LIST OF IAS OF THE DANUBE RIVER BASIN CONCERN

REVIEW OF IAS IN THE DANUBE RIVER BASIN

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GUIDANCE DOCUMENT – 2021 VERSION

DATA:

Currently, the list includes:

- 3 Cyanobacteria,
- 8 algae species,
- 17 aquatic vascular plants,
- 49+2 new taxa (JDS5) aquatic macroinvertebrate and
- 32 fish species.

GUIDANCE DOCUMENT – 2021 VERSION

· Situation over the time:

Number of alien species per taxa group recorded during JDS4 and previous Danube Surveys; For JDS4 first number represent total number of alien taxa detected by all methods; Numbers in bracket represent No. of species detected by traditional methods and by (e)DNA IAS based detection, respectively.

Quality element	JDS1 (2001)	ADS (2004)	JDS2 (2007)	JDS3 (2013)	JDS4 (2019)
Aquatic macrophytes	3	-	6	4	6
Macroinvertebrates	12	13	20	34	35 (27/29)
Fish	-	-	14	12	17 (17/12)

TESTING THE PROCEDURES FOR ASSESSMENT OF PRESSURE CAUSED BY INVASIVE SPECIES AND RISK ASSESSMENT TOOLS

- SBC Index (Arbačiauskas et al. 2008, Panov et al. 2009) - macroinvertebrates and fish;

- BPL index (Olenin et al., 2007) - macroinvertebrates and

- BAI index (Paunović and Csányi, 2018) – macroinvertebrates and fish.

TESTING THE PROCEDURES FOR ASSESSMENT OF PRESSURE CAUSED BY INVASIVE SPECIES AND RISK ASSESSMENT TOOLS

SBC Index results – JDS4, JDS3 and JDS2 (4=severe; 3= high; 2= moderate; 1= low)

Stretch	SBC Fish	SBC Fish class 2019 JDS4	SBC MZB	SBC MZB class 2019 JDS4	SBC Class Fish 2013 JDS3	SBC Class MZB 2013 JDS3	SBC Class MZB 2007 JDS2
Upper	2.56	3	3	3	4	3	4
Middle	2.56	3	2.56	3	2	3	4
Lower	1.9	2	0.86	1	1	1	3

TESTING THE PROCEDURES FOR ASSESSMENT OF PRESSURE CAUSED BY INVASIVE SPECIES AND RISK ASSESSMENT TOOLS

BAI Index results – JDS4 (4=severe; 3= high; 2= moderate; 1= low)

MHS data

Stretch	BAI Fish	BAI class	BAI Macroinv.	BAI class
Upper	0.38	4	0.15	3
Middle	0.14	3	0.11	3
Lower	0.02	1	0.06	1

BAI Index results – JDS4 K&S data

Stretch	BAI Macroinv.	BAI class
Upper	0.14	3
Middle	0.14	3
Lower	0.05	1

TESTING THE PROCEDURES FOR ASSESSMENT OF PRESSURE CAUSED BY INVASIVE SPECIES AND RISK ASSESSMENT TOOLS

Based on SBC and BAI indexes, the **level of biocontamination** of the Danube River was estimated as **moderate to high**, with **higher levels for the Upper (high to severe biocontamination) and Middle Danube** (moderate to high biocontamination), in comparison to the Lower Danube (low biocontamination).

RISK ASSESSMENT – SPECIES INVASIVENESS

Example: Assessment of invasiveness of *Clathrocaspia knipowitschii* (Makarov, 1938) (Gastropoda: Hydrobiidae: Caspiinae);

- More data is needed;

- Species Invasiveness has been assessed as 2.20, while Impact to the Danube is assessed as 2.00, which characterise the species as invasive;

- Fast spreadind along the Danube.

METHODOLOGY FOR IDENTIFICATION VULNERABLE AREAS FOR IAS WITHIN THE DRB

Invasibility – susceptibility of assessment unit (water body, river, part of the river, river basin, lake, part of the lake, etc.) for biological invasions, or vulnerability of Water Body to biological invasions.

