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Danube Transnational Programme
Danube Hazard m³c

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Tackling hazardous substances pollution in the Danube River Basin by **M**easuring, **M**odelling-based **M**anagement and **C**apacity building

Duration: 1.7.2020 – 31.12.2022
Lead partner: TU - Wien

Adrienne Clement
Budapest University of Technology and Economics (BME)

Project co-funded by European Union funds (ERDF, IPA, ENI) and National Funds of the participating countries

We aim to ...

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- improve baseline knowledge on the status quo of HS water pollution and on the relevance of different emission pathways
- elaborate recommendations for the national and transnational river basin management plans
- enhance skills and competence regarding inventorying, modelling and management of HS pollution in the DRB

Partners

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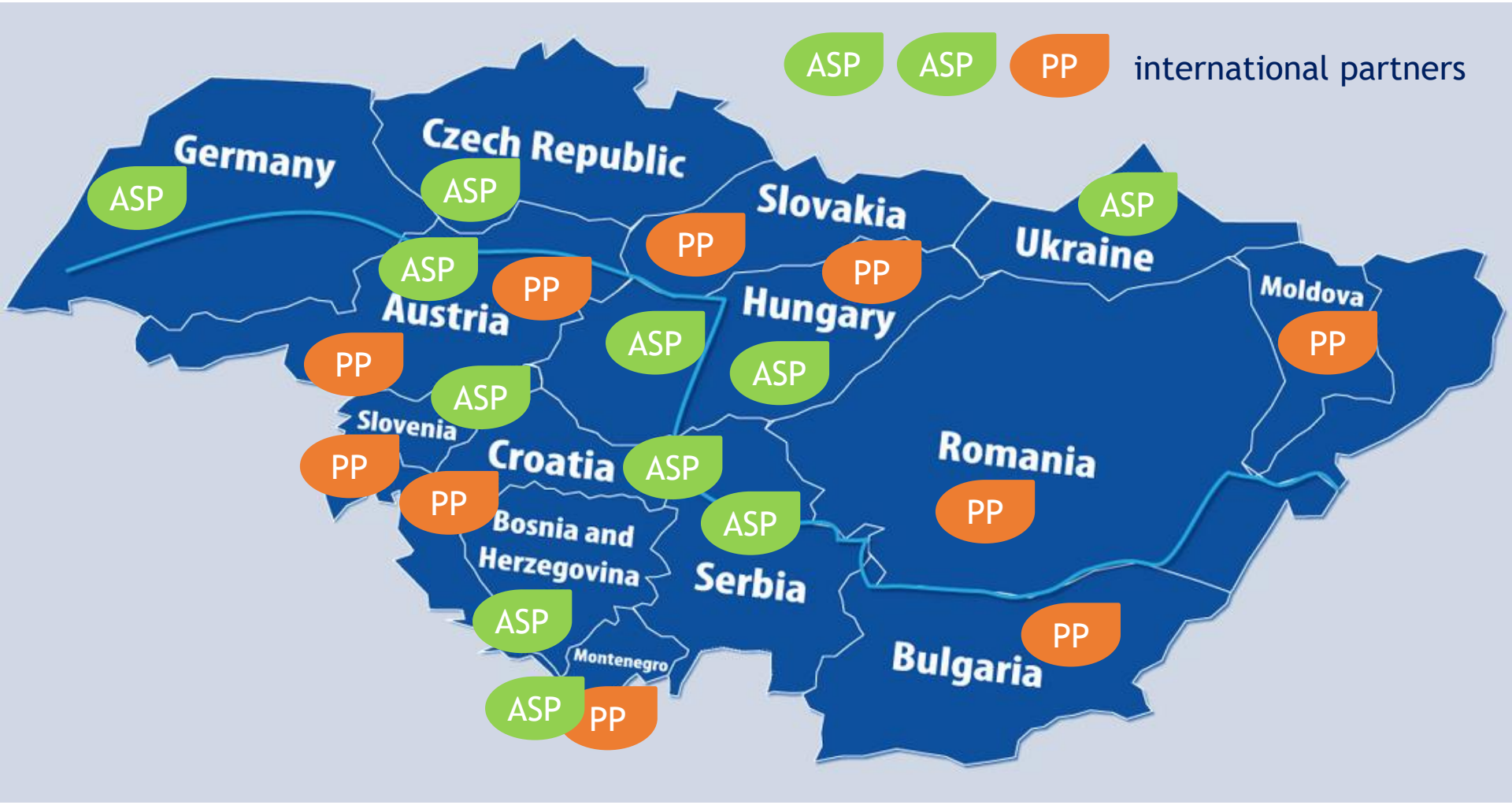

Project structure

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Management

WP T1 Inventory of hazardous substances

WP T2 Scenarios modelling and assessment in pilot regions

WP T3 Transnational HS pollution assessment and recommendations

WP T4 Capacity building

Communication

WP T1

Inventory of hazardous substances

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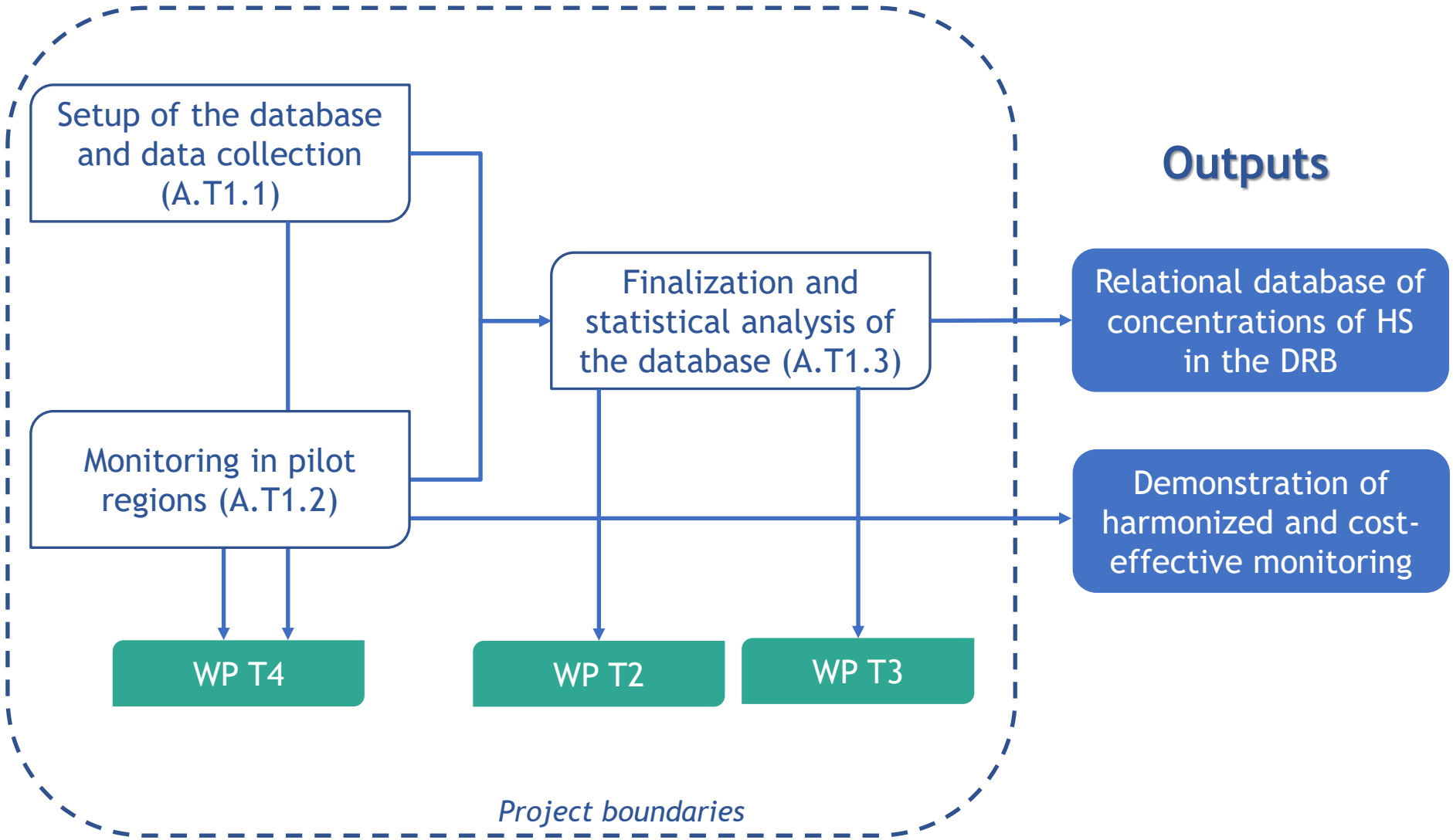

