



PESTICIDE SCREENING GROUNDWATER

2009

Czech Hydrometeorological Institute

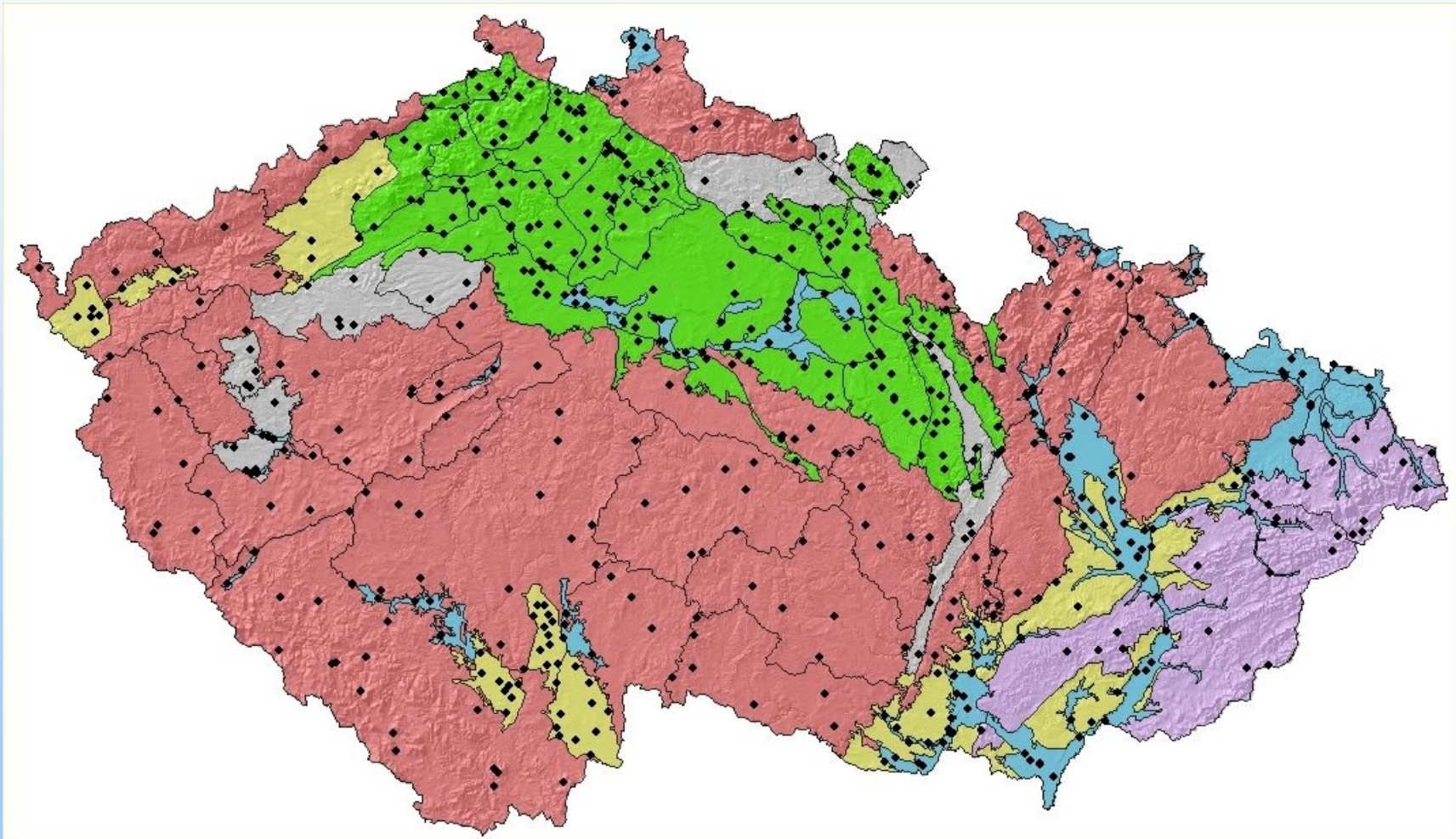


Sampling sites

650 sites

~ 610 CHMI national monitoring network

~ 40 drinking water supply sources > 50 l/s





Selection of substances

Physico-chemical properties

Matrix	Soil half life	Koc	Kow	Water solubility in mg/l	GUS index
Groundwater	> 20	< 1900	< 3	> 3	> 1.8

$$\text{GUS} = \log_{10} \text{DT50} \times (4 - \log_{10} K_{oc}) \quad (\text{Gustafson, 1989})$$

