Acque Veronesi

Lo stato delle acque in provincia di Verona

Il sistema di approvvigionamento provinciale, le variazioni nel tempo della qualità delle falde, i controlli dell'Ente Gestore, i punti di criticità.

Mario dal Grande

Acque Veronesi

69 COMUNI

74 Sorgenti

719.000 ABITANTI

5200 km RETE

113 campi pozzi

105 MLN m^3

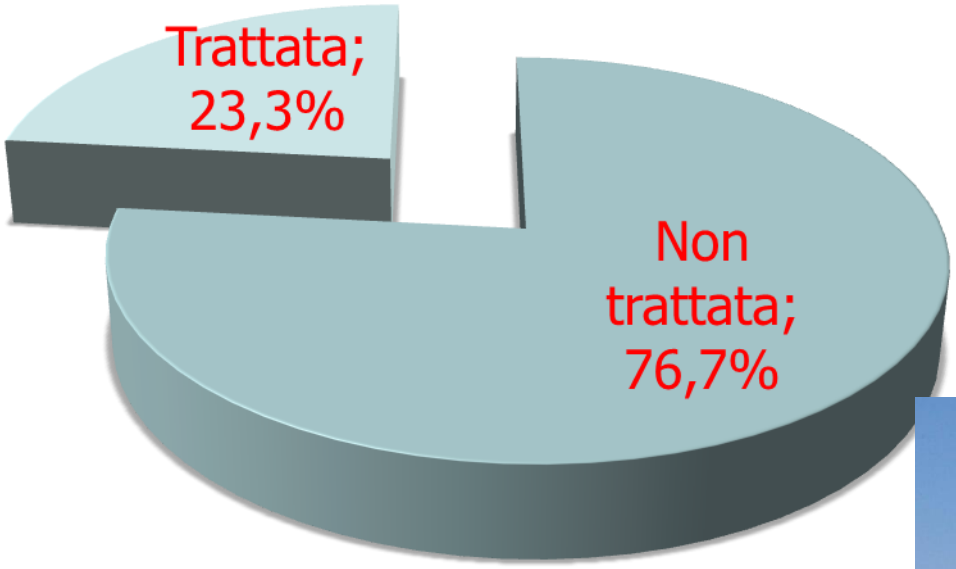
I numeri di Acque Veronesi

TIPOLOGIA DI PRELIEVO	[m³/anno]		VALORE %	
	2011	2012	2011	2012
Emungimento potabile da falda profonda	75.300.497	78.413.175	73,3%	74,5%
Emungimento non potabile da falda profonda	25.099.368	24.511.598	24,4%	23,3%
Prelievo da sorgenti	2.358.296	2.277.938	2,3%	2,2%
Totale	**102.758.161**	**105.202.711**	**100%**	**100%**

97,8%

Sono stati prelevati dall'ambiente complessivamente 105,2 milioni di m^3 di acqua: l'emungimento è avvenuto per il 97,8% da falde acquifere e per il 2,2% da sorgenti.

Potabilizzazione acqua



27 impianti di potabilizzazione

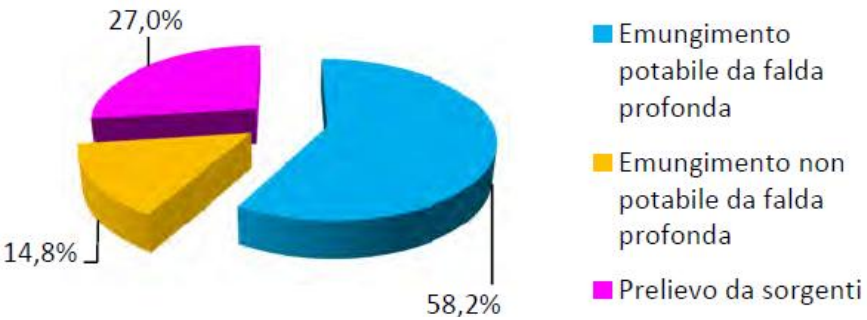
La quantità di risorsa idrica potabile prelevata è pari a 80,7 milioni di m^3, mentre la quantità che necessita di un processo di potabilizzazione è pari a 24,5 milioni di m^3.

TIPOLOGIA DI PRELIEVO	[m³/anno]		VALORE %	
DISTRETTO MONTANO	2011	2012	2011	2012
Emungimento potabile da falda profonda	3.321.509	3.300.476	47,9%	58,2%
Emungimento non potabile da falda profonda	1.931.899	839.362	27,9%	14,8%
Prelievo da sorgenti	1.682.811	1.531.927	24,3%	27,0%
Totale	**6.936.219**	**5.671.764**	**100%**	**100%**

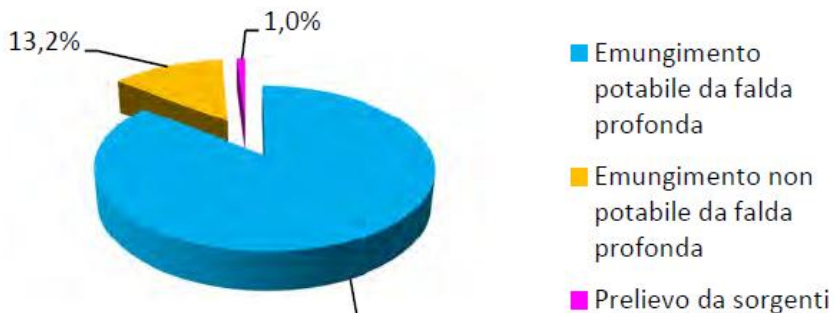
TIPOLOGIA DI PRELIEVO	[m³/anno]		VALORE %	
DISTRETTO PEDEMONTANO	2011	2012	2011	2012
Emungimento potabile da falda profonda	63.279.605	65.554.499	86,1%	85,8%
Emungimento non potabile da falda profonda	9.564.255	10.111.460	13,0%	13,2%
Prelievo da sorgenti	675.485	746.011	0,9%	1,0%
Totale	**73.519.345**	**76.411.970**	**100%**	**100%**

TIPOLOGIA DI PRELIEVO	[m³/anno]		VALORE %	
DISTRETTO PIANURA	2011	2012	2011	2012
Emungimento potabile da falda profonda	8.699.383	9.558.200	39,0%	41,3%
Emungimento non potabile da falda profonda	13.603.214	13.560.776	61,0%	58,7%
Totale	**22.302.597**	**23.118.976**	**100%**	**100%**

