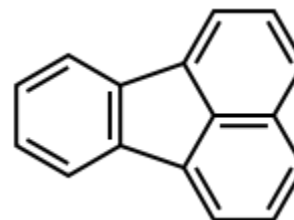
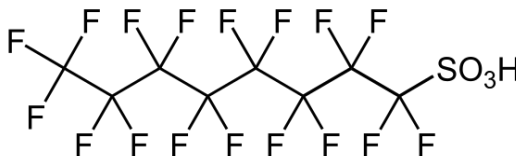
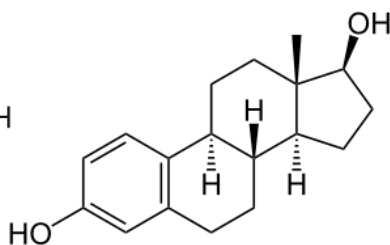
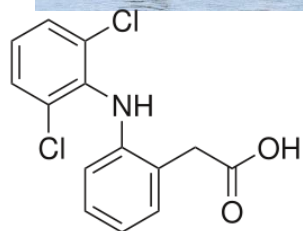
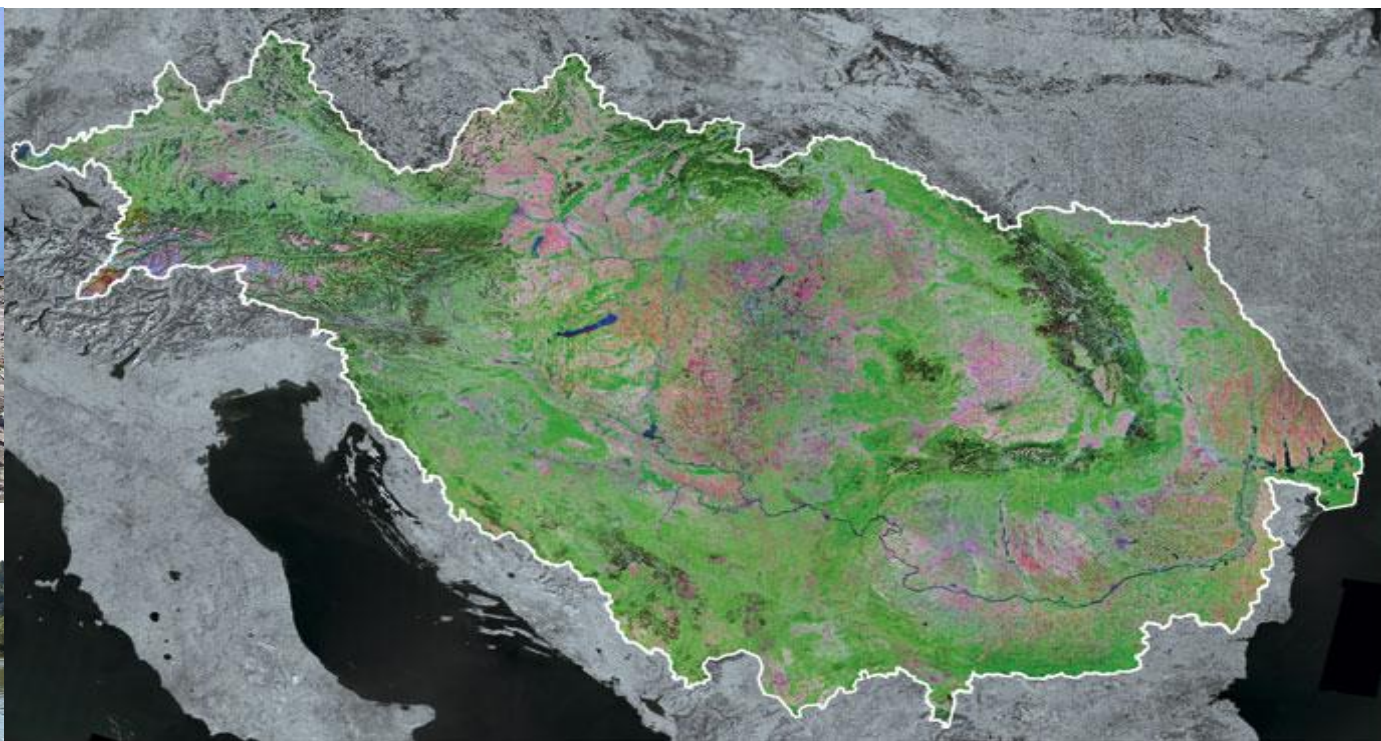
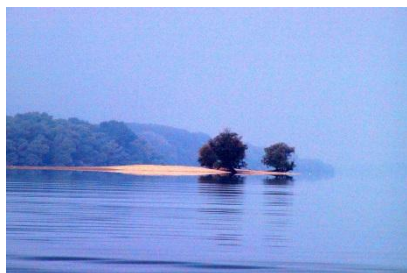