Active substances usage: >1000 kg/year between 2002-2007

Literature review of occurrence

Analytical methods availability: literature review
cooperation with labs
methods development

Budget



Selection of substances

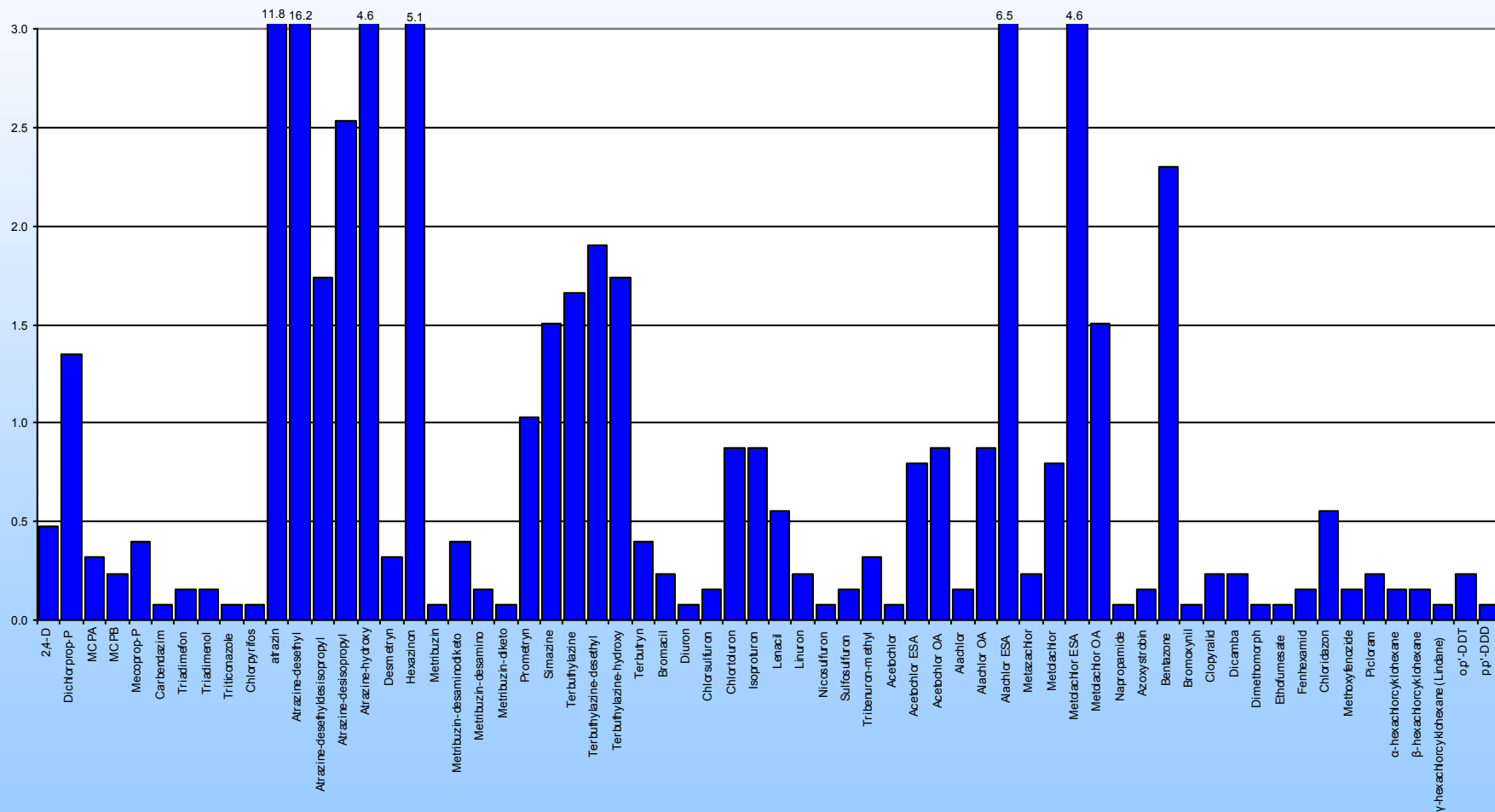
2,4,5-T	dichlorprop-P	linuron	phosphamidon
2,4-DP, dichlorprop	dimethachlor	MCPA	picloram
2,4-D	dimethipin	MCPB	pirimicarb
acetochlor	dimethoat	MCPP (mecoprop)	prometryn
acetochlor ESA	dimethomorph	mecoprop-P	propachlor
acetochlor OA	diuron	metalaxyl	propiconazole
alachlor	epoxiconazole	metalaxyl-M	propoxycarbazone-sodium
alachlor ESA	ethofumesate	metamitron	propyzamide
alachlor OA	fenarimol	metazachlor	pyridate
atrazine	fenhexamid	metconazole	pyrimethanil
atrazine-desethyl	florasulam	methabenzthiazuron	rimsulfuron
atrazine-desethyl desisopropyl	fluazifop-p-butyl	methamidophos	simazin
atrazine-desisopropyl	flusilazole	methidathion	sulfosulfuron
atrazine-hydroxy	foramsulfuron	methoxyfenozone	tebuconazole
azoxystrobin	hexachlorbenzen	metobromuron	terbuthylazine
bentazone	hexazinon	metolachlor	terbuthylazine-desethyl
bromacil	chlorbromuron	metolachlor ESA	terbuthylazine-hydroxy
bromoxynil	chloridazon	metolachlor OA	terbutryn
carbendazim	chlorotoluron	metoxuron	thiamethoxam
carbofuran	chlorpyrifos	metribuzin	thifensulfuron-methyl
clomazone	chlorsulfuron	metribuzin-desamino	thiophanate-methyl
clopyralid	imazamethabenz-methyl	metribuzin-desamino diketo	triadimefon
cyanazine	imazamox	metribuzin-diketo	triadimenol
cyproconazole	imazethapyr	metsulfuron-methyl	tri-allate
desmetryn	imidacloprid	monolinuron	triasulfuron
diazinon	iprodione	napropamide	tribenuron-methyl
dicamba	isoproturon	nicosulfuron	trifluralin
dichlobenil	kresoxim-methyl	phorate	triforine
dichlormid	lenacil	phosalone	triticonazole



