LA QUALITA' DEGLI EFFLUENTI DEPURATI DAGLI IMPIANTI MM

Dott.ssa Francesca Pizza

Milano Nosedo WWTP

ORDINE DEGLI INGEGNERI
DELLA PROVINCIA DI MILANO

Università di Brescia

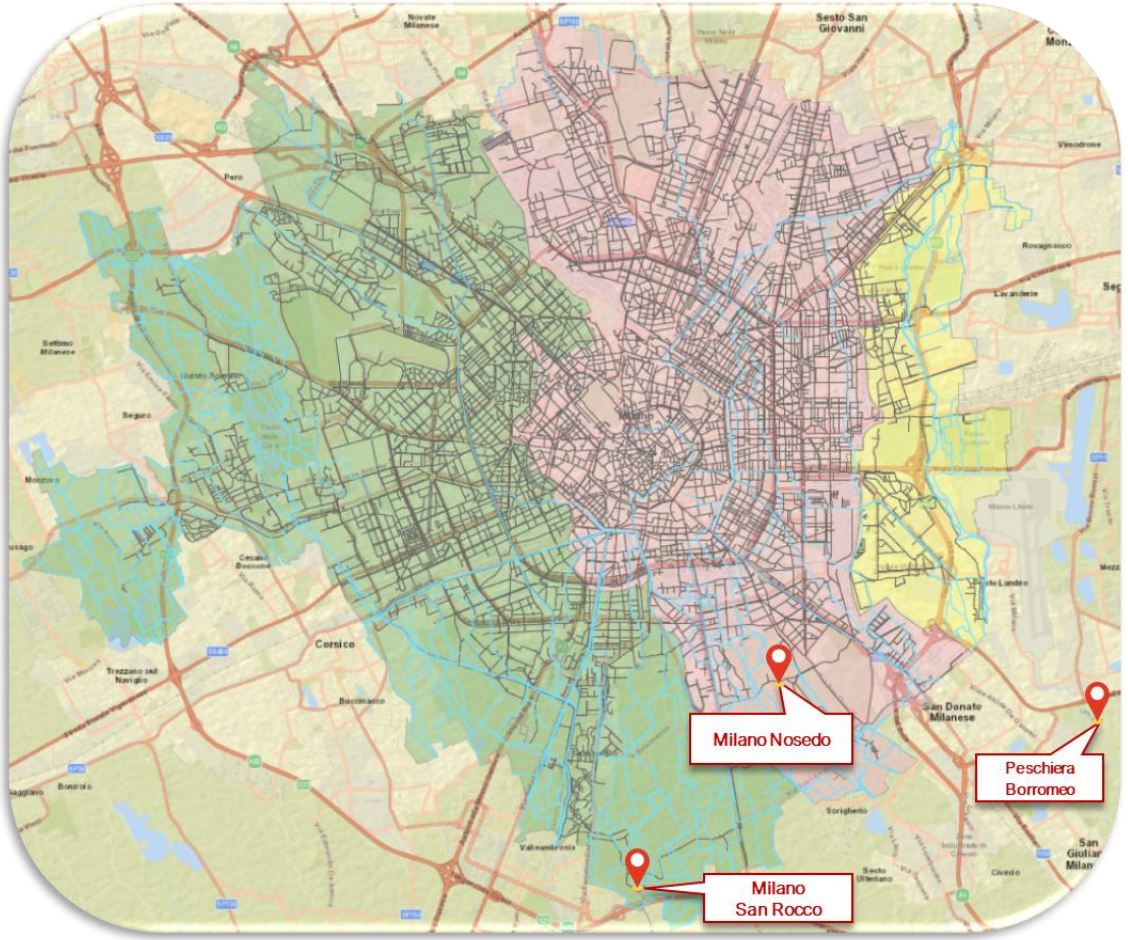
Gruppo di Lavoro
'Gestione impianti
di depurazione'

71ª Giornata di Studio
di Ingegneria Sanitaria-Ambientale

Riutilizzo in agricoltura delle acque reflue depurate: prospettive e opportunità

Milano e i suoi depuratori

- Suddivisione in 3 grandi bacini
- Bacino occidentale **Milano San Rocco:** 1.036.000 AE; 4 m^3/s media tempo secco; 12 m^3/s max tempo pioggia; 4 m^3/s a riuso irriguo
- Bacino centro orientale **Milano Nosedo:** 1.250.000 AE; 5 m^3/s media tempo secco; 15 m^3/s max tempo pioggia; 11 m^3/s a riuso irriguo
- Bacino residuale orientale **Peschiera Borromeo:** 250.000 AE; in gestione Gruppo CAP



