

**Implementation of EU Water Directive (WFD): the interest of integrating water,  
energy, food and ecosystems**

Session 4 - Towards the good ecological status: fighting emerging pollutants with  
innovative solutions

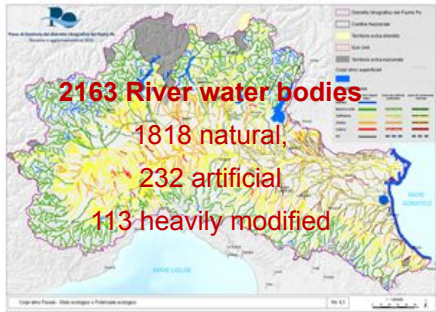
Status of surface water in the district, first results on  
microplastics and ongoing analysis for MIE in the  
waters of the Po river

Fernanda Moroni

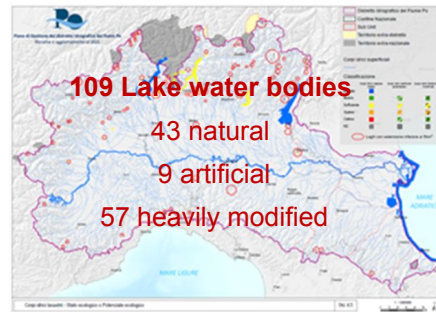
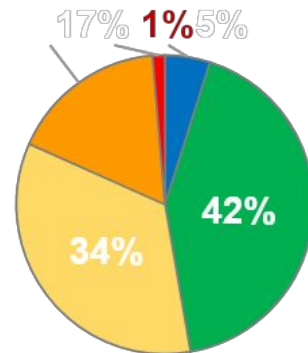
Manager of the Water Planning and Protection Sector

# Surface water body status ex DIRECTIVE 2000/60/EC

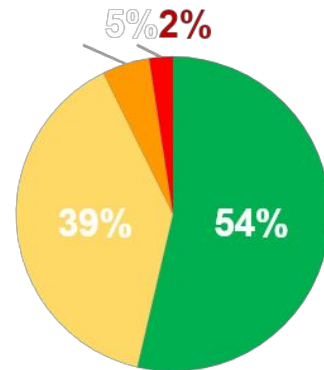
## Ecological status/Potential



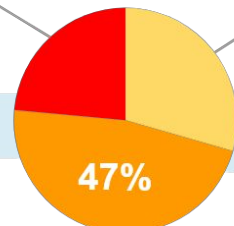
RW



LW

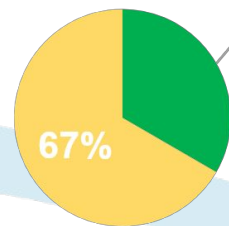


TW

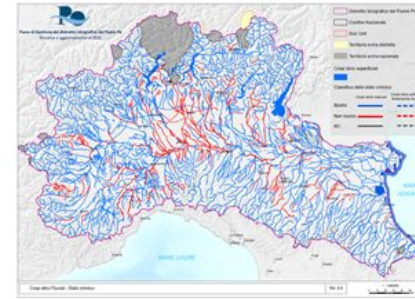


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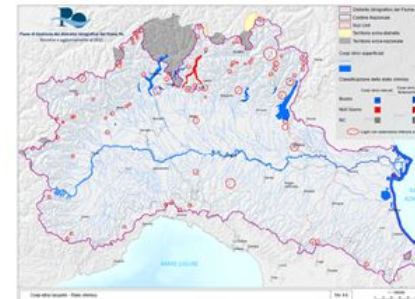
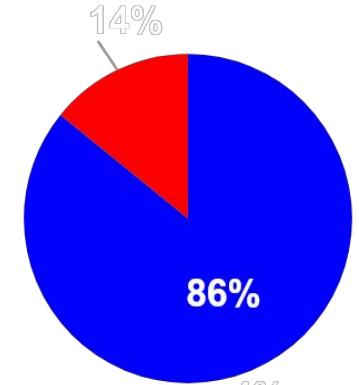