Results - groundwater

Number of values > LOQ [%]

Počet hodnot nad mezí stanovitelnosti pro jednotlivé pesticidy v podzemních vodách v roce 2009 [%]

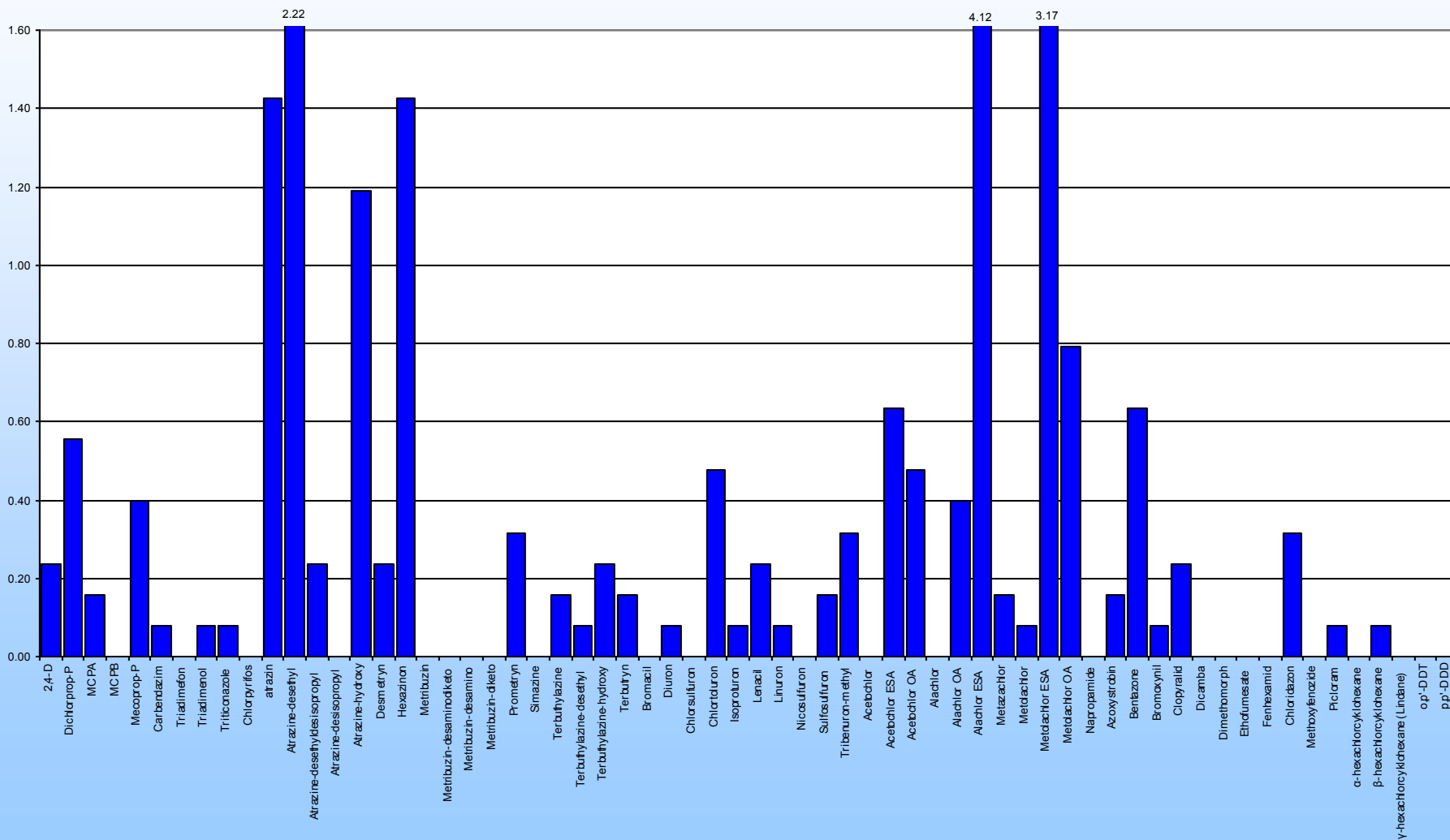




Results - groundwater

Number of values > GW standard [%]

Počet hodnot nad limit 0.1 µg/l pro jednotlivé pesticidy v podzemních vodách v roce 2009 [%]