WP T1

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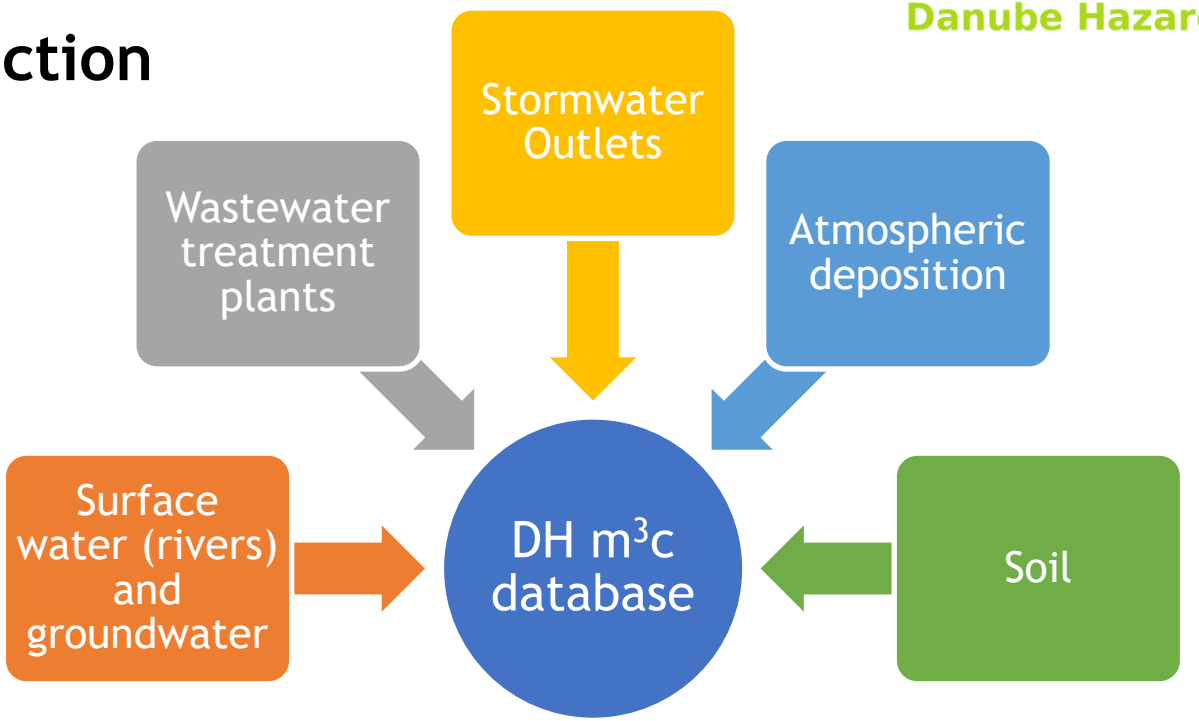
Data collection



Substances

- Priority Substances + Priority Hazardous Substances + Other Substances under 2008/105/EC and 2013/39/EC
- Danube River Basin Specific Pollutants (also nominated RBSPs)
- Watchlist parameters
- DH m³c selected project parameters
- Some support parameters (e.g. total suspended solids)

WP T1

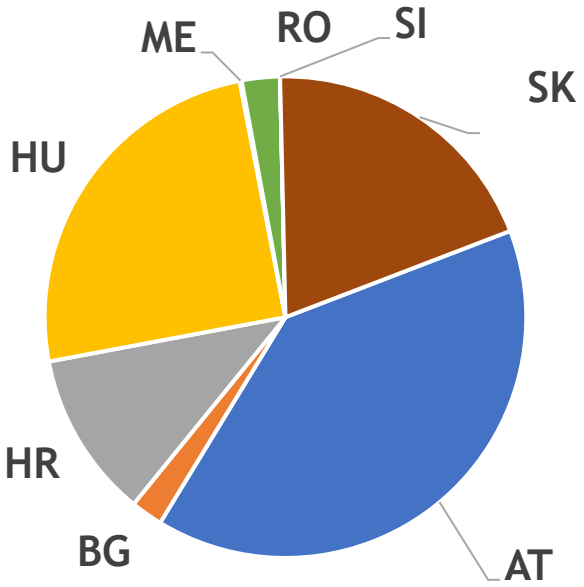
Database of HS

Country	River	Atm. Dep.	Soil	Waste water	Storm water
Austria	X	X		X	X
Bulgaria	X		X		
Croatia	X	X		X	
Hungary	X	X	X	X	X
Moldova					
Montenegro	X		X		
Romania	X			X*	
Slovenia	X			X	
Slovakia	X*			X	
*Germany***					
Czech Rep.					
Bosnia					
*Serbia***	X				
Ukraine					
Total number of data	**2 232 422**	**7 564**	**16 750**	**25 930**	**8 286**

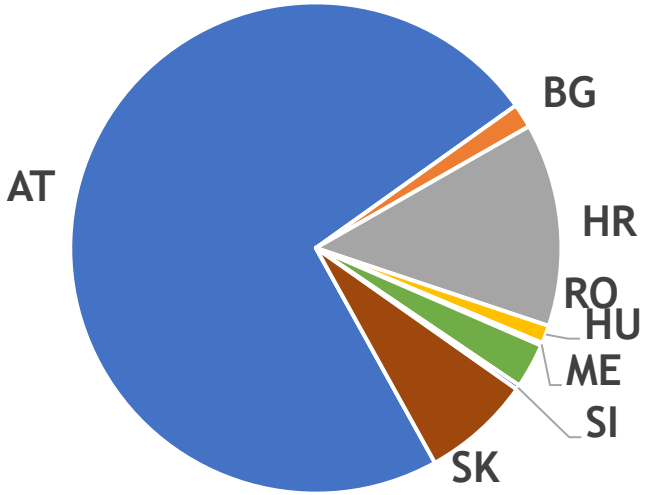
*Time aggregated data

** Data are available but the DRS format were not applied

Substances under 2013/39/EU



Other relevant substances



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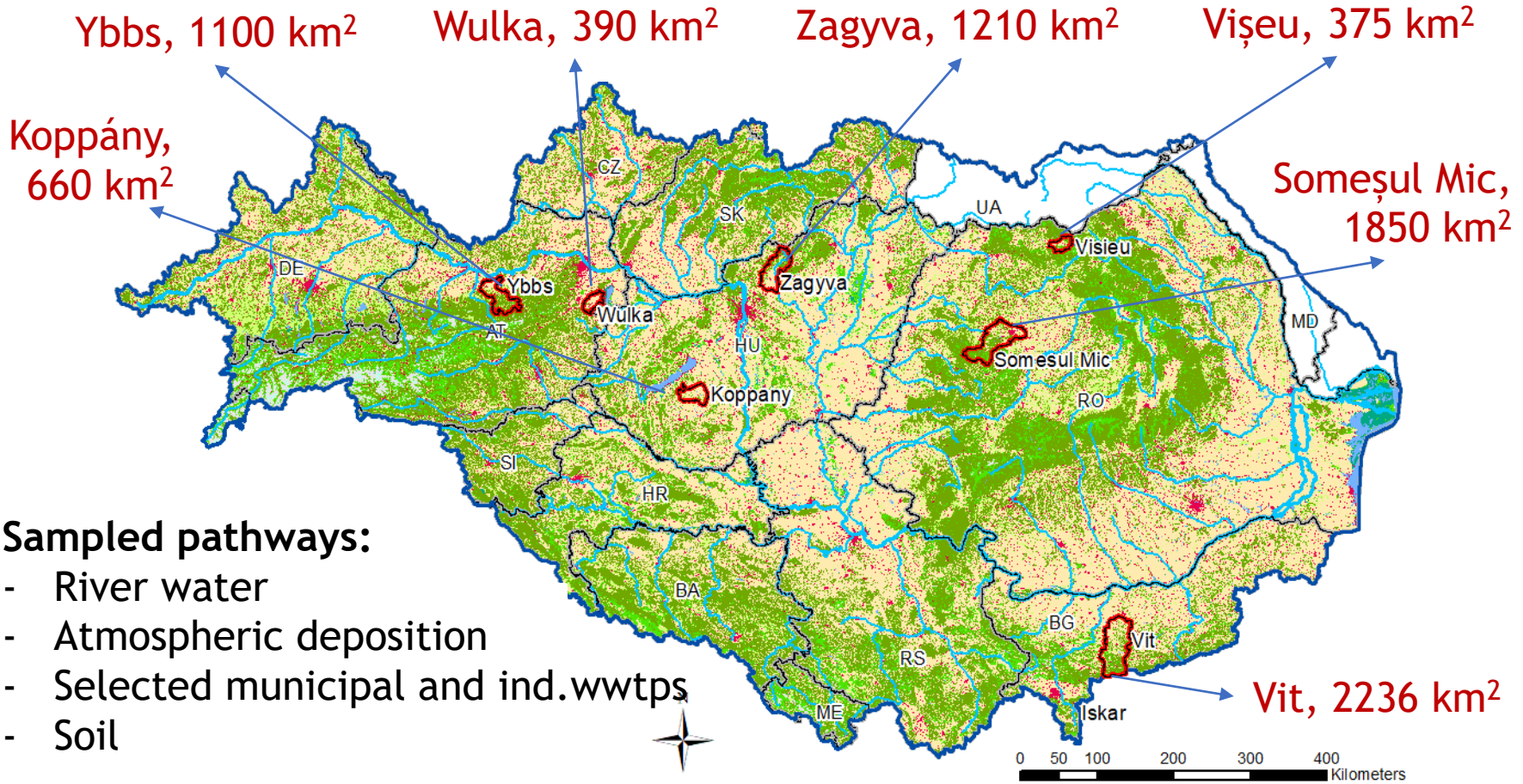
Monitoring