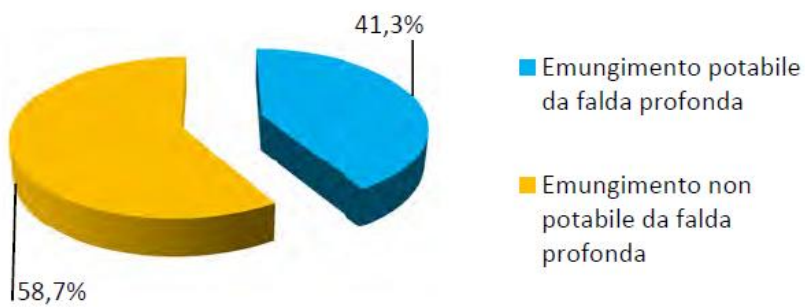
Tipologia Emungimento Distretto Montano

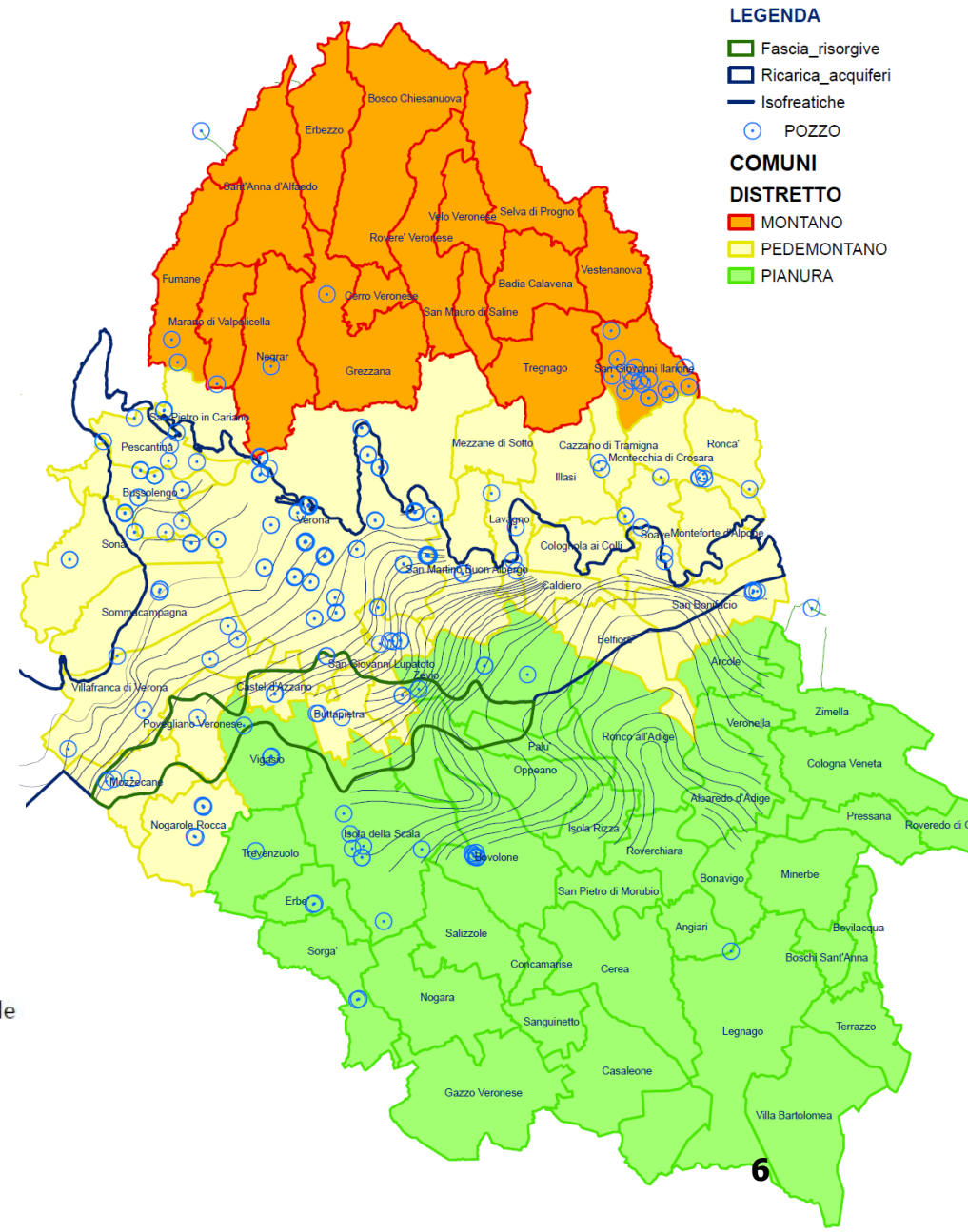


Tipologia Emungimento Distretto Pedemontano



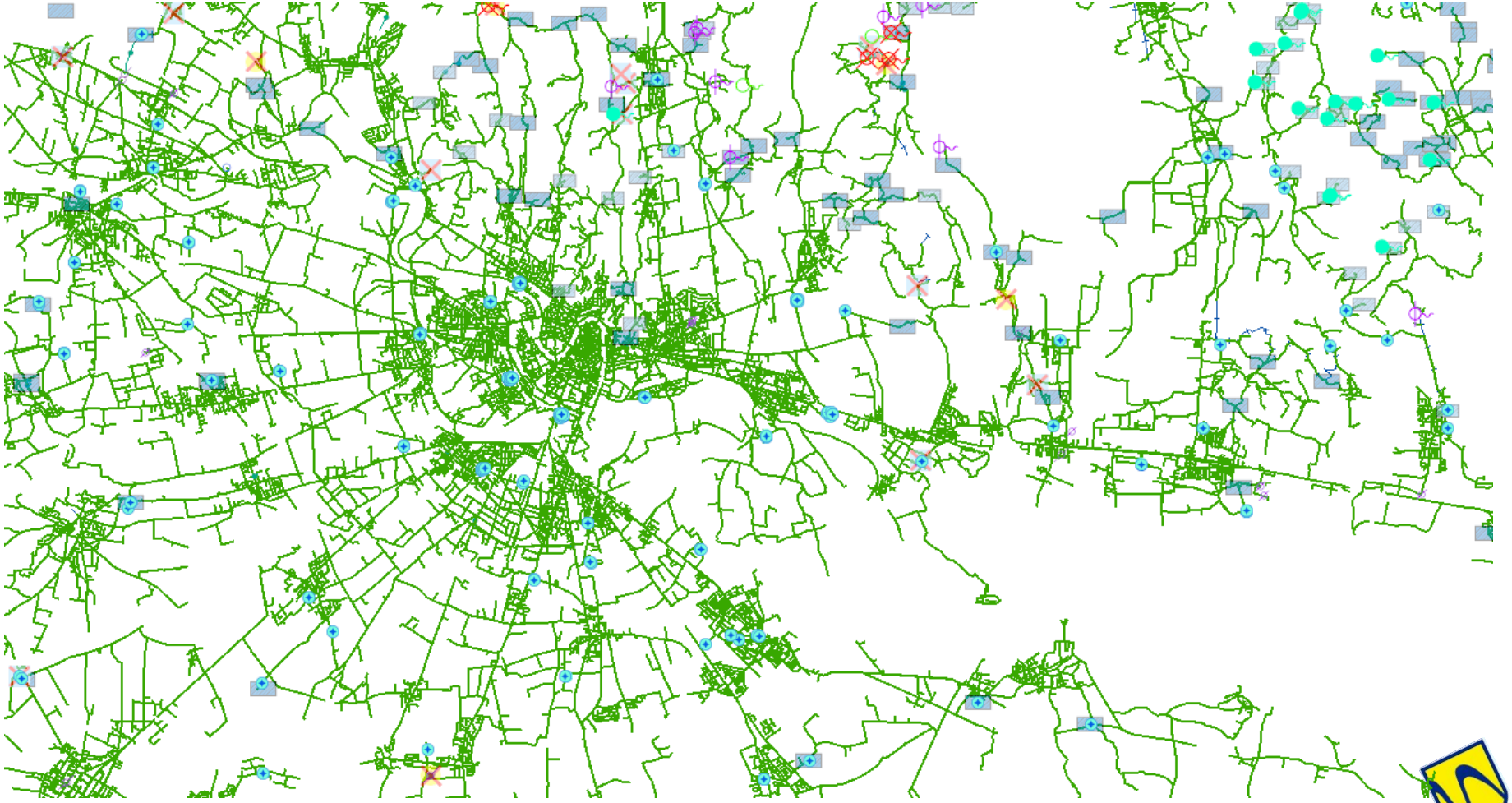
Tipologia Emungimento Distretto Pianura



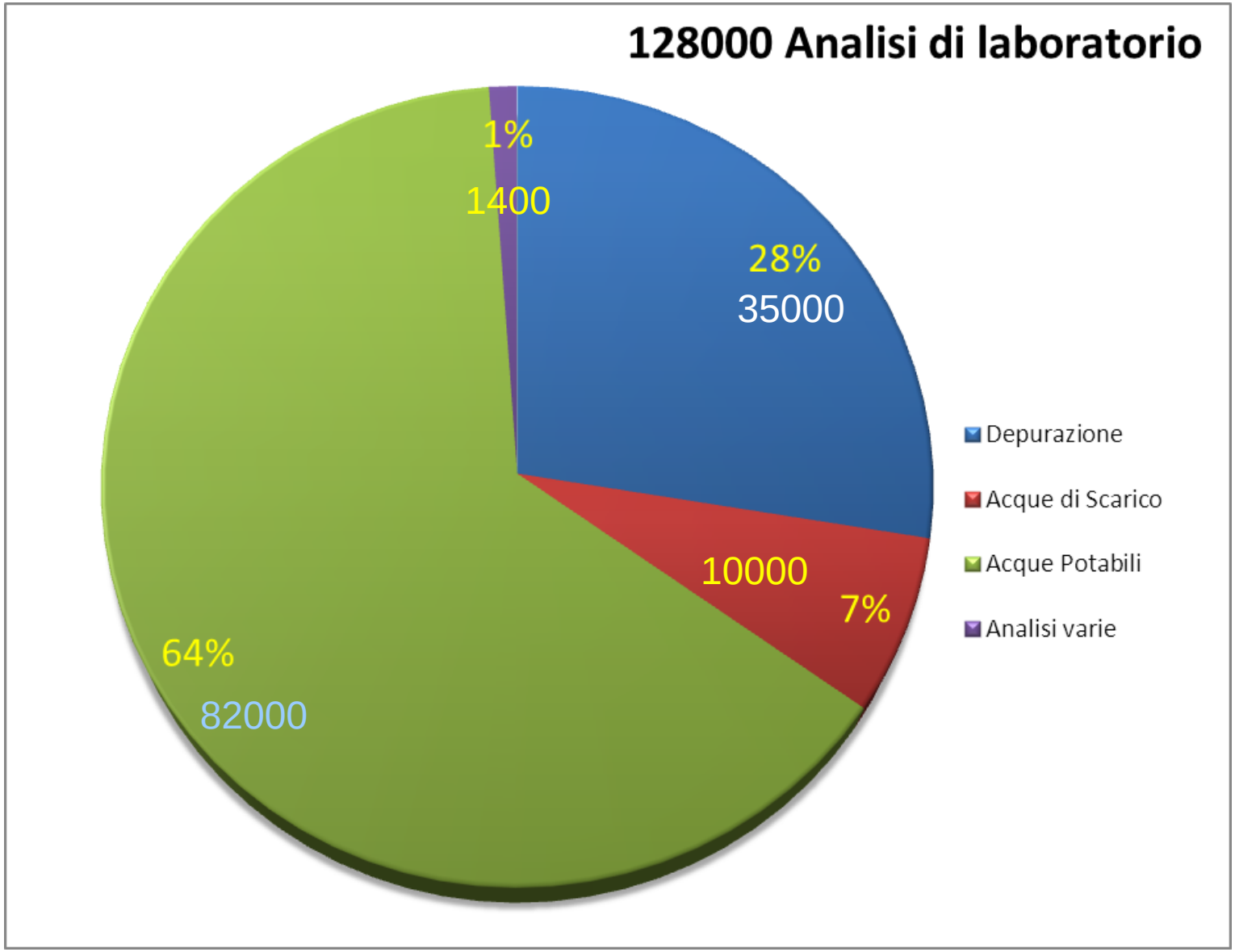


5200 km rete acquedotto
2500 km rete fognatura

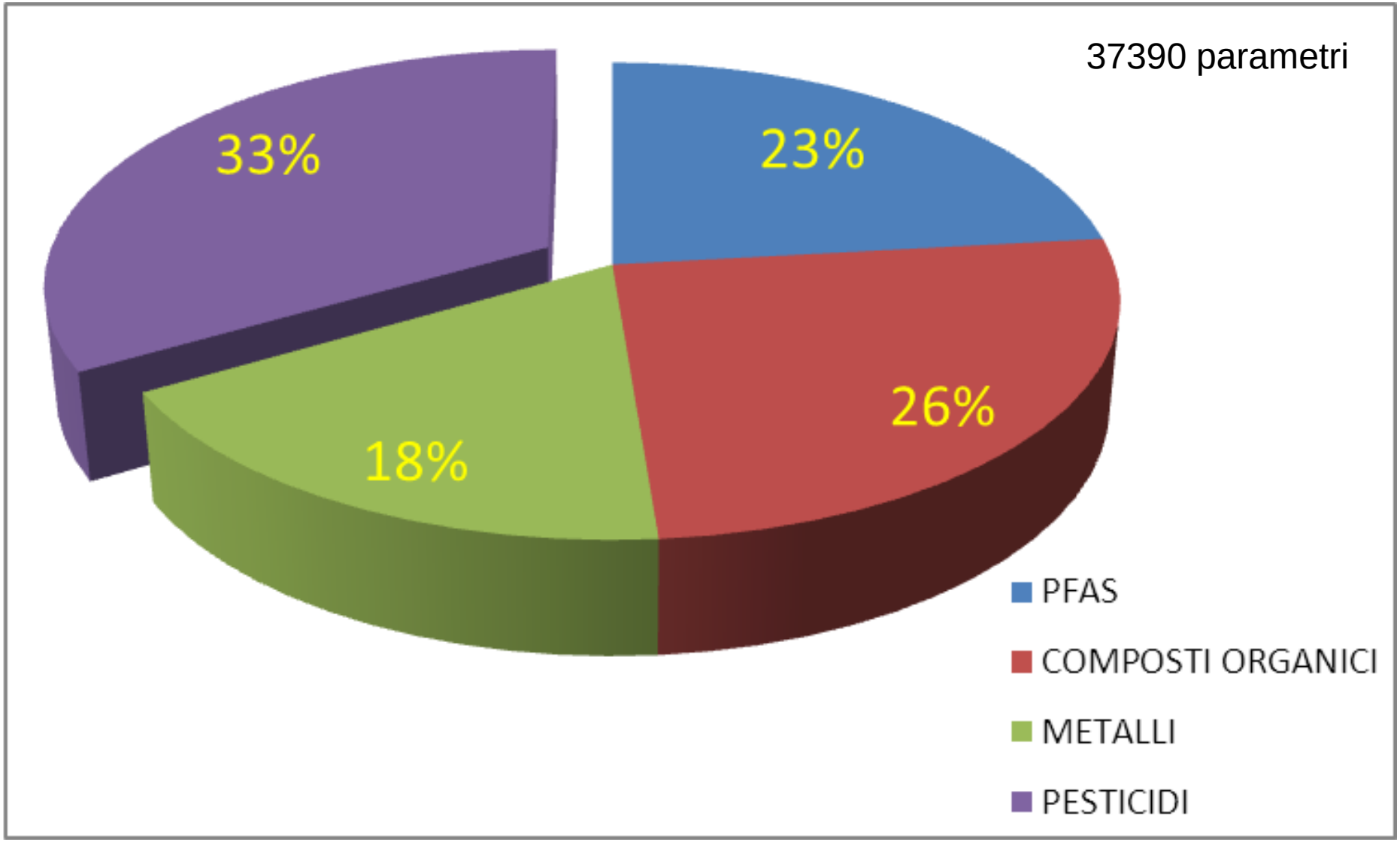
Estratto cartografia di Acque Veronesi



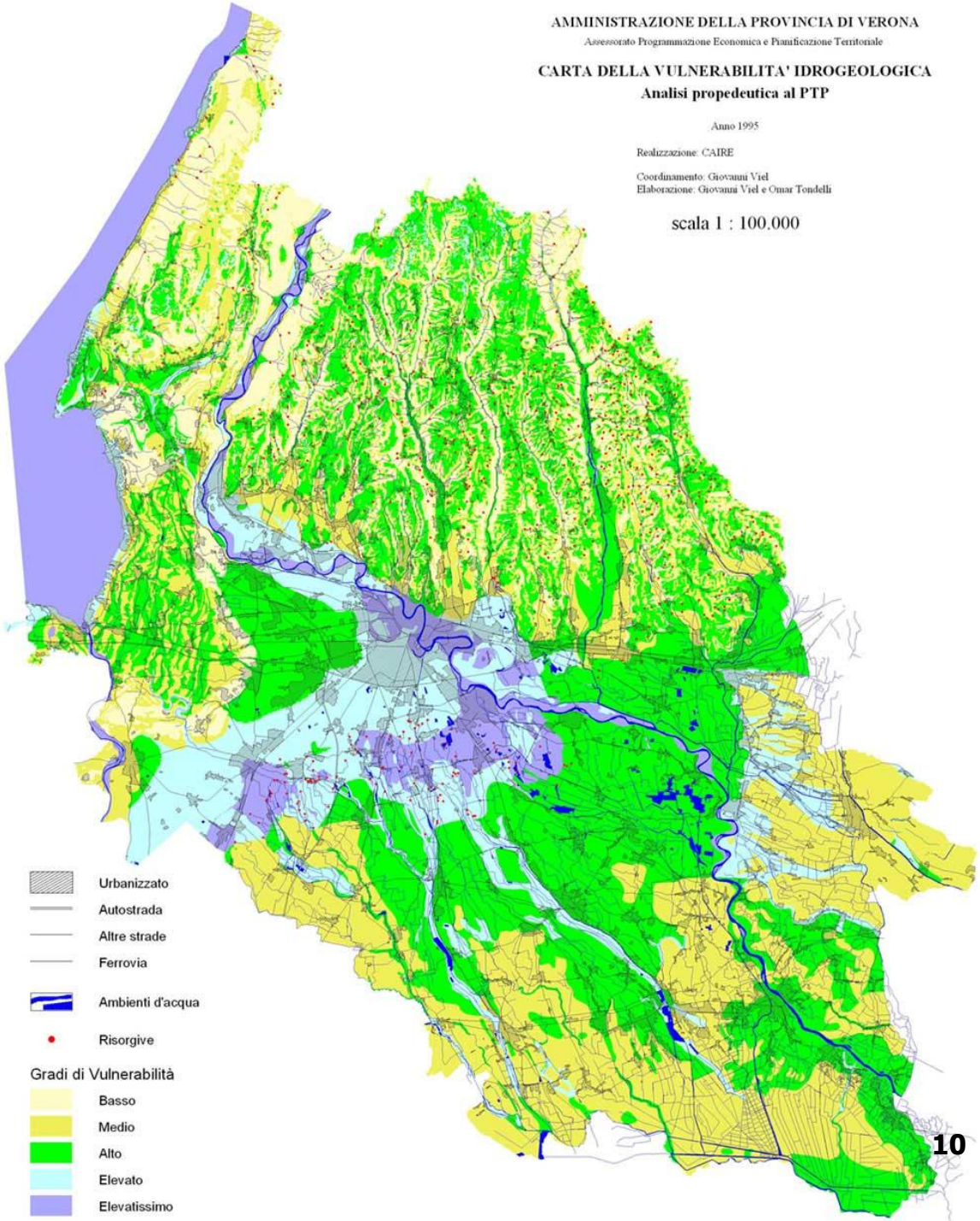
Analisi laboratorio 2013



Analisi chimiche 2013 (microinquinanti)