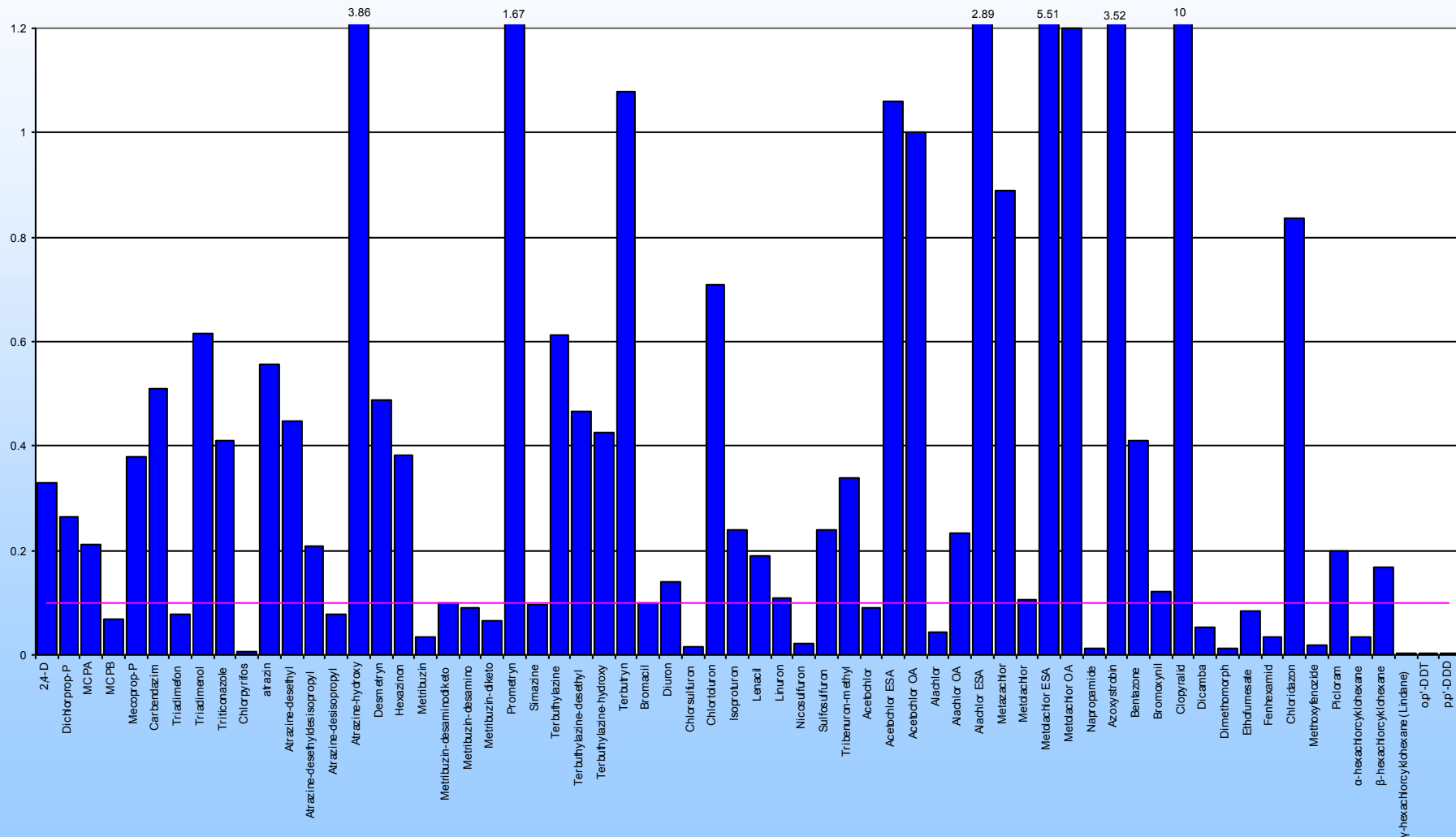




Results - groundwater

Maximum concentrations [ug/l]

Maximální koncentrace pro jednotlivé pesticidy v podzemních vodách v roce 2009 [µg/l]

