



Session 2:

Environmental impacts of floods: past evidence monitoring and structuring the information

Reporting structure of the Floods Directive for environmental effects of flooding and synergies with the WFD and BHD





Environmental consequences of floods

- In addition to economic and social damage, floods can have severe environmental consequences, for example, when installations holding large quantities of toxic chemicals are inundated or disconnected artificial wetland areas destroyed.





Environmental consequences of floods

- This is recognized in the EU Floods Directive where Member States have to carry out a Preliminary Flood Risk Assessment (PFRA), where environmental consequences of past and/or potential future (read: modeled) floods can be categorized as impact on:
 - Water body status;
 - Protected areas;
 - Pollution sources; and
 - „other“.





Environmental consequences of floods

- **Waterbody Status:** Adverse permanent or long-term consequences ecological or chemical status of surface waterbodies or chemical status of ground water bodies affected, as of concern under the WFD. Such consequences may arise from pollution from various sources (point and diffuse) or due to hydromorphological impacts of flooding.
- **Protected Areas:** Adverse permanent or long-term consequences to protected areas or water bodies such as those designated under the Birds and Habitats Directives, bathing waters or drinking water abstraction points.
- **Pollution Sources:** Sources of potential pollution in the event of a flood, such as IPPC and Seveso installations, or point or diffuse sources.
- **Other:** Other potential permanent or long-term adverse environmental impacts, such as those on soil, biodiversity, flora and fauna, etc.





Environmental consequences of floods

- The reporting to the European Commission about the PFRA shows differences in between Member States,
- but in general less information on environmental impacts is available compared to the economic impacts.
- When EEA questioned the member countries beginning of 2015 to add information on a voluntary base, it became clear that information about the environmental impact is often not available (in a structured way).
- Nevertheless, we obtained/collected preliminary data and information.





Environmental impacts due recent floods (voluntary reporting under PFRA)

- Additional info send to EEA:

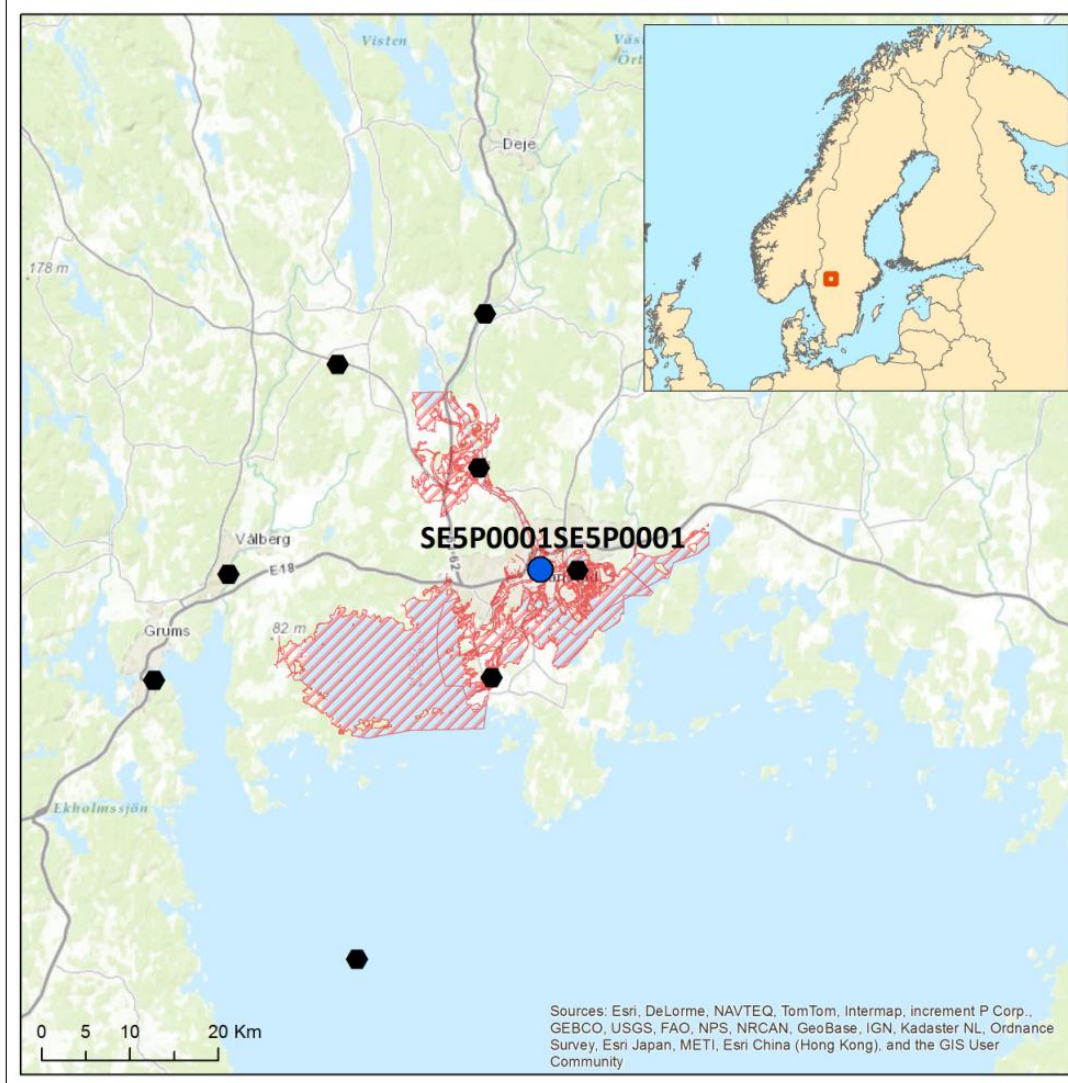
	number of flood phenomena	events with pollution impacts	protected areas	point sources	diffuse and point sources of pollution	with env consequences
BG	347	28	DW: 28; C: 2		14	
EE	7	6	BW: 1; C: 5	3	3	
FI	5	1			1	impact ec.st.
HU	26	15	DW: 1, C: 7		15	6
LV	3	3			3	1
SE	10	9			9	8
XK	8	8	C: 8		8	4