CW

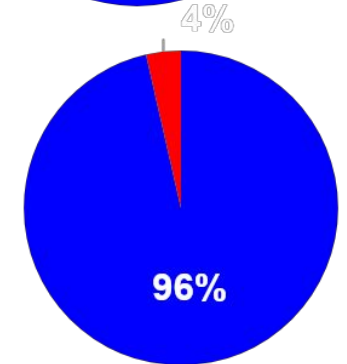


RW

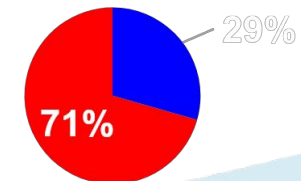
## Chemical status



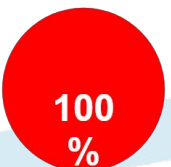
LW



TW



CW



# Chemical pollution from hazardous substances must be reduced

More data and innovative technologies are needed for MIE to prevent their use, monitor and remove them from surface and groundwater

Usage-Class	SPECIFIC-POLLUTANTS-Causing-Failure-of-Good-Ecological-Status
Herbicides	AMPA-(glyphosate-metabolite),-Bentazone,-Bensulfuron-Methyl,-Chloridazon,-Dicamba,-Ethofumesate,-Flufenacet,-Glyphosate,-MCPA,-Metamitron,-Metolachlor,-Metolachlor-ESA,-Metribuzin,-Nicosulfuron,-Oxadiazon,-Pretilachlor,-Prometryne,-Propazine,-Quinclorac,-Terbuthylazine
Fungicides	Azoxystrobin,-Boscalid,-Dimetomorf,-Fenhexamid,-Metalaxyl,-Tebuconazole
Insecticides	Azinphos-methyl,-Dichlorvos,-Dimethoate,-Fenitrothion,-Imidacloprid,-Pirimicarb,-Thiacloprid,-Tiamethoxam,-Trifenylstannane
Heavy-Metals,	Arsenic,-Chromium
Industrial-Contaminants	PFBS-(perfluoroalkyl-substance,-PFOA-(analogue-of-PFBS)
Solvents	Chlorobenzene,-Dichlorobenzene,-Toluene

Usage-Class	PRIORITY-SUBSTANCES-Causing-Failure-of-Good-Chemical-Status
Insecticides	Chlorpyrifos,-Dichlorvos,-Hexachlorocyclohexane
Herbicides	Trifluralin
Fungicides	Hexachlorobenzene
Persistent-Organic-Pollutants-(POPs)	Pentachlorobenzene-(biocide,-POP),-PBDE-(flame-retardant),-PFOS-(perfluoroalkyl-substance),-DEHP-(phthalate-plasticizer)
Polycyclic-Aromatic-Hydrocarbons	Benzo(a)pyrene,-Benzo(b)fluoranthene,-Benzo(g,h,i)perylene,-Benzo(k)fluoranthene,-Fluoranthene,-Indeno(1,2,3-cd)pyrene
Heavy-Metals-and-Compounds	Cadmium,-Mercury,-Lead
Organic-Solvents	Chloroform
Surfactants	Nonylphenol,-Para-tert-octylphenol

## New knowledge and methods of investigation

### Macroplastic



### Microplastics



<https://www.adbpo.it/plastica/>







La ricerca dei contaminanti emergenti nel Po

16 stazioni lungo l'asta del fiume Po. Durata 12 mesi con frequenza trimestrale.

Ricerca di sostanze potenzialmente pericolose (farmaci, prodotti per la cura personale, pesticidi, ecc.) per l'ambiente e per la salute.

Elaborazione dati sullo stato ambientale, utili per la tutela della salute pubblica e la gestione delle fonti di inquinamento.

