Venezia, 1 Dicembre 2022

La tutela delle fonti idriche

Veritas S.p.A. Direttore Laboratorio: Dr. Stefano Della Sala

The Water Cycle (PNG) | U.S. Geo | The Water Cycle | U.S. Geological

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The Water Cycle

COMPLETED

By Water Science School October 2, 2022

Overview

The water cycle describes where water is on Earth and how it moves. Human water use, land use, and climate change all impact the water cycle. By understanding these impacts, we can work toward using water sustainably.

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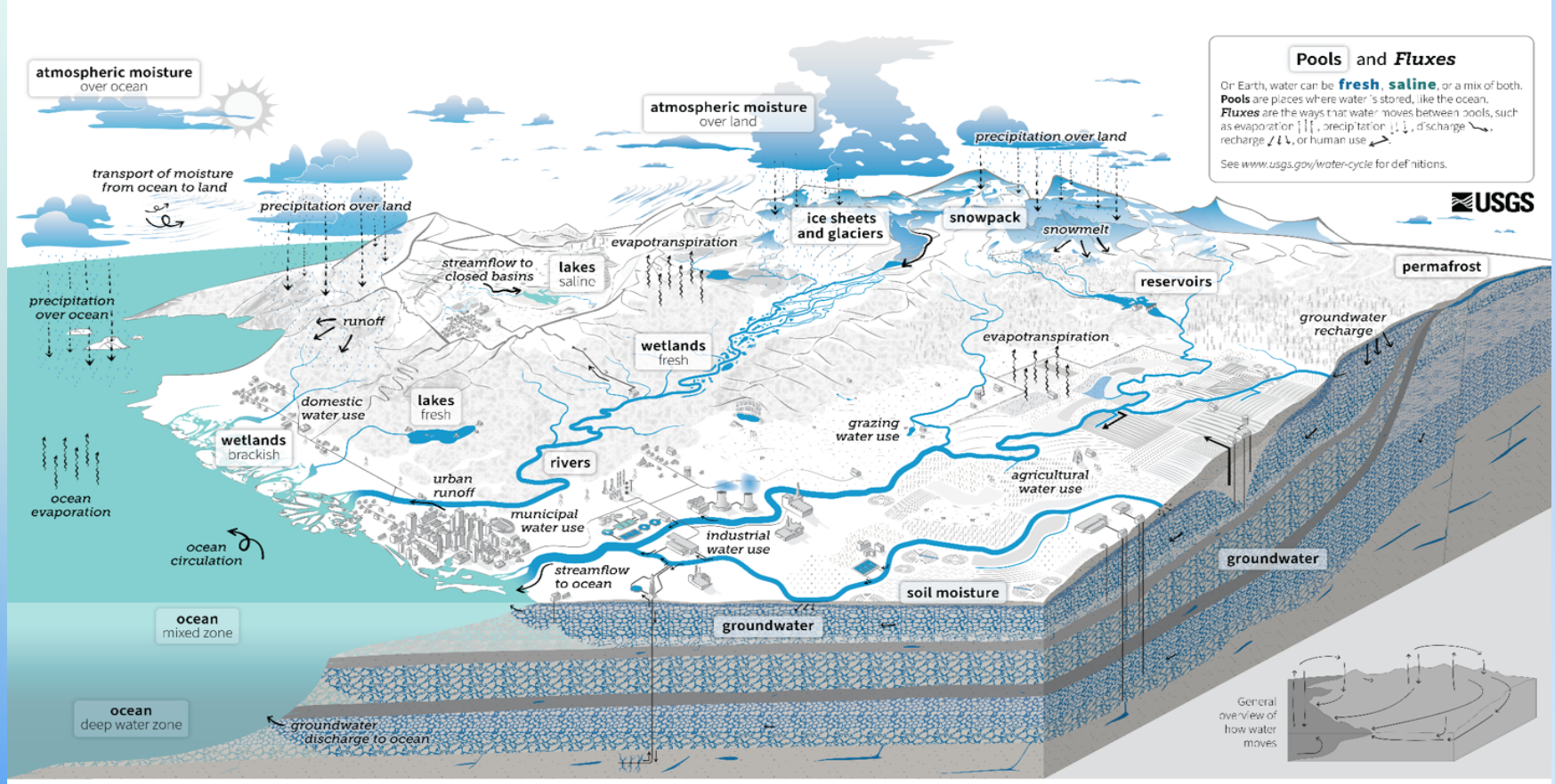

The Water Cycle

The water cycle describes where water is on Earth and how it moves. Water is stored in the atmosphere, on the land surface, and below the ground. It can be a liquid, a solid, or a gas. Liquid water can be fresh, saline (salty), or a mix (brackish). Water moves between the places it is stored. Water moves at large scales and at very small scales. Water moves naturally and because of human actions. Human water use affects where water is stored, how it moves, and how clean it is.

Pools store water. 96% of all water is stored in **oceans** and is saline. On land, saline water is stored in **saline lakes**. Fresh water is stored in liquid form in **freshwater lakes**, artificial **reservoirs**, **rivers**, and **wetlands**. Water is stored in solid, frozen form in **ice sheets** and **glaciers**, and in **snowpack** at high elevations or near the Earth's poles. Water vapor is a gas and is stored as **atmospheric moisture** over the ocean and land. In the soil, frozen water is stored as **permafrost** and liquid water is stored as **soil moisture.** Deeper below ground, liquid water is stored as **groundwater** in aquifers, within cracks and pores in the rock.

Fluxes move water between pools. As it moves, water can change form between liquid, solid, and gas. **Circulation** mixes water in the oceans and transports water vapor in the atmosphere. Water moves between the atmosphere and the surface through **evaporation**, **evapotranspiration**, and **precipitation**. Water moves across the surface through **snowmelt**, **runoff**, and **streamflow**. Water moves into the ground through infiltration and **groundwater recharge**. Underground, groundwater flows within aquifers. It can return to the surface through natural **groundwater discharge** into rivers, the ocean, and from **springs**.

We alter the water cycle. We redirect rivers. We build dams to store water. We drain water from wetlands for development. We use water from rivers, lakes, reservoirs, and groundwater aquifers. We use that water to supply our **homes** and **communities.** We use it for **agricultural** irrigation and **grazing** livestock. We use it in **industrial** activities like thermoelectric power generation, mining, and aquaculture. The amount of water that is available depends on how much water is in each pool (water quantity). It also depends on when and how fast water moves (water timing), how much water we use (water use), and how clean the water is (water quality).

