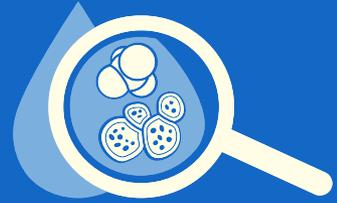




# JOINT DANUBE SURVEY 4



## JDS4: Key Findings

One of the world's most comprehensive investigative surface-water monitoring efforts in the world

**ICPDR** **IKSD**

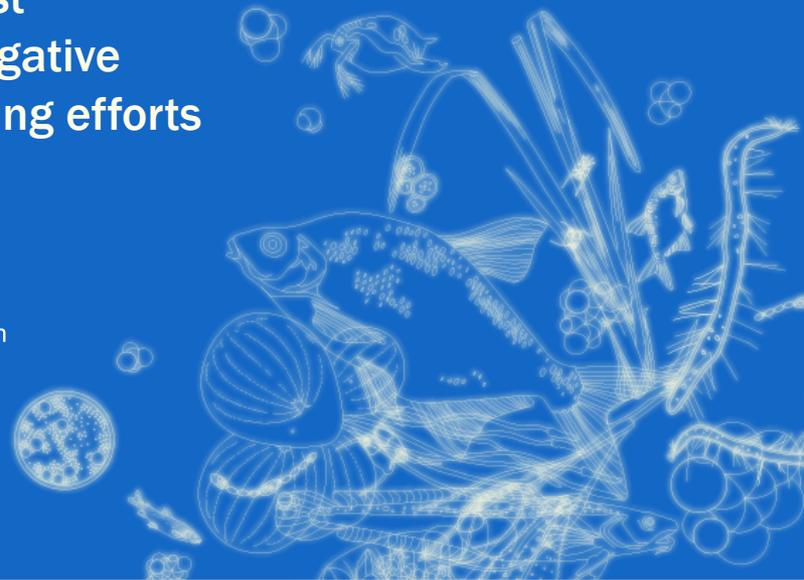
International Commission  
for the Protection  
of the Danube River

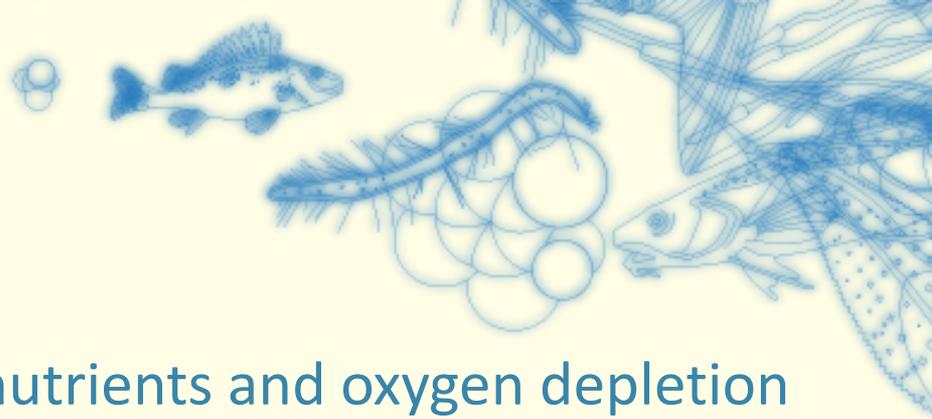
Internationale Kommission  
zum Schutz der Donau



This action has  
received funding from  
the European Union

by Igor Liska, ICPDR





## JDS4: KEY FINDINGS

- ✓ BQEs indicating pressure from nutrients and oxygen depletion by biodegradable substances – Phytoplankton, Macrophytes, Phytobenthos, partly Macrozoobenthos – indicated a good status at many sites and pointed at local pressure only;
- ✓ Fish and Macrozoobenthos indicated impacts induced by hydromorphological pressures at most of the sites;
- ✓ Danube was reconfirmed as a key source of fish biodiversity in Europe, but the fish community is threatened along the whole river;
- ✓ Pressure by Invasive Alien Species remains significant.



## JDS4: KEY FINDINGS

- ✓ Parallel application of traditional biological assessment techniques and modern molecular methods demonstrated a big potential of DNA and environmental DNA-based approaches for biodiversity and WFD ecological status class assessments (particularly effective in detecting the hard to capture benthic species);
- ✓ Hydromorphological monitoring showed intensified restoration on the still strongly altered Upper/Middle Danube and only insignificant deteriorations on the Lower Danube, the long reaches of which are still only slightly to moderately altered.