Many studies use complicated systems for the assessment of invasibility of water bodies to IAS.

METHODOLOGY FOR IDENTIFICATION VULNERABLE AREAS FOR IAS WITHIN THE DRB

The idea is to propose simple system, based mostly on easily available data.

Criteria for selection:

1. data should be easy accessible – available

2. preferably data from map sources and

3. relevant global programmes (CORINE), as well as the data regularly published by relevant authorities and public services – Statistical Yearbooks

4. Data should be from known source and validated.

METHODOLOGY FOR IDENTIFICATION VULNERABLE AREAS FOR IAS WITHIN THE DRB

The model comprise two sets of indicators – spatial/geomorphological characteristics of the area (Module 1) and pressures – human influence Module 2).

Module 1 involve the following parameters:

- Elevation (classification as follow: 0-200 m.a.s.l=4; 200-500=3; 500-800=2; >800=1);

- Relief characteristics (diverse 1; uniform=3); and

- Distance from the main invasive corridors (>100 km=1; <100 km=3).

METHODOLOGY FOR IDENTIFICATION VULNERABLE AREAS FOR IAS WITHIN THE DRB

Module 2 involve the following parameters:

- Population density (<50=1; 50--150=3; >150=5);

- Assessment of intensity of trade with exotic species (low=1; medium=3; high=5);

- Intensity of navigation (low=1; medium=3; high=5);

- Intensity of water related recreation activities, including recreational fishing (low=1; medium=3; high=5); and

- The general level of hydromorphological degradation in the assessment unit (low=1; medium=3; high=5).

Each module has been assessed separately and expressed as mean value of assessed parameters. The final assessment represents mean value of both modules.

TESTING OF THE MODEL - SERBIA

Reservoirs should be considered separately, since they are more susceptible to invasion than natural systems, due to heavily altered habitats – red dots on the map.
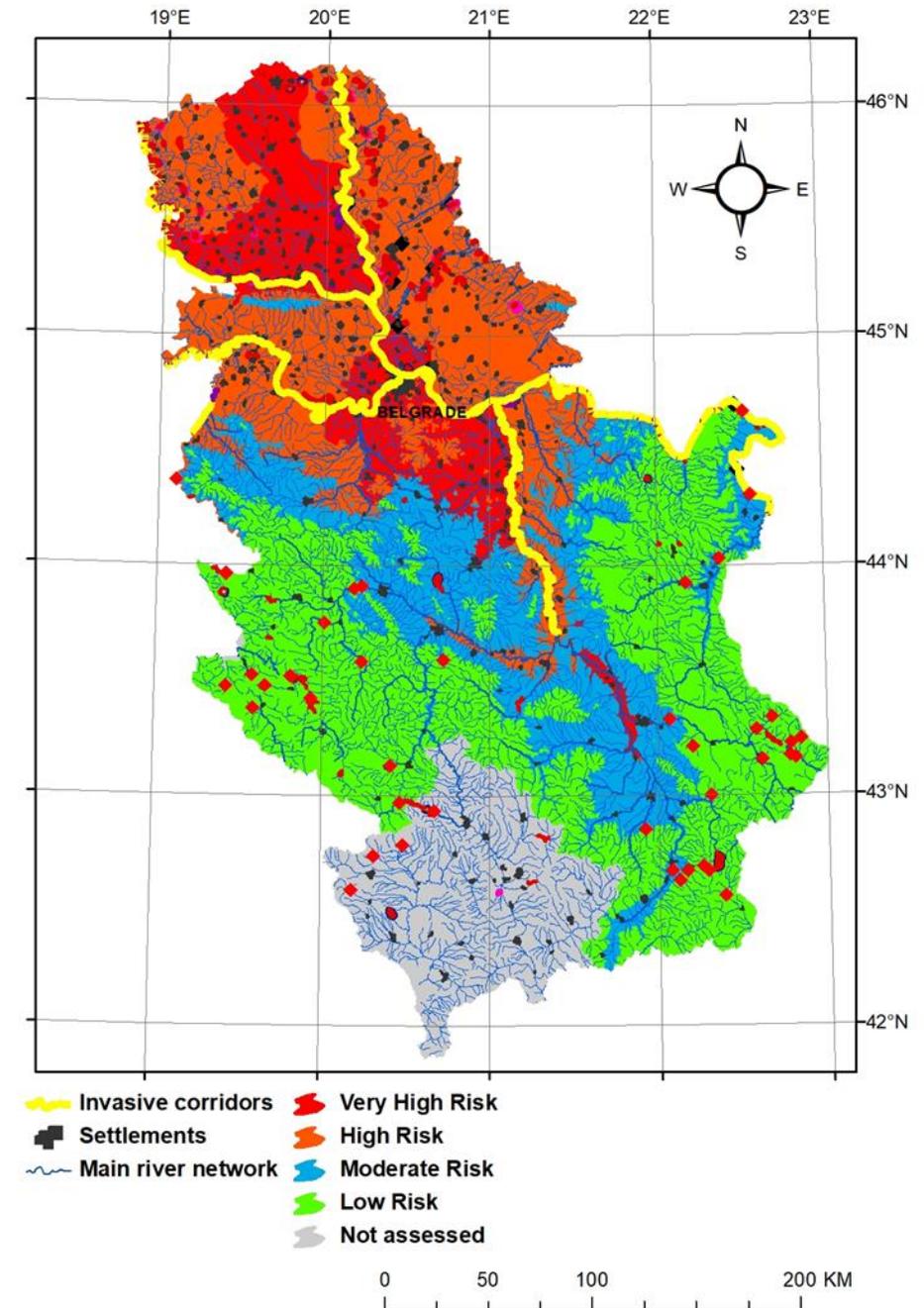
DATA COLLECTION PROCEDURE PROPOSAL