We affect **water quality**. In agricultural and urban areas, irrigation and precipitation wash fertilizers and pesticides into rivers and groundwater. Power plants and factories return heated and contaminated water to rivers. Runoff carries chemicals, sediment, and sewage into rivers and lakes. Downstream from these sources, contaminated water can cause harmful algal blooms, spread diseases, and harm habitats. **Climate change** is affecting the water cycle. It is affecting water quality, quantity, timing, and use. It is causing ocean acidification, sea level rise, and more extreme weather. By understanding these impacts, we can work toward using water sustainably.

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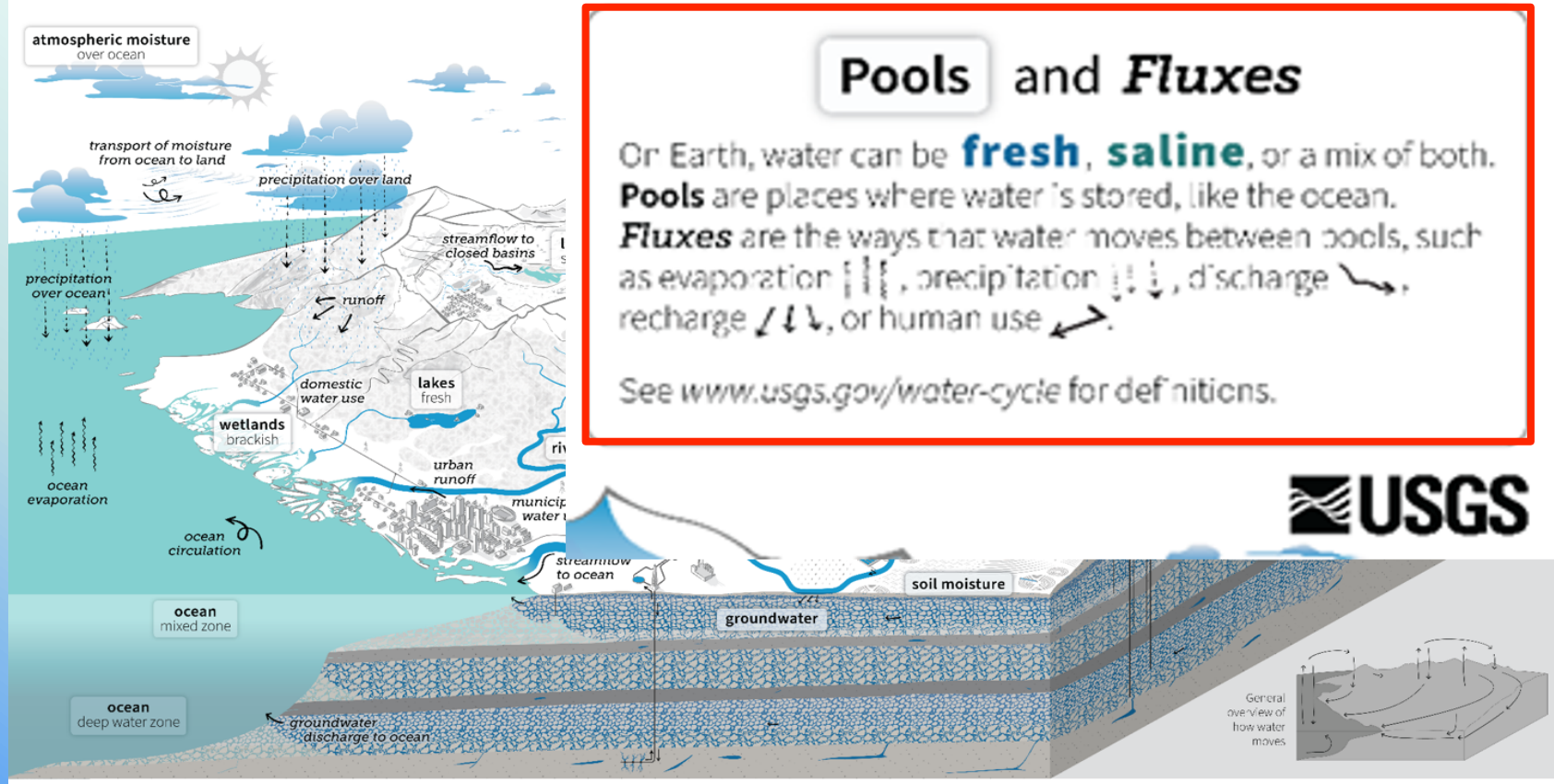

Pools and *Fluxes*

On Earth, water can be **fresh**, **saline**, or a mix of both. **Pools** are places where water is stored, like the ocean. ***Fluxes*** are the ways that water moves between pools, such as evaporation, precipitation, discharge, recharge, or human use.

See *www.usgs.gov/water-cycle* for definitions.

USGS

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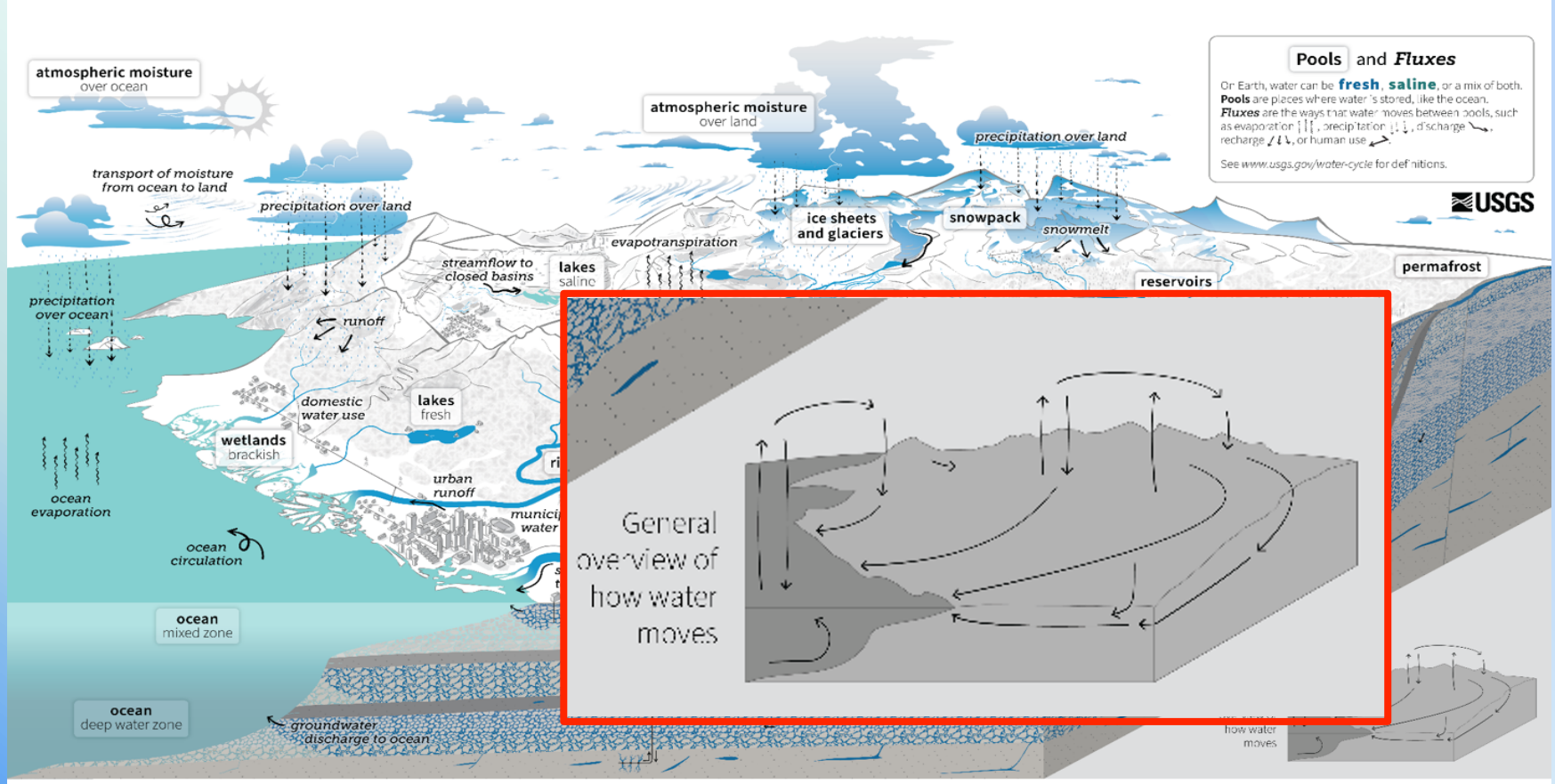