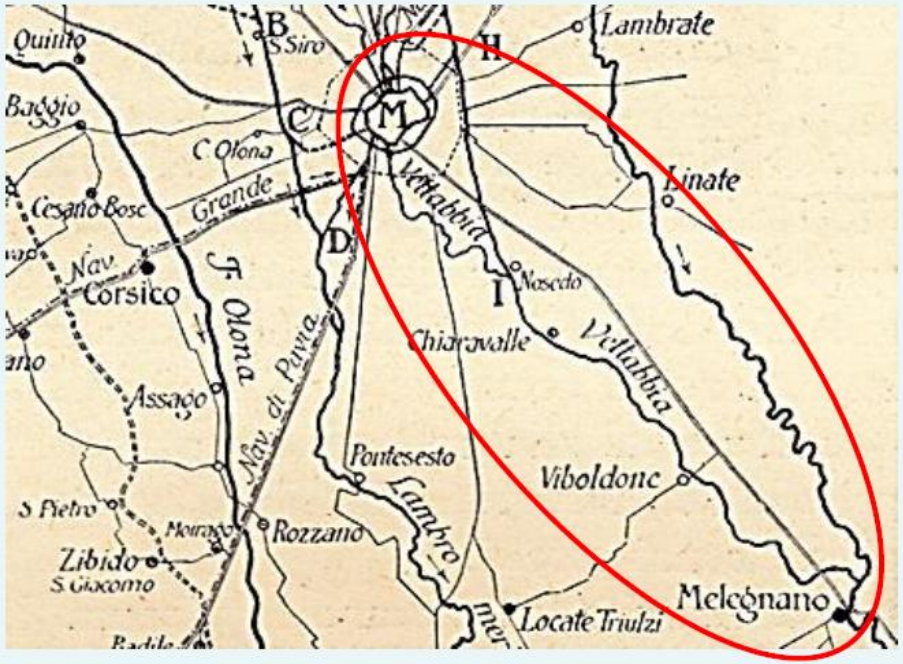
Riutilizzo - Le antiche origini del recupero delle acque reflue

Fino dall'epoca romana il principale emissario delle acque della città di Milano era la **Roggia Vettabbia**

Dal Medioevo In essa trovavano recapito anche le acque di rifiuto cittadine

Lungo il suo percorso tra **Milano e Melegnano** le acque della Vettabbia erano utilizzate per l'irrigazione di un **ampio comprensorio agricolo coltivato a marcita**

L'uso irriguo delle acque della Vettabbia è fatta risalire all'opera dei Monaci delle **Abbazie** di **Chiaravalle** e **Viboldone** (XII secolo)



*«quelli che più in particolar modo si distinsero nel promuovere l'irrigazione e migliorarne il metodo furono i monaci di **Chiaravalle** o Cistercensi, o quei di **Vicoboldone**, ossia gli Umiliati»*

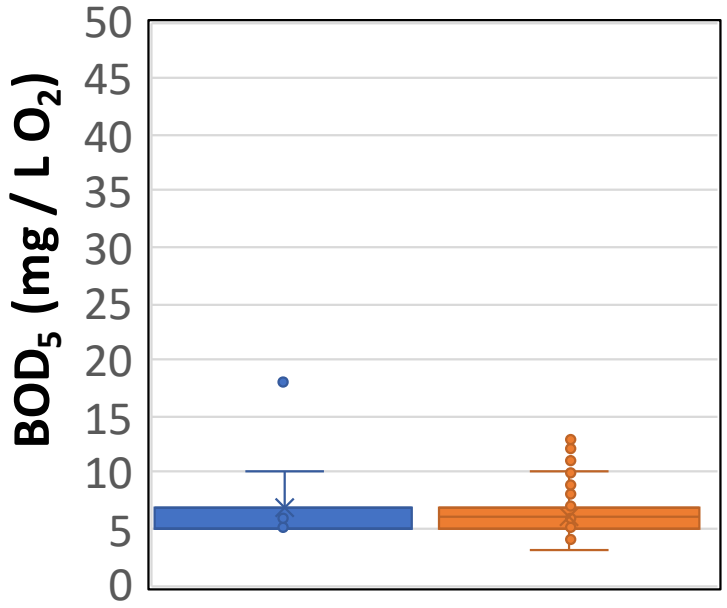
Domenico Berra – Dei prati del Basso Milanese detti a marcita – Milano 1822» in **F. Poggi – La Fognatura di Milano 1911**

Selected parameters

- **BOD**
- **COD**
- **Total phosphorous**
- **E. coli**
- **Metals (Nickel)**
- **Diclofenac**
- **Imidacloprid**
- **PFOA**
- **PFOS**
- **N_{tot}**
- **$N\text{-}NH_4$, $N\text{-}NO_3$**
- **Anionic surfactants**
- **Nonionic surfactants**
- **Phenols**
- **Total hydrocarbons**
- **Pesticides** (Aldrin, Endrin, Isodrin)