Measurement campaigns are carried out over **one year in 7 pilot regions**, which were selected to cover differences and major aspects of the DRB.



Sampled pathways:

- River water
- Atmospheric deposition
- Selected municipal and ind.wwtps
- Soil

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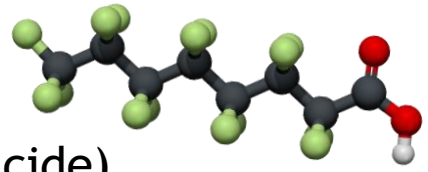
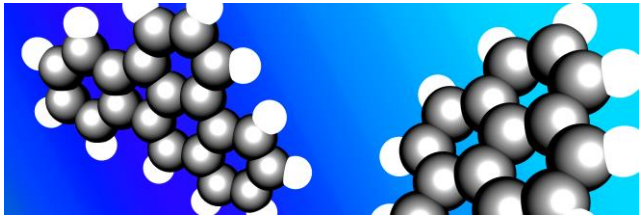
Preselected ”indicator” substances (representative for different sources)



Agriculture
- Tebuconazol (fungicide)
- Metolachlor, Metolachlor -ESA, Metolachlor –OA (herbicide)

Industrial chemicals
- PFOS, PFOA
- Octylphenol, Bisphenol-A, Nonylphenol

Pharmaceuticals
- Diclofenac
- Carbamazepine



Substances of both natural and anthropogenic origin
- Toxic metals (As, Cd, Cu, Cr, Pb, Hg, Ni, Zn)
- PAH16

Chemical analysis

- Each sample are measured in the same laboratory
- Labs of NARW, JSI, UBA and subcontracted lab Wessling

Development of the sampling protocol (SOP)

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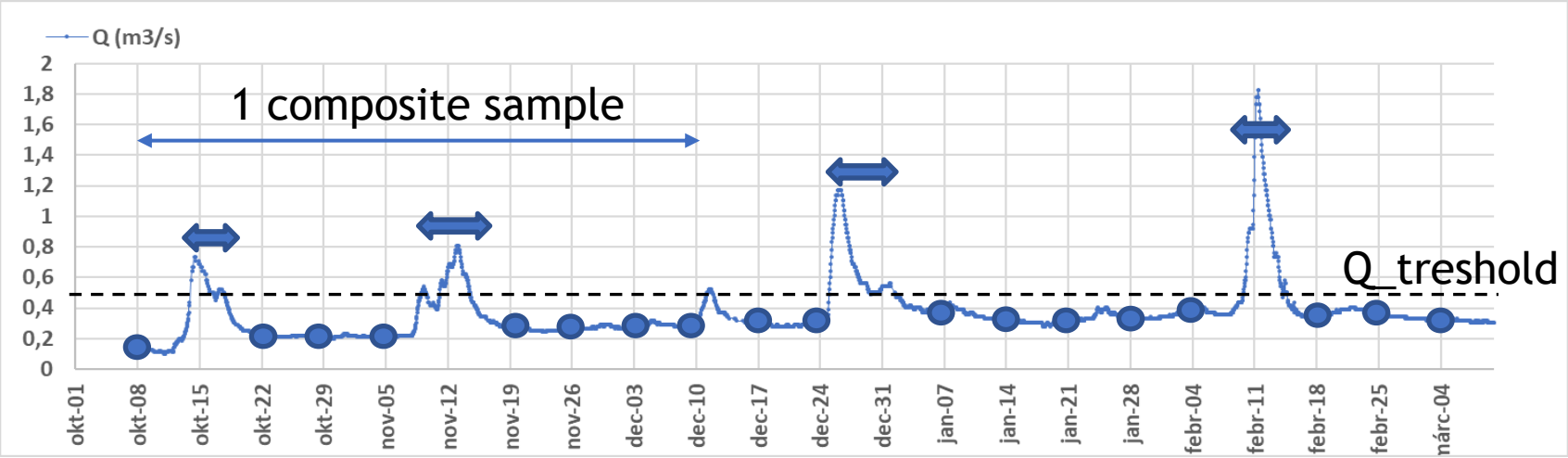
Sampling approach for river monitoring



- Low and mindflow conditions:
  weekly spot sampling, 8 samples (2 months) = 1 composite

⟷ High flow events:
  flow proportional sampling with autosamplers

Sampling is supported by **continuous online measurements** of indicator parameters (turbidity and conductivity)

WP T1

High-flow sampling (Upper Zagyva pilot region, Hungary)

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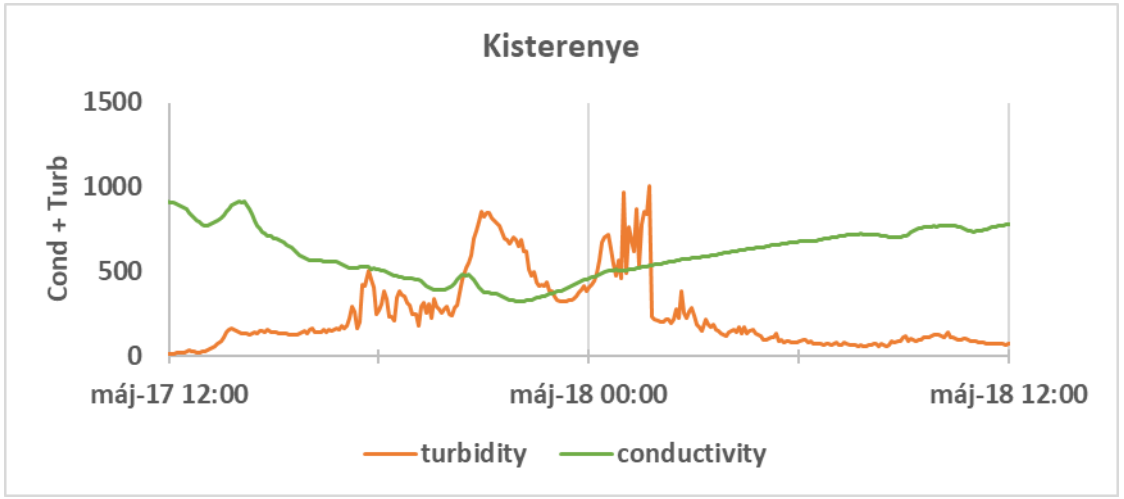