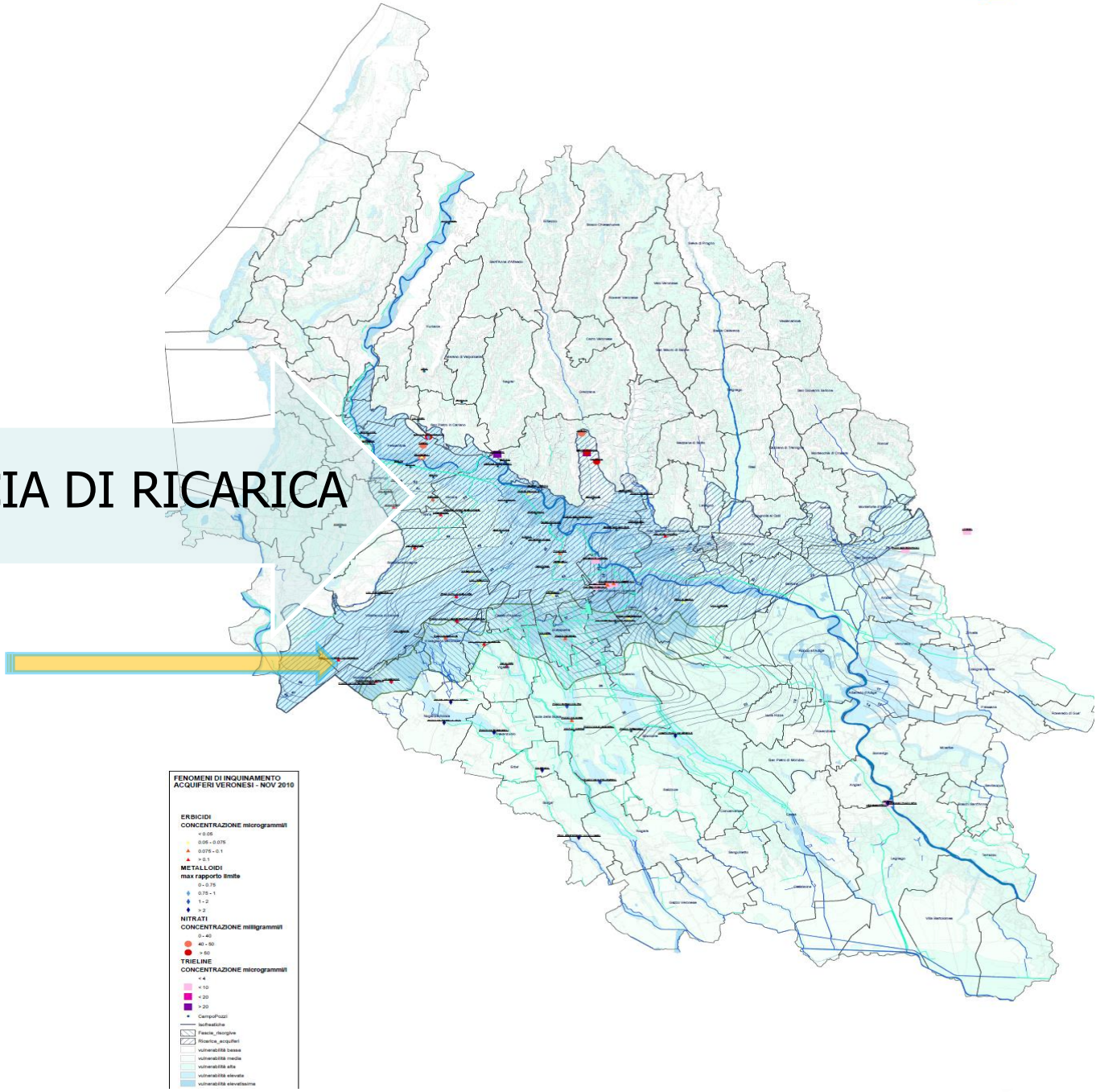
Carta vulnerabilità idrogeologica provincia di Verona
(analisi propedeutica al piano territoriale provinciale)



Cartografia di Acque Veronesi

FASCIA DI RICARICA

FASCIA DELLE RISORGIVE



Piezometria Provincia di Verona

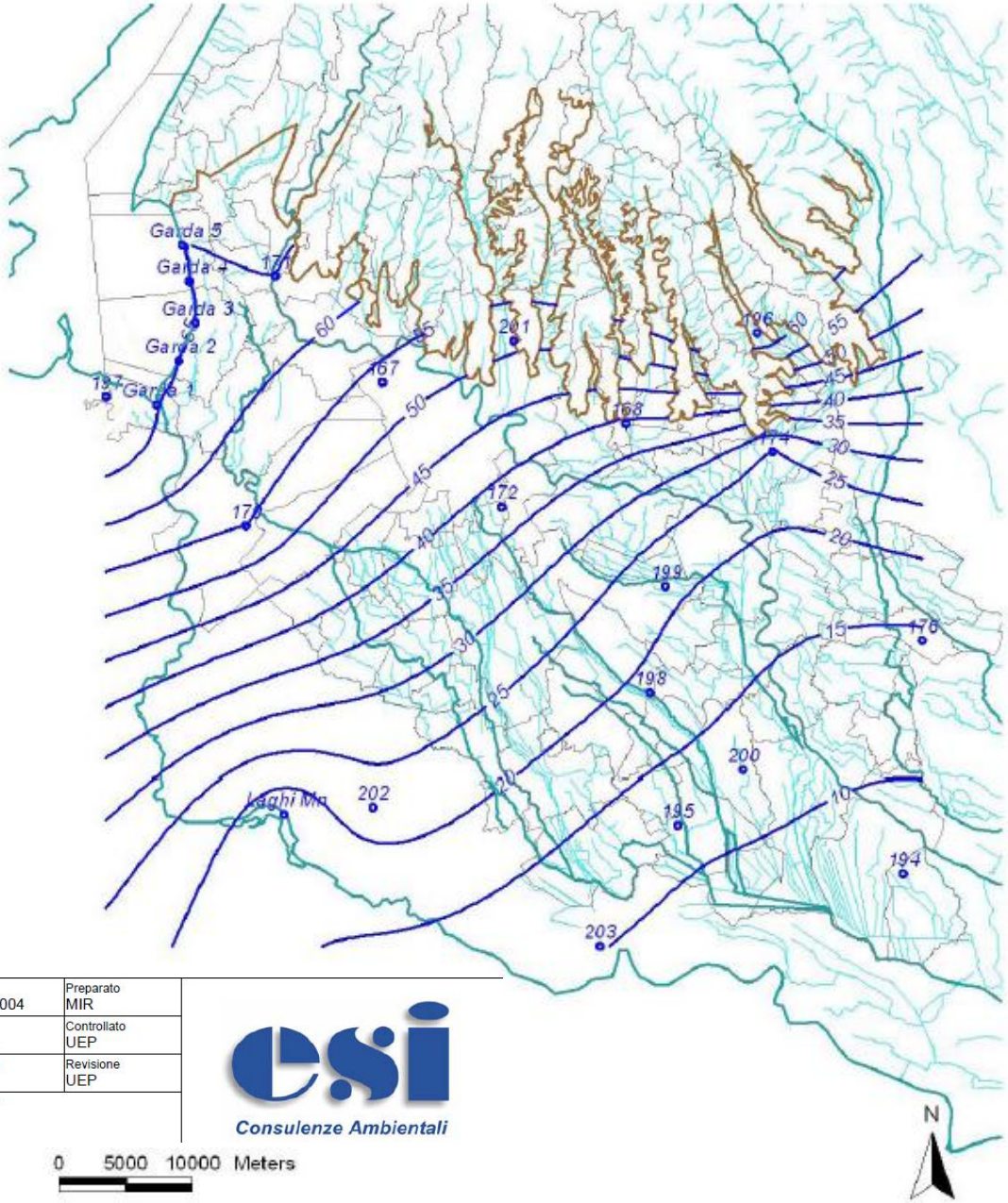
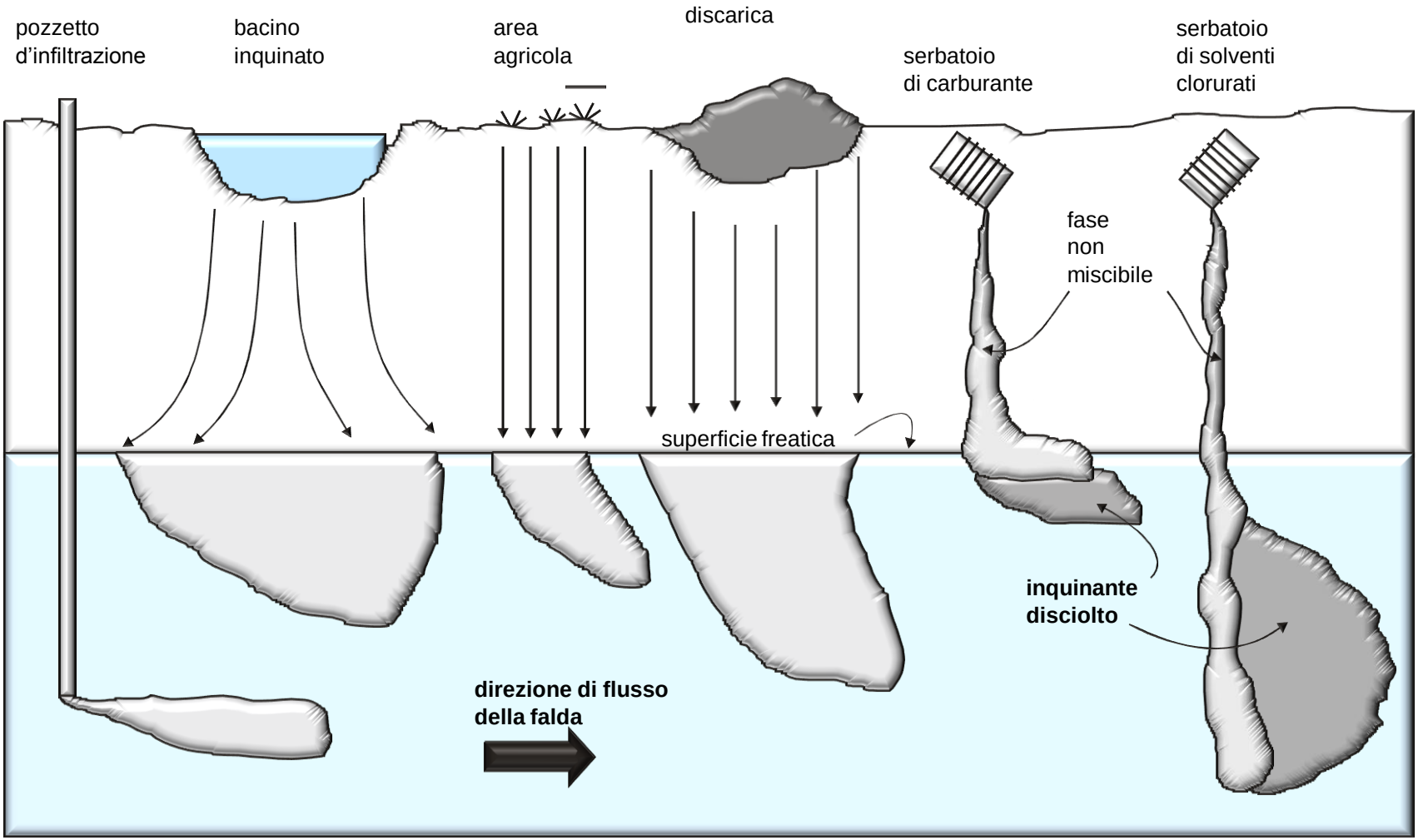