Emerging substances in the Danube River Basin: Contribution by NORMAN

ICPDR IKSD

International Commission
for the Protection
of the Danube River

Internationale Kommission
zum Schutz der Donau



Igor Liska
ICPDR

Danube River Protection Convention (DRPC)

ICPDR IKSD

International Commission
for the Protection
of the Danube River

Internationale Kommission
zum Schutz der Donau

signed 29 June 1994, Sofia (Bulgaria)



Protection of water &
ecological resources



Sustainable use
of water



Reduce nutrients &
hazardous substances



Manage floods
& ice hazards

ICPDR coordinates implementation of
EU Water Framework Directive & EU
Floods Directive on basin-wide level



Contracting Parties

ICPDR IKSD

International Commission
for the Protection
of the Danube River

Internationale Kommission
zum Schutz der Donau



Germany



Austria



Czech Republic



Slovakia



Hungary



Slovenia



Croatia



Bosnia & Herzegovina



Serbia



Montenegro



Romania



Bulgaria



Rep. of Moldova



Ukraine



European Union

Stakeholder Involvement: 23 Observers



International Commission
for the Protection
of the Danube River
Internationale Kommission
zum Schutz der Donau



Danube ^{Strategy}
Civil Society
Forum

viadonau



DANUBE PARKS
network of protected areas



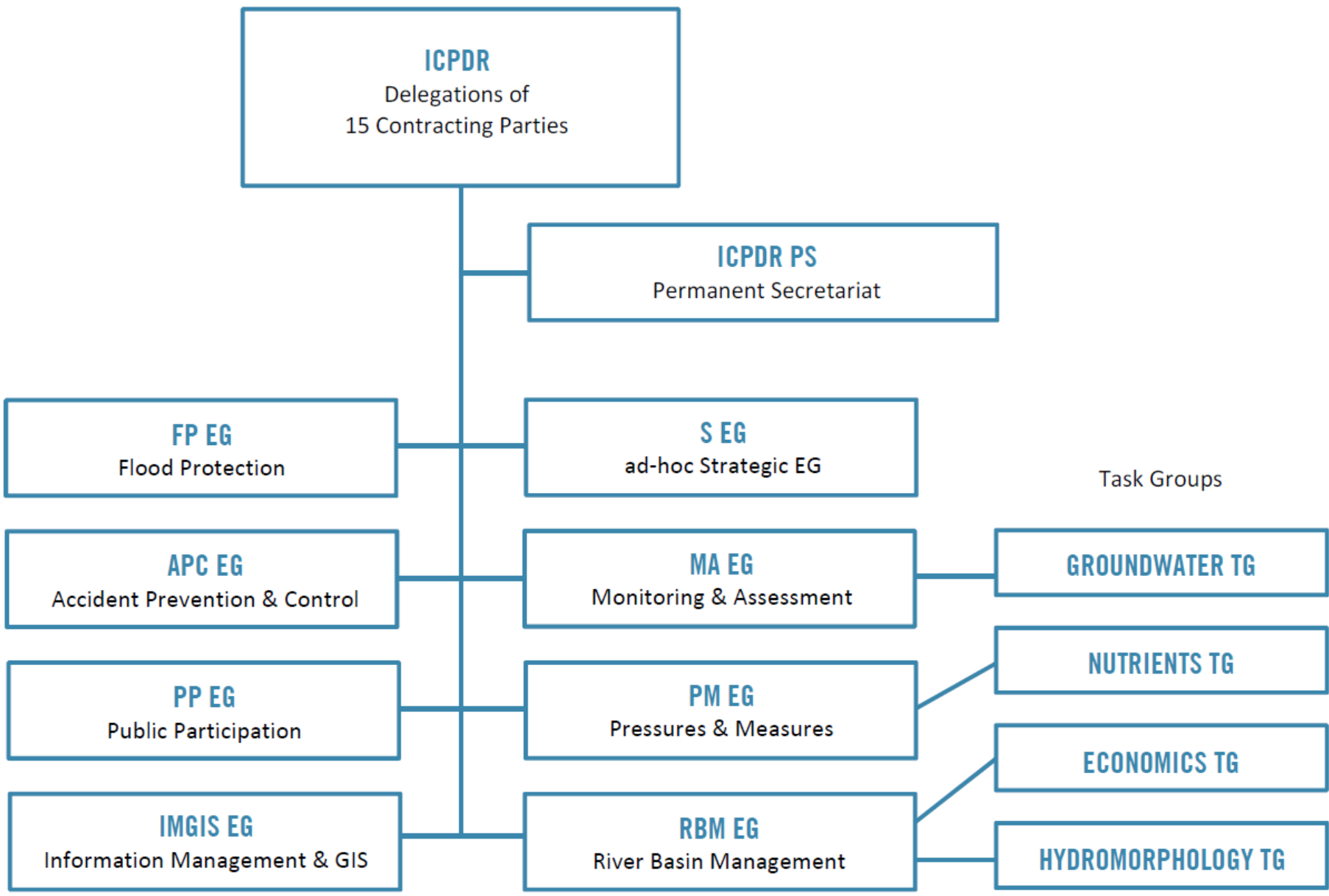
Danube Tourist
Commission

dcc | danube
competence
center



Task Groups

Expert Groups



Trans National Monitoring Network – TNMN

ICPDR IKSD

International Commission





In case of Czech Republic information on mercury in biota is also included in the chemical status presented on this map.

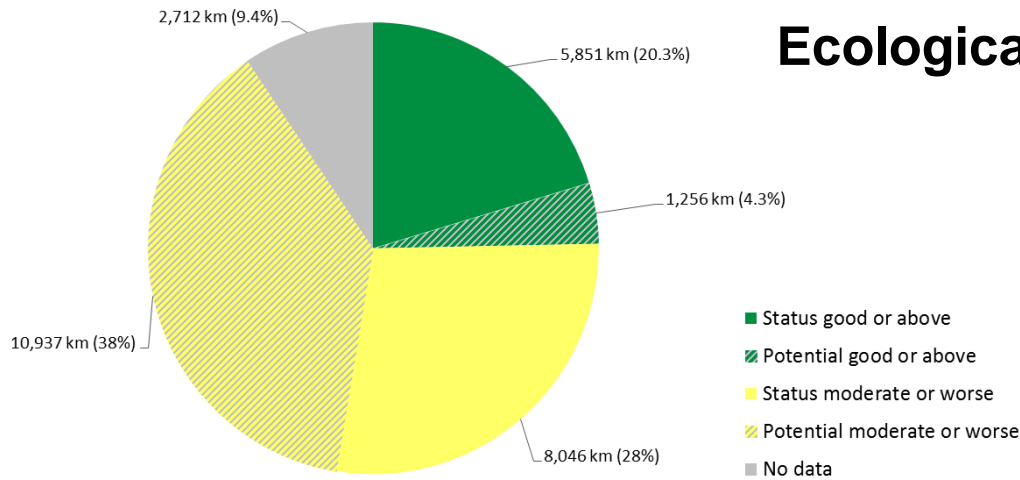
This ICOPDR product is based on national information provided by the Contracting Parties to the ICOPDR (AT, BA, BG, CZ, DE, HR, HU, ME, MD, RO, RS, SI, SK, UA) and CH. EuroGlobalMap data from EuroGeographics was used for all national borders except for AL, BA, ME where the data from the ESRI World Countries was used; Shuttle Radar Topography Mission (SRTM) from USGS Seamless Data Distribution System was used as elevation data layer; data from the European Commission (Joint Research Center) was used for the outer border of the DRBM of AL, IT, ME and PL.