## JDS4: KEY FINDINGS

- ✓ Analysis of antibiotic resistant bacteria showed a significant increase in multi-resistance.
- ✓ Target analysis of WFD PS, EU Watch List and Danube RBSPs in water showed only occasional exceeding of Environmental Quality Standards;
- ✓ Hg and brominated diphenylethers in biota showed concentrations higher than the EQS at all sites;
- ✓ Wide-scope chemical target screening and non-target screening proved to be a promising alternative to target analysis of WFD PS and RBSPs;



## JDS4: KEY FINDINGS

- ✓ Processing screening data (>2,600 substances from wide-scope target screening, >65,000 substances used for suspect/non-target screening) → prioritisation of Danube River Basin Priority Substances in water, biota, sediment, wastewater and groundwater.
- ✓ Analysis of groundwater showed that for some compounds lower concentrations were detected in groundwater than in the Danube, but the opposite situation was also observed;
- ✓ No Groundwater & Drinking Water Environmental Quality Standards exceeded but new compounds may pose a risk;



## JDS4: KEY FINDINGS

- ✓ First ever comprehensive screening of microplastics along the Danube established a baseline of pollution by MP;
- ✓ Rare Earth Elements monitored for the first time;
- ✓ Radioactive contamination of the Danube with artificial nuclear fission radionuclides  $^{137}\text{Cs}$  and  $^{90}\text{Sr}$  decreased 100x since Chernobyl accident (1986) - no indication of hazardous man-made radioactive contamination.

# Public & Scientific Reports

## Overview chapter on ecology and biology

Frang Rügner (Federal Ministry of Agriculture, Regions and Tourism, Directorate-General – Environment and Water Management, Margarete 2, 1030 Vienna, Austria)  
 Miroslav Ruzic (Institute for Biological Research "Siniša Stanković" – National Institute of Republic of Serbia, Bulevar Oslobođenja 15, 11000 Belgrade, Serbia)

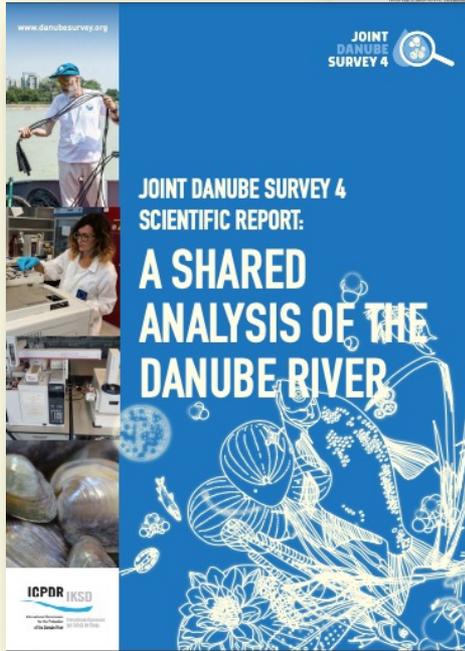
...al status (and designation of Heavily Modified Water Bodies) for each water body is ... and was not done during Joint Danube Survey 4. The ambition of JDS4 was to ... of the whole Danube, a homogeneous internationally coordinated fingerprint at certain ... indication of the ecological status for the sites using a harmonized approach regardless ... of in natural or Heavily Modified Water Bodies. Biological quality elements indicating ... and oxygen depletion by biodegradable substances – Phytoplankton, Macrophytes, ... macroinvertebrates – indicated a good status at many sites and point at local pressure only ... However, indicated impacts induced by hydro-morphological pressures at a majority of ... of water bodies along the whole length of the Danube over the last years is not ... . Climate change phenomena and increasing pressures from massive water species may ... ecological status. The applicability of molecular methods using DNA and environmental ... proved to be promising and delivered sound results for a majority of sites.

... framework Directive (WFD, 2000) is constructed around the assessment of the ... (1) – dealt with in Chapter 2(9) status. Failing the objective of reaching good status is a ... necessity of mitigation measures, may lead to the designation of a Heavily Modified ... of has diverse consequences for water management. For the Danube catchment ... detail in the River Basin Management Plans of the ICPDR. As the Joint Danube ... having an extensive amount of data and assessing the quality of the Danube with ... sampling sites, it is dealing – beside other objectives (see Chapter 1) – with the ... important aspect of the data analysis.

