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Editorial

Georg A. Janauer: *Department of Limnology and Oceanography, University of Vienna, Austria, e-mail: georg.janauer@univie.ac.at*
Thomas Hein: *Institute of Hydrobiology and Water Management, University of Natural Resources and Life Sciences, Vienna, Austria, e-mail: thomas.hein@boku.ac.at*

Dear Readers,

This issue of Danube News highlights the topic sturgeon and possible ways of saving these flagship species of the Danube Basin, so typical in the past, but increasingly threatened by growing habitat constraints, overexploitation, and disruption of migration. Scientific and administrative efforts converge with the aim of enhancing sturgeon conservation, while technical adaptations of river flow, migration obstacles, loss of spawning habitat, and illegal fishing still impact the survival base of sturgeon in the Danube River, and in all the countries comprising the range of these fish. The contributions to this issue cover political aspects of sturgeon conservation (Cristina Sandu), programs of Sterlet restoration (Thomas Friedrich *et al.)*, challenges in sturgeon ex-situ conservation (Ralf Reinartz *et al.)*, sturgeon monitoring with telemetry and genetics (Radu Suciu *et al.)*, and the paramount issue of obstacles to sturgeon migration during the spawning period due to dams and navigation projects (Jürg Bloesch).

Thomas Hein, President of IAD

Georg Janauer, Editor of DN
Photograph: ÖWAV

Cristina Sandu, and Jürg Bloesch as Special Editor of DN 33, gain our special thanks for proposing this important topic and gathering these excellent and informative contributions.

Political support for sturgeon conservation in the Danube Region

Cristina Sandu: *Institute of Biology Bucharest, Romanian Academy, e-mail: cristina.sandu@dstf.eu*

The public attention gained lately by Danube sturgeons is the output of the close cooperation of several governmental and non-governmental organizations active in the Danube River Basin. The adoption of the EU Strategy for the Danube Region (EUSDR) in 2011 created the frame to foster sturgeon conservation and bring this topic high on the political agenda of the Danube countries.

This issue of Danube News highlights briefly the contribution of key governmental stakeholders as well as some of the main activities devoted to sturgeons in the recent years: a restoration program for Sterlet in the Upper and Middle Danube, measures for ex-situ conservation (outside of natural habitats), monitoring of genetic diversity and migration patterns in the Lower Danube, engagement to tackle the problem of major obstacles disrupting sturgeon spawning migration, and investigation of the illegal trade with caviar.

Background

An iconic species of the Danube, inhabiting the river since ancient times, the sturgeons underwent a dramatic decline in the 20th century due to habitat loss, migration disruption, pollution, hydromorphological alterations and overexploitation. An alarm signal was raised by scientists after 2000, when the IAD and WWF brought together international sturgeon experts to discuss this critical situation. As a follow up, the Sturgeon Action Plan (SAP) was elaborated and adopted under the Bern Convention (Bloesch et al. 2005). Few supporting activities were launched in the following years by the Danube countries, such as a ban of commercial sturgeon fishery in Romania, Bulgaria, Serbia and the Ukraine, restocking activities and a dialogue to restore their spawning migration at the Iron Gate dams. However, without concerted coordination at international level, taking into account sturgeon needs during their whole life-cycle, the declining trends continued.

After 2011, the EUSDR provided an international platform for transboundary coordination of measures and integration of all the sectorial policies under one overarching goal: the harmonization of social and economic policies with the environmental needs to ensure the sustainable development of the region. To foster sturgeon conservation, key stakeholders from the Danube Region (ICPDR, IAD, WWF, WSCS) established the Danube Sturgeon Task Force in the frame of EUSDR, Priority Area 06 (PA 6), and elaborated the Program "Sturgeon 2020" based on the SAP (Sandu et al. 2013). National and international political support plays a vital role for the implementation of this program, and recent years have brought significant progress in this direction, highlighted briefly below.

The EU Strategy for the Danube Region (EUSDR)

Considering that the Danube River Basin is the most international river basin worldwide, with a high diversity of the natural and cultural heritage, and large disparities of the social and economic status, the EUSDR has a major role in the implementation by linking policy with the operational level, facilitating the dialogue of major stakeholders in the basin and ensuring the harmonization of measures. The EUSDR annual forum, as the largest event of the strategy, provides the opportunity for direct interactions of regional stakeholders with policy makers, creating the frame to develop interlinkages between different areas and projects of regional importance.