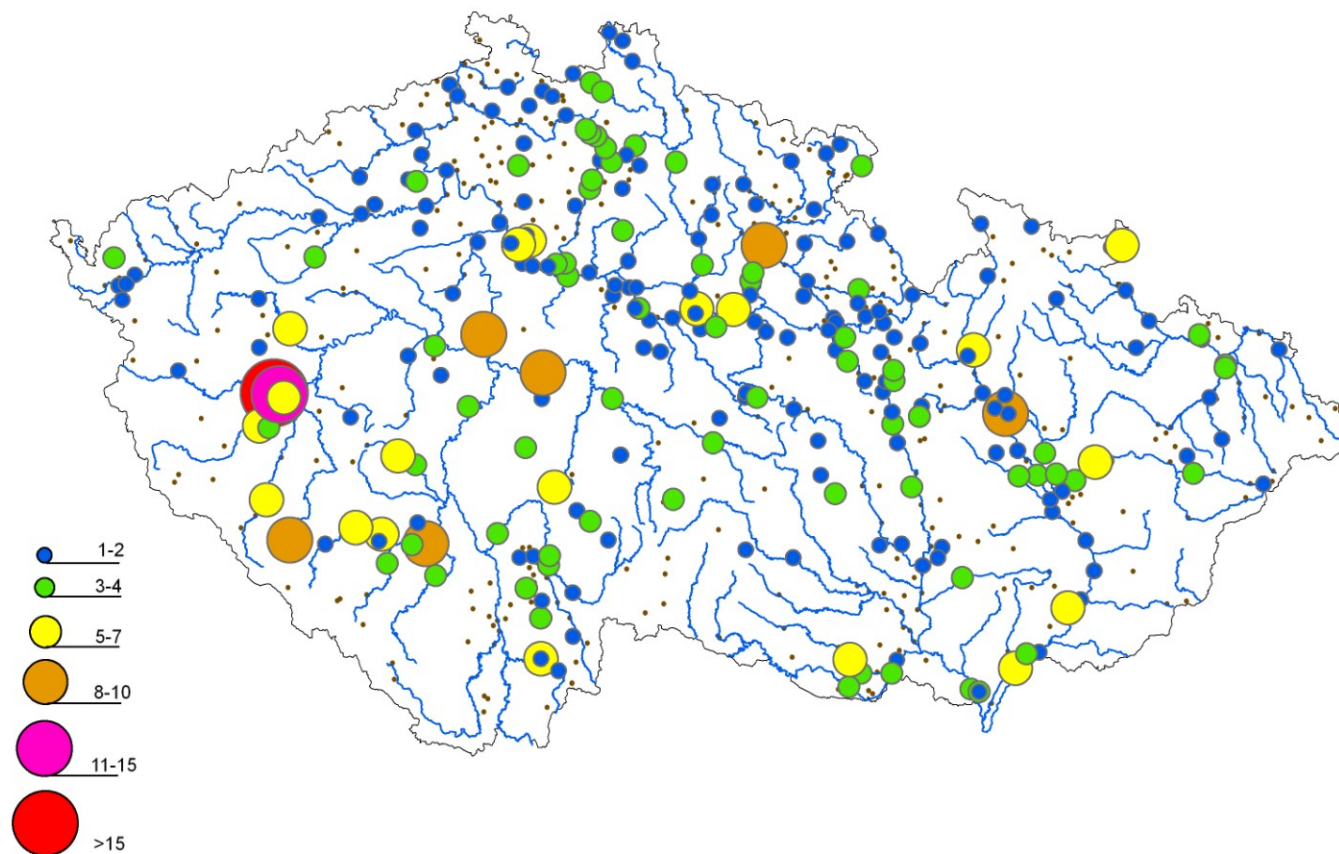




Results - groundwater

Number of pesticides found at each monitoring site