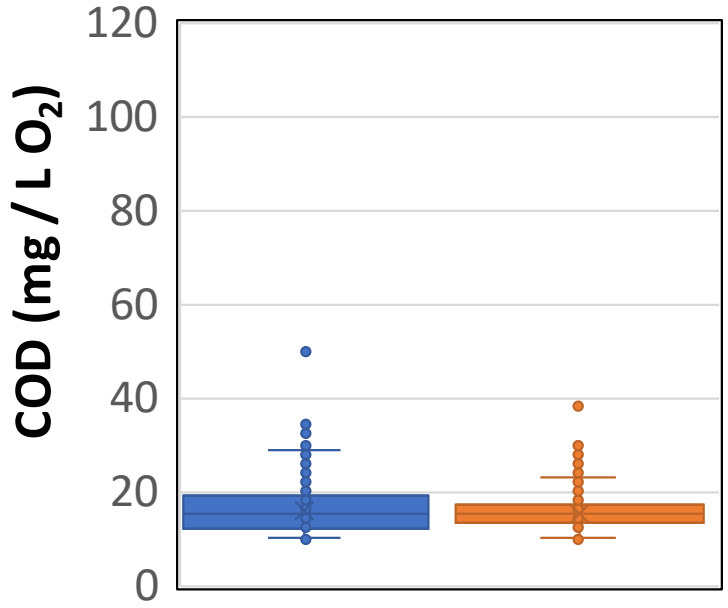
Methodological note: Values < LOQ were not considered.

BOD



WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	724	744
Av.	6.9	6.2
n data< LOQ	99%	55%
LOQ	< 5	< 5

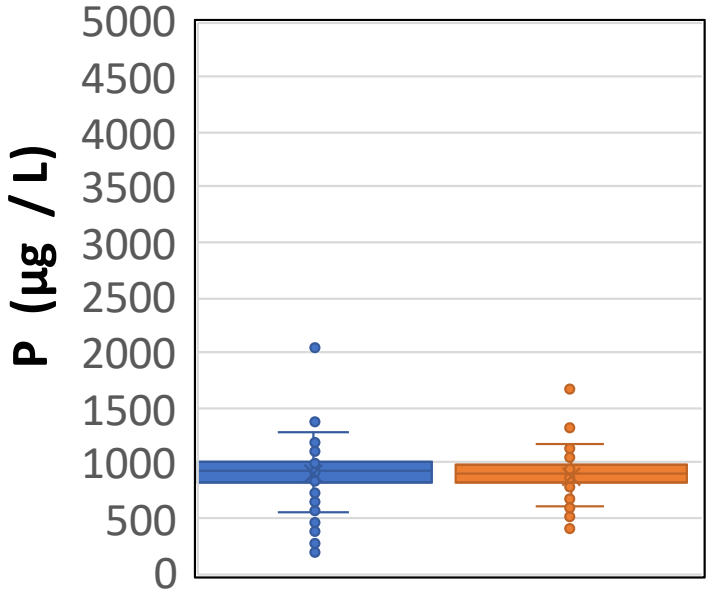
COD



WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	814	843
Av.	16.0	15.2
n data< LOQ	22%	26%
LOQ	<10	< 10

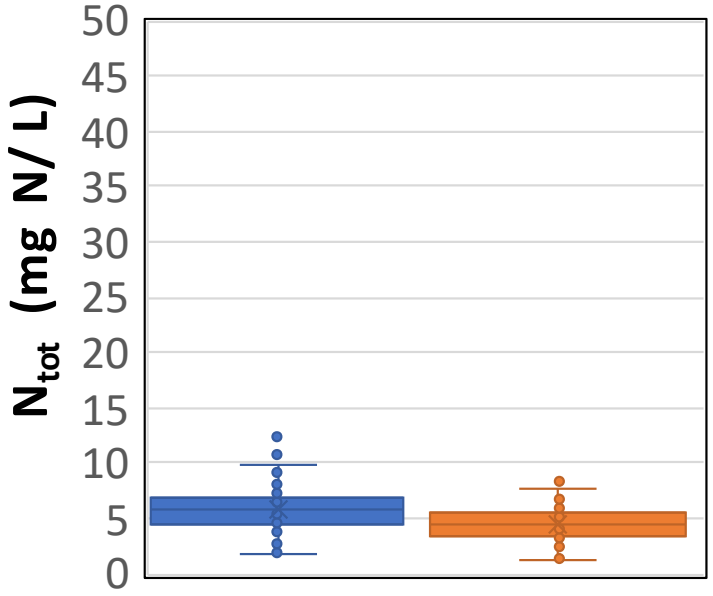
Università di Brescia

P_{tot}



WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	793	822
Av.	905.9	888.0
n data< LOQ	0%	0%
LOQ		