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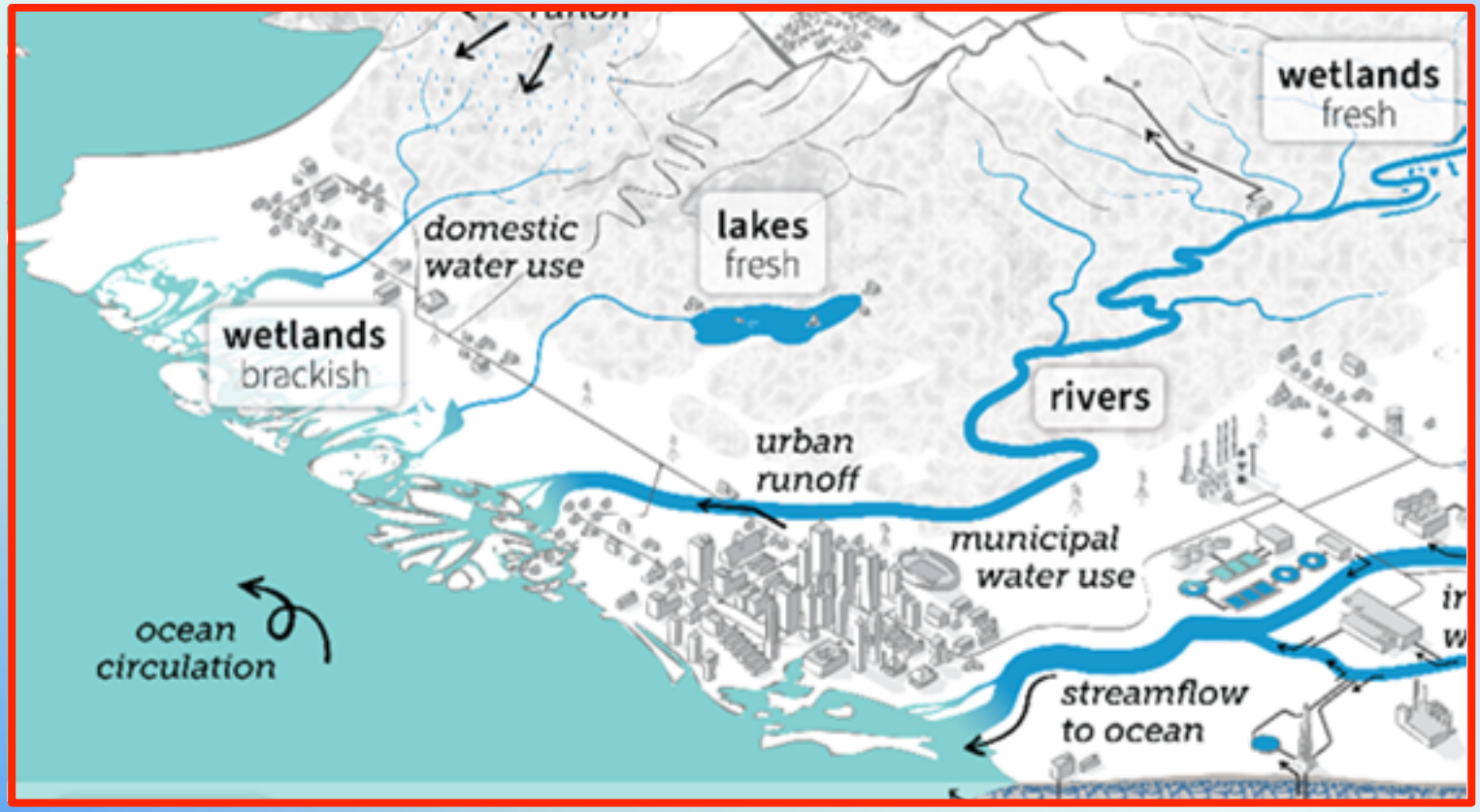