## Emerging Micropollutants (MIE)

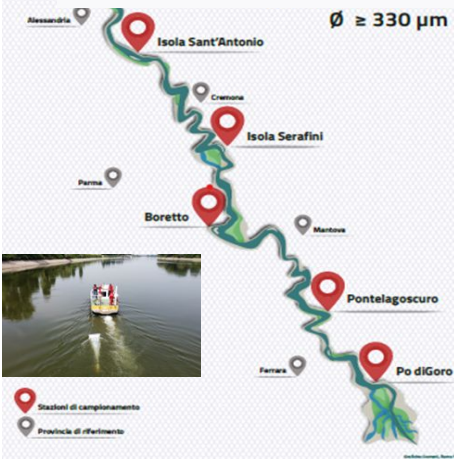


## The scientific research of microplastics in the Po River

### Manta River Project

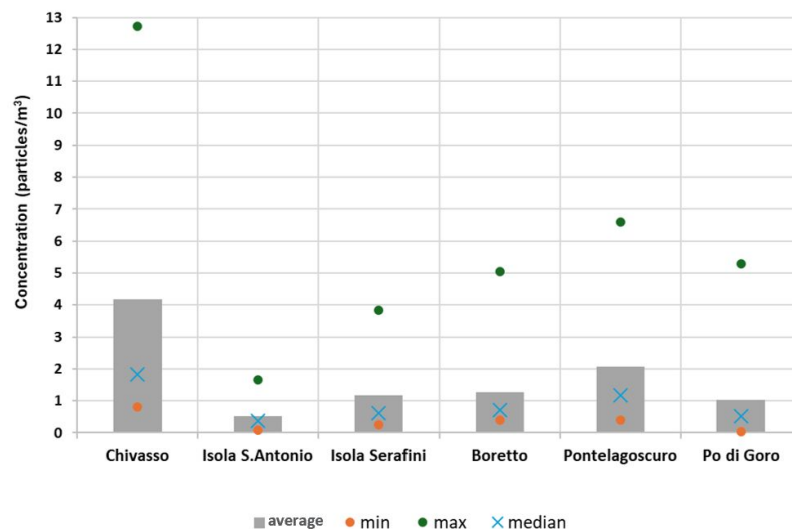
### Sampling and analysis of microplastics