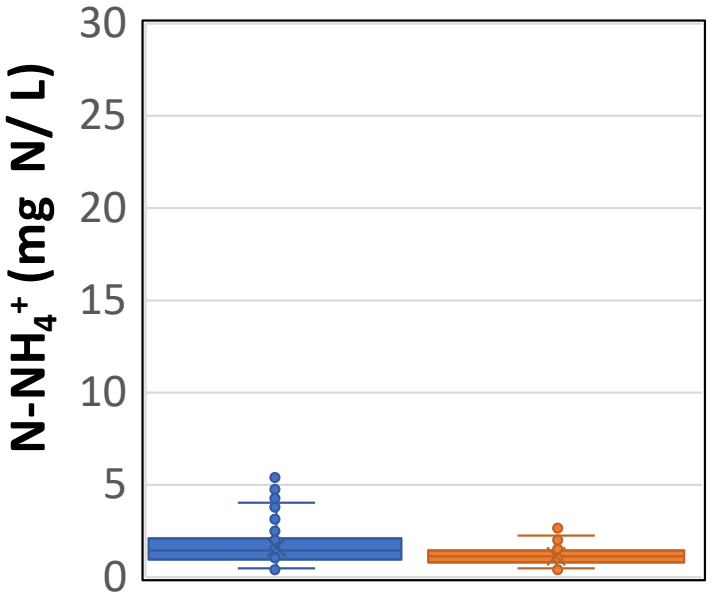
N_{tot}



WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	793	822
Av.	5.7	4.4
n data< LOQ	0%	0%
LOQ		

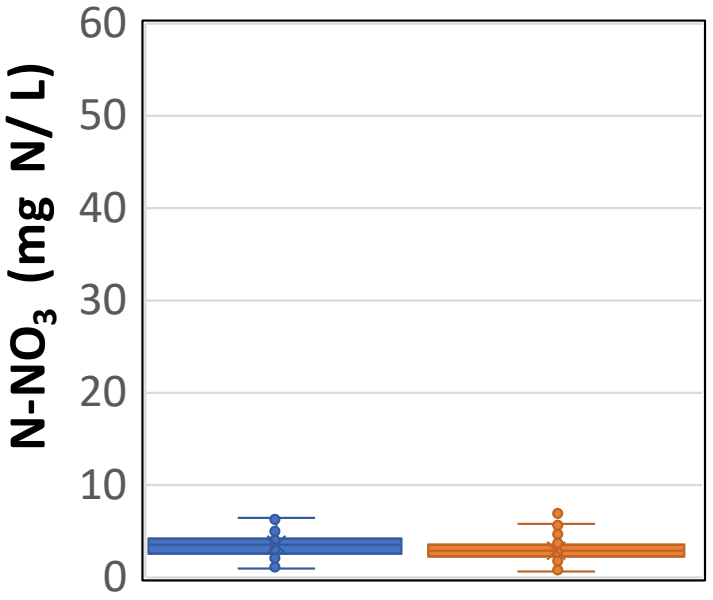
Università di Brescia

$N\text{-}NH_4$



WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	793	822
Av.	1.6	1.1
n data< LOQ	30%	32%
LOQ	<0.5	< 0.5

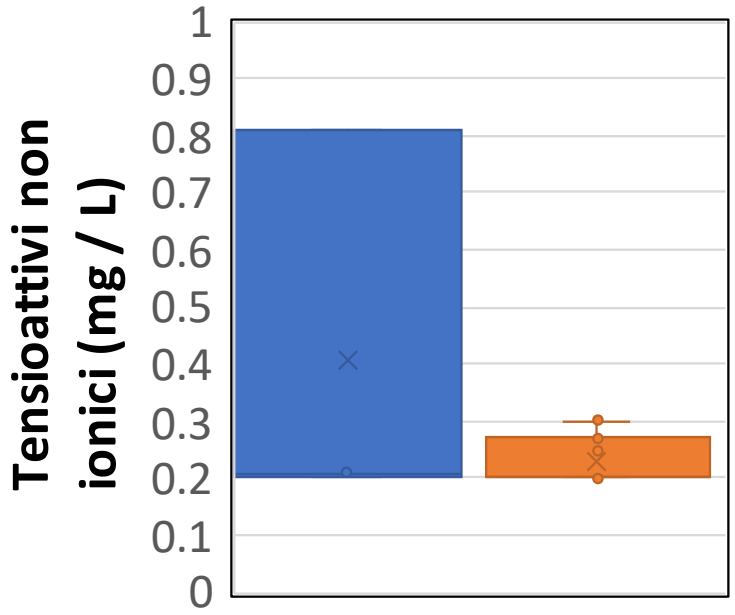
$N\text{-}NO_3$



WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	793	821
Av.	3.4	2.9
n data< LOQ	0%	0%
LOQ		