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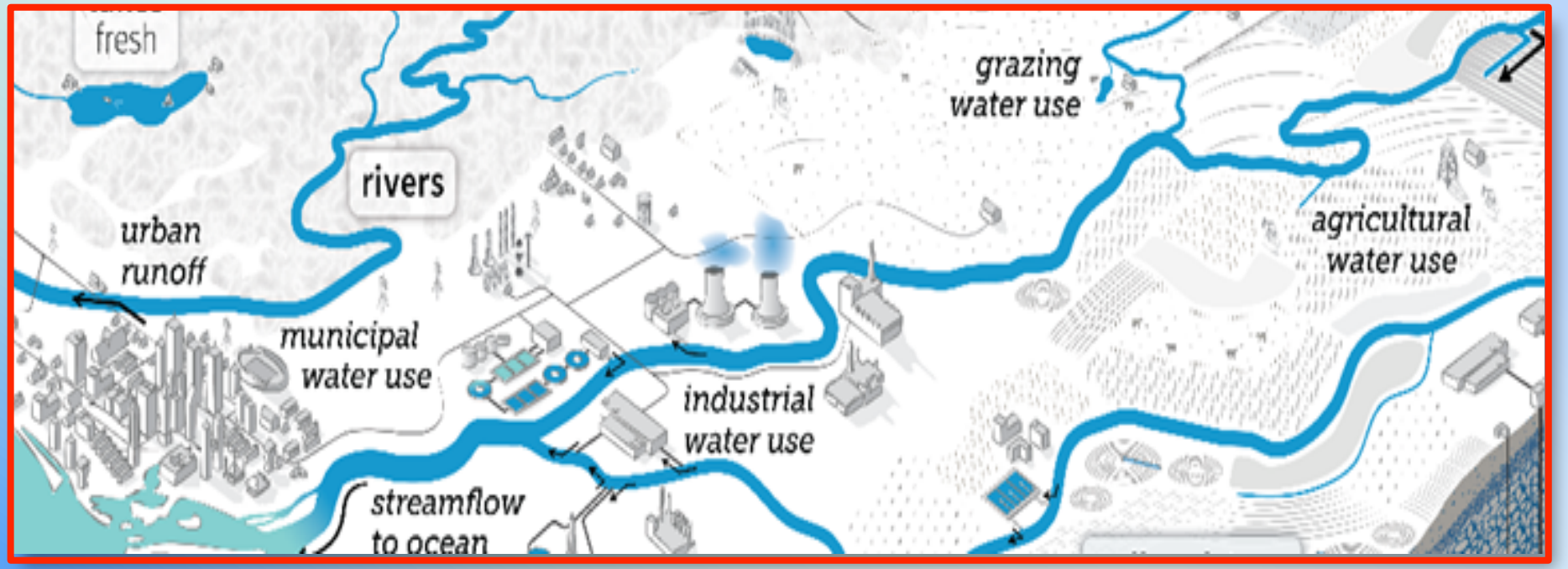
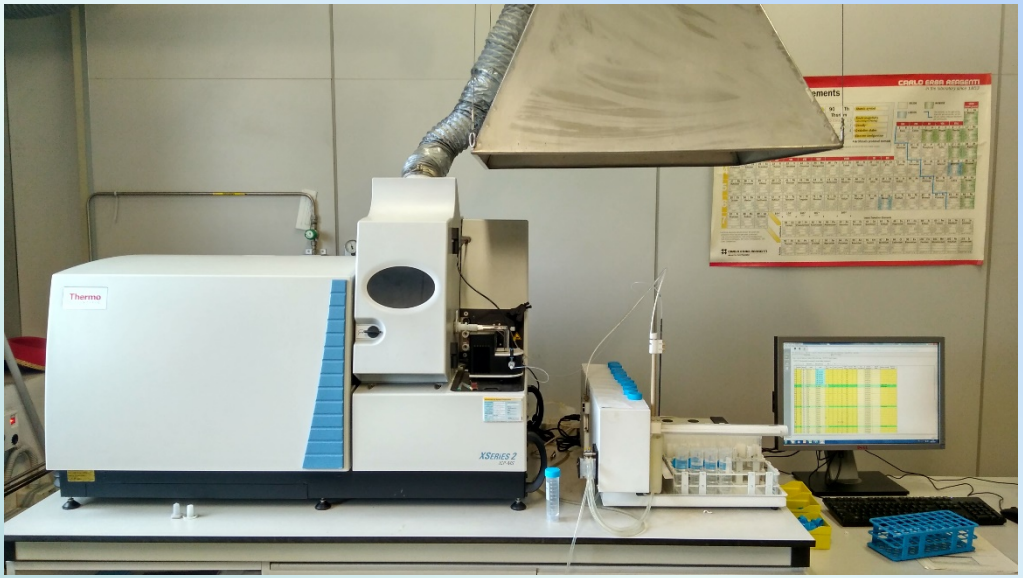


Preparativa Ambientale

- tutti i campioni che necessitano di preparativa prima di essere analizzati:
  - Fanghi e terreni
  - Campioni di acque di scarico da mineralizzare
  - Campioni acquosi da estrarre per le determinazioni organiche

Reparto Spettroscopia

- analisi dei metalli in campioni acquosi e solidi:
  - Tecnica ICP-OES
  - Tecnica ICP-MS

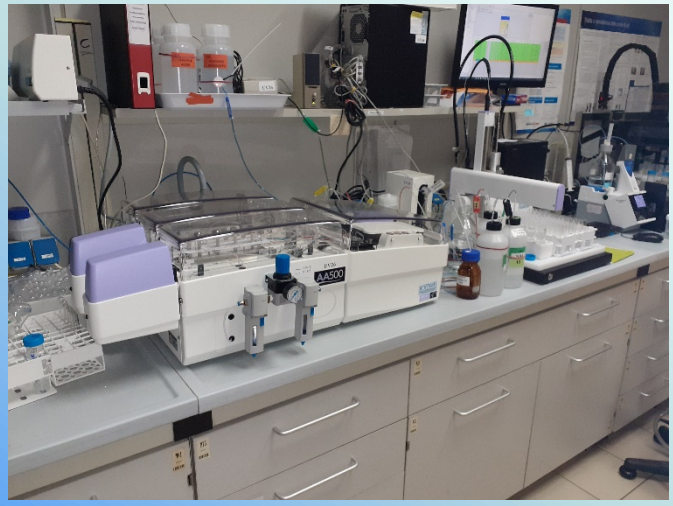


Reparto Cromatografia

- Esegue le analisi di contaminanti organici nelle seguenti matrici
  - Fanghi e terreni
  - Campioni di acque di scarico
  - Campioni di acque potabili

Reparto Macrodescrittori

- Esegue le analisi dei macrodescrittori
  - Campioni di acque di scarico
  - Campioni di acque potabili