Ecological & chemical status of surface waters (2015)

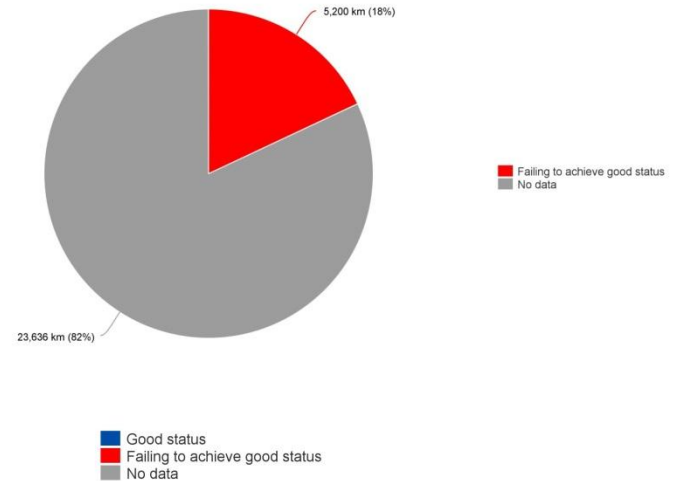


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Ecological status: ~ 25% good or above



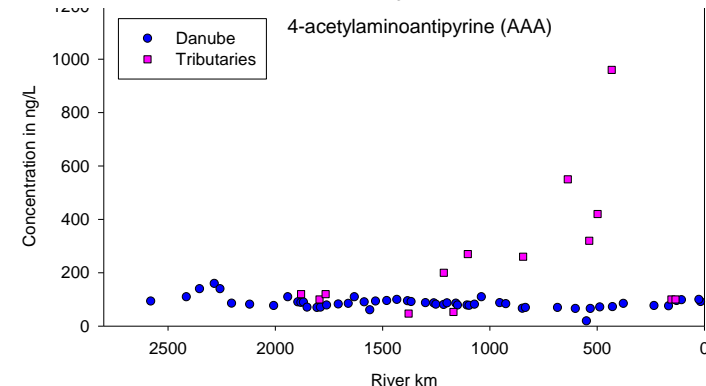
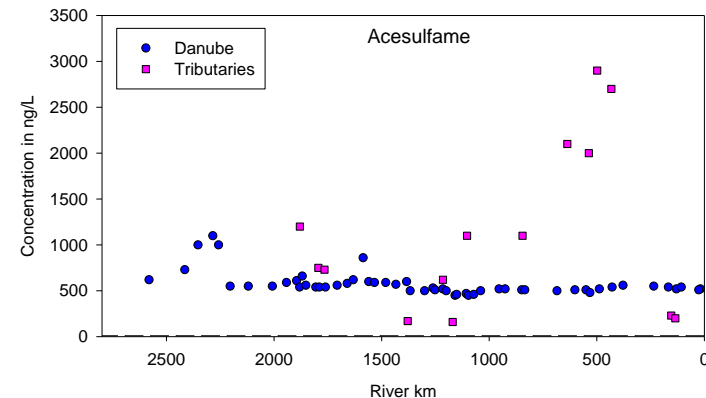
Mercury in biota