The following possibilities have been identified:

- Extraction of the information from the data on biological quality elements (BQE) from national water quality/status monitoring;

- Using the data from future Danube Surveys;

- Using the data from peer review publications; and

- Using the data from official reports on national and regional level.

TO BE CONSIDERED AS A PART OF DANUBIS DATABASE – IN ORDER TO PROVIDE AVAILABILITY AND CONFIDENCE OF THE INFORMATION.

ACTIVITIES IN CONSEQUENT PERIOD

The following key activities have been proposed:

- Update of the methodology for data collection related to the IAS within the DRB or all aquatic taxa groups (macroinvertebrates, algae, macrophytes and fish);
- Update of the methodology for assessment of pressure of aquatic invasions within the DRB;
- Development of the methodology for identification vulnerable areas for IAS within the DRB and
- Update of the information on pressures caused by aquatic invasions in the Danube River.

Unknown issues – decline of *Corbicula fluminea*, fast spreading of *Clathrocaspia knipowitschii* …

ACTIVITIES IN CONSEQUENT PERIOD

Proposal from Hungary to declare Desert false indigo as IAS, the possibility of involvement of riparian neophyte species in further activities

- Overview of the situation based on JDS3 and sava Survey (2014-2015) provided;
- Riparian habitats are highly exposed to bioinvasions;
- *Amorpha fruticosa* is not the only riparian macrophyte taxa that should be considered as invasive for the Danube – e.g. *Ambrosia artemisiifolia* L., *Robinia pseudoacacia* L., etc.

In order to collect confident data on invasive neophyte species of riparian corridors in the Danube River Basin, the involvement of this component in the future Danube Surveys could be discussed.

UPDATED METHODOLOGY OF RISK ASSESSMENT AND ASSESSMENT OF PRESSURES CAUSED BY BIOLOGICAL INVASIONS ADAPTED TO THE DRB, AS WELL AS UPDATED DATA ON DISTRIBUTION OF IAS – 2021

Presented data reflected in both documents:

- Updated methodology of risk assessment and assessment of pressures caused by biological invasions adapted to the DRB, as well as updated data on distribution of IAS and

- Guidance document on Invasive Alien Species (IAS) in the Danube River Basin.