La tematica degli inquinanti emergenti

Microinquinanti organici

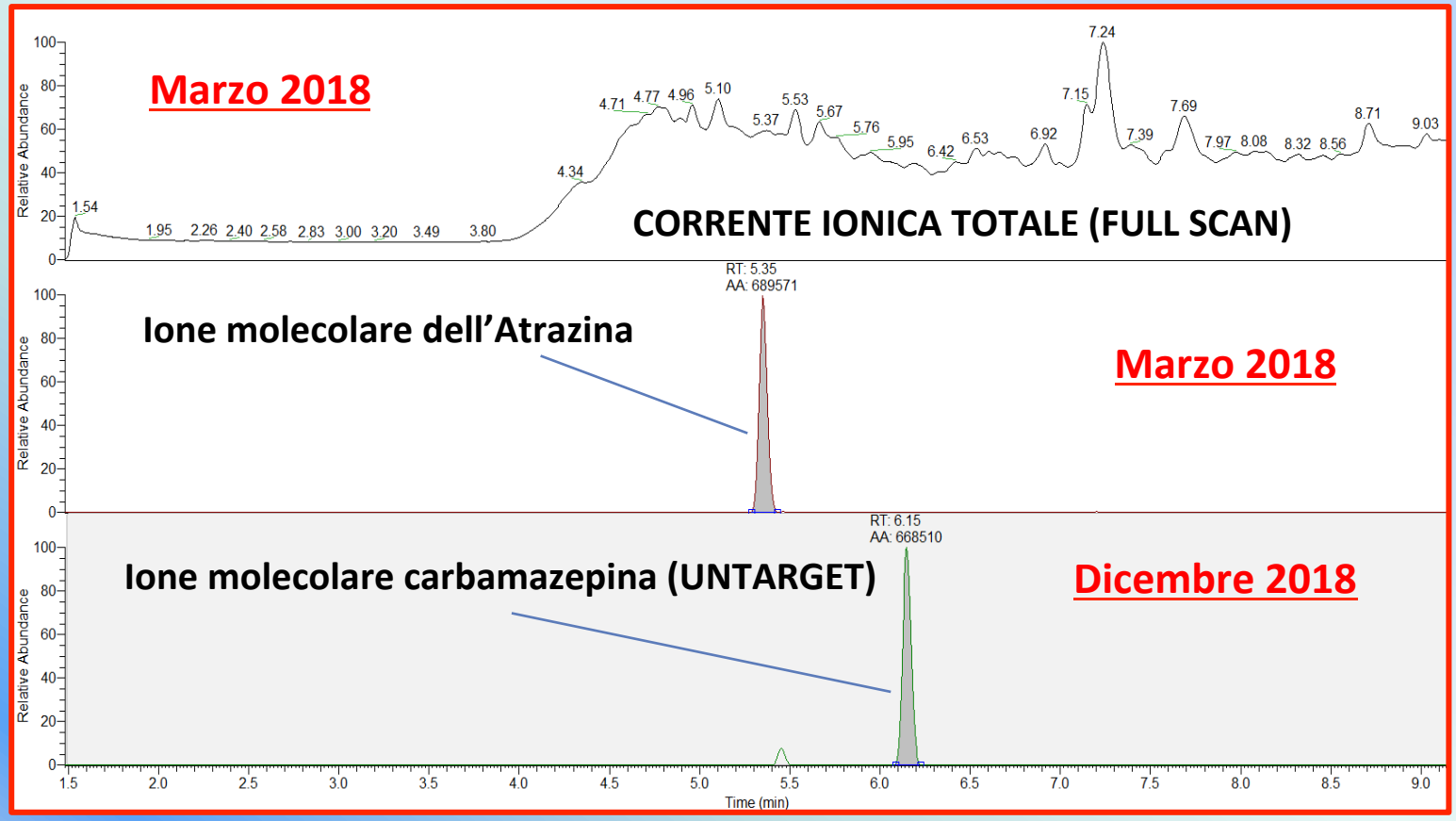
Microplastiche

Sistema IC/HPLC-HRMS

Veritas S.p.A– Il ruolo dell'alta risoluzione

Esempio: analisi di un'acqua superficiale

<u>A 9 mesi</u> dall'esecuzione dell'analisi si vuole verificare se su quel campione (acquisito a marzo 2018) era presente anche carbamazepina. Basta rielaborare il file già acquisito!



17 maggio 2016

Glifosate, giunge il parere scientifico dell'Oms e della Fao

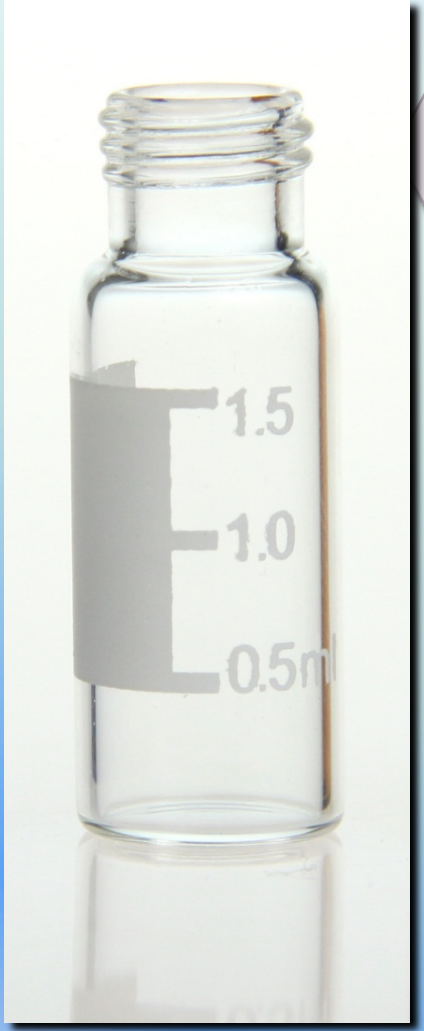
Pubblicato il parere scientifico delle organizzazioni internazionali preposte alla tutela della salute dei cittadini. Adesso c'è l'ufficialità della pronuncia.

Dopo tanto parlare, dopo aver visto gli schieramenti, è arrivato il **parere scientifico** che mette la parola fine all'annosa querelle **salutista** sul pesticida più chiacchierato del momento, il **glifosate**. «È improbabile che l'assunzione di **glifosate** attraverso la dieta sia cancerogena per l'uomo». La tesi è sostenuta dalla **Fao** e dall'Organizzazione mondiale della sanità (**Oms**), e giunge in via ufficiale al termine di un meeting del **Panel of Experts on Pesticide Residues in Food and the Environment**.

«La grande maggioranza delle **prove scientifiche** - si legge - indica che la somministrazione di glifosate e di prodotti derivati a dosi fino a **2.000 milligrammi** per chilo di peso per via orale, la più rilevante per l'esposizione con la dieta, non è associata ad effetti genotossici nella stragrande maggioranza degli studi condotti su **mammiferi**». La pronuncia scientifica è secca e burocratica.

«Qualche studio - prosegue il documento di Fao e Oms - ha evidenziato un'associazione positiva tra l'esposizione al glifosate e il rischio di **linfoma non Hodgkin**. Tuttavia l'unico studio condotto con una grande coorte e di grande qualità, non ha trovato evidenza di una associazione per nessun livello di esposizione». Insomma, l'Oms sembra contraddire lo **Iarc**, che della stessa organizzazione fa parte.