$\phi \geq 330 \mu\text{m}$

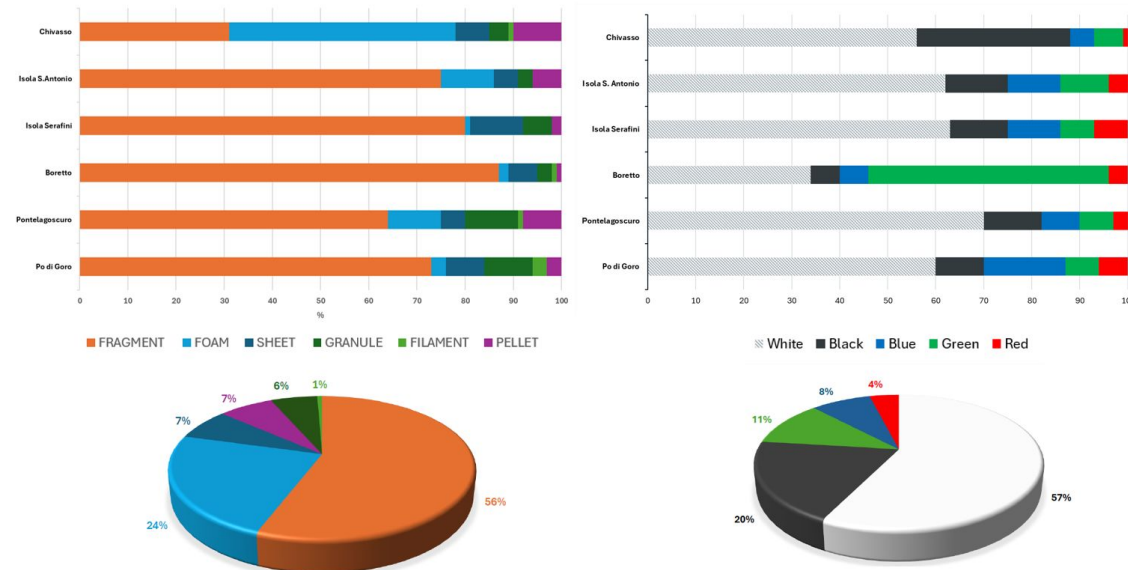


# Experimental results and conclusions

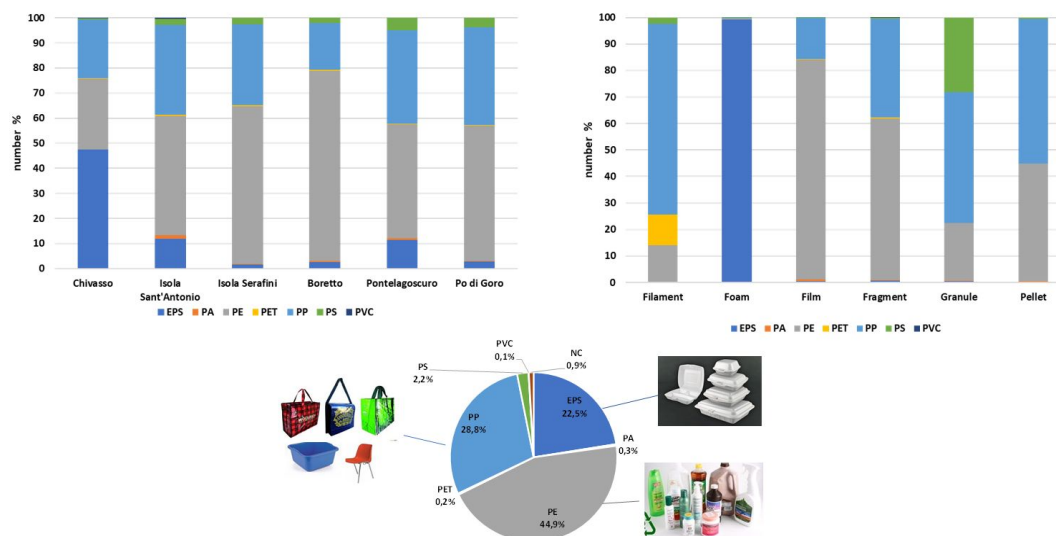
## Microplastic concentrations



## Distribution of collected MPs by category and colour



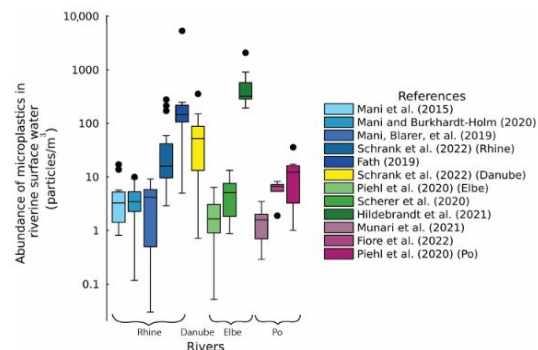
## Polymer distribution in sampling sites and in MP categories



## Conclusions

- Manta River Project 2 provided a first insight into the potential microplastic contribution that the River Po carries to the Adriatic Sea
- The MSFD protocol was first applied in the River Po
- The average microplastic concentration was in the range of  $4.2 \text{ n}^\circ/\text{m}^3$  and  $0.5 \text{ n}^\circ/\text{m}^3$
- In all stations the most frequent category was the *fragment*
- The three predominant polymers were: PE, PP, EPS
- HSI has been proven to be robust and efficient, also allowing to significantly reduce the analysis time for microplastic classification, compared to FT-IR/micro-FT-IR techniques
- The results show that the application of HSI to freshwater microplastics can be considered as an emerging suitable method for the characterization and classification of samples in a rapid, reliable and non-destructive way.
- The River Po District Basin Authority will use the obtained data to identify strategies for preventing plastic pollution in fresh and marine water.

Gao, S., Orlowski, N., Bopf, F. K., & Breuer, L. (2024). A review on microplastics in major European rivers. WIREs Water, 11(3), e1713. <https://doi.org/10.1002/wat2.171322> of 22 GAO ET AL .



Microplastics concentrations in the water phase (particles/m³) of the reviewed rivers in log-scale.

