS OF SUPPORT TO PHOENIX

- **WHO** (World Health Organization)
- **Norman Network** (Network of reference laboratories, research centres and related organization for monitoring of emerging environmental substances - **FR**)
- **ANSES** (French Agency for Food, Environmental and Occupational Health & Safety– **FR**)
- **RIVM** (National Institute for Public Health and the Environment – **NL**)
- **OVAM** (Public Waste Agency of Flanders– **BE**)
- **ANBI** (National Consortium of Land Reclamation and Drainage Authorities - **IT**)
- **Consorzio di bonifica Adige Euganeo (IT)**
- **VIVERACQUA** (Consortium of Integrated Water Services of operating in Veneto - **IT**)
- **Centro Idrico Novoledo (IT)**
- **OPO Veneto** (Organization of Fruit and Vegetable Producers of Veneto Region - **IT**)

Subscribe the LIFE PHOENIX newsletter (IT and EN version)

- Link at: **http://www.regione.veneto.it/web/guest/iscrizione-newsletter**
- Check the box: **SANITA' / PROGETTO LIFE**
- Insert: your email address
- Accept: condition of personal data treatment (GDPR)
- Click on: **ISCRIVITI** (subscribe)

….. **NEW WEBSITE VERY SOON!!**

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