The sturgeon conservation program of the DSTF was acknowledged in the first report of the European Commission to the EU Parliament concerning the implementation of EUSDR (COM 181, 2013), as well as in the annual reports of EUSDR PA 6, where it was labeled as a flagship project. Its integrative measures require cooperation with numerous stakeholders from different fields, and hence, it is connected with all 11 Priority Areas of the EUSDR *(Figure 1)*. While with some areas such as PA 1a (Navigation), PA 3 (Tourism and culture), PA 4 (Water quality), PA 7 (Knowledge society), and PA 9 (People and skills) the cooperation has been established, these connections still need to be developed with other areas.

To raise awareness about the need to embed environmental policies into the development strategies of the other priority areas, at the 4th EUSDR annual forum in 2015 (Ulm, Germany) a workshop was organized by PA 6, focused on the connections required by the cross-cutting measures of the Program "Sturgeon 2020" with all 11 PAs, emphasizing concrete possibilities for trans-sectorial cooperation. The funding programs allocated by the EUSDR in the frame of the Technical Assistance Facility (TAF) and START programs allowed DSTF to draft several joint projects for sturgeon conservation, focused on in-situ and ex-situ conservation,

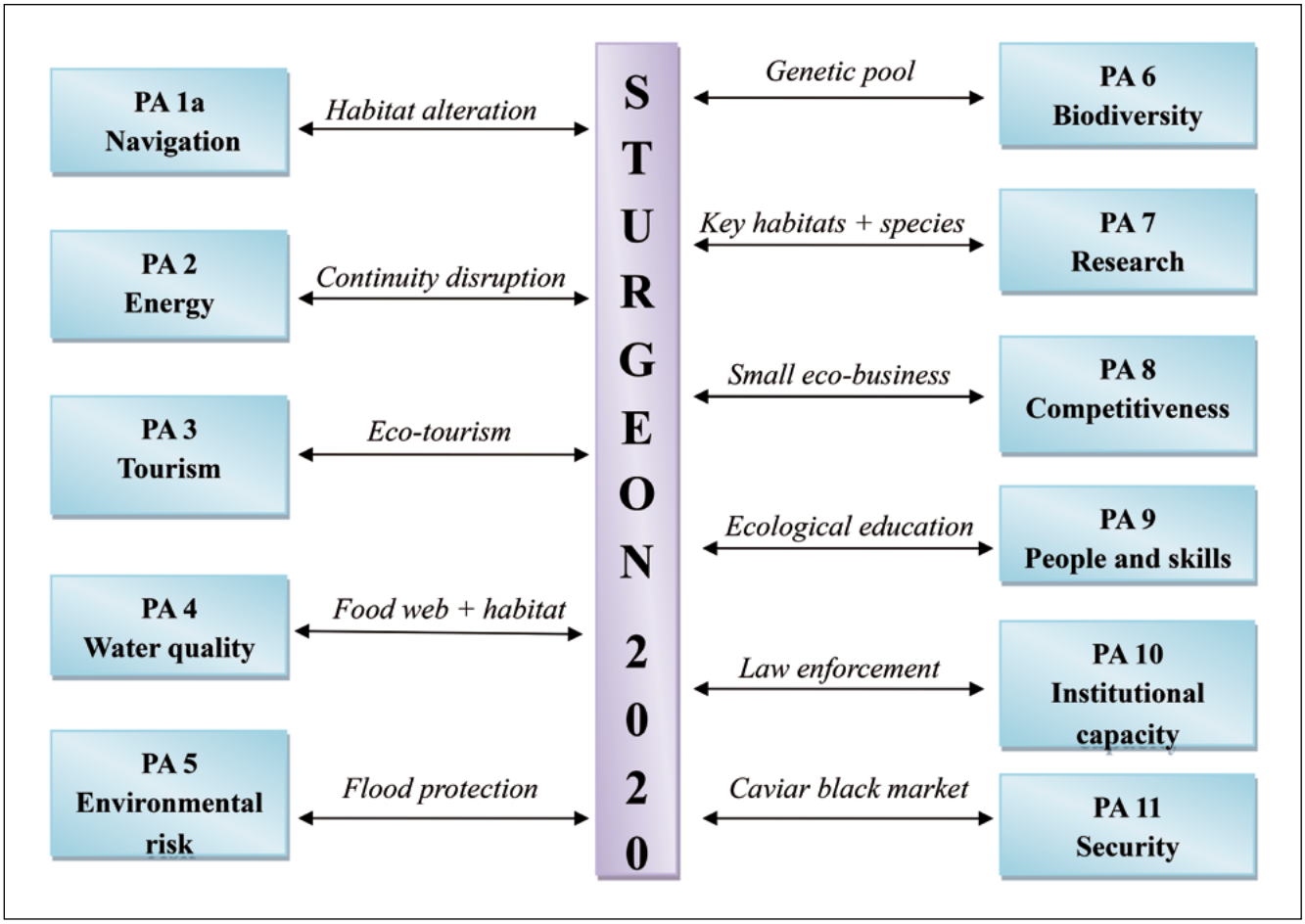

Figure 1. Interlinkage of the Program "Sturgeon 2020" with the 11 Priority Areas of EUSDR