Chemical status: ~ 70% good
 *excluding mercury in biota

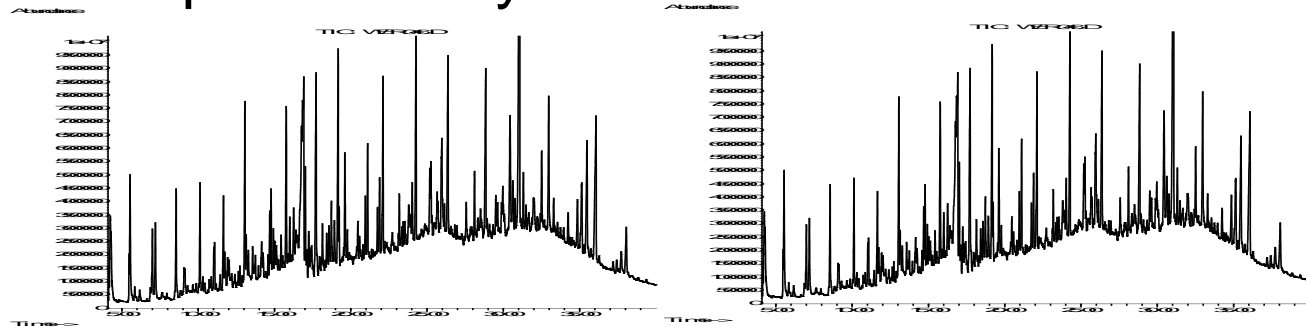
JDS: Emerging substances

- ✓ Large number of emerging polar organic substances was found but they were at very small concentrations;
- ✓ Concentrations for most of the contaminants were lower in 2013 compared to JDS2 in 2007;
- ✓ Pharmaceuticals mostly < 40 ng/l;
- ✓ Elevated concentrations: metamizol metabolites FAA and AAA, artificial sweeteners acesulfame, cyclamate and sucralose, metformin, enalapril, triphenylphosphin oxide, 2-benzothiazolesulfonic acid, benzotriazoles, iodinated X-ray contrast media and the stimulant caffeine.



JDS3: New techniques

- ✓ **Effect-based screening** used large-volume extraction (1000 l water) and analysis of 264 substances using LC-HRMS followed by a set of in vitro and in vivo bioassays;
- ✓ **Non-target screening** was based on UHPLC-QTOF-MS and LC-HR-MS to search for as many compounds as possible; > 3370 different organic compounds found;
- ✓ An alternative **passive sampling** approach to detect the trace concentrations of organics was tested - samplers were exposed to water for up to two days to adsorb the dissolved pollutants.



JDS3

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- ✓ Numerous NORMAN laboratories were involved in sampling and chemical/ecotoxicological analyses of JDS 3 samples;
- ✓ 1000 l samples were taken at two sites for NORMAN Collaborative Trial on non-target screening involving 18 laboratories.



DRBMP 2015 - Pollution by hazardous substances

- ✓ Significant Water Management Issue in the Danube River Basin;
- ✓ The recent ICPDR investigations (particularly those related to JDS3 and emission inventories) on the priority and other hazardous substances have provided essential information on the relevance of these substances resulting in a much clearer picture on the pollution problem (relevant substances and their magnitude) than ever before.



Danube list of RBSPs

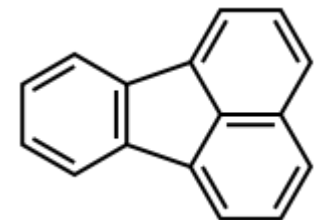
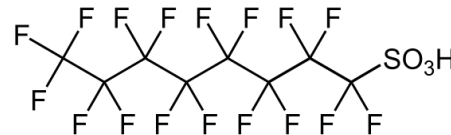
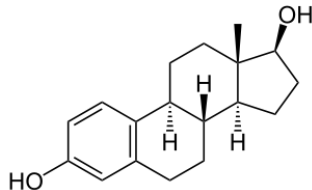
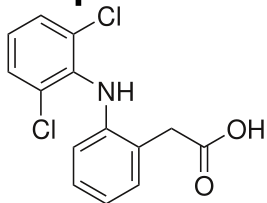
-
- ✓ Introduced in 2002;
 - ✓ Consists of:
 - ✓ Priority substances from WFD Annex 10 (Annex II of the Directive 2008/105/EC);
 - ✓ Substances specific for the Danube River Basin: COD, NH₄-N, TN, TP, As, Cu, Zn, Cr.
 - ✓ Revision needed based on the emission & monitoring data

RBSP prioritization

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- ✓ Prioritization methodology developed by NORMAN network produced a list of **20** substances suggested as relevant for the DRB based on the results of the JDS3 target screening of **654** substances in the Danube water samples by 13 laboratories;
- ✓ PNEC values were available for **189** out of **277** JDS3 substances actually determined in the samples;
- ✓ The list contains five WFD priority substances (three PAHs, fluoranthene and PFOS) and two EU Watch List candidate compounds (17beta-estradiol, diclofenac).