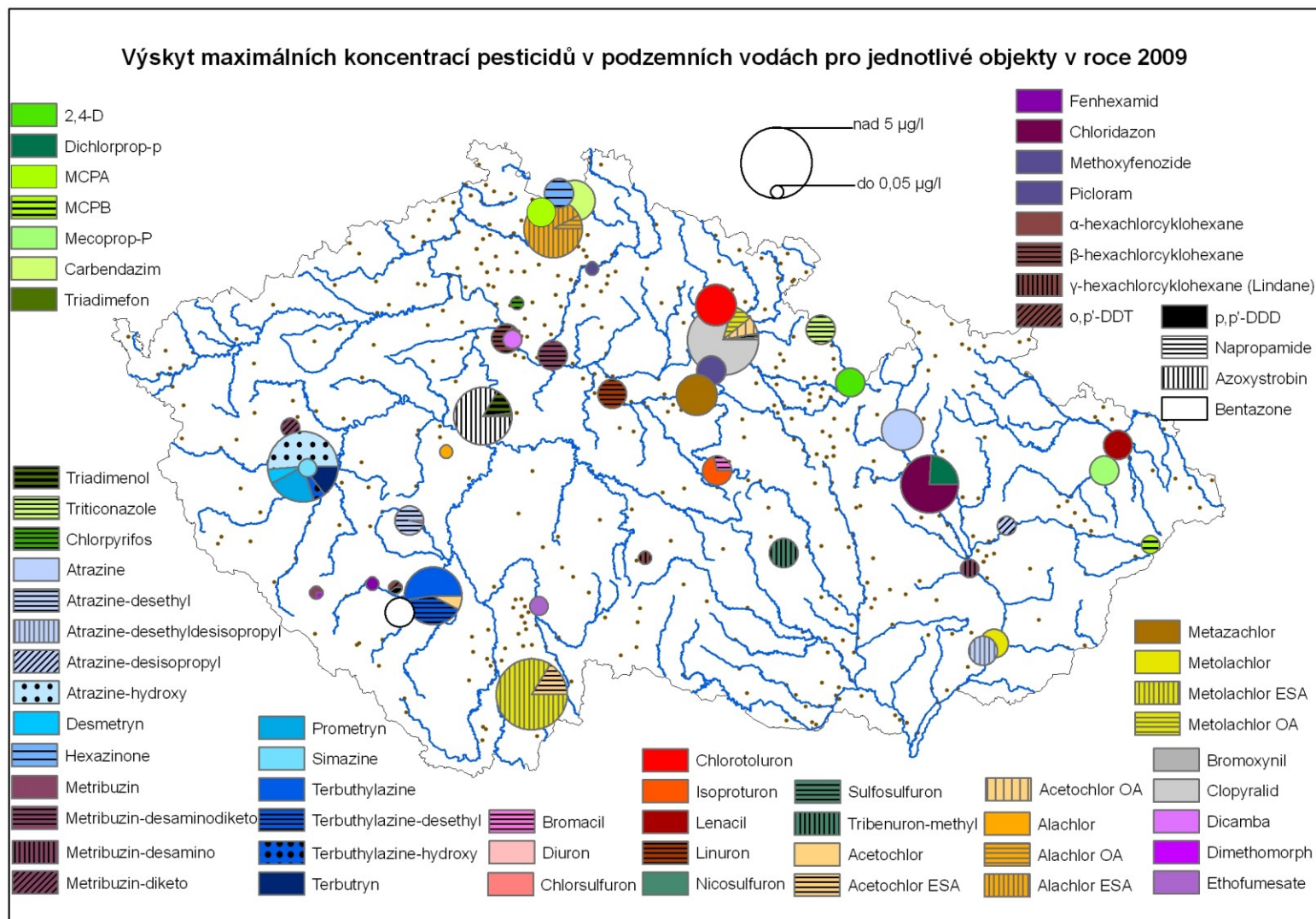
Počet pesticidů nad mezí stanovitelnosti v podzemních vodách pro jednotlivé objekty v roce 2009





