

The ultimate need for the implementation of sturgeon protection in the Danube River Basin - a view of 2006 and call for actions with the Sturgeon Action Plan under the Bern Convention

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Introduction

Six species of sturgeons are native to the Danube River Basin, five are classified as either 'Endangered' or 'Critically Endangered', and one 'Vulnerable' (*Acipenser ruthenus*) according to the 2004 IUCN Red List of Threatened Species (IUCN 2004). In fact, one of the five endangered species (*Acipenser gueldenstaedti*, *A. nudiventris*, *A. stellatus*, *A. sturio*, *Huso huso*), the Atlantic sturgeon (*A. sturio*), is already extinct in the Danube River Basin.

Recently, CITES (2006) introduced a ban for export and import quota of sturgeon caviar that had become extremely scarce proving that their protected status under international regulations was not effective. In 2004-2005, *in situ* information from the Lower Danube River by scientists and fishermen substantiated the critical situation of sturgeon stocks (PARASCHIV & SUCIU 2006). Single sturgeon catches of extremely rare species added much speculation about the existence of remaining populations. While the scientific community has comprehensively reviewed the biology and status of Danube sturgeons, elucidated the causes of threats, and provided the necessary measures to restore endangered sturgeon populations (e.g., REINARTZ 2002, and literature quoted therein), the economic and political side remained obscure as legal fishery statistics are thought to be biased, and illegal trade and poaching are significant. Legal instruments are not harmonized among countries, are partly insufficient and partly not implemented. Thus, the recent dramatic decline of Danube sturgeon populations reinforces the urgent need for significantly enhanced basin-wide cooperation and action for conservation and restoration of sturgeons in the Danube River. In December 2005, a Sturgeon Action Plan (AP 2006; BLOESCH et al. 2006), jointly prepared in a WWF/IAD workshop by experts and stakeholders, was adopted by the Standing Committee of the Bern Convention in the frame of the Council of Europe. Together with already existing instruments, the AP may provide important tools and mechanisms for the propagation and implementation of measures and actions to avoid complete extinction of sturgeons in the Danube River and Black Sea systems.

Status and major threats of the sturgeons in the Danube River Basin

The key threats to Danube sturgeons include: Over-exploitation (over-fishing linked with poaching and illegal trade), habitat loss and degradation due to river regulation and construction including the disruption of spawning migrations by dams and pollution (bio-accumulation of toxic substances), and potential alteration of the genetic and ecological status by the introduction of exotic species and genotypes possibly through inadequate hatchery practice (REINARTZ et al. 2003).

Due to the many factors affecting sturgeon populations it is impossible to relate the threatened status of any sturgeon species to a single cause or change in the environment. However, the

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general picture shows the following spatial focus of major threats to the highly endangered sturgeons:

- *Upper Danube (River from the source to Bratislava):*
Habitat degradation (e.g. spawning grounds)
- *Middle Danube (River from Bratislava to the Iron Gate gorge):*
Iron Gate dams, disruption of migration
- *Lower Danube (River downstream of Iron Gate including the Delta):*
Over-fishing, Over-exploitation, pollution
- *Black Sea: Over-fishing, Over-exploitation, pollution*

Since sturgeons exhibit certain common traits they are extremely susceptible to anthropogenic impacts, evidenced by the former (up to Regensburg) and current (restricted to the Lower Danube) distribution of the Danube sturgeons. There is evidence that still four sturgeon species (*A. gueldenstaedti*, *A. ruthenus*, *A. stellatus*, *H. huso*) reproduce in the Lower Danube River but *A. gueldenstaedti* and *A. stellatus* became alarmingly scarce (PARASCHIV & SUCIU 2006). Based on the former occurrence of migratory sturgeons in the Danube River system, we can assume that traditional spawning sites for anadromous species were situated in the Middle Danube River as well as along some major tributaries, such as the Tisza, Sava and Drava Rivers. Due to the blocking of migration routes by the Iron Gates dams I and II, constructed in 1972 and 1985, respectively, these upstream spawning sites can no longer be reached by migratory sturgeons.

Hydrological alterations (flow management by hydropower stations) can have negative effects on spawning and reproduction success of adults and dispersal of early life intervals. Channelisation and bank constructions, the disconnection of rivers from their floodplains, sand and gravel exploitation, i.e. to remove the “bottlenecks” for navigation, all adds to the general loss of sturgeon habitats. Pollution due to excessive organic substances and nutrients (ICPDR 2004) are also detrimental for sturgeons, especially in the Lower Danube. In particular, the accumulation of toxic and harmful substances such as heavy metals, endocrine disruptors, hormone active substances (HAS) and persistent organic chemicals (PCPs and PAHs) in sediments, and subsequent up-take through the food-chain (AKIMOVA & RUBAN 1996) may alter tissues and physiology of fish and reduce the reproductive capability of populations.

The most direct impact by humans, however, is over-fishing that is difficult to accurately assess since different databases are quoted and data are claimed to be inaccurate (AP 2006). An ecological indicator is provided by biometry showing a long-term shift to smaller size and younger age and hence a loss of large, old spawners (Figure 1; CEAPA et al. 2002).