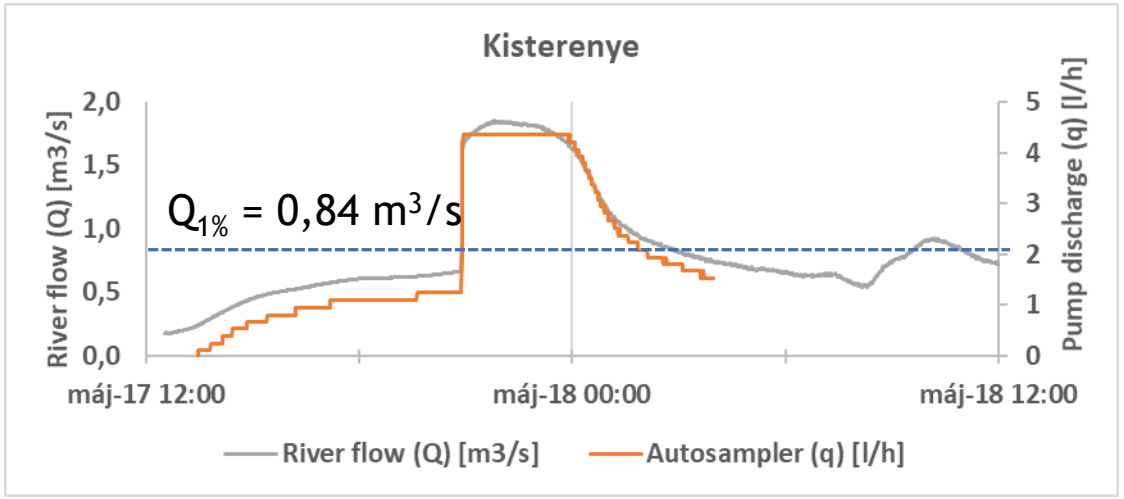

Sampled total volume: 21,9 l

WP T1

Preliminary results of pilot measurements

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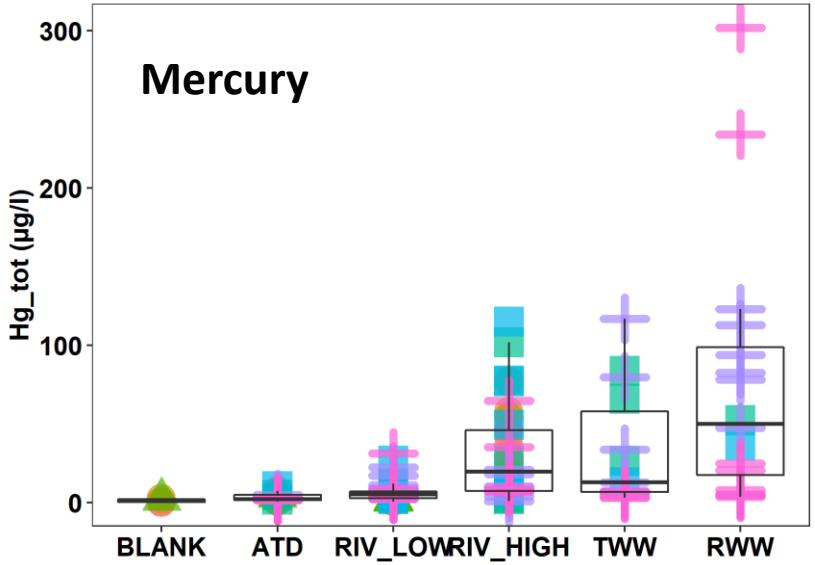