# Third six-year planning cycle in progress, the fourth one has started...

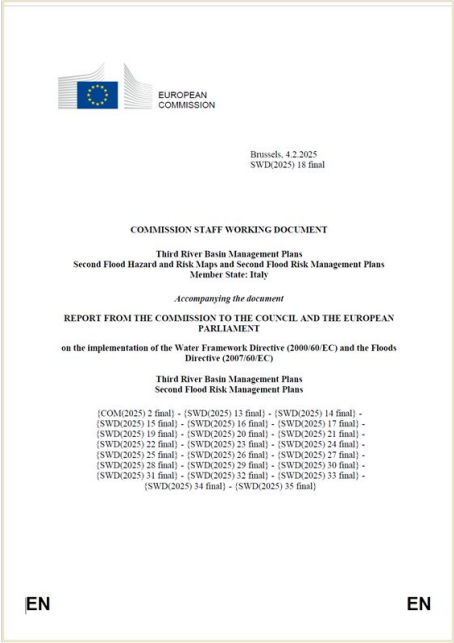


Piano di Gestione del distretto idrografico del fiume Po

2010

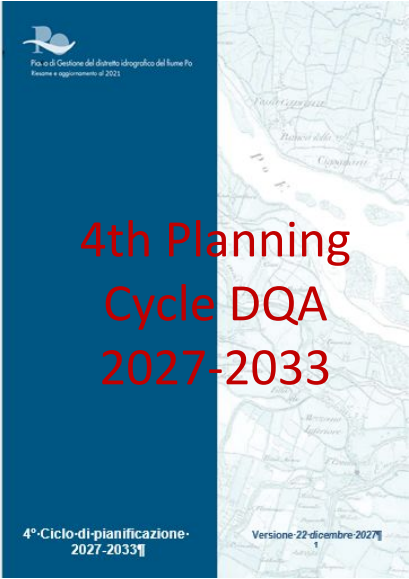
2015

2021



Review,  
started in  
December 2024

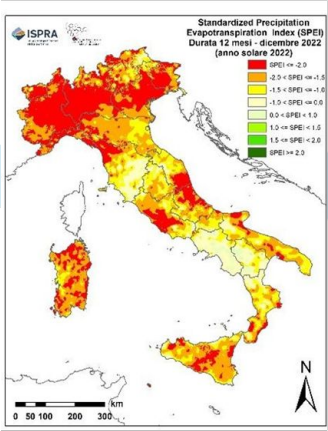
2027



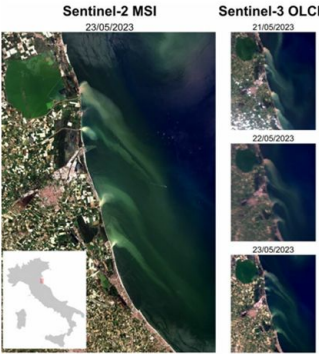
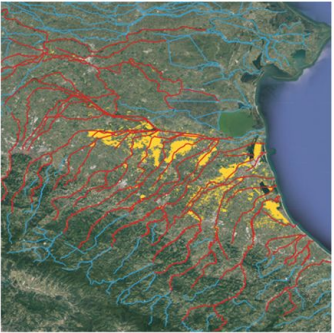
## IMPACT OF CLIMATE CHANGE ON WATER QUALITY

Water scarcity and prolonged drought 2022

Floods 2023-2024



May 2023: 129 river water bodies and 2 coastal marine water bodies

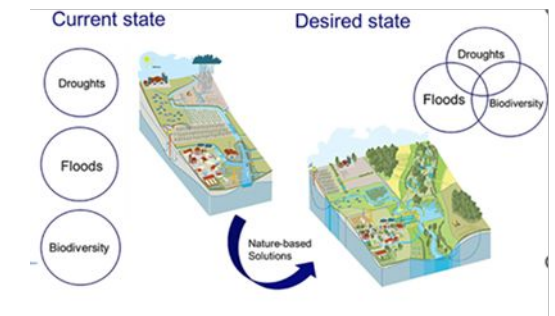


# PdGPO 2021 vs 2027: strategies and priorities

1. Increase resilience of water bodies: need to address diffuse pollution (nutrients, phytosanitary, other emerging chemical pollutants), quantitative aspects (from DMV to ecological flow, control of uses), hydromorphological changes in water bodies (promote natural retention measures, green infrastructure)
2. Ensure cross-sectoral integration: need to improve integration of Water policy objectives with other sectoral policies (Soil Defense, Agriculture, Natura 2000 Network, European Green Deal)
3. Invest in Plan measures: need to optimize existing human and financial resources and seize funding opportunities arising from the 2021-2027 European Funds (EAFRD, ESF, EMFF) or other possibilities (LIFE, Horizon Europe, EIB, Next Generation EU, etc.)
4. Implement the "polluter pays and user pays" principles: need to fully implement "Full recovery cost" principle (art.9 WFD) and possible revision of tariff and fees
5. Increase multidisciplinary knowledge: necessary to carry out research and studies to increase knowledge and develop innovative technologies, particularly to reduce environmental and socio-economic impacts of hydromorphological pressures, diffuse source pollutant loads, and new emergencies related to climate change and pandemic/human health risks