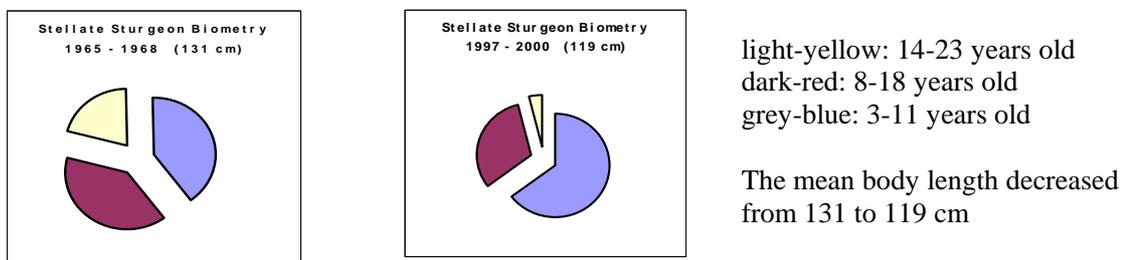


Figure 1: Change of Population structure of *A. stellatus* in the Danube River.
Data from CEAPA et al. (2002).

Recent conservation measures are not sufficient for Danube sturgeon conservation

Methods for the artificial propagation of sturgeons have been widely established throughout the world and in the Danube River Basin, and complete guidelines are available for many species on the basis of hatchery research. With regard to protection, of special interest/importance are natural and artificial hybridization. Despite a considerable hatchery routine, there still are gaps in knowledge concerning the successful breeding and rearing as well as successful management strategies of exploited populations (WILLIOT et al. 2002). In the Upper and Middle Danube River, recent efforts have focused on *Acipenser ruthenus*. Stocking has included attempts to reintroduce the species in river stretches where it is extinct, as well as supportive stocking of existing populations (REINARTZ 2002). In the Lower Danube River artificial propagation and stocking have been carried out in Serbia & Montenegro (LENHARDT et al. 2006), Bulgaria (VASSILEV 2006), and Romania for *Acipenser gueldenstaedti*, *A. nudiventris*, *A. ruthenus*, *A. stellatus* and *Huso huso* (BACALBASA–DOBROVICI & PATRICHE 1999). Research is also underway with the aim of providing high-quality caviar from aquaculture sources, thereby developing an important new economic niche for aquaculture as well as potentially reducing fishing pressure on wild sturgeon stocks. In the past decade, several national and regional attempts have been undertaken to combat sturgeon stock decrease and implement sustainable management practices, such as a regional strategy by Bulgaria, Romania, Serbia & Montenegro and Ukraine in November 2003, a conservation programme for *Acipenser ruthenus* by Germany (Bavaria) in March 2005 (REINARTZ 2006), and a National Action Plan for migratory sturgeons by Serbia & Montenegro (LENHARDT et al. 2005). Also NGOs such as WWF Hungary have provided valuable input and concrete actions for sturgeon conservation. GUTI (2006) stresses the importance of life-collections and gene-pool banks. However, the new trend of emerging private sturgeon hatcheries may add more problems than providing solutions. A moratorium as being implemented since May 2006 by the Romanian government (ANONYMOUS 2006), and in-line with the AP (2006), may be the only way to avoid complete extinction.

Continuous scientific research must provide a detailed basis for concrete restoration and conservation measures and specific sustainable management programmes. Although there is a considerable body of scientific and technical information on sturgeons in general, and on Danube River species in particular, important gaps of knowledge still exist (KYNARD and SUCIU, technical workshop contributions, AP 2006). There are open questions about the reference situation for Danube River sturgeons concerning their life-cycle, the current status of populations and exploitation, their key habitats and migration patterns, and biological background information for sturgeon husbandry and stocking. Last but not least, the remaining ultimate question is: What are the most effective and realistic measures and indicators of success (and/or failure) in conserving Danube sturgeons, suitable for monitoring timely and effective implementation of the Action Plan?

Actions required for achieving the goal and objectives of the Sturgeon Action Plan under the frame of the Bern Convention

The ultimate Goal of the Action Plan is: *Through national action and international cooperation, to secure viable populations of all Danube sturgeon species and forms by sustainable management and by restoration of their natural habitats and migratory movements.*

The Action Plan is based around 12 objectives, containing in total 72 actions, and are grouped under four general headings:

- Basin-wide coordination of sturgeon policy and best-practice management (Objectives 1-2)
- Legislation and enforcement controls for sturgeon fisheries and trade (Objectives 3-6)
- Conservation of sturgeon species and populations, including their genetic integrity (Objectives 7-8)
- Protection, management and restoration of sturgeon habitats, including reopening of migration routes (Objectives 9-12)

All detailed actions are listed and prioritized in the AP-Document (AP 2006), providing the rationale behind, the geographical applicability and the relevant species, the indicators of success, and the main actors addressed. It is important to note that the main actions must be performed in parallel in the Lower, Middle and Upper Danube, such as to maintain sturgeon populations that can migrate and spawn, i.e., to encompass the entire life-cycle (Table 1). Of special importance and priority is certainly to make the Iron Gate dams passable for sturgeons, as a river stretch of 800 km and major tributaries could be made accessible again for spawning.

Table 1: Joint action needed to close the sturgeon life-cycle ensuring natural reproduction.

Conservation & protection measures	