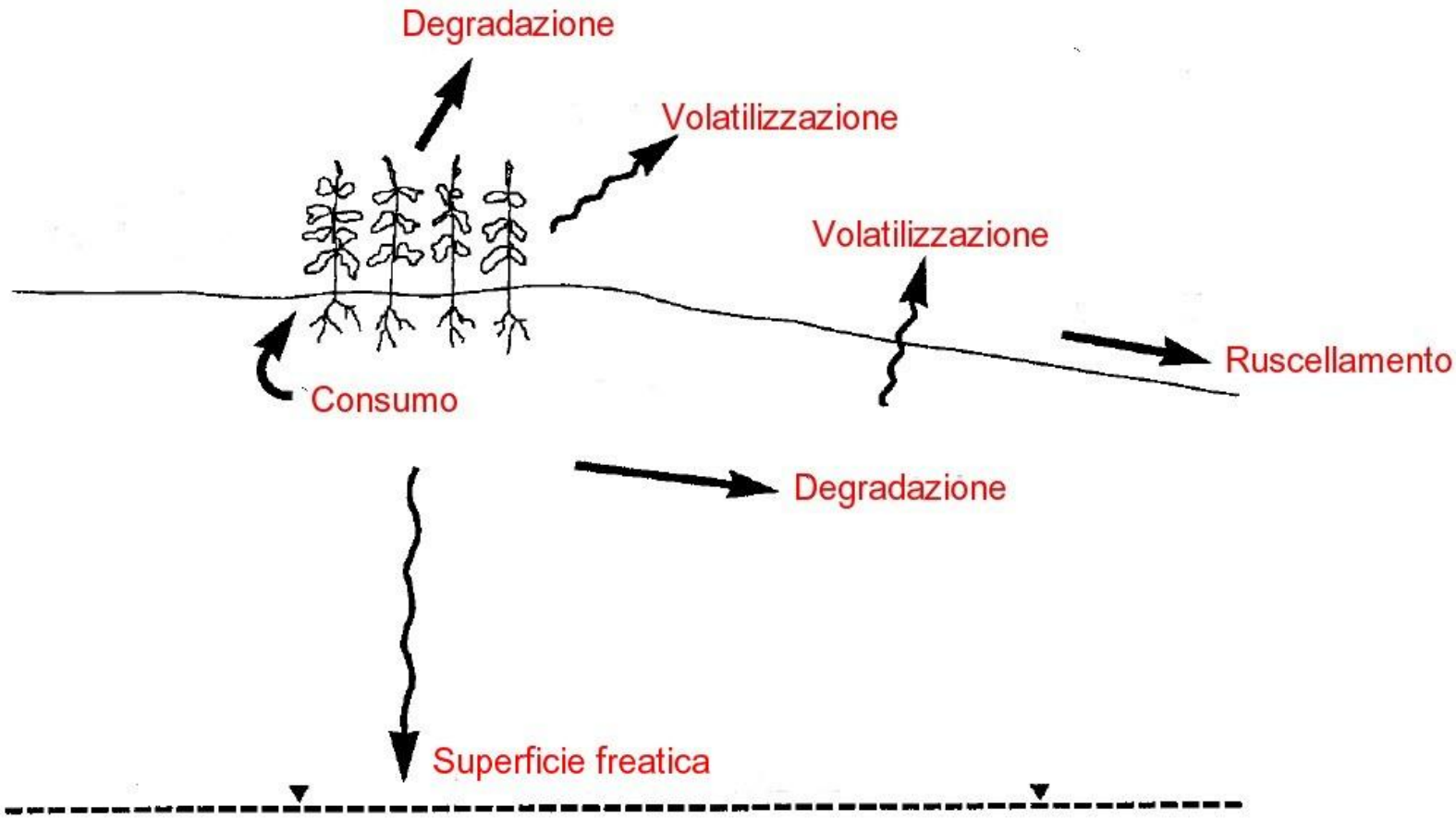
Figura 2.4 Piezometria Febbraio 2002	Data 10.10.2004	Preparato MIR
	Scala Grafica	Controllato UEP
	Originale A4	Revisione UEP
	Percorso	