DRBMP 2015: 1st draft Danube RBSPs



No.	Substance	CAS No.	No. of sites substance detected	C _{max} ¹	MEC ₉₅ ²	Lowest PNEC/EQS	Key study	International Commission for the Protection of the Danube River		Internationale Kommission der Donau		Final score
								Type	EoE ³	EoE score	FoE ⁴	
1	2,4-Dinitrophenol (DNP)	51-28-5	68	0.06	0.04	0.001	RIVM 2014	EQS chronic water ⁵	40	0.2	1.00	1.20
2	PFOS (Perfluorooctansulfonate)	1763-23-1	63	0.026	0.02	0.00065	EU 2013	EQS chronic water ⁵	31	0.2	0.93	1.13
3	Chloroxuron	1982-47-4	65	0.04	0.02	0.0024	James et al. 2009	PNEC acute	8.3	0.1	0.93	1.03
4	Desethylterbutylazine	30125-63-4	54	0.028	0.01	0.0024	RIVM 2014	EQS chronic water ⁵	4.2	0.1	0.79	0.89
5	2-hydroxy atrazine	2163-68-0	53	0.06	0.02	0.002	Ecostat 2013	EQS chronic water ⁵	10	0.1	0.76	0.86
6	Bromacil	314-40-9	31	0.19	0.14	0.01	INERIS 2013	EQS chronic water ⁵	14	0.2	0.46	0.66
7	Dimefuron	34205-21-5	58	0.041	0.04	0.008	Oekotoxzentrum 2014	EQS chronic water ⁵	5.0	0.1	0.56	0.66
8	Bisphenol A	80-05-7	30	1.94	1.03	0.1	Nendza 2003	EQS chronic water ⁵	10	0.2	0.16	0.36
9	Benzo(g,h,i)perylene	191-24-2	65	0.029	0.003	0.002	CEC 2008	EQS chronic water ⁵	1.5	0.1	0.26	0.36
10	Diazinon	333-41-5	21	0.009	0.01	0.001	Management Team PPDB 2009	PNEC acute	10	0.1	0.12	0.22
11	Indeno(1,2,3-c,d)pyrene	193-39-5	15	0.005		0.002	CEC 2008	EQS chronic water ⁵			0.19	0.19
12	Linuron	330-55-2	32	1.42	1.12	0.26	Oekotoxzentrum 2014	EQS chronic water ⁵	4.3	0.1	0.07	0.17
13	Amoxicillin	26787-78-0	33	0.28	0.08	0.078	van der Aa et al. 2011	PNEC chronic	1.0	0.1	0.03	0.13
14	Metazachlor	67129-08-2	30	0.03	0.02	0.019	INERIS 2014	EQS chronic water ⁵	1.1	0.1	0.03	0.13
15	17beta-estradiol	50-28-2	8	0.029		0.0004	CEC 2011	EQS chronic water ⁵			0.12	0.12
16	Benzo(a)pyrene	50-32-8	3	0.002		0.00017	EU 2013	EQS chronic water ⁵			0.04	0.04
17	Diclofenac	15307-79-6	51	0.318	0.036	0.05	Oekotoxzentrum 2014	EQS chronic water ⁵			0.04	0.04
18	Bentazon	25057-89-0	61	0.1	0.02	0.06	USEPA 2008	PNEC acute			0.01	0.01
19	Fipronil	120068-37-3	1	0.02		0.012	EU 2011	EQS chronic water ⁵			0.01	0.01
20	Fluoranthene	206-44-0	58	0.02	0.006	0.0063	EU 2013	EQS chronic			0.01	0.01

DRBMP 2015 - Pollution by hazardous substances

-
- ✓ Further efforts are needed to identify which priority substances and other emerging chemicals are of basin-wide relevance;
 - ✓ Further information on in-stream concentrations and river loads via improved regular monitoring (enhanced devices and higher sampling frequency) and specific sampling campaigns (e.g. to sample point source effluents) is needed.

- ✓ Planned for 2019.
- ✓ Target screening of new PS from 2013/39/EU; Danube RBSPs, EU Watch List substances; other emerging substances of concern in DRB.
- ✓ Non-target screening of organic substances in DRB;
- ✓ Monitoring of point source effluents (target & non-target screening).
- ✓ Application of new methods for monitoring of chemical substances (verification of use of alternative methods for pollutant analysis with the view of reducing WFD monitoring costs).

Look forward to future cooperation with NORMAN

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