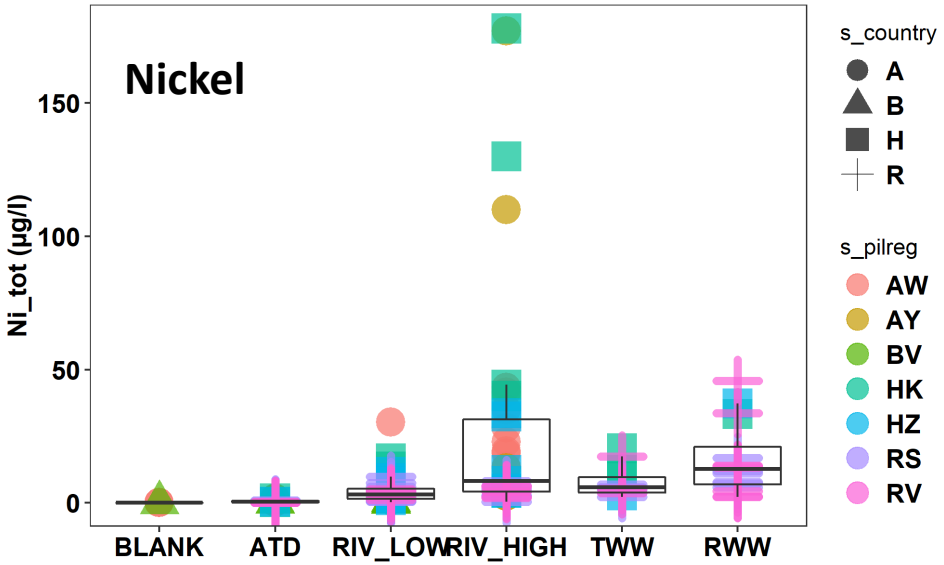

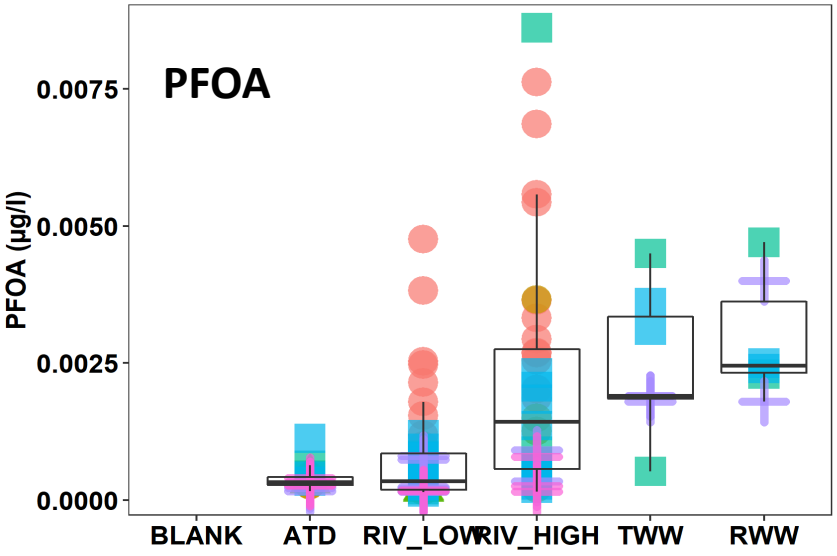

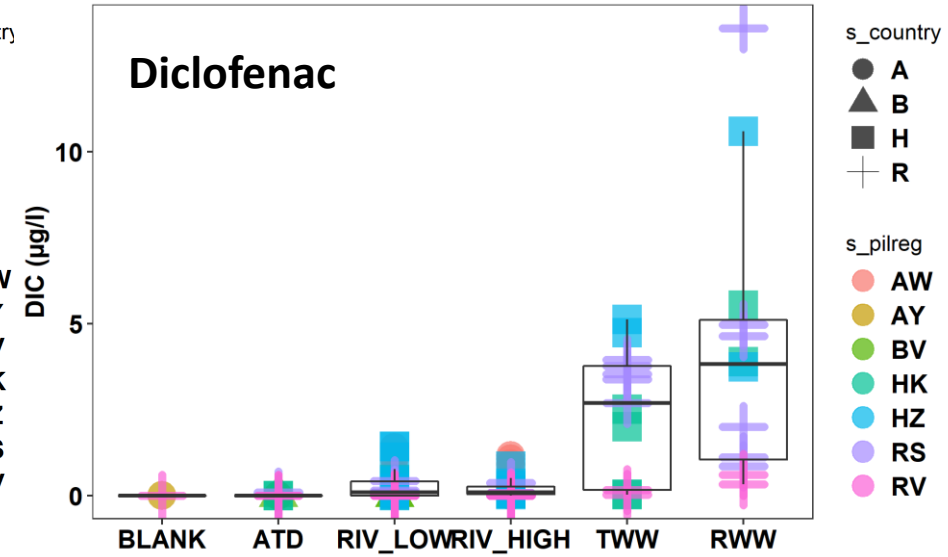

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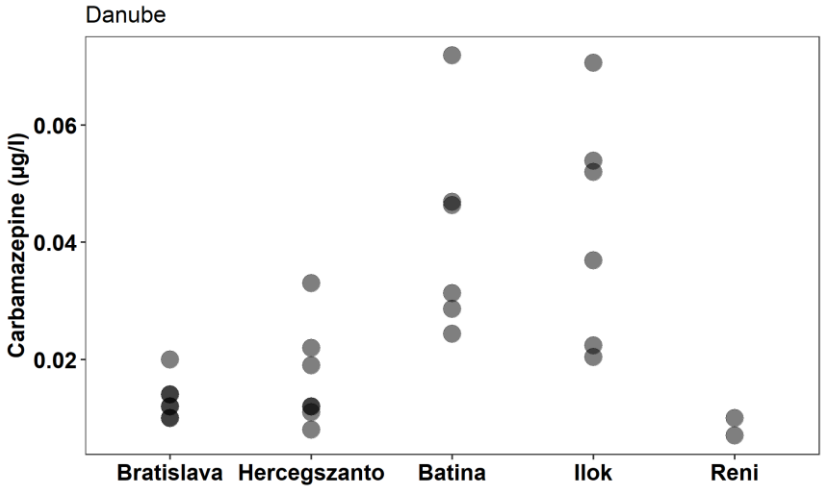
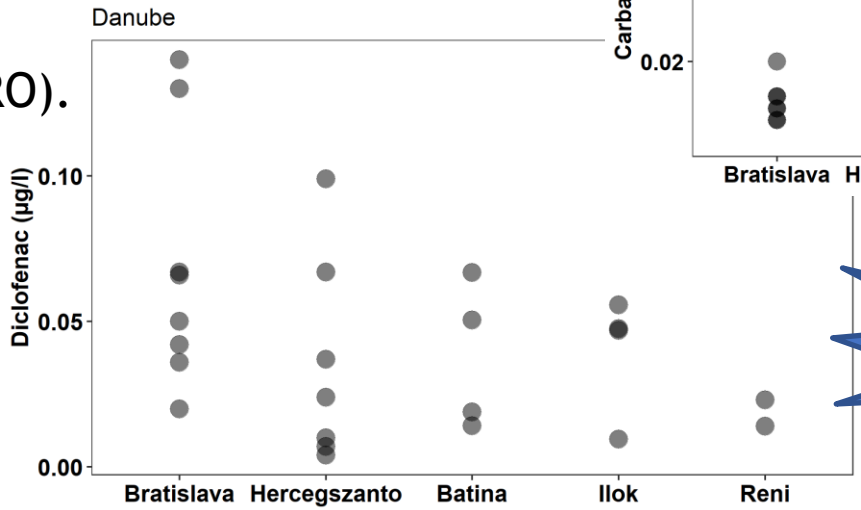
Additional measurements within TNMN

Regular measurements were extended: additional analysis at 6 monitoring stations are performed by the countries, but Wessling performs some extra measurements (covered by DH m³c budget):

- Station Jochenstein (DE)
- Station Bratislava (SK)
- Station Hercegszanto (HU)
- Stations Danube Batina and Danube Ilok (HR)
- Station Reni (RO).





Thank you!

WP T2

Scenarios modelling and assessment in pilot regions

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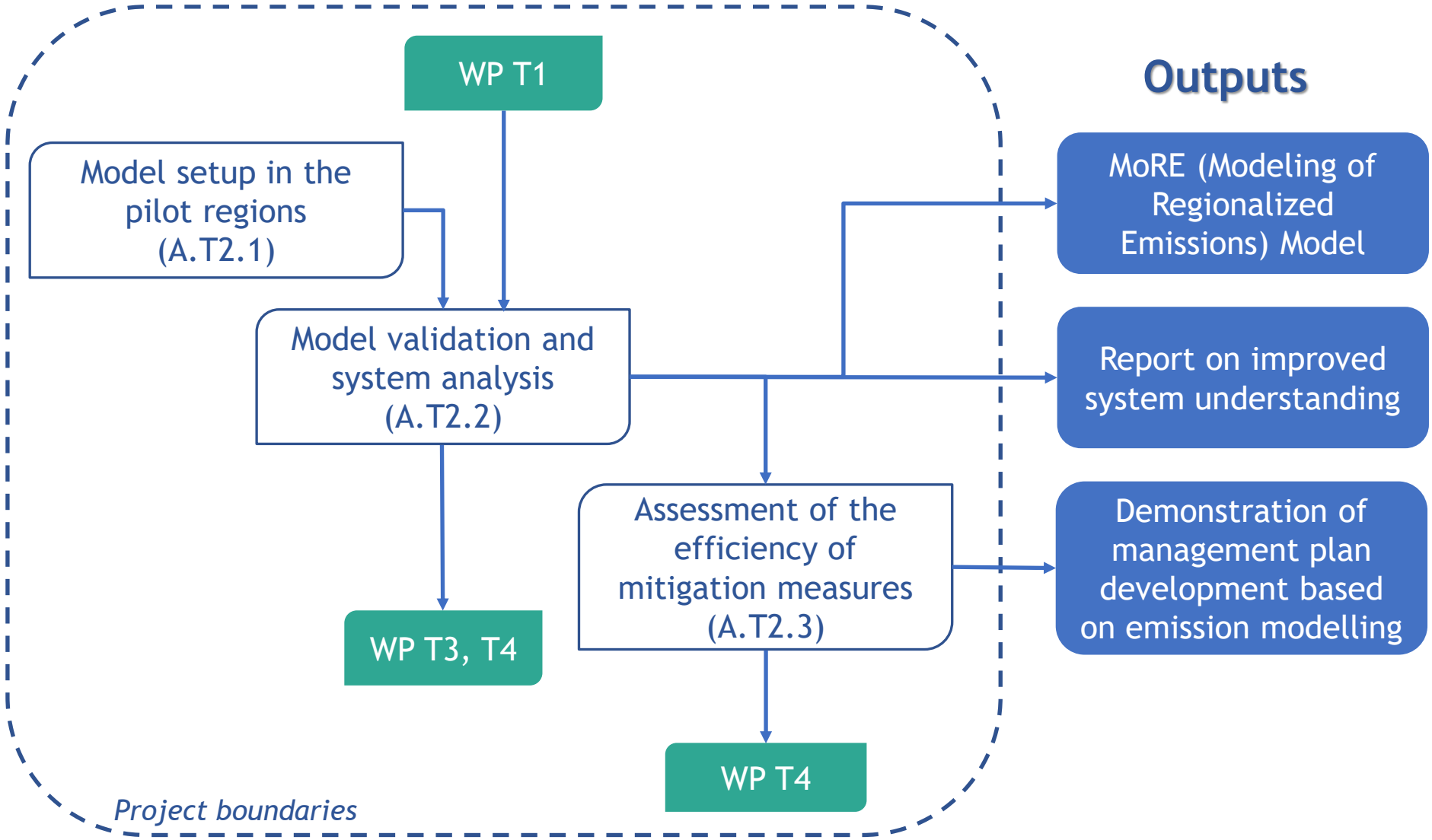

WP T2

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Data collection – Data availability