esi
Consulenze Ambientali

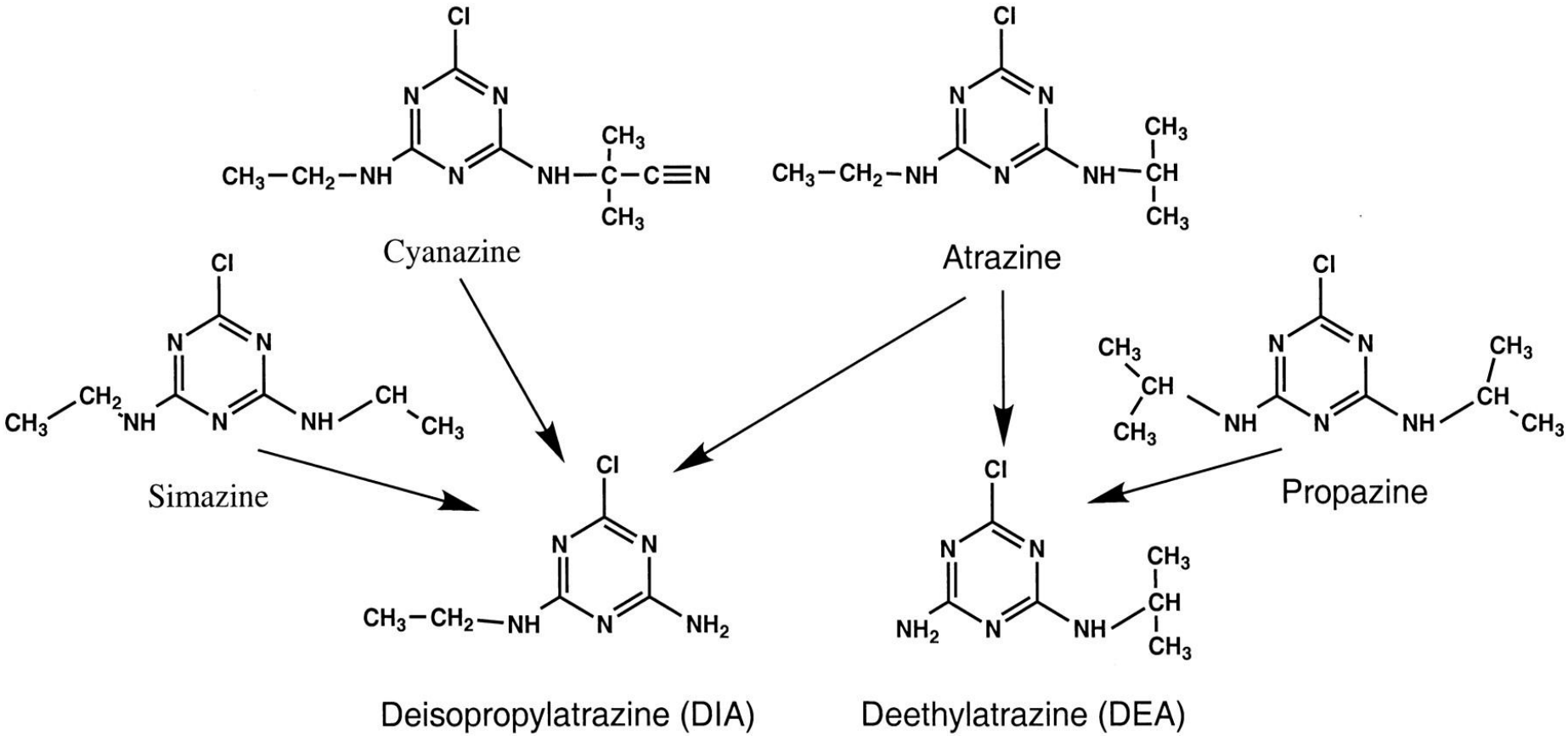
Modalità di contaminazione della falda



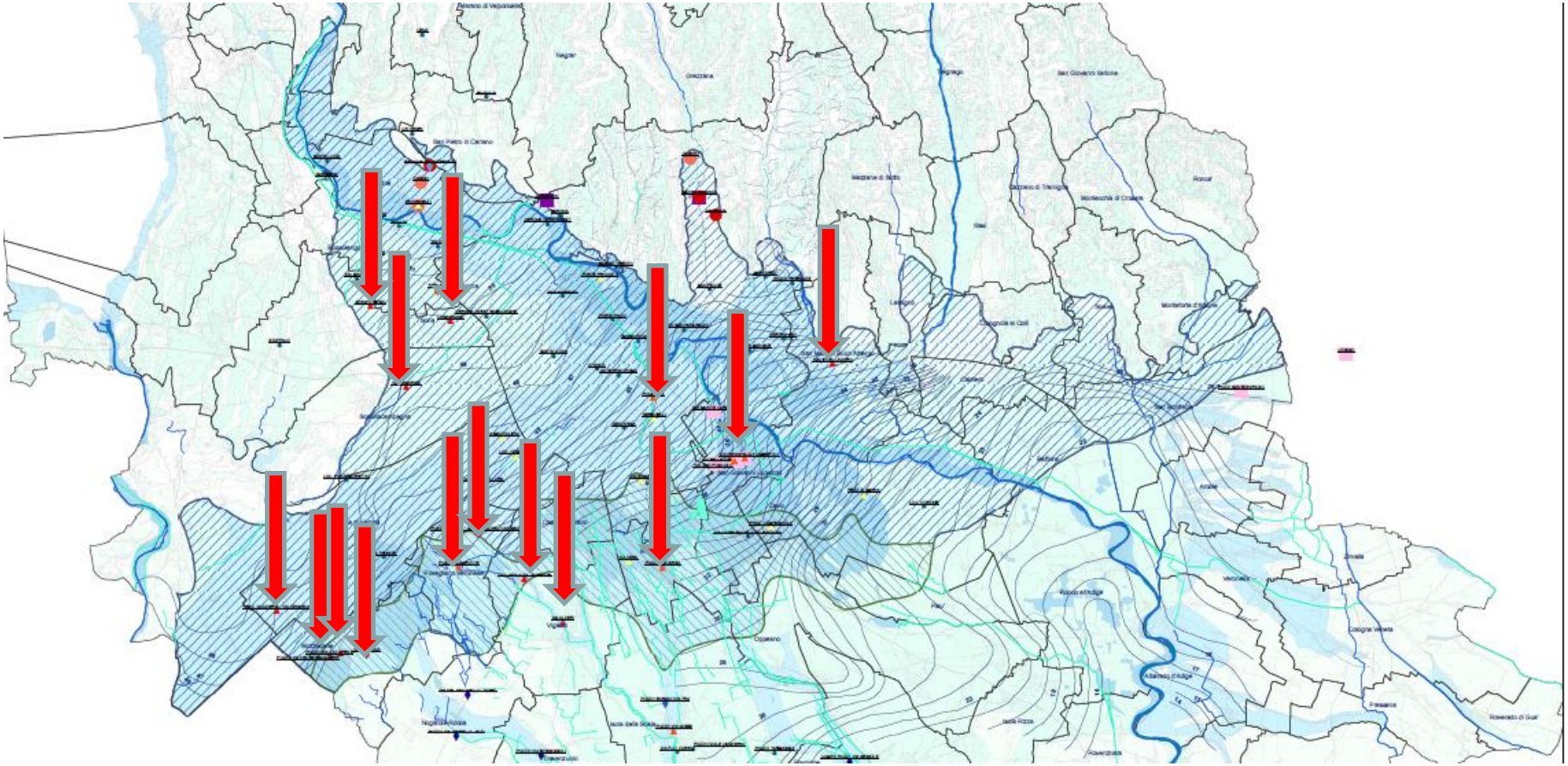
Destino dei fitofarmaci



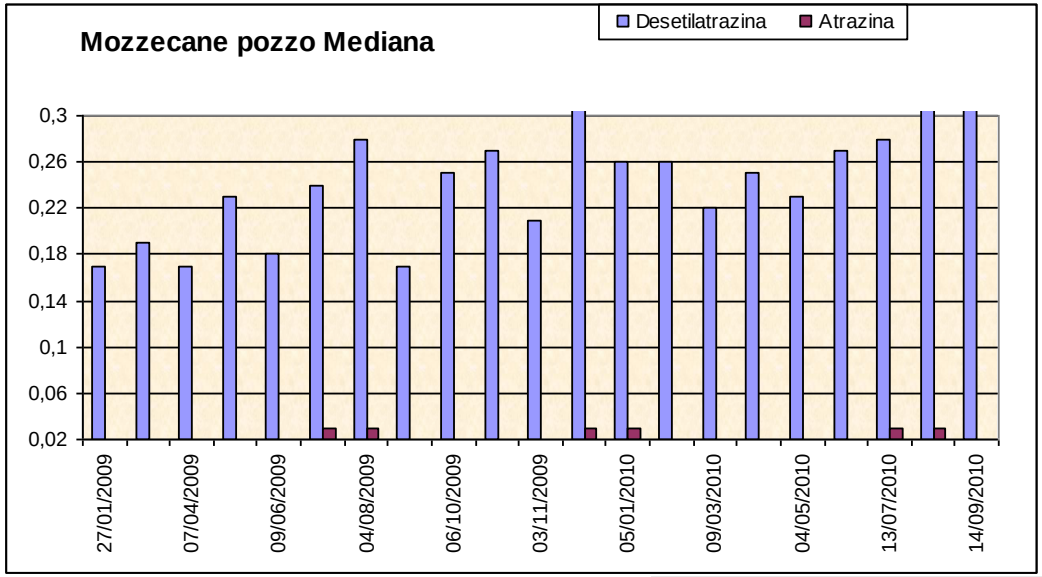
Schema degradazione erbicidi triazinici



Presenza di erbicidi triazinici



Mozzecane pozzo Mediana



Situazione: in aumento

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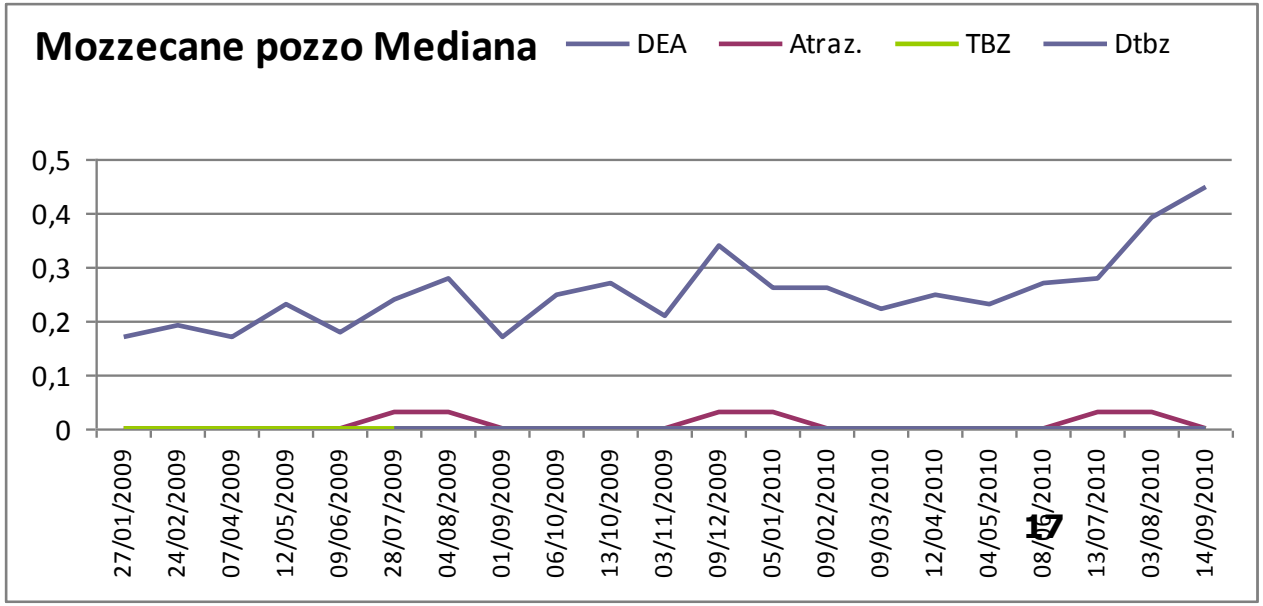
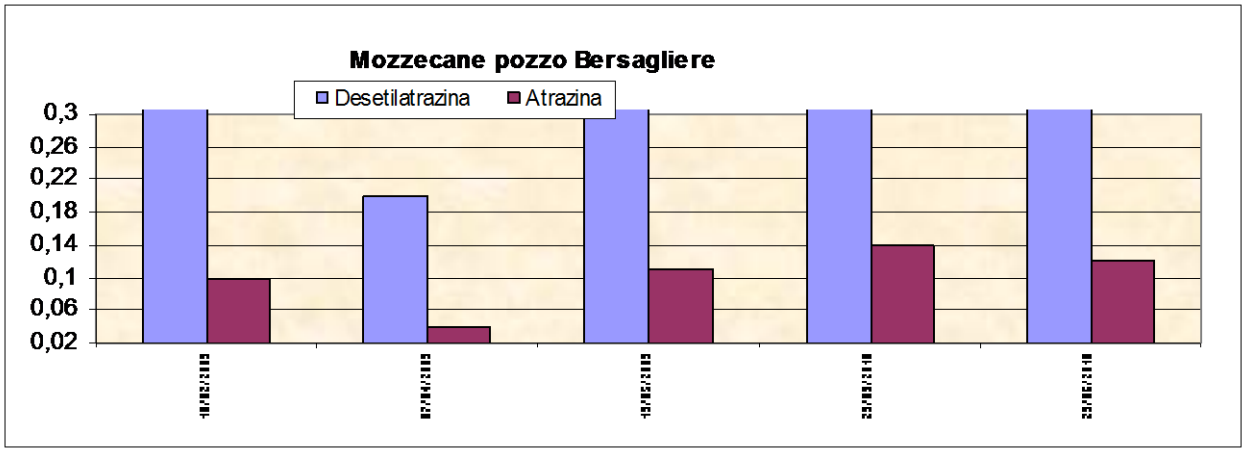


Mozzecane pozzo Bersagliere



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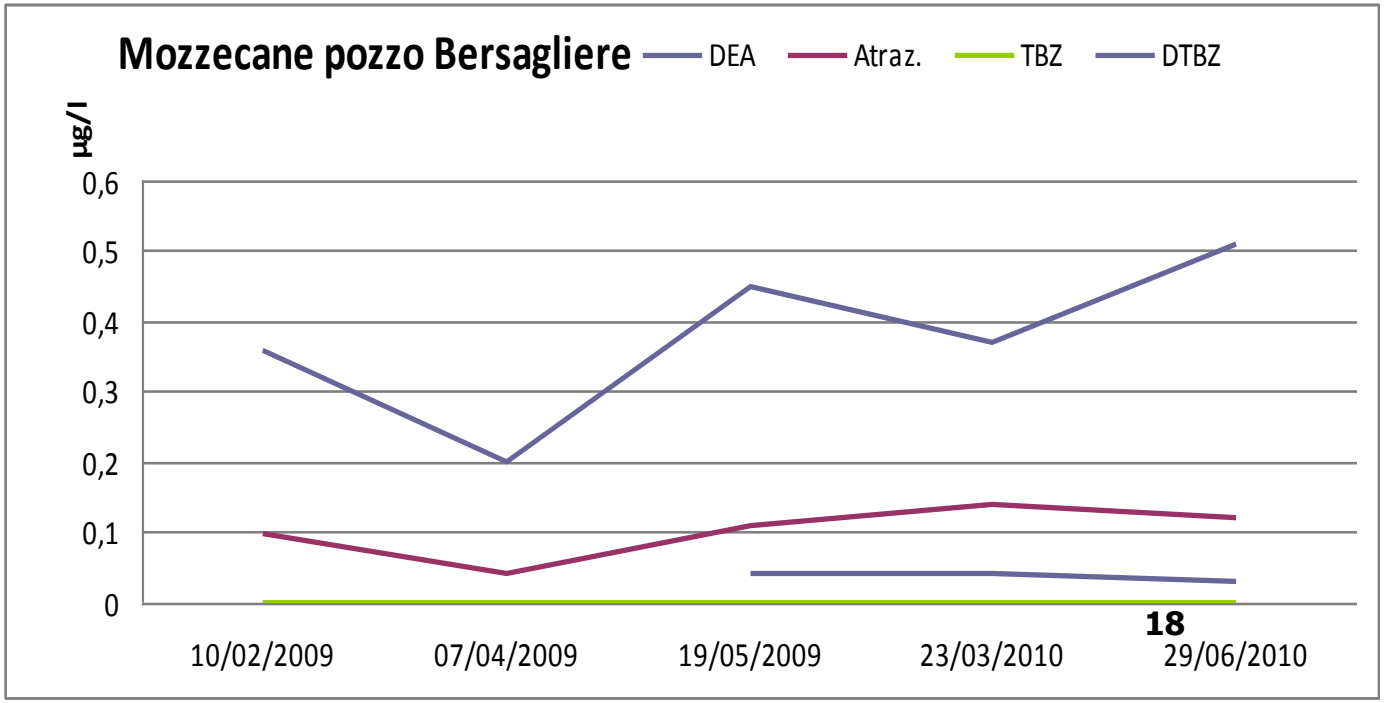
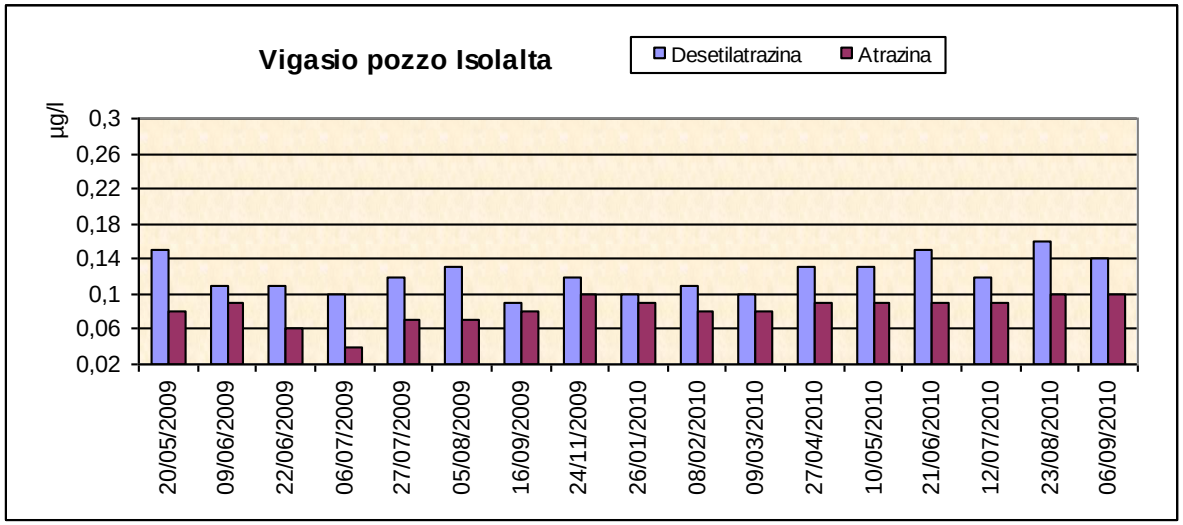
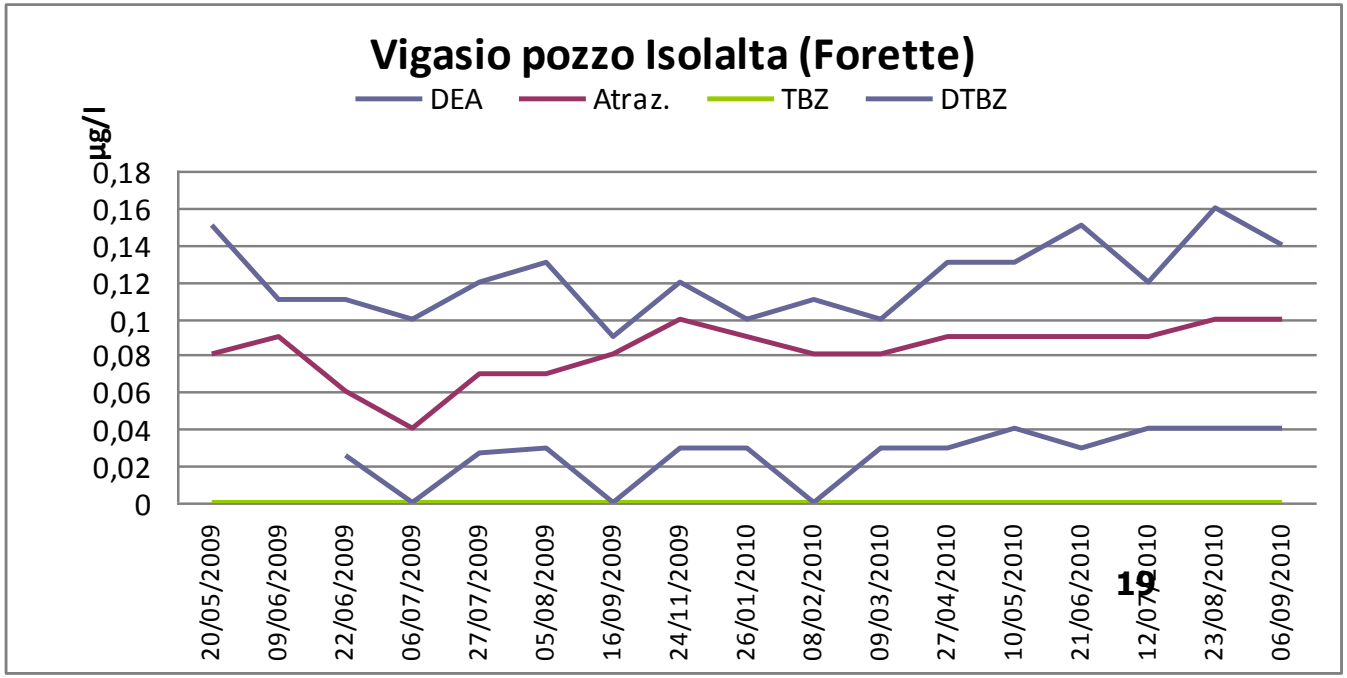