DACT – Condizioni sperimentali



Preparazione Campione

- 1.5 mL campione
- Aggiunta STD interno $^{13}C3$-DACT

Condizioni operative

- ✓ ***Sistema:*** UHPLC-HRMS Orbitrap Q Exactive Focus,

  Iniezione diretta, 100 µL, FULL SCAN + Data Dependent Scan
- ✓ ***Eluente***: A H_2O+HCOOH 0,1% + $HCOONH_4$ 10 mM
- ✓ B MeOH + HCOOH 0,1%
- ✓ ***Colonna:*** Hypersil GOLD C18 100x2.1 , 35 °C, 300 µL/min
- ✓ ***Ionizzazione:*** HESI +

MICROPLASTICHE

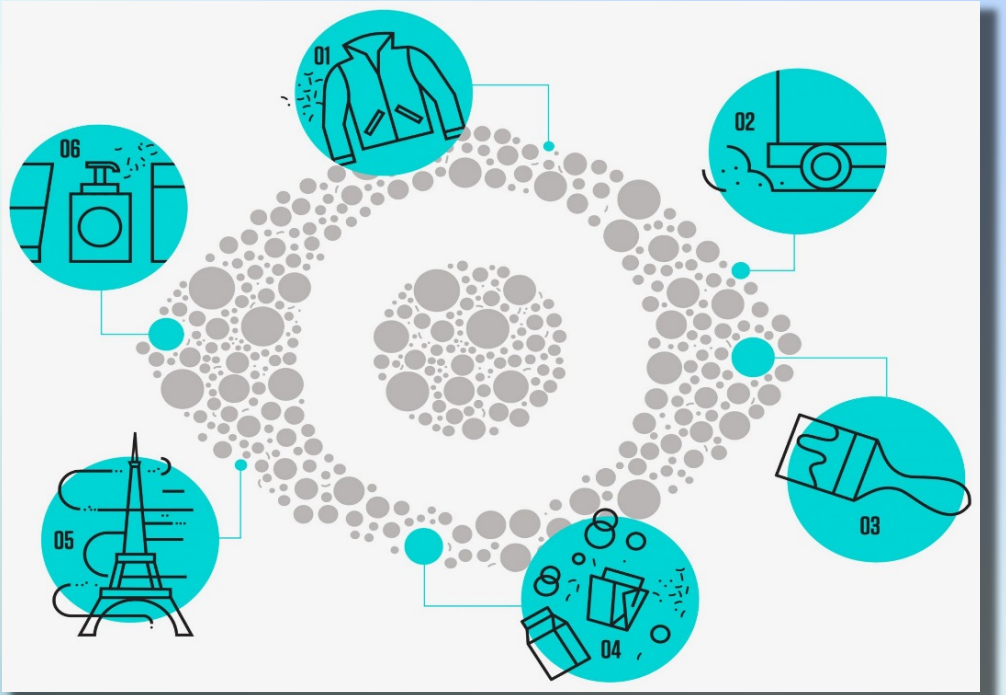
Una micro-plastica è un piccolo pezzo di plastica di dimensioni comprese tra 5 mm e 1 micron.
Le più comuni: sono PE, PP, PET

Fonti:

Primarie: Particelle progettate per essere piccole (ad es.: microsfere cosmetiche)

Secondarie: si formano per degradazione di plastiche più grandi

- Lavaggio di tessuti fatti con fibre sintetiche
- Polvere di pneumatici
- Vernici
- Fibre sintetiche nell'aria
- Microsfere - primarie



https://orbmedia.org/stories/Invisibles_plastics/multimedia

Sistema GC-MS automatizzato

A – Campionatore automatico TriPlus per la preparazione dei campioni (estrazione online)

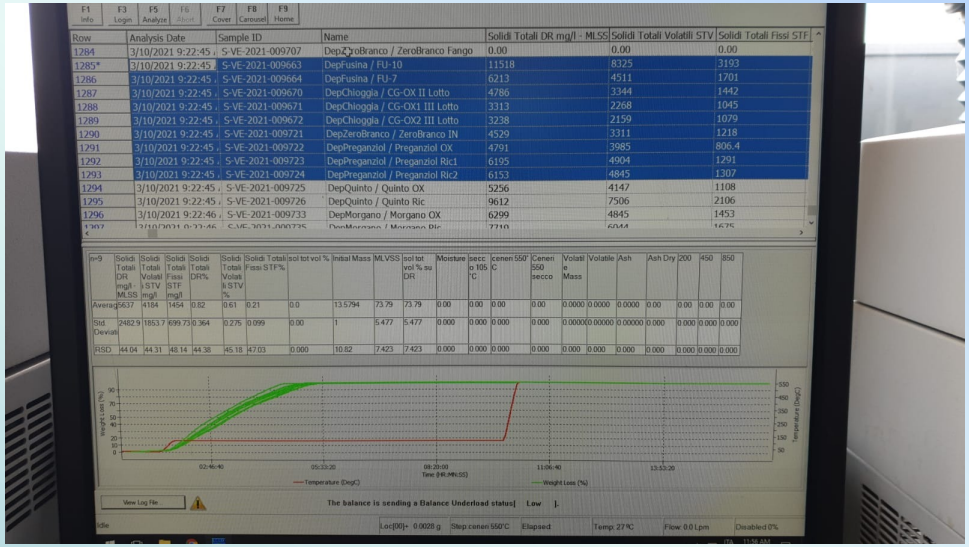
B – iniettore PTV Large Volume (50 µL o più)

C - TSQ9000 with AEI Source

Analisi termogravimetrica automatizzata

Analisi si fanghi e terreni di :

- ✓ Residuo secco a 105° C
- ✓ Solidi volatili a 550 °C



Row	Analysis Date	Sample ID	Name	Solidi Totali DR mg/l - MLSS	Solidi Totali Volatili STV	Solidi Totali Fissi STF
1284	3/10/2021 9:22:45	S-VE-2021-009707	DepZeroBranco / ZeroBranco Fango	0.00	0.00	0.00
1285*	3/10/2021 9:22:45	S-VE-2021-009663	DepFusina / FU-10	11518	8325	3193
1286	3/10/2021 9:22:45	S-VE-2021-009664	DepFusina / FU-7	6213	4511	1701
1287	3/10/2021 9:22:45	S-VE-2021-009670	DepChioggia / CG-OX II Lotto	4786	3344	1442
1288	3/10/2021 9:22:45	S-VE-2021-009671	DepChioggia / CG-OX1 III Lotto	3313	2268	1045
1289	3/10/2021 9:22:45	S-VE-2021-009672	DepChioggia / CG-OX2 III Lotto	3238	2159	1079
1290	3/10/2021 9:22:45	S-VE-2021-009721	DepZeroBranco / ZeroBranco IN	4529	3311	1218
1291	3/10/2021 9:22:45	S-VE-2021-009722	DepPreganziol / Preganziol OX	4791	3985	806.4
1292	3/10/2021 9:22:45	S-VE-2021-009723	DepPreganziol / Preganziol Ric1	6195	4904	1291
1293	3/10/2021 9:22:45	S-VE-2021-009724	DepPreganziol / Preganziol Ric2	6153	4845	1307
1294	3/10/2021 9:22:45	S-VE-2021-009725	DepQuinto / Quinto OX	5256	4147	1108
1295	3/10/2021 9:22:45	S-VE-2021-009726	DepQuinto / Quinto Ric	9612	7506	2106
1296	3/10/2021 9:22:46	S-VE-2021-009733	DepMorgano / Morgano OX	6299	4845	1453