eco-tourism and communication, and to establish a roadmap for ex-situ conservation measures in the Middle and Lower Danube, where the surviving populations of wild migratory sturgeons need urgent protection measures to avoid further loss of species and genetic diversity.

International Commission for the Protection of the Danube River (ICPDR)

Established in 1998 with the aim to implement the Danube River Protection Convention, the ICPDR coordinates the implementation of the Water Framework Directive (WFD, EC/60/2000) and Floods Directive (FD, EC/60/2007) in the Danube River Basin by working closely with water management authorities of the Danube countries.

Besides being a valuable natural, cultural and economic asset, and flagship species of the Danube Region, sturgeons have also an important role as top predators in the aquatic food webs: the status of their populations is a good indicator of the river's "good ecological status" requested by the WFD. For this reason, several supportive measures were included in the Danube River Basin Management Plan (ICPDR 2015) and will be implemented in the next years (e.g. pollution reduction, habitat protection and restoration, support to restore migration at the Iron Gates dams, etc.). Moreover, the ex-situ conservation program is supported by the Water Directors of the Danube countries, i.e. a strengthened cooperation will be launched in the following years between the Water, Fishery and CITES authorities and sturgeon stakeholders in the Middle and Lower Danube to secure the genetic diversity of Danube sturgeons and initiate joint restocking programs. A communication strategy was recently elaborated by the ICPDR, in line with DSTF and EUSDR PA 6 goals, aiming to increase the visibility of sturgeons as flagship species of basin wide importance and raise public awareness on their critically endangered status. The long distance migratory sturgeons, living in the Black Sea and migrating upstream the Danube River for spawning, require monitoring and protection measures in both habitats, and hence, intensive cooperation of relevant authorities implementing WFD, MSFD and HBD. The recent Danube declaration of the environmental ministries of the Danube countries offers further support for the implementation of "Sturgeon 2020", especially in areas where ICPDR has key competences (ICPDR 2016).

Fishery and CITES authorities

The EUSDR START project "Ex-situ survey to preserve sturgeon genetic diversity in the Middle and Lower Danube" (STURGENE) provided the opportunity to establish contacts with the Fishery and CITES authorities from the Middle and Lower Danube. In a joint meeting with representatives of EC DG ENV, water management authorities and environmental NGOs the roadmap for ex-situ conservation was presented, and agreement was reached on future measures for sturgeon conservation, such as the extension of the fishery ban for a period of 5 years. However, to increase its efficiency, it was recommended that this time the measure should be accompanied by compensatory measures for sturgeon fishermen, enforced control of illegal fishery, a coordinated transnational in-situ monitoring program of sturgeons and a feasibility study to re-establish migration at the Iron Gate dams.

Several other key actions were highlighted, such as: (1) establishment of an international consortium, with governmental representatives and scientists, to lead the ex-situ conservation program, (2) elaboration of coordinated National Action Plans for Sturgeon Conservation in all the Danube countries, (3) launching a feasibility study for in-situ conservation, as a basis for the ex-situ conservation program, (4) a genetic inventory of captive sturgeons to select suitable candidates for future restocking programs, (5) establish a pilot facility for migratory species and secure most valuable sturgeons, (6) launch an urgent rescue program for Russian sturgeon (on the brink of extinction – nearly no natural reproduction). The joint implementation of the roadmap for ex-situ conservation could pave the way for further concerted actions of fishery authorities from the Middle and Lower Danube countries in the benefit of sturgeons.

European Investment Bank (EIB)

The interest of the EIB to support the implementation of EC environmental directives requiring restoration of river connectivity resulted in funding a preliminary study downstream of the Iron Gate II dam aiming to observe sturgeon behavior to identify possible locations and designs for functional fish passes allowing sturgeon upstream and downstream migration. After selecting the best methods and training Romanian, Serbian and Bulgarian teams in tagging and telemetry, a second project is envisaged for 2016, focusing on sturgeon monitoring that will help scientists and engineers understand fish behavior at the dams and design tailor made solutions to allow their passage.