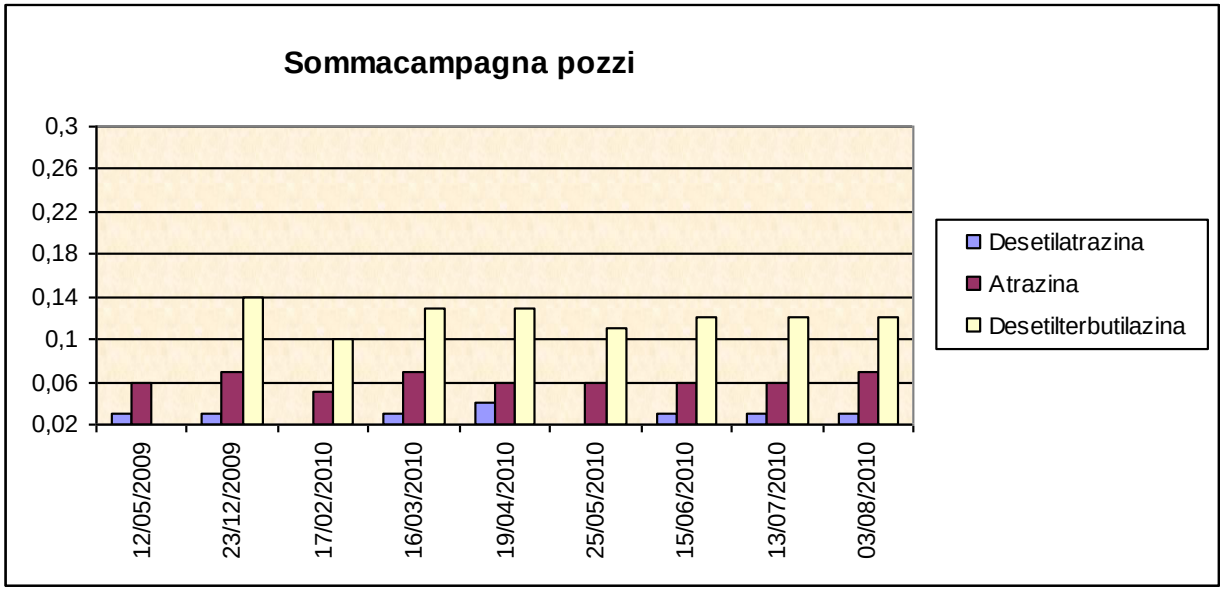
Vigasio pozzo Isolalta



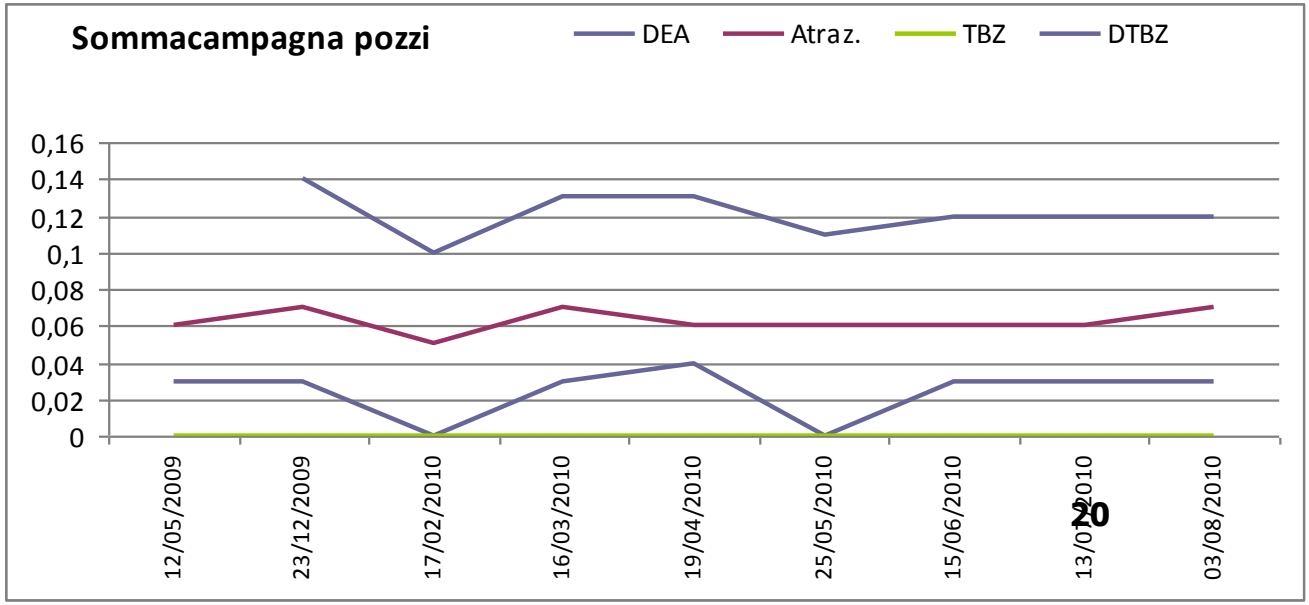
DAR =1,6



Sommacampagna pozzi

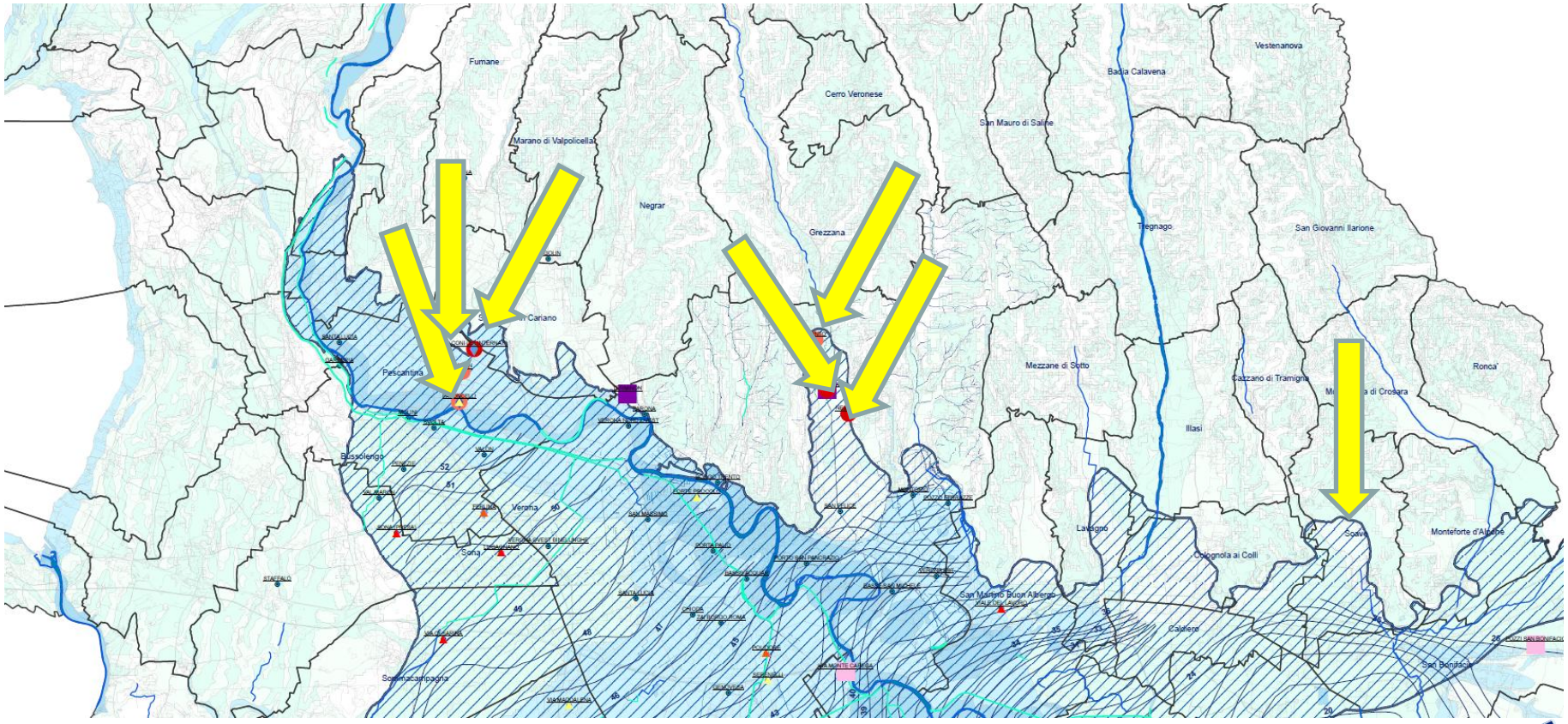


DAR = 0,5

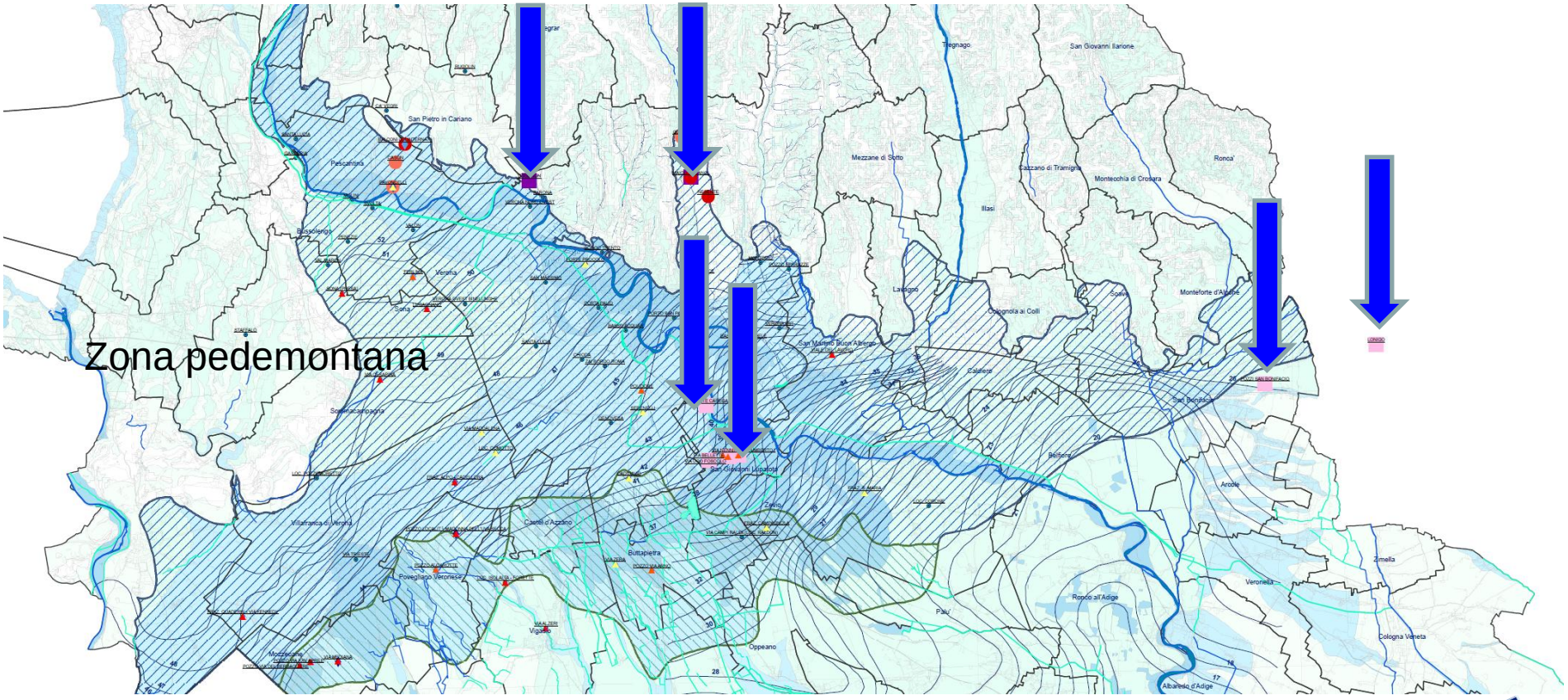


Nitrati

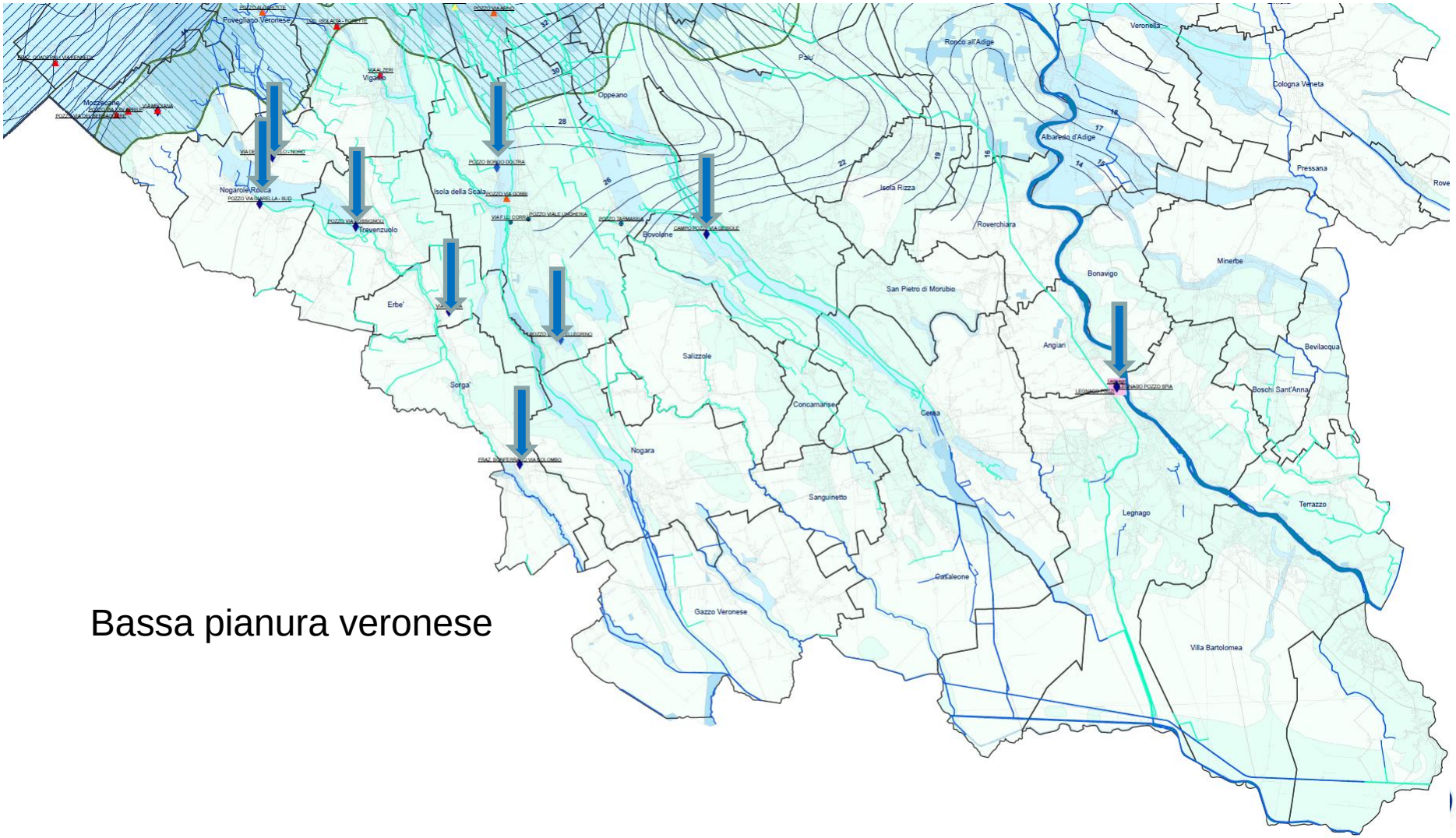
Zona pedemontana – fondo valli lessinia



Pozzi con presenza di tetracloroetilene tricloroetilene

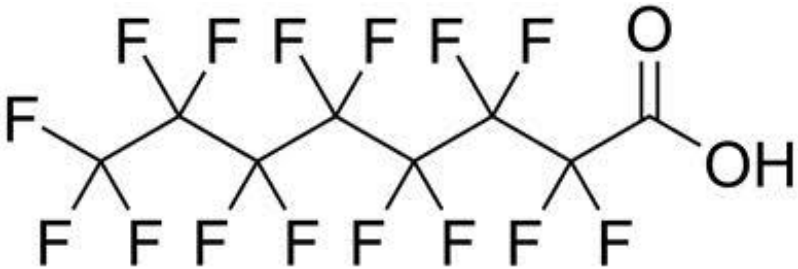


Metalli (Fe, Mn, As)

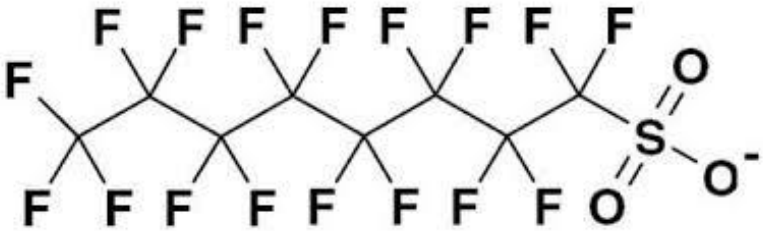


Bassa pianura veronese

PFAS
(Sostanze perfluoroalchiliche)



PFOA
Acido perfluorottanoico



PFOS
Perfluorottansolfonato

Altri PFAS (acidi carbossilici)
Acido perfluorobutanoico
Acido perfluoropentanoico
Acido perfluoroesanoico
Acido perfluoroeptanoico
Acido perfluorononaico
Acido perfluorodecanoico
Acido perfluoroundecanoico
Acido perfluorododecanoico
Acido perfluorotridecanoico

Altri PFAS (acidi solfonici)
Perfluorobutansolfonato
Perfluoroesansolfonato

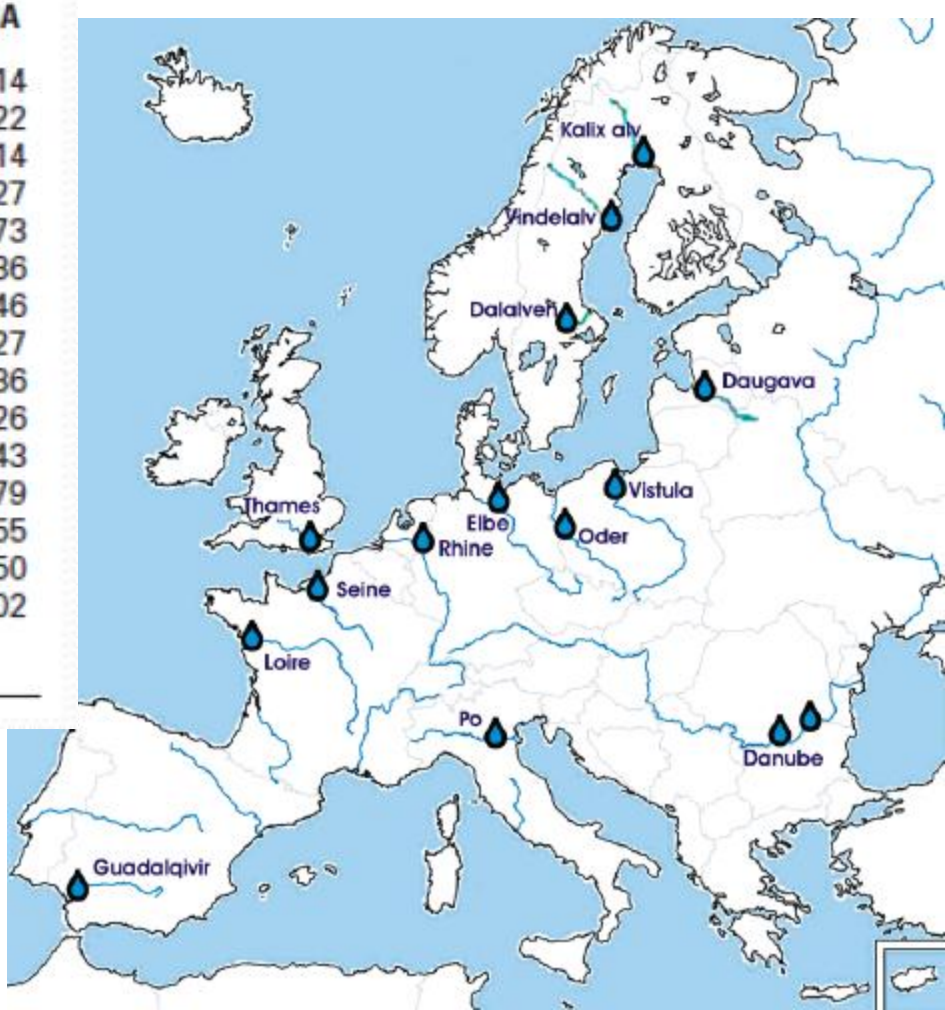
PFAS in Europa

TABLE 1. Mean Concentrations of PFCAs in European River Water (ng/L)

	PFHxA	PFHpA	PFOA	PFNA
Dalälven	<0.94[a]	0.36	<0.97	<0.14
Vindelälven	<0.58	0.20	<0.65	0.22
Kalix Älv	<0.58	0.26	<0.85	<0.14
Elbe	15.4	2.7	7.6	0.27
Oder	2.2	0.73	3.8	0.73
Vistula	2.3	0.48	3.0	0.36
Po	19	6.6	200	1.46
Danube	3.0	0.95	16.4	0.27
Daugava	<1.4	0.86	<2.2	0.36
Seine	13.3	3.7	8.9	1.26
Loire	3.4	0.90	3.4	0.43
Thames	32	4.1	23	0.79
Rhine (February 2006)	18.2	1.8	11.6	0.55