Veritas S.p.A– Inquinanti emergenti

International Agency for Research on Cancer

World Health Organization

20 March 2015

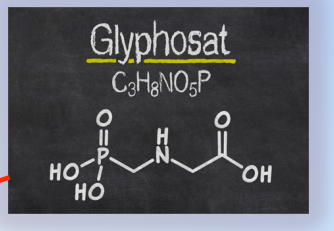
IARC Monographs Volume 112: evaluation of five organophosphate insecticides and herbicides

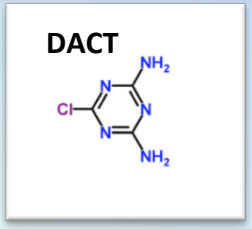
Lyon, France, 20 March 2015 – The International Agency for Research on Cancer (IARC), the specialized cancer agency of the World Health Organization, has assessed the carcinogenicity of **five organophosphate pesticides**. A summary of the final evaluations together with a short rationale have now been published online in The Lancet Oncology, and the detailed assessments will be published as Volume 112 of the IARC Monographs.

What were the results of the IARC evaluations?

The herbicide **glyphosate** and the insecticides **malathion** and **diazinon** were classified as *probably carcinogenic to humans* (Group 2A).

The insecticides **tetrachlorvinphos** and **parathion** were classified as *possibly carcinogenic to humans* (Group 2B).





REGIONE AUTONOMA FRIULI VENEZIA GIULIA

Notizie dalla **Giunta**

sei in: home > notizie dalla Giunta > **dettaglio notizia**

16.10.2015 18:36

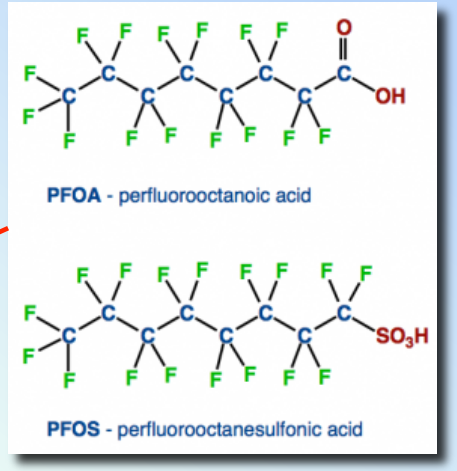
ACQUA: IN FVG SITUAZIONE CONFORME A NORME POTABILITÀ

Trieste, 16 ott - Nell'ambito delle Politiche regionali per la Tutela delle acque e della salute, l'Agenzia Regionale per la Protezione dell'Ambiente (ARPA) del Friuli Venezia Giulia conduce un continuo monitoraggio rivolto a individuare ogni tipo di sostanza potenzialmente nociva e al momento attuale la situazione è conforme a tutte le norme sulla potabilità della acque.

Nell'intento di offrire ai cittadini della regione un più alto livello di tutela delle acque potabili, ARPA è stata dotata, tra le prime Agenzie in Italia, di tecnologie d'avanguardia, capaci di rilevare sostanze in concentrazioni anche minimali.

È stato l'utilizzo di queste sofisticate nuove apparecchiature ad aver rivelato che, in alcuni dei campioni analizzati, vi sarebbero tracce di un elemento sinora mai rilevato: tale sostanza è stata riconosciuta come un composto della degradazione dell'atrazina (diamindoclorotriazina, DACT).

La direzione della Salute della Regione, immediatamente attivata e coinvolta, ha convocato il Gruppo tecnico interistituzionale per la tutela delle acque da rischi ambientali, composto dagli esperti dell'Osservatorio Ambiente e Salute, dai direttori dei dipartimenti di prevenzione delle Aziende per l'Assistenza Sanitaria (AAS), dall'ARPA e dalla stessa direzione Salute, ha potuto confermare che non vi sono rischi sanitari: "non vi sono evidenze epidemiologiche di danni acuti o cronici", con la precisazione che "il DACT è un metabolita dell'atrazina e l'atrazina non ha mai sforato i limiti da 20 anni".



IRSA CNR

Istituto di Ricerca sulle Acque - CNR

Rischio associato alla presenza di sostanze perfluoro-alchiliche (PFAS) nelle acque potabili e nei corpi idrici recettori di aree industriali nella Provincia di Vicenza e aree limitrofe

nell'ambito della Convenzione tra il MATTM e IRSA - CNR

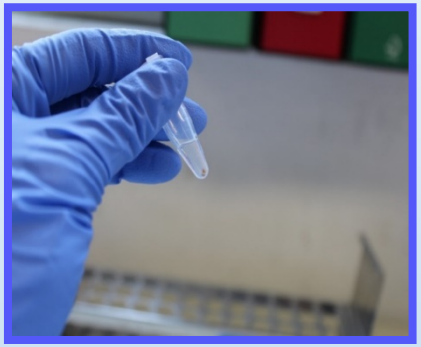
per la

Realizzazione di uno studio di valutazione del Rischio Ambientale e Sanitario associato alla contaminazione da sostanze perfluoro-alchiliche (PFAS) nel bacino del Po e nei principali bacini fluviali italiani

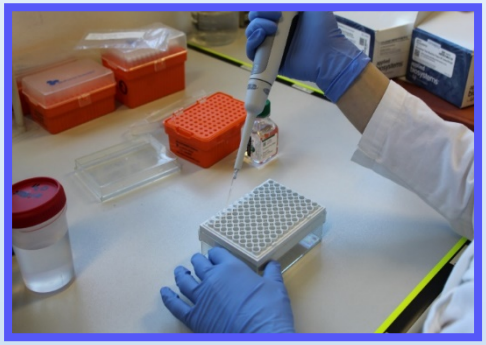
Quali saranno i prossimi?

REAL-TIME PCR PROCEDURE: DNA EXTRACTION AND AMPLIFICATION

1 L sample is filtered on a polycarbonate membrane with a nominal porosity of 0,45 µm and then suspended with 1 ml of sterile water.