DW: drinking water;
BW: bathing water

- SE:

- Deterioration of water quality in surface and groundwater. Damage to the waste water treatment facilities (3 events).
- Drinking water affected and waterworks flooded. (2 events).
- Pumping station for waste water treatment plants under flood.
- Spawn areas affected and crayfish habitats destroyed.
- Recreational bathing water contaminated.





Floods in Sweden (Karlstad area)

- PFRA - Flood phenomena (locations reported as centroids)
- FHRM - Flood hazard and risk map
- ⬢ UWWTD - Discharge points

Floods in Karlstad (Sweden) occurred in 1987 and 1995. Due to the floods, some contaminated sites and waterworks were flooded (water boiling was recommended).

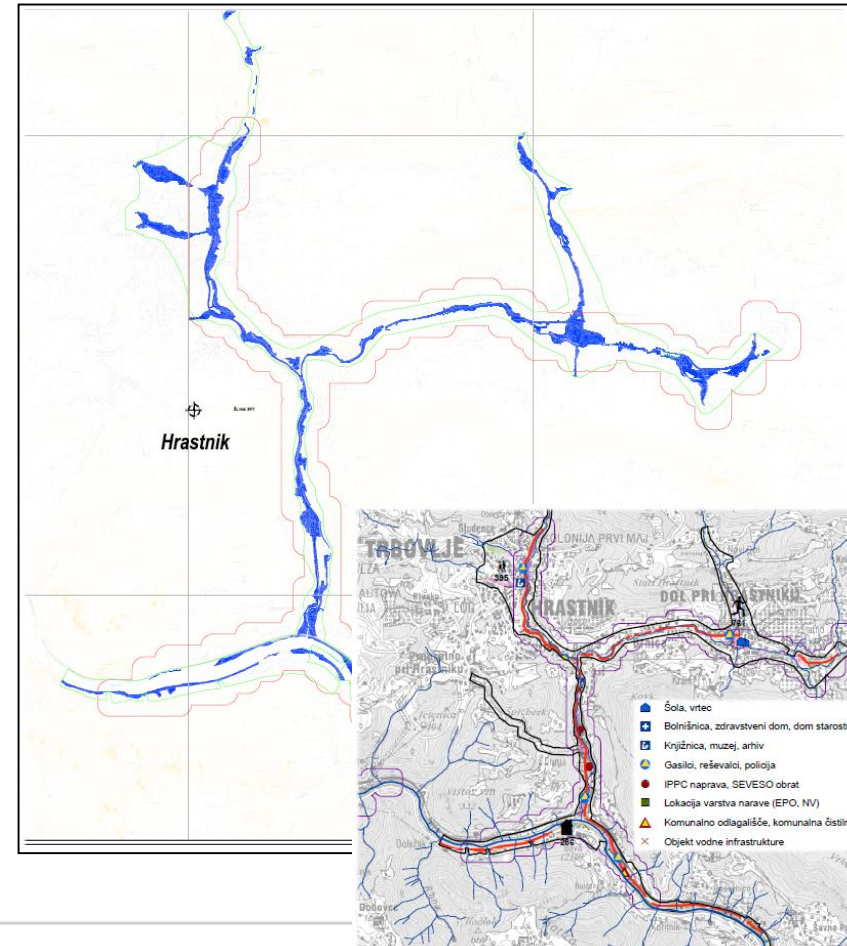
Cartography and desing: TC Vode d.o.o.