Rhine (August 2006)	3.3	3.3	12.3	1.50
Guadalquivir	6.2	1.58	4.6	1.02

[a] "<" denotes values below the MDL

McLachlan et al. (2007)
Riverine discharge of perfluorinated carboxylates from the European Continent.
Environ. Sci. Technol 41, 7260-7265



PFAS nel mondo

NAZIONE	STATO/PROVINCIA	PFOA [ng/L]	PFOS [ng/L]	Riferimento
USA	California	**10 - 190**	**20 - 190**	Larabee and Reinhard, 2008
	North Carolina	**290**	**130**	Nakayama et al., 2007
	Kentucky	**22 - 330**	**7 - 150**	Loganathan et al., 2007
	Georgia	**1 - 230**	**1,8 - 22**	Loganathan et al., 2007
Giappone	Osaka	**5,2 - 92**	**0.26 - 0,22**	Takagi et al., 2008
	Yodo River	**4,2 - 2.600**	**0.4 - 120**	Lein et al., 2008
	Tsurumi River	**13 - 16**	**0**	Zushi et al., 2008
	Kyoto	**7.9 - 110**	**< 5.2 - 10**	Senthilkumar et al., 2007
	Other	**0.1 - 460**	**0.24 - 37**	Saito et al., 2004
Italia	Lago Maggiore	**3**	**9**	Loos et al., 2007
	Fiume Po	**60 - 1.300**	**10**	Loos et al., 2008
Corea del sud		**0.9 - 62**	**2.4 - 650**	Rostkowski et al., 2006
Germania		**0.7 - 250**	**1 - 200**	Skutlarek et al., 2006
Gran Bretagna	Env Agency GW	**< 100 - 600**	**< 100 - 6.300**	Env Agency, 2007
	Env Agency SW	**< 100 - 340**	**< 100 - 14.500**	Env Agency, 2007
	Env Agency TRBM	**< 100 - 2.000**	**< 100 - 33.900**	Env Agency, 2007
	WRc	**< 24 - 370**	**< 11 - 210**	Atkinson et al., 2006
Cina	Pearl River	**0.85 - 13**	**1 - 99**	So et al., 2007
	Yangtze River	**2 - 260**	**< 0.001 - 14**	So et al., 2007