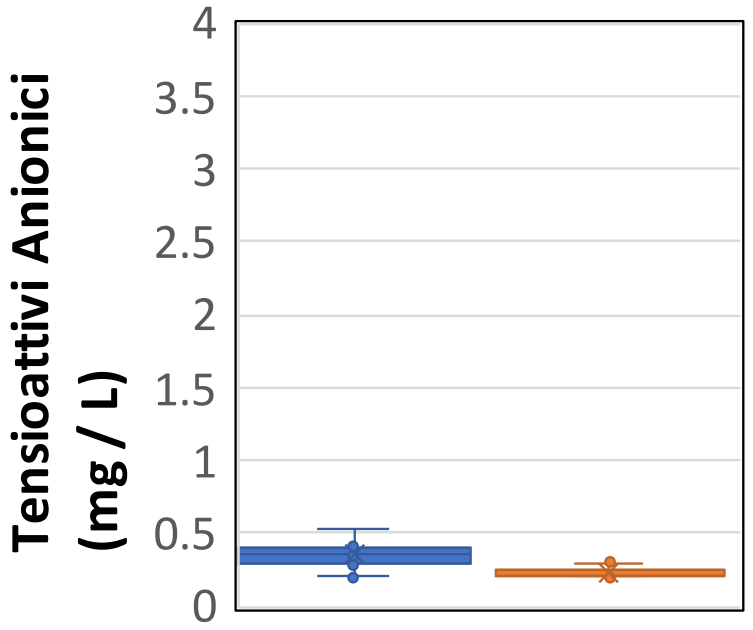
Università di Brescia

Nonionic surfactants



WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	147	150
Av.	0.4	0.2
n data< LOQ	98%	90%
LOQ	< 0.2	< 0.2

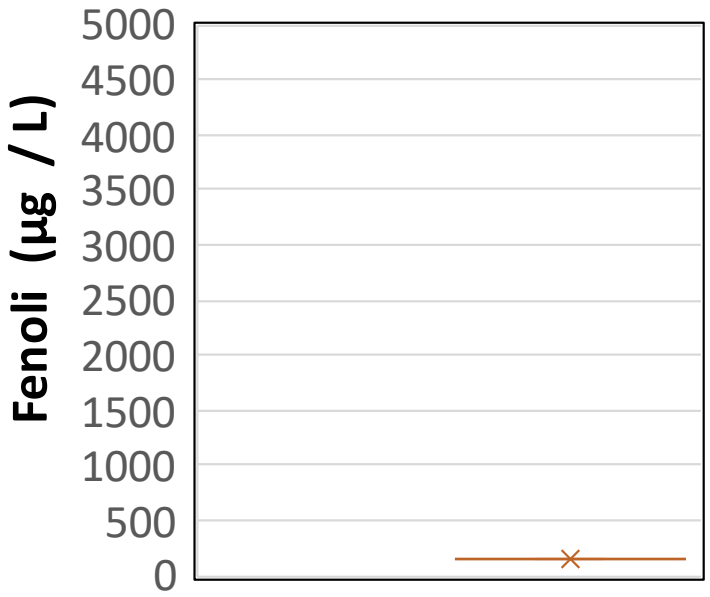
Anionic surfactants



WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	147	150
Av.	0.3	0.2
n data< LOQ	69%	90%
LOQ	< 0.2	< 0.2

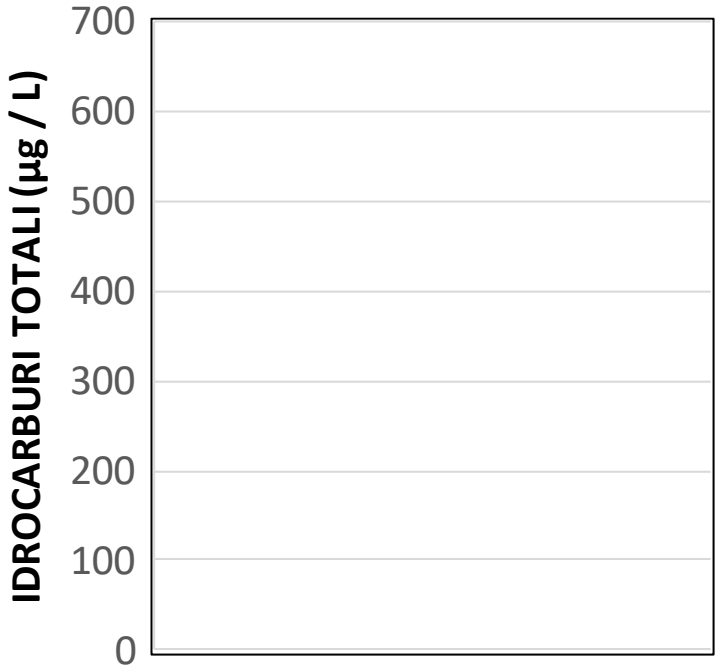
Università di Brescia

Phenols



WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	6	18
Av.	#N/A	148.0
n data< LOQ	100%	94%
LOQ	< 100	< 100