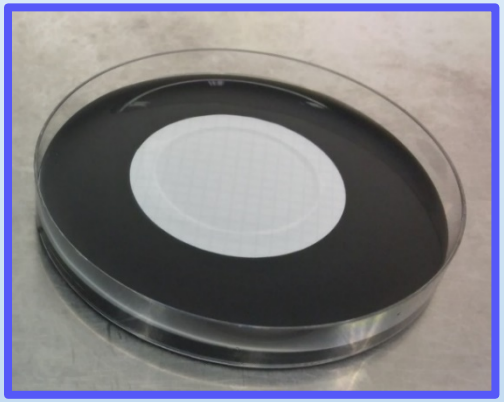


50 µl of lysis buffer are added to the sample which is then subjected to heat shock to help lysis and centrifugated.

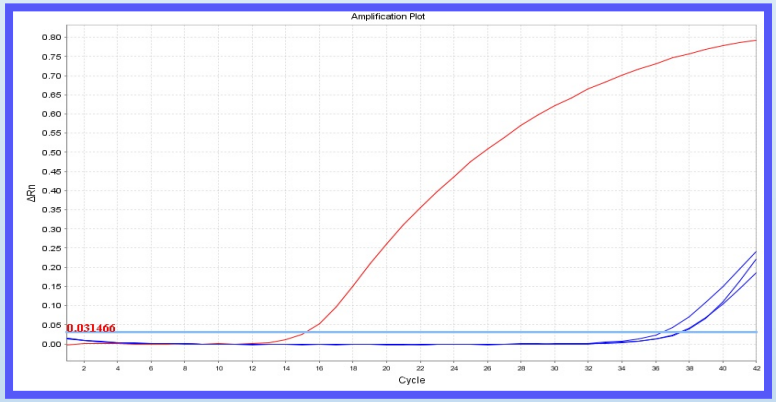


10 µl of sample are transferred to a new tube with inside 15 µl of master mix composed by all reagents necessary to amplify *Legionella* spp / *Legionella pneumophila* DNA.

RESEARCH OF *Legionella spp/Legionella pneumophila* BY CULTURAL AND REAL-TIME PCR METHODS



Methods ISO 11731-2:2004 and ISO 11731:2017



Methods ISO/TS 12869:2012 and ISO/TS 12869:2012

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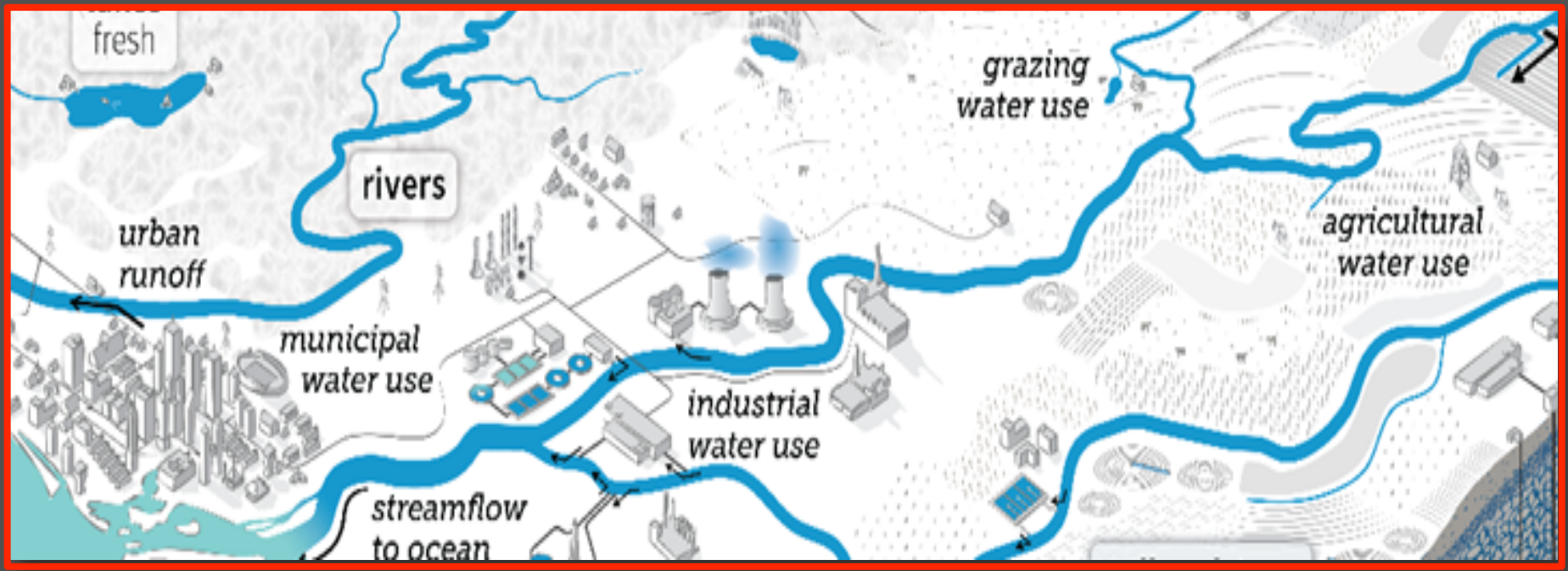
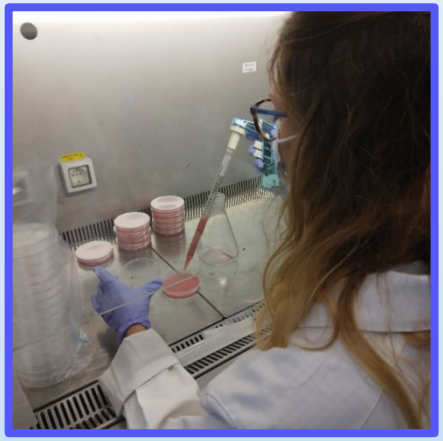
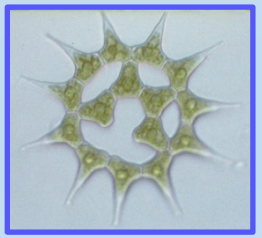
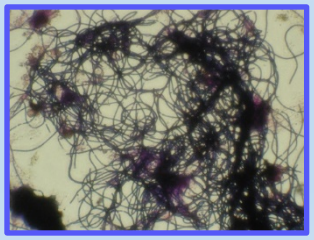
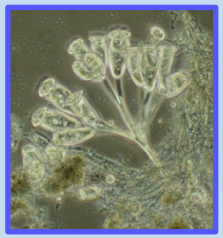
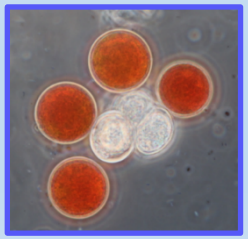
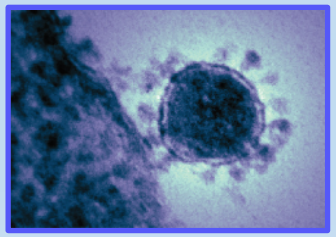


VERITAS BIOLOGICAL LABORATORY







COMMUNICATION