## Nature Based Solution



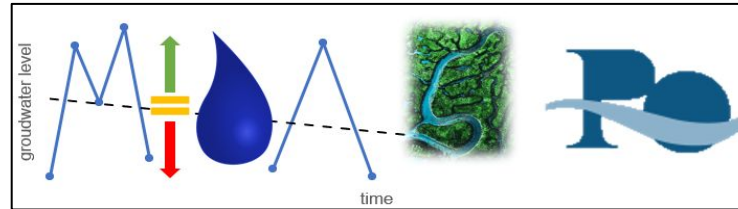
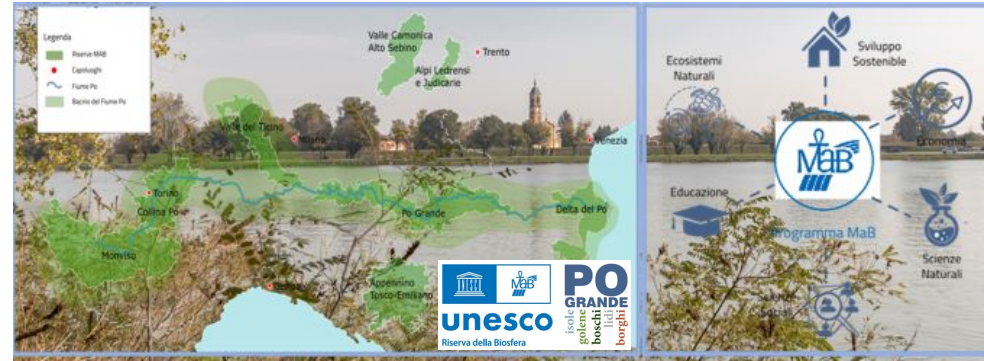


# STKs ENGAGEMENT

to face future challenges with innovation and social responsibility, widespread and shared



## Enza River Contract



**Protocollo d'intesa**  
Per la costituzione della Consulta per l'Agricoltura nel distretto idrografico del fiume Po

TRA

L'Autorità di Bacino distrettuale del fiume Po (d'ora in poi AdbPo), C.F. 92038990344, nella persona del Segretario Generale, Dottor Alessandro Bratti, domiciliato per la sua carica presso l'Autorità di Bacino distrettuale del fiume Po, Strada Garibaldi, 75 – 43121 Parma, nominato con DPCM 14 luglio 2022

E

Le seguenti associazioni:

Confederazione Generale dell'Agricoltura - Confagricoltura, C.F. 80077270587, nella persona del Presidente, Dottor Massimiliano Giansanti, domiciliato per la sua carica presso Confagricoltura, Corso Vittorio Emanuele II, 101 – 00186 Roma;

Confederazione Italiana Agricoltori - CIA -, C.F. 80213630587, nella persona del Presidente, Dottor Cristiano Fini, domiciliato per la sua carica presso CIA - Agricoltori Italiani, Via Mariano Fortuny, 20 – 00196 Roma;

Confederazione Nazionale Coltivatori Diretti - Coldiretti, nella persona del Presidente, Dottor Ettore Prandini, domiciliato per la sua carica presso Confederazione Nazionale Coltivatori Diretti - Coldiretti, Via XXIV Maggio, 43 – 00187 Roma;

Associazione Nazionale Bonifiche Irrigazioni Miglioramenti Fondiari - ANBI- C.F. 80069870584, nella persona del Presidente, P.A. Francesco Vincenzi, Via Di Santa Teresa, 23 – 00198 Roma;



<https://naturepositivenetwork.net/>



PROTOCOLLO DI INTESA



PROTOCOLLO DI INTESA

TRA

UTILITALIA

E

AUTORITA' DI BACINO DISTRETTUALE DEL FIUME PO







# Thank you for your attention

For further insights

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<https://www.adbpo.it/>

<https://pianoacque.adbpo.it/piano-di-gestione-2021/>

<https://pianoacque.adbpo.it/partecipazione-pubblica-2027/>

<https://www.adbpo.it/partecipazione-pubblica-2027/>

<https://www.pogrande.it/>