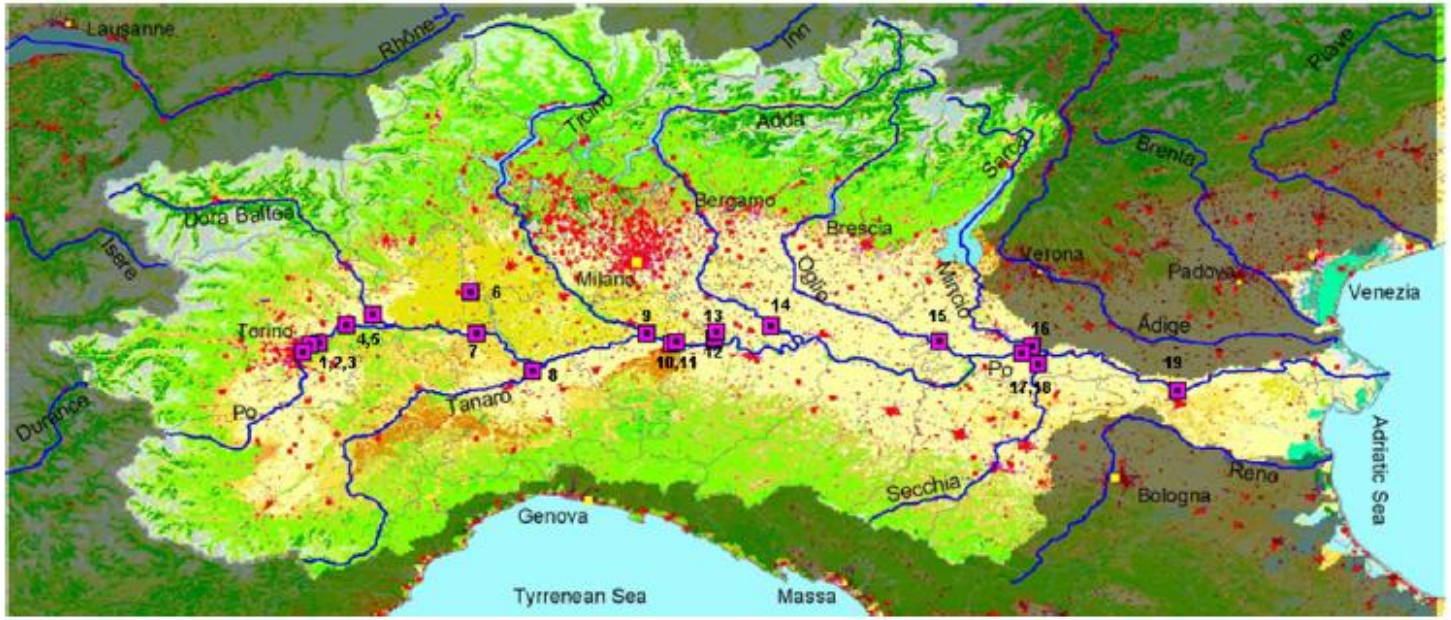


Fig. 1. Po River basin with sampling points. Map based on CCM River and Catchment Database for Europe (Vogt et al., 2003).

Available online at www.sciencedirect.com
ScienceDirect
Chemosphere 71 (2008) 306–313
CHEMOSPHERE
www.elsevier.com/locate/chemosphere

Analysis of perfluorooctanoate (PFOA) and other perfluorinated compounds (PFCs) in the River Po watershed in N-Italy

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Received 12 June 2007; received in revised form 28 August 2007; accepted 2 September 2007
Available online 23 October 2007

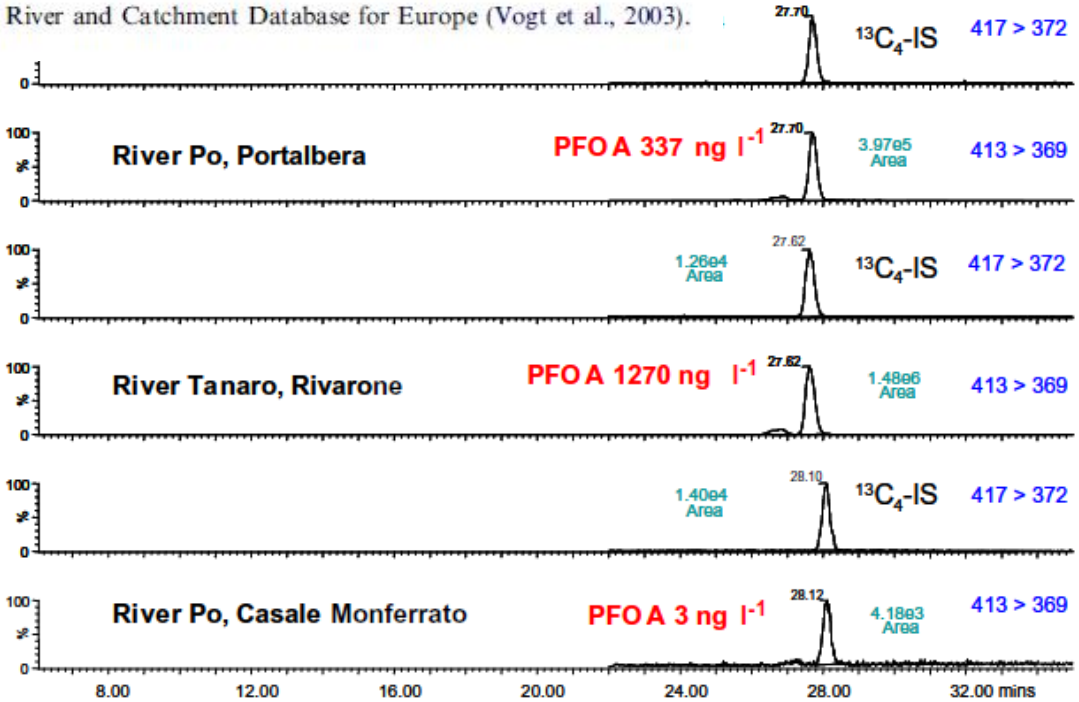
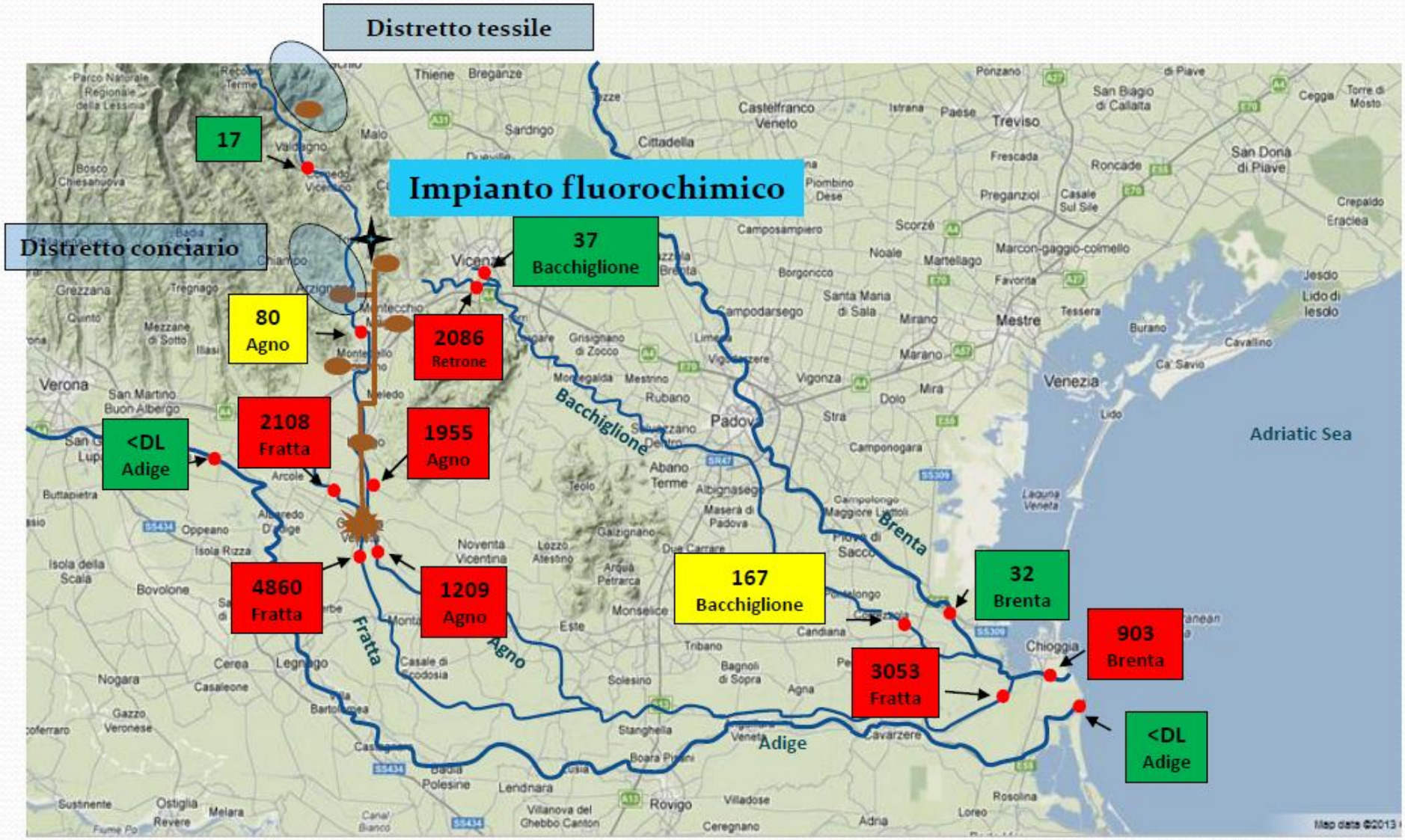
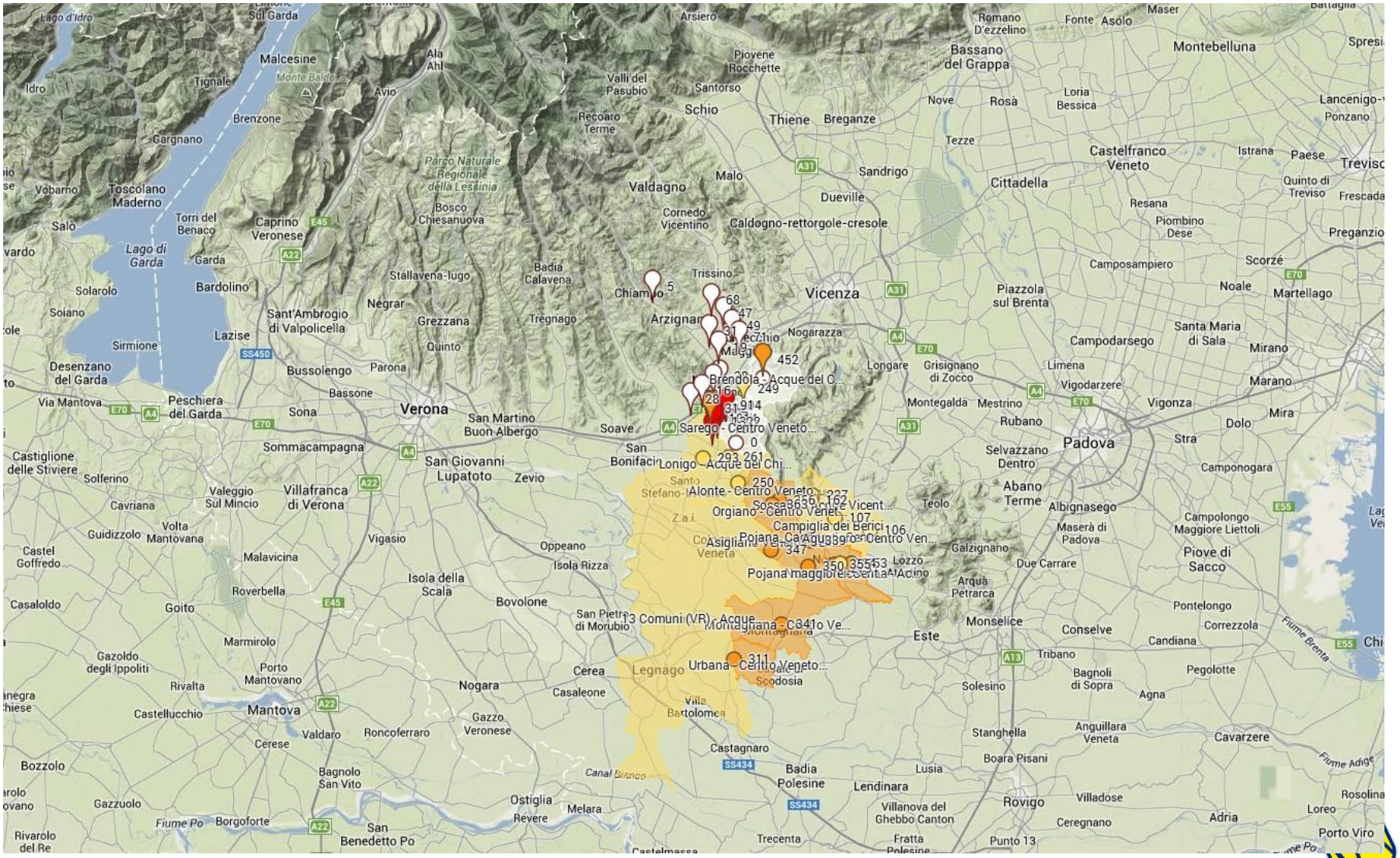


Fig. 2. LC–MS–MS chromatograms of PFOA.

Lo studio 2012 del CNR - IRSA

Studio CNR-IRSA
distribuzione PFAS in alcuni fiume del Veneto



Mappa PFAS Veneto