Results - groundwater

Maximum concentrations found at each monitoring site

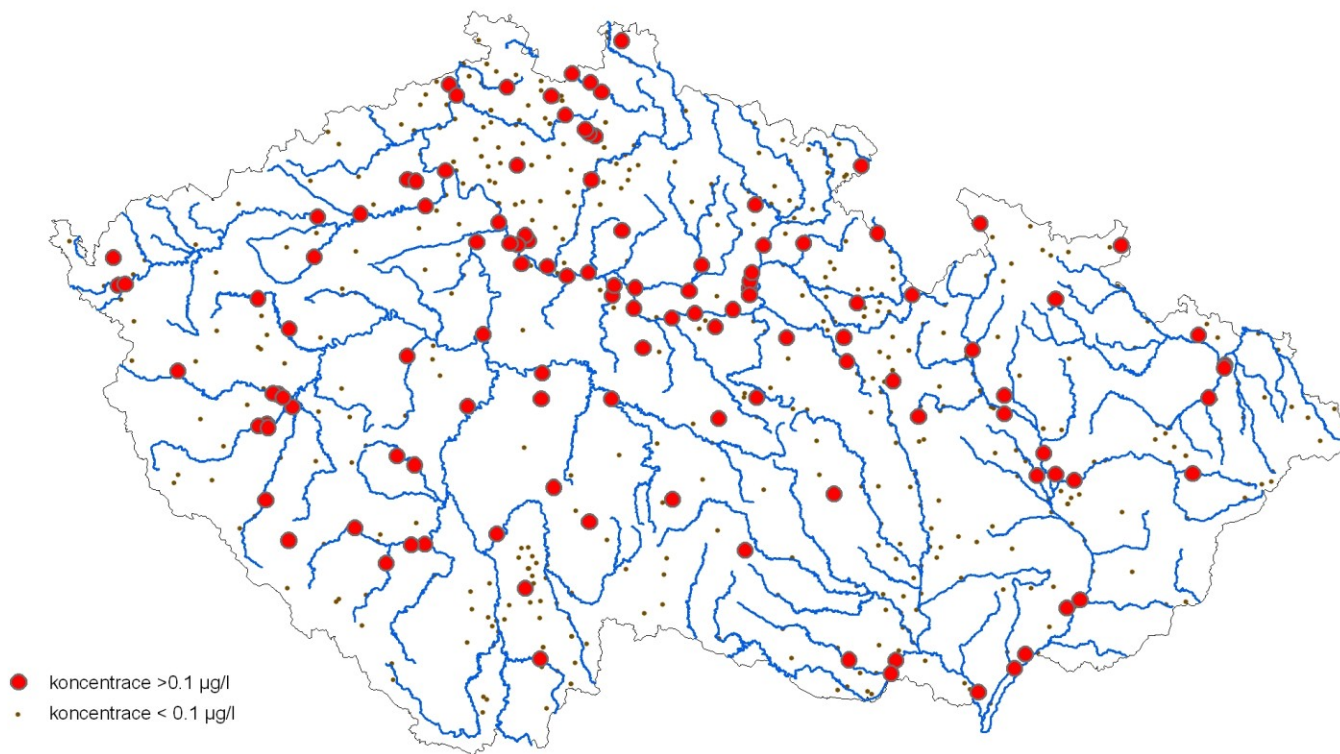




Results - groundwater

Sites exceeding GW standard

Objekty s koncentracemi $>0.1 \mu\text{g/l}$ v podzemních vodách v roce 2009





Results - groundwater

64 of 138 substances detected

at least one pesticide found at 261 of 649 sites

GW standard exceeded at 121 sites

**Highest concentrations: Clopyralid, Metolachlor ESA, Hydroxyatrazine,
Azoxystrobin, Alachlor ESA, Prometryne**

**Most frequent findings: Atrazine, Desethylatrazine, Alachlor ESA,
Hexazinone, Hydroxyatrazine, Metolachlor ESA**



Results – passive samplers

43 of 78 substances detected

at least one pesticide found at 64 of 65 sites

**Highest concentrations: Acetochlor, Terbutylazin, Linuron, Chlorotoluron
2,4-D, Metolachlor**

**Most frequent findings: Atrazine, Desethylatrazine, Hexazinone,
Terbutylazine, Metolachlor, Simazine, Terbutryne**

**POCIS
(Polar Organic Chemical Integrative Sampler)**





Conclusions

- ☹ pesticide occurrence at 40% (261 of 610) of national monitoring network sites
- ☹ pesticide occurrence at 38% (15 of 39) drinking water supply sources

Problematic substances:

triazine, chloroacetinilide, phenoxyalkane, urea pesticides

Metabolites occur very frequently

Results incorporated into groundwater operational monitoring program for 2010-2012



Thank you for attention...