The role of EIB is increasingly important for EUSDR, as in 2015 the European Commission and the bank have established an European Investment Advisory Hub as a joint initiative under the Investment Plan for Europe (EIB 2015). The aim of this HUB is to provide technical guidance and support to project promoters, public authorities and investors to develop projects. In this context, the DSTF addressed to the HUB a request for support to develop "Sturgeon 2020" into bankable projects and identify funding sources to ensure the implementation of the conservation measures. The output is expected soon, and will hopefully burst the development of new sturgeon projects in the Danube Region.

Conclusion

The numerous connections of "Sturgeon 2020" with the other Priority Areas call for the development of joint projects

and a constructive dialogue with various stakeholders from the Danube Region to mitigate the impact on sturgeons and their habitats. Such intensified cooperation between different organizations involved in sturgeon conservation may be strengthened by the ongoing political integration of the EU WFD, EU Floods Directive and EU Habitats Directive (Sundseth 2015). Acquiring increasing support of decision makers will have a vital role for the implementation of measures and the success of this program.

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Restoration programs for the Sterlet *(Acipenser ruthenus)* in the Upper and Middle Danube

Thomas Friedrich: *Institute for Hydrobiology & Aquatic Ecosystem Management, BOKU, Vienna, Austria, e-mail: thomas.friedrich@boku.ac.at*
Ladislav Pekárik: *Institute of Botany, Slovak Academy of Sciences, Bratislava, Slovakia, e-mail: ladislav.pekarik@savba.sk*
Ralf Reinartz: *Consultant for Fisheries & Aquatic Ecology, Münster, Germany, e-mail: ralfreinartz@online.de*
Clemens Ratschan: *ezb-TB Zauner GmbH, Engelhartszell, Austria, e-mail: ratschan@ezb-fluss.at*

Of the five native sturgeon species in the Upper Danube, only the Sterlet is still present in a small population in the Aschach impoundment at the border between Germany and Austria. The Middle Danube sustains larger Sterlet quantities, but stocks are decreasing. At this point little is known on habitat use, population size and population dynamics of this species. Reintroductions with fish of hatchery origin in other sections of the Danube did not result in the establishment of viable populations thus far (Reinartz 2008; Friedrich 2013; Friedrich et al. 2014), questioning the success rate of conventional stocking methods. In the last years several projects were implemented to address these issues accordingly.

INTERREG – Sterlet Project in Upper Austria/Bavaria

In the border region between Upper Austria and Bavaria, several consecutive modules of a bilateral research project are running since 2013. The goal of these efforts is to acquire basic knowledge needed for the conservation and management of the local, self-sustaining Sterlet population.

A mark-recapture program has been implemented, and already more than 100 gillnet catches were examined. Photographs, morphological and meristic characteristics of the fish and DNA samples were taken, the fish were marked with PIT tags, and recaptures were identified. Preliminary calculations suggest that the local population size is in the order of a few hundred individuals, but further recapture and telemetry results are needed to confirm this rough estimate. Hybridisation with Siberian Sturgeon is a threat to this population, but fortunately the proportion of hybrids in the last years was by far lower, compared to the study by Ludwig et al. (2009).

20 Sterlets were tagged with acoustic transmitters and tracked by boat and with loggers spread over the impoundment of Aschach, but also two more impoundments downstream. Based on the patterns of catches of the fishery, it was hypothesized that the head of the impoundment would be the preferred habitat of the population (Friedrich et al. 2014). But telemetry data showed that Sterlets strongly prefer deep areas all year round. They were recorded in depths of less than 4-5 m only in very rare cases. The deepest parts, mainly in the centre of the impoundment, are used as overwintering habitats. Pressure/depth sensor data revealed astonishing patterns of vertical migrations between habitats used during day and night. Typical migration patterns in summer show sequences of long residence in restricted areas that are interpreted as "feeding habitats". These phases are interrupted by phases of fast, unidirectional migrations. In the case of upstream migrations, these phases frequently end at the power plant of Jochenstein *(Figure 1)*. Wandering downstream through turbines, several fish left the impoundment and could be tracked in the two subsequent Danube sections (Ratschan et al. 2014).

Efforts in 2016 will further focus on the discovery of key habitats, especially spawning and wintering habitats and on exchanges with neighbourly sections of the Danube and possible sub-populations. In this regard the DNA samples