Input data type	Actual input data code	Name	description	unit	Wulka	Ybbs	Koppany	Zagyva	Vit	Viseu	Somesul Mic
Analytical Unit	BI_A	Area of analytical unit	Area of analytical units	km²	Available	Available	Available	Available	Available	Available	Available
Topography	BI_ELEVA	Digital Elevation model	mean hights of subcatchments	m	Available	Available	Available	Available	Available	Available	Available
Landuse	BI_A_AL_slope_0-1	arable land	(in 5 slope classes: 0-1; 1-2; 2-4; 4-8; >8 % if possible]	km²	Available	Available	Available	Available	Available	Available	Available
Landuse	BI_A_PST	pastures		km²	Available	Available	Available	Available	Available	Available	Available
Landuse	BI_A_WS_mr; BI_A_WS_trib	water surface	main river; tributaries; but also lakes; reservoirs	km²	Available	Available	Available	Available	Available	Available	Available
Landuse	BI_A_FOR	naturally covered areas	woods; scrubland	km²	Available	Available	Available	Available	Available	Available	Available
Landuse	BI_A_O	open areas	alpine-mountainous area without vegetation; beaches; dunes	km²	Available	Available	Available	Available	Available	Available	Available
Landuse	BI_A_OPM	surface mining areas		km²	Corine (1.3.1)	Corine (1.3.1)	Available	Available	Available	Available	Available
Landuse	BI_A_URB	settlements	total urban areas	km²	Available	Available	Available	Available	Available	Available	Available
Landuse	BI_A_IMP	impervious urban area	paved areas inside urban areas: settlements; industrial estates; car parks....	km²	Available	Available	Available	Available	Available	Available	Available
Landuse	BI_A_WL	wetlands		km²	Available	Available	Available	Available	Available	Available	Available
Landuse	BI_A_OR	country roads	paved road area; not included in settlements	km²	Available	Available	Available	Available	Available	Available	Available
Landuse	BI_A_REM	other remaining areas	if not very small, please indicate landuse as comment	km²	Available	Available	Available	Available	Available	Available	Available
Drainages	TD_SHR_a_td_agrl	Tile drained areas	from arable land and pastures	km²	Available	Available	Available	Available	Not available	Available	Available
Meteorological Data	AD_EVAPO_lt	Evapotranspiration,	mean annual evapotranspiration	mm	Available	Available	Available	Available	Not available	Available	Available
Meteorological Data	(e.g.) BI_PREC_apr	Precipitation	monthly values	mm	Available	Available	Available	Available	Available	Available	Available
Hydrological data	BI_Q_net	Net runoff from	modelling period; annual data on subcatchment level	m³/s	Available	Available	Available	Available	Available	Available	Available
Erosion	ER_agrl_SL_spec_lt_AL	Soil loss	potential soil loss from arable land (optional from 5 slope classes)	t/(ha·a)	Available	Available	Available	Available	Not available	Available	Available
Erosion	ER_agrl_SL_spect_lt_PST	Soil loss	potential soil loss from pastures	t/(ha·a)	Available	Available	Available	Available	Not available	Available	Available
Sewer sytem	BI_INH	number of inhabitants		inh	Available	Available	Available	Available	Available	Available	Available
Sewer sytem	US_ss_VOL_SST	sedimentation tanks	storage volume of stormwater sedimentation tanks in separate sewer	m³	Not available	Not available	Available	Available	Available	Available	Available
Sewer sytem	US_cso_VOL_SOT	stormwater overflow	storage volume of stormwater overflow tanks in combined sewer systems	m³	Not available	Not available	Available	Available	Available	Available	Available
Sewer sytem	US_cso_VOL_spec_SOT	stormwater overflow	storage volume of stormwater overflow tanks in combined sewer systems	m³/ha	Not available	Not available	Available	Available	Available	Not available	Not available
Sewer sytem	US_L_CS	combined sewers	length of combined sewers	km	Available	Available	Not available	Not available	Available	Available	Available
Sewer sytem	US_L_SS	stormwater sewers	length of stormwater sewers	km	Available	Available	Not available	Not available	Available	Available	Available
Sewer sytem	US_L_WWS	sewage sewers	length of sewage sewers	km	Available	Available	Not available	Not available	Available	Available	Available
Sewer sytem	US_SHR_inh_con_tot	connection rate	percentage of inhabitants that are connected to sewer systems	%	Available	Available	Available	Available	Available	Available	Available
Sewer sytem	US_SHR_inh_conWWTP_tot	connection rate	percentage of inhabitants that are connected to sewer systems and waste	%	Available	Available	Available	Available	Available	Available	Available
Sewer sytem	US_SHR_inh_nss_tot	connection rate	percentage of inhabitants that are not connected to sewer systems	%	Available	Available	Available	Available	Available	Available	Available
Sewer sytem	US_INHC_H2O		inhabitant specific water consumption	l/(inh·d)	Available	Available	Available	Available	Available	Available	Available
Sewer sytem	US_nss_SHR_inhl_towwtp_sept		percentage of inhabitant load that is transported from septic tanks to waste	%	Available	Available	Available	Available	Not available	Not available	Available
Sewer sytem	US_Q_spec_COM		runoff rate for comercial waste water	l/(ha·s)	Not available	Not available	Not available	Not available	Not available	Not available	Not available
Urban wastewater	WWTP_ps_INH_conWWTP	connection rate	number of inhabitants that are connected to sewer systems and waste	inh	Available	Available	Available	Available	Available	Available	Available
Urban wastewater	WWTP_ps_CP	capacity	capacity of the waste water treatment plant (point sources)	PT	Available	Available	Available	Available	Available	Available	Available
Urban wastewater	WWTP_ps_PE	load	nominal load of waste water treatment plant (point sources)	PT	Available	Available	Available	Available	Available	Available	Available
Urban wastewater	WWTP_ps_TS	treatment type	current treatment type of waste water treatment plant (point sources)	-	Available	Available	Available	Available	Available	Available	Available
Urban wastewater	WWTP_ps_Q	discharge	runoff via waste water treatment plant (point sources)	m³/a	Available	Available	Available	Available	Available	Available	Available
Industrial wastewater	ID_ps_Q	discharge	runoff via industrial direct dischargers	m³/a	Available	Available	Available	Available	Available	Available	Available

WP T2

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Finalized:

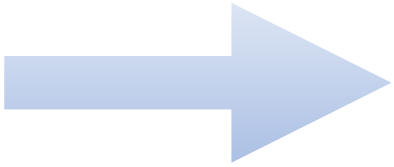
- Technical model setup and translation to English
- Delineation of the 7 pilot regions, subdivided in 34 subcatchments
- Collection of basic input data

Next steps:

- Adaption of model algorithms
- Preparation of substance-specific input data
- First preliminary version of the model by the end of 2021

Model is ready and status quo is analysed

Catalogue of measures



Model is run for management scenarios

WP T3

Transnational HS pollution assessment and recommendations

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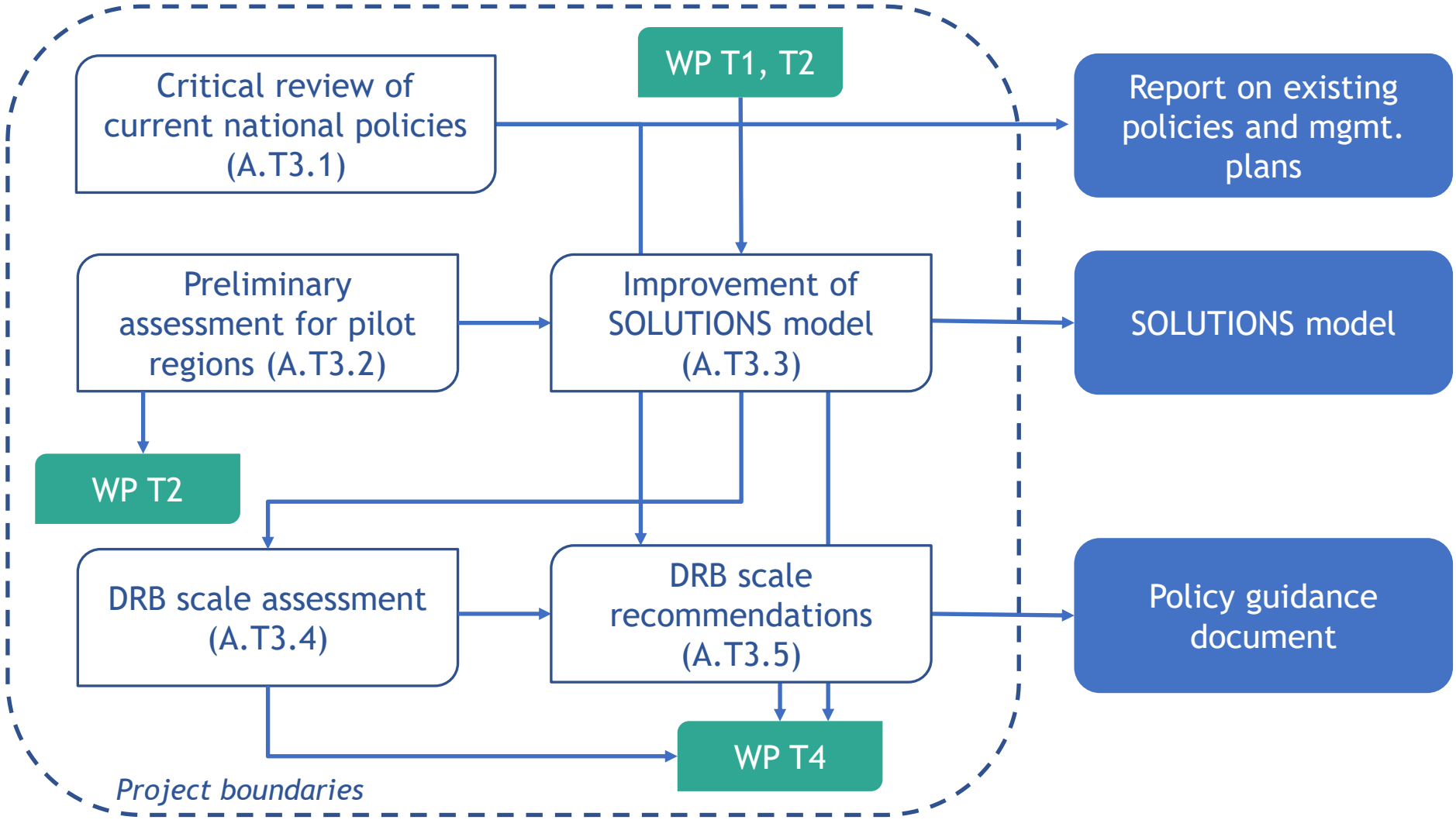