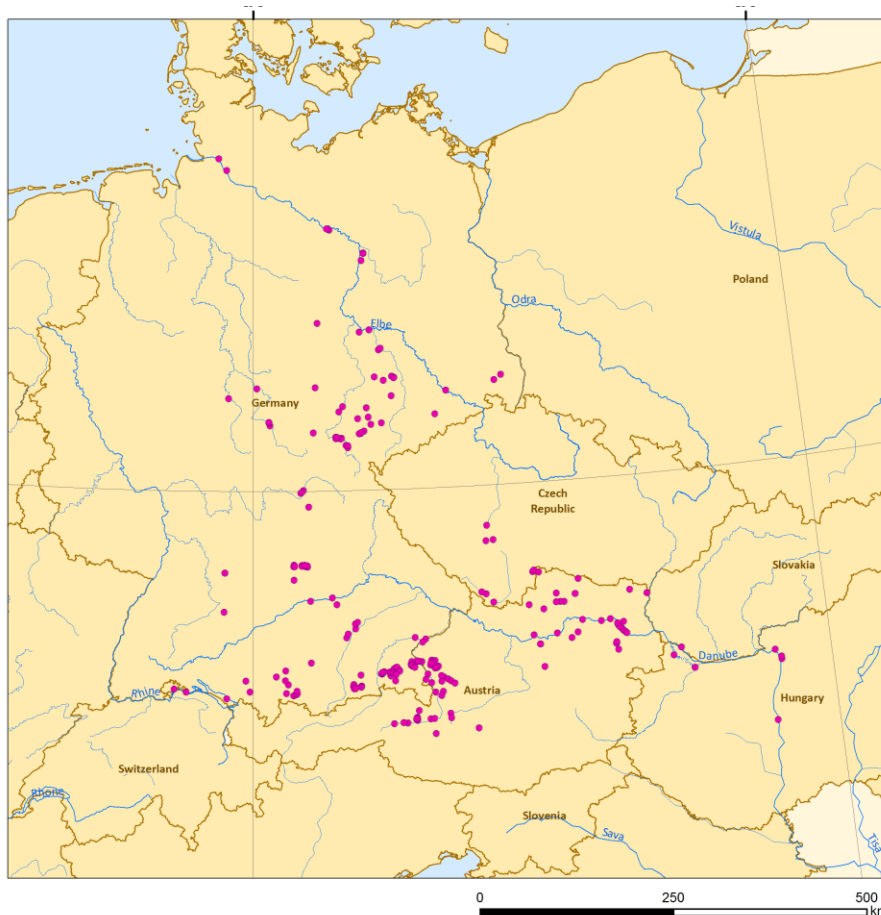
Possible environmental impacts of floods in Slovenia – point source pollution and APSFR

- 61 areas of significant flood risk determined in 2014
- 44 of them with significant potential point pollution sources (IPPC, Seveso)
- Celje: 8 point sources
- Hrastnik and Stahovica: 4 point sources
- Prevalje and Trbovlje: 3 sources
- 6 locations with 2 sources
- 10 locations with one
-





Floods impact to bathing water quality – example of Central European floods in 2013



The affected bathing waters in the region, as well as the monitoring and management of water quality.

Out of 313 abnormal situations which were reported to affect European bathing waters in the 2013 season due to flooding, at least 223 can be attributed to the 2013 Central European floods:

- 128 in Germany
- 77 in Austria
- 7 in Hungary
- 8 in the Czech Republic
- 2 in Switzerland and
- 1 in Slovakia.

Abnormal situation periods started as early as 27 May and ended as late as 30 August.





Bathing waters in Austria flooded/impacted by 2013 flood - examples

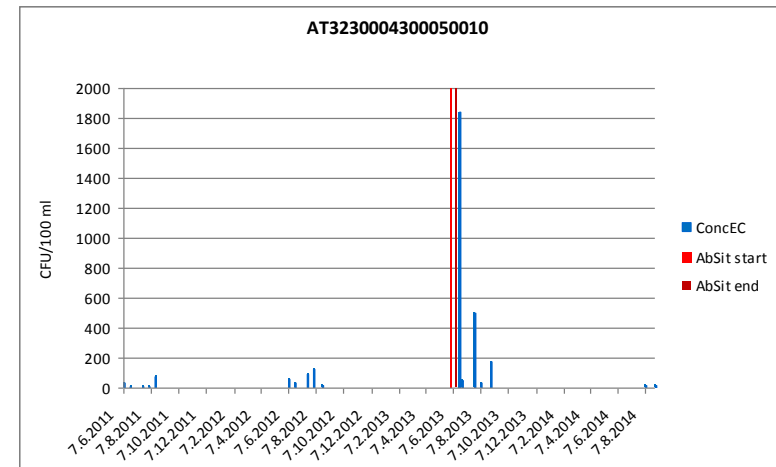
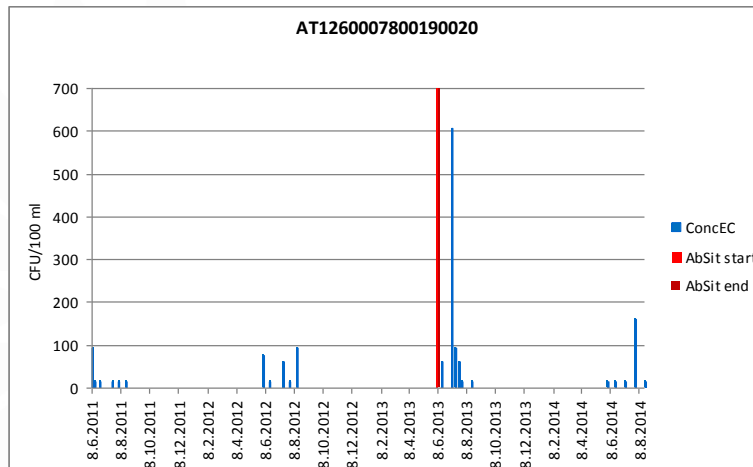