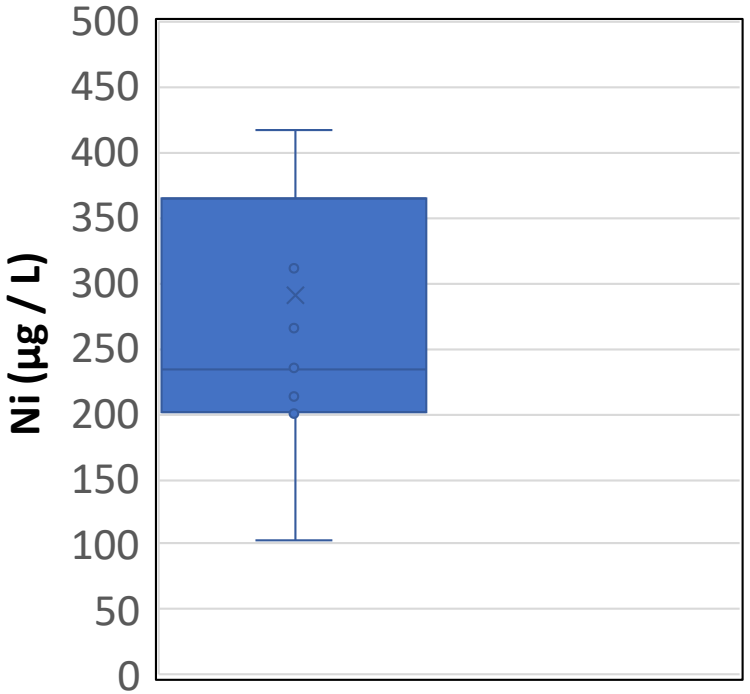
Total hydrocarbons



WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	6	18
Av.	#N/A	#N/A
n data< LOQ	100%	100%
LOQ	1000	1000

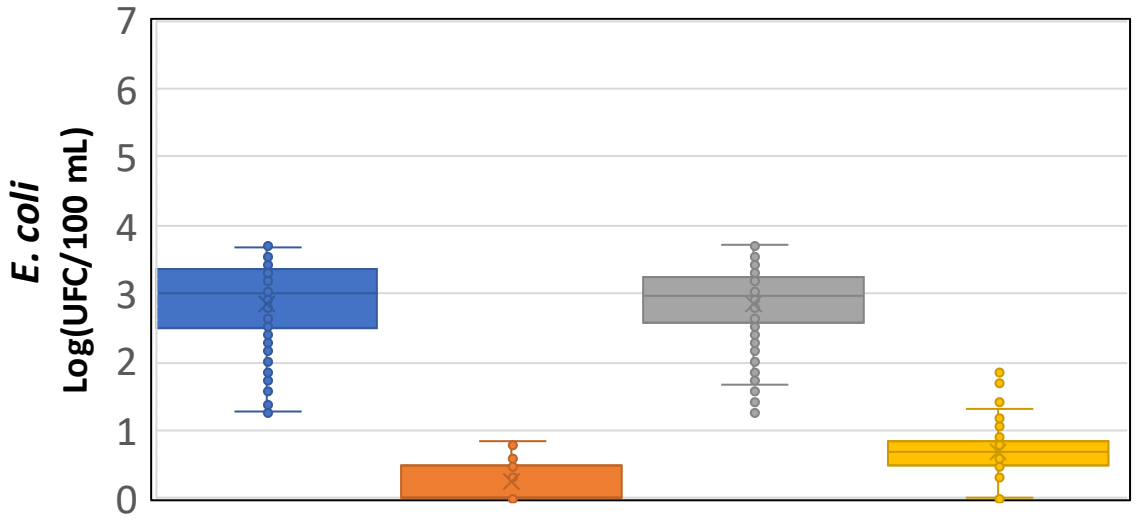
Università di Brescia

Nickel



WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	646	820
Av.	291	#N/A
n data< LOQ	99%	100%
LOQ	100	100

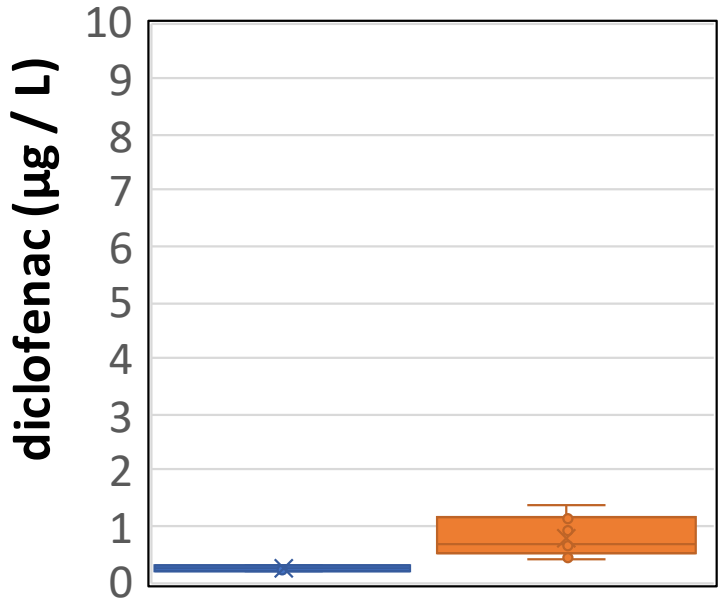
E. coli



WWTPs	SAN ROCCO	SAN ROCCO	NOSEDO	NOSEDO
Period	non-irrigation	irrigation	non-irrigation	irrigation
PE	1,050,000	1,050,000	1,250,000	1,250,000
n data	695	161	382	343
Av.	2.9	0.2	2.9	0.7
n data< LOQ	6%	83%	4%	27%
LOQ	<10	<1; <3	<10	<1; <3