WP T3

Basin-scale modelling

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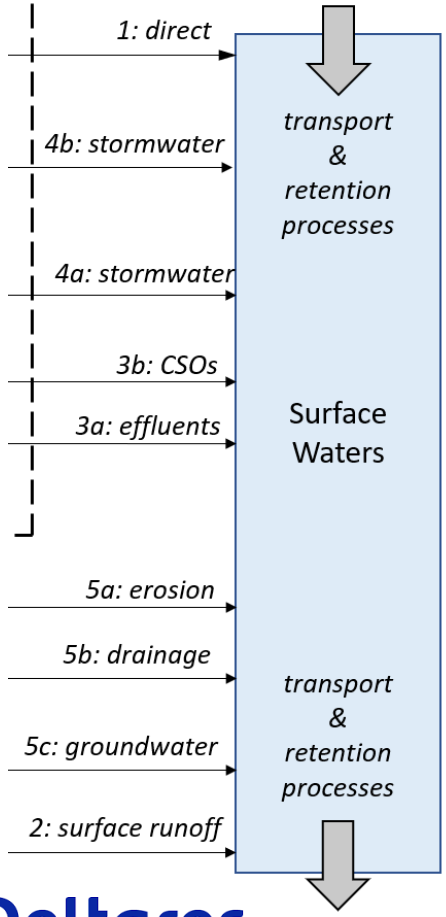
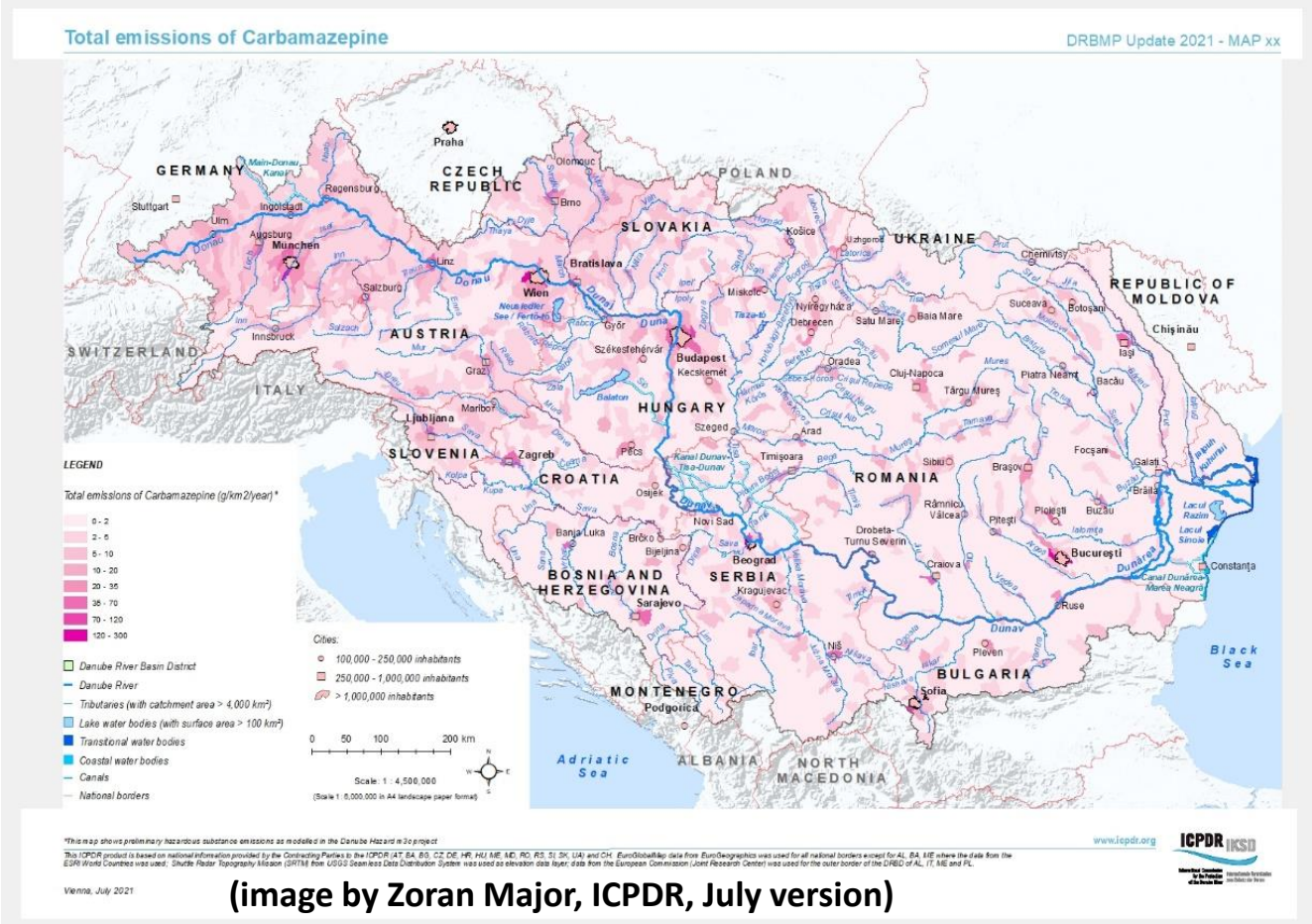
- Model evaluation using TNMN and JDS observations,
- Preliminary results of basin-wide emissions,
- Input to the 3rd Danube River Basin District Management Plan





(image by Zoran Major, ICPDR, July version)

Deltares

WP T3

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Policy questionnaire

- Tool for investigating the **existing national policies** on managing HS pollution
- Providing a **common structure** for reporting on the national situations and covering a broad range of aspects including regulatory framework, river basin management, monitoring, pollution sources, measures

Legislation harmonization	River basin management level	Point source emitters	Diffuse pollution
General information on the harmonization of the national legislation with the relevant EU Directives, e.g. WFD, Directive 2013/39/EU, Directive 2010/75/EU…	Information on the priority and specific substances in water bodies subject to regulation; the respective monitoring of water bodies and the established monitoring database	Information on the management of industrial discharges, i.e. issuing discharge permits, implementation control, database establishment and polluters taxation	General information on the policy framework concerning air emissions and pesticides application

WP T3

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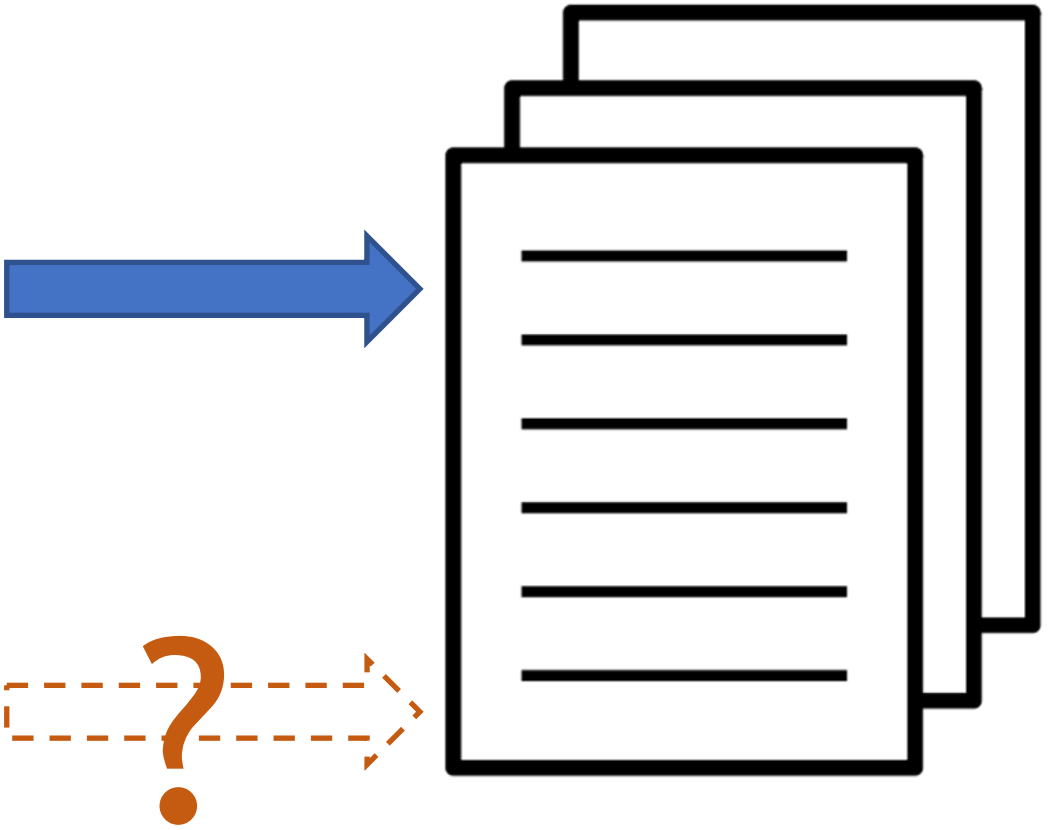
Policy questionnaire

- ✓ Austria (UBA, TU-Vienna)
- ✓ Bulgaria (BWA)
- ✓ Croatia (FCET)
- ✓ Hungary (BME)
- ✓ Montenegro (CETI)
- ✓ Romania (NARW)
- ✓ Slovakia (WRI)
- ✓ Slovenia (JSI)
- ✓ Serbia (MEP) - ASP
- ✓ Ukraine (UHISSE) - ASP