Bathing waters in Austria flooded/impacted by 2013 flood – *Echericia Coli* CFU (colony forming units/100 ml)

Code: AT1260007800190020
 Status: good; BWType: River
 Name: Donau Altarm, Greifenstein

Code: AT3230004300050010
 Status: good; BWType: Lake
 Name: Badesee St. Georgen





Floods impact to bathing water quality - conclusion



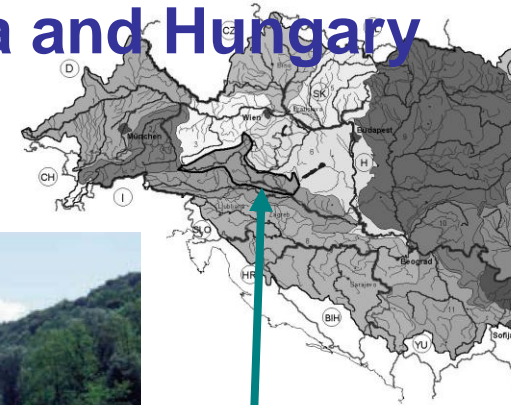
Flooded bathing water
(location) in Vienna, 2013

The major sources of pollution responsible for faecal bacteria in waters are pollution from sewage and water draining from farms and farmland. The pollution from sewage and from farmlands increases during heavy rains and floods, washing more pollution into the rivers and seas and overflowing sewage systems.





Positive effects of regular flooding of low land river - a case of river Mura in Slovenia, Croatia and Hungary



Mur river in Austria



In Slovenia



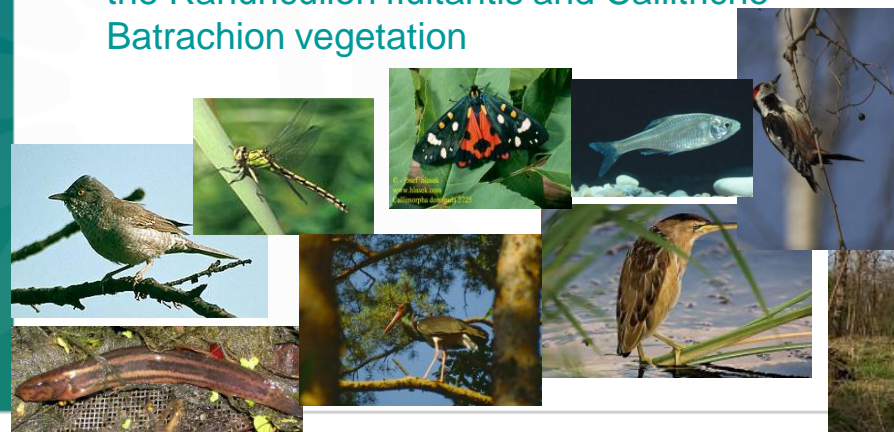
Between Slovenia and Croatia



Due regular flooding the Mura corridor is rich with gravel bars, eroded river banks, arm channels, oxbow lakes, flood forest, wet meadows...the reason for high

biodiversity (from the HD list: 30 bird species, 15 fish species, dragonfly, amphibian)

- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)
- Illyrian oak-hornbeam forests (Erythronio-carpinion)
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation





Questions

- Are the categories for environmental impacts as foreseen for the floods directive reporting covering the whole issue?
- How can this be improved (adding categories, better structuring, more clear definitions ...)?
- What kind of data and information is needed to have a more complete reporting on environmental impacts of flooding in the next PFRA?
- What kind of monitoring and structuring of information is needed during and (immediately) after flooding? Are these data currently monitored? And shared? Cross-boundary?
- What kind of information can “science” provide? And how to bring this information together with the policy questions?