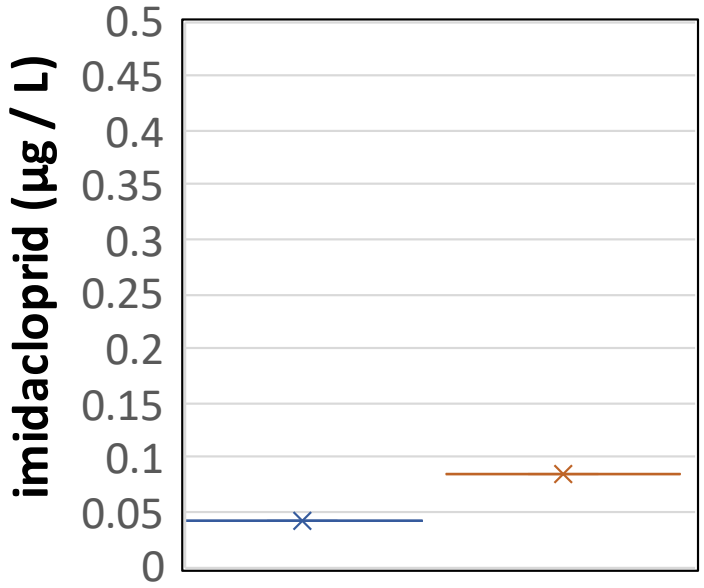
Università di Brescia

Diclofenac



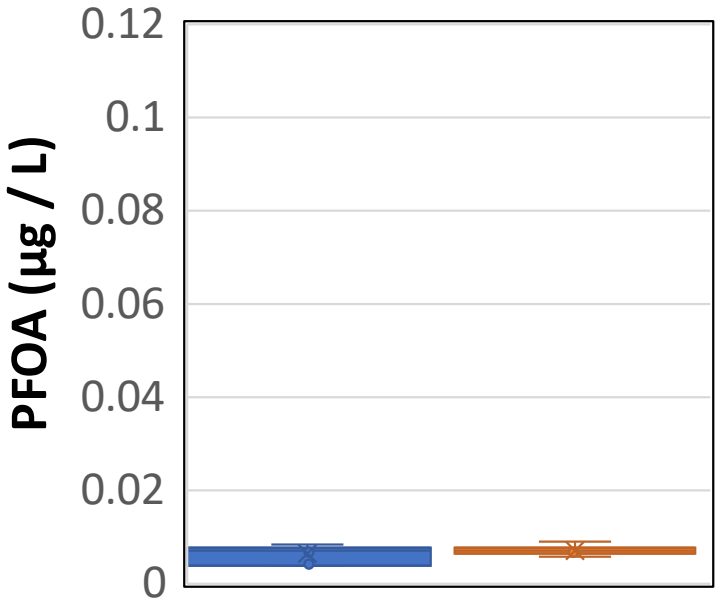
WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	5	10
Av.	0.2	0.8
n data< LOQ	0%	0%
LOQ	< 0.00128	< 0.00128

Imidacloprid



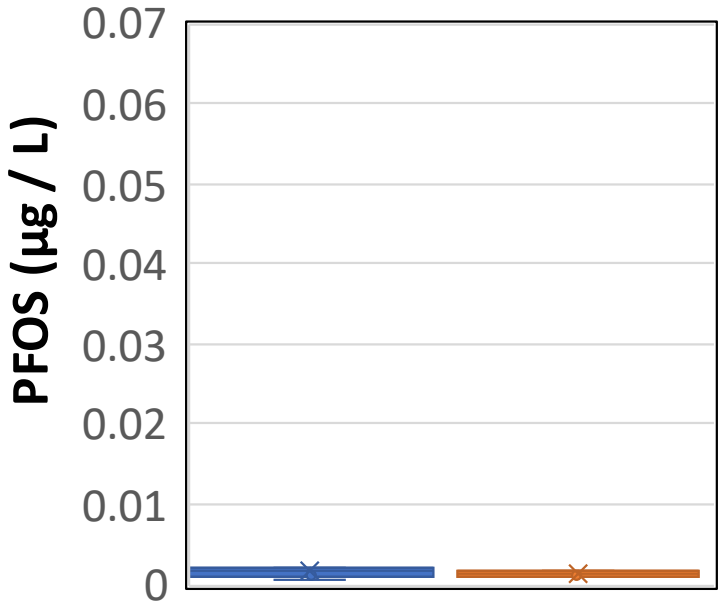
WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	1	1
Av.	0.0	0.1
n data< LOQ	0%	0%
LOQ		

PFOA



WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	7	8
Av.	0.006	0.007
n data< LOQ	0%	0%
LOQ		