? Moldova (ENI)

? Germany (GEA)-ASP



WP T3

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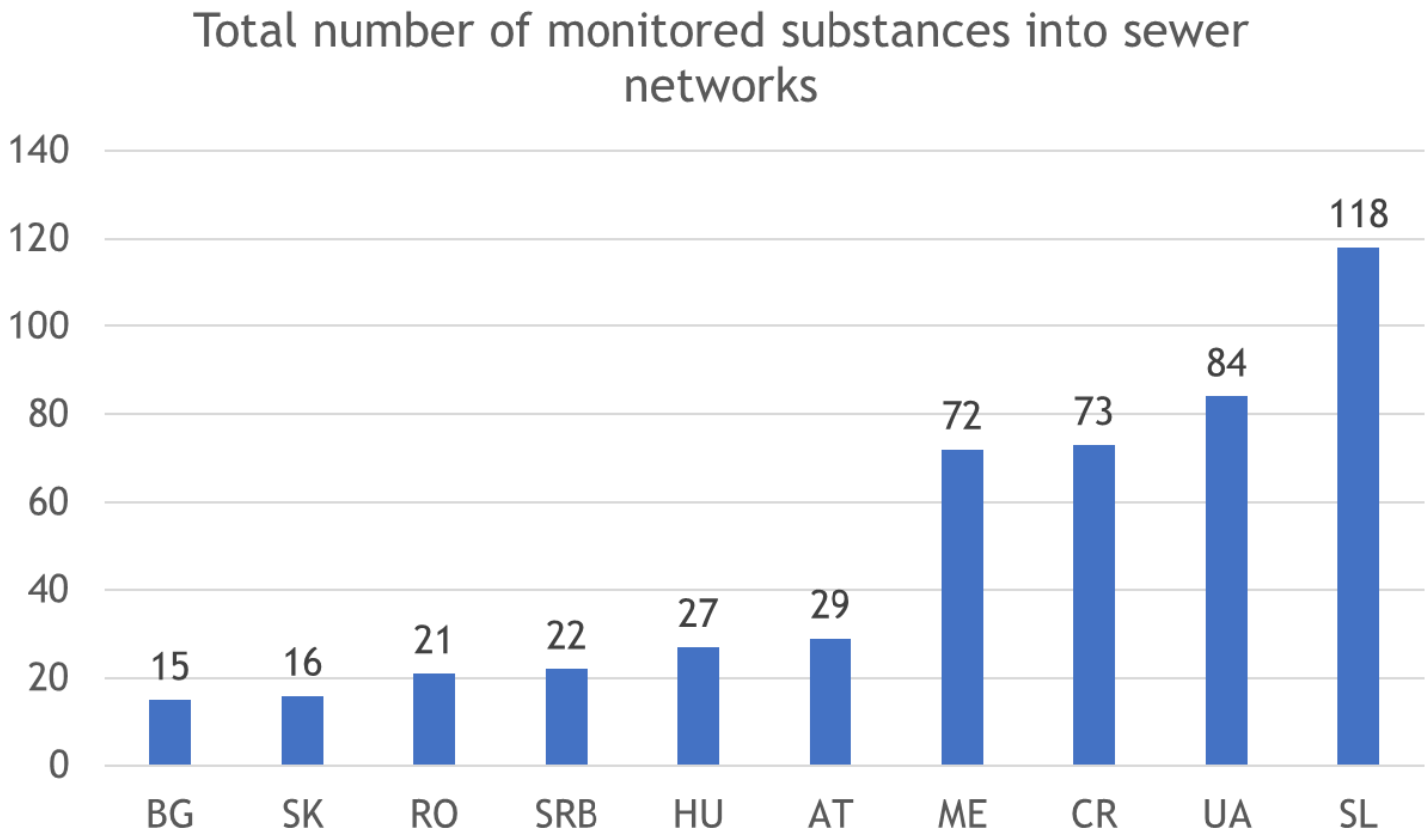
Some preliminary results

- **Monitored hazardous substances of industrial emitters discharging into sewer networks**
- **Only 8 substances (As, Cd, Cr $^{6+}$, Cu, Pb, Hg, Ni and Zn) are monitored by all the countries, though the limit values are different**



WP T4

Capacity building

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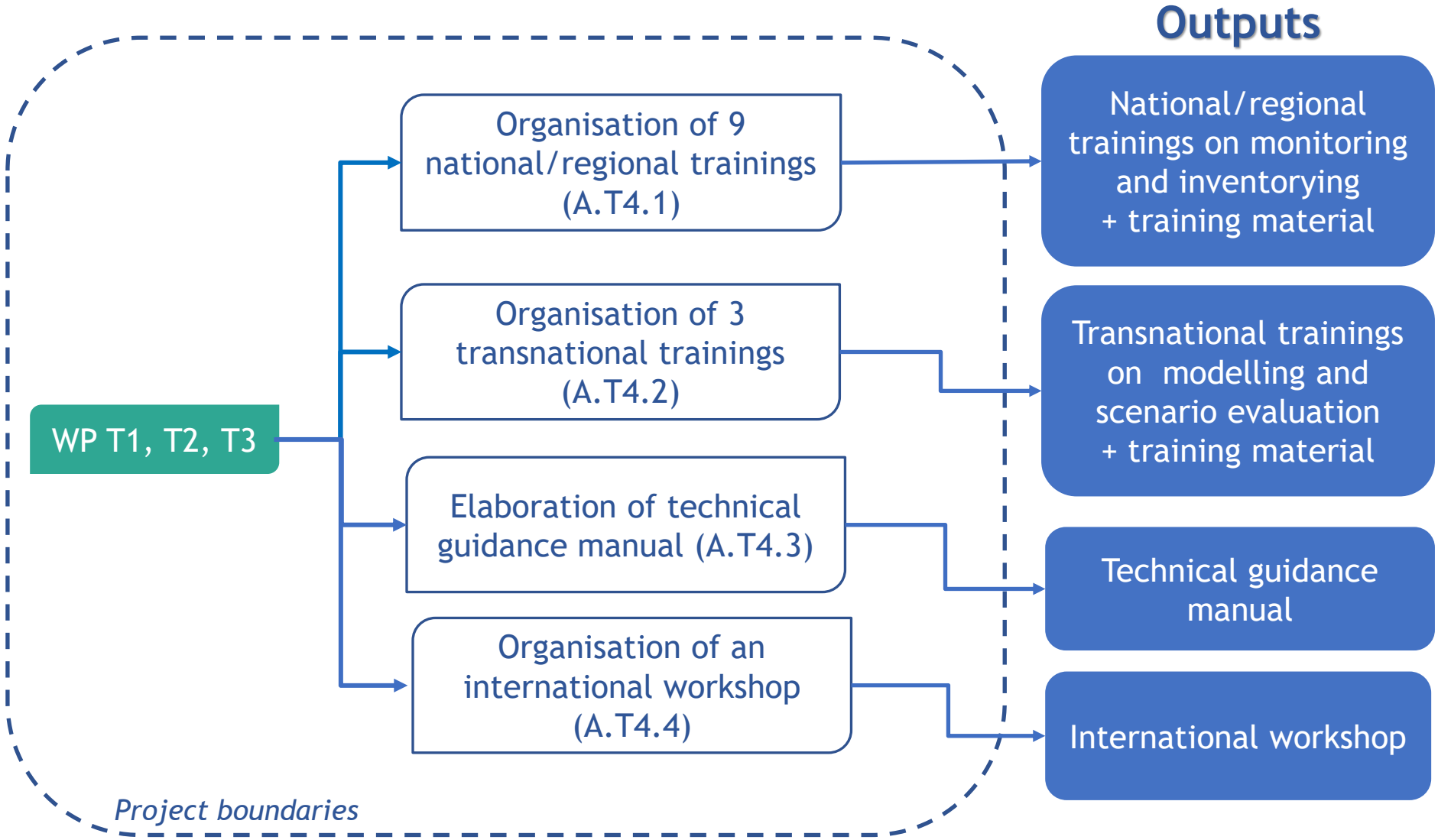

Thank you for your attention!

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cetio
Center for Eco-Toxicological Research

TU WIEN

BWA
BULGARIAN WATER ASSOCIATION

Jožef Stefan Institute, Ljubljana, Slovenia

Administrația Națională "APELE ROMÂNE"

MŰEGYETEM 1782

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UNIVERSITAS STUDIORUM ZAGRABIENSIS MDCLXIX

INSTITUTUL DE CHIMIE

ENVIRONMENT AGENCY AUSTRIA umweltbundesamt

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