... of ecological status?  
 Ecological status is a national task of EU member states regulated in detail in Annex ... Directive and specified in various Common Implementation Strategy Guidance ... Commission. The ecological status is established for each water body based on

... of original activities projects for river basin management  
[https://www.environment/water/water-factsheets/factsheets/publication\\_jds4\\_en.htm](https://www.environment/water/water-factsheets/factsheets/publication_jds4_en.htm)

Scientific Report: A Shared Analysis of the Danube River JDS4 173



## JDS4 Scientific Report

565-page report (print & PDF): Available at

[www.danubesurvey.org/jds4/publications/scientific-report](http://www.danubesurvey.org/jds4/publications/scientific-report)

## What Methods Did JDS4 Put into Practice?

2,600 substances  
 used for water body investigations  
 +65,000 substances  
 used for water body sample monitoring and  
 altogether +300,000  
 substances from market

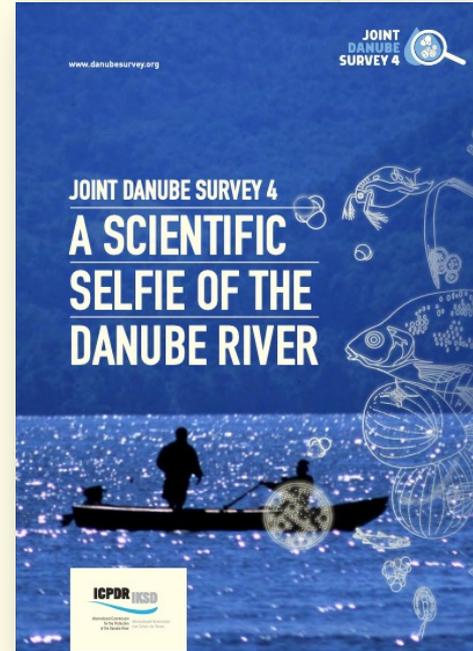
... the key conclusions began with the statement that it had provided a unique ... quality in the whole Danube and provided the largest ever amount of knowl- ... edition collected within a single scientific exercise. Following the conclusion of ... repeated.



... tion monitoring is ... of Priority Substances ... pollutants. This means ... out how much of the ... contained substances, ... substances defined as

... emerging chemicals from ... targeted ... non-target screening ... JDS4 focusing on ... target screening while ... detected as suspects ... comprehensive use ... used their comparison

Two emerging chemicals: **Imidacloprid** is an insecticide broadly applied throughout the Danube River Basin in both horticulture and agriculture. It was detected in 50 out of 51 samples. **Diclofenac** is a widely used pharmaceutical, detectable at 46 sampling sites.



## JDS4 Public Report

23-page report (print & PDF): Available at

[www.danubesurvey.org/jds4/publications/public-report](http://www.danubesurvey.org/jds4/publications/public-report)



# Fish Cards

These cards provide information about the characteristics of selected species.

Due to a variety of pressures on aquatic habitats, many of our Danube fish are endangered. On each card, the status of the fish species on the Red List of the International Union for Conservation of Nature (IUCN.org) is given.

Fish are ideal indicators of the ecological quality of the ecosystem. For this reason fish are one of the biological quality elements defined in the Water Framework Directive of the European Union (WFD), together with invertebrates, water plants and plankton.

Spot & Identify 60 Danube Fish Species

JOINT DANUBE SURVEY 4 

## DISCOVER OUR DANUBE FISH



Species *balcanica* **BALCAN LOACH**



max. length 15 cm

Fish family True loaches (Cobitidae)

Species *Acipenser gueldenstaedtii* **DANUBE STURGEON**



max. length 240 cm

Fish family Sturgeons (Acipenseridae)

*Huso huso* **GIANT STURGEON**



max. length 800 cm

Fish family Sturgeons (Acipenseridae)

Available as printed card sets or PDF versions in both English & German

Visit: [www.danubesurvey.org/jds4/publications/fish-cards](http://www.danubesurvey.org/jds4/publications/fish-cards)

Find us on social media



#JDS4

#discoverDanube

#ICPDR

Get in touch:

[jds4@icpdr.org](mailto:jds4@icpdr.org)

[www.danubesurvey.org](http://www.danubesurvey.org)



This action has  
received funding from  
the European Union

**JOINT  
DANUBE  
SURVEY 4**



**ICPDR IKSD**

International Commission  
for the Protection  
of the Danube River

Internationale Kommission  
zum Schutz der Donau