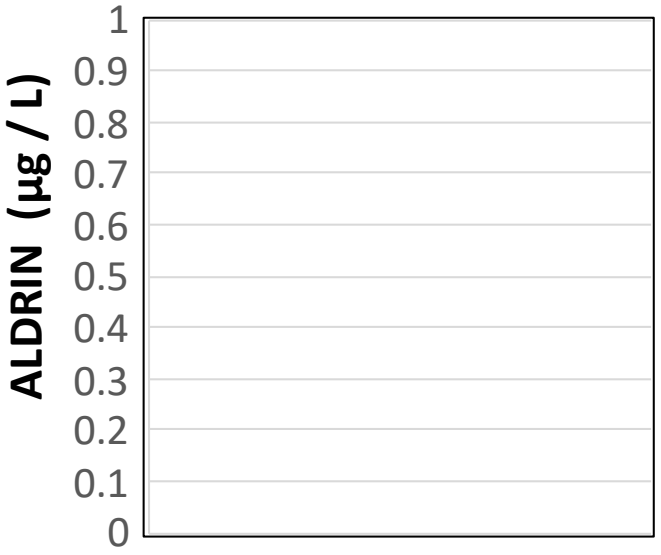
PFOS



WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	7	8
Av.	0.002	0.001
n data< LOQ	14%	25%
LOQ	<0.00126	< 0.00126

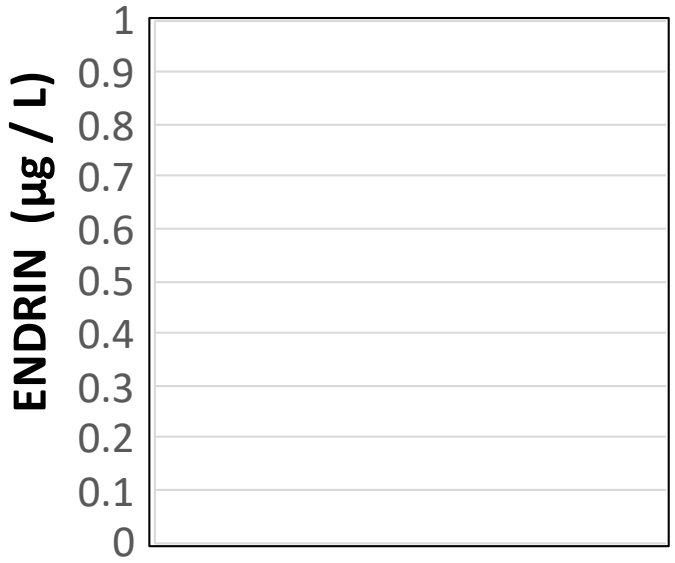
Università di Brescia

Aldrin



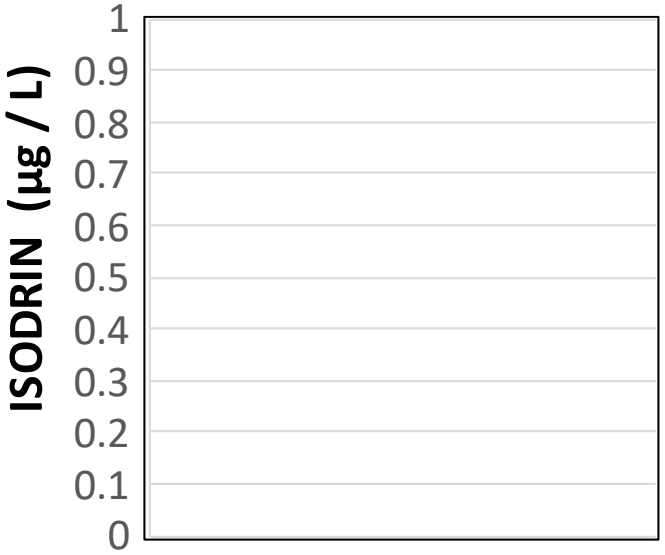
WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	6	18
Av.	#N/A	#N/A
n data< LOQ	100%	100%
LOQ	< 1	< 1

Endrin



WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	6	18
Av.	#N/A	#N/A
n data< LOQ	100%	100%
LOQ	< 1	< 1

Isodrin



WWTPs	SAN ROCCO	NOSEDO
PE	1,050,000	1,250,000
n data	6	18
Av.	#N/A	#N/A
n data< LOQ	100%	100%
LOQ	< 1	< 1

Water reuse: high on the political agenda

- Water resilience is one of the flagship initiatives of this Commission
- Water reuse contributes directly to the Water Resilience Strategy and the circular economy agenda
- It is increasingly relevant for resilience, competitiveness and strategic sectors
- Political attention remains high, including in high-level meetings, stakeholder engagement and requests to identify barriers
- Links with wider EU priorities: energy, security, fertilisers and bioeconomy

European Commission

GRAZIE PER L'ATTENZIONE

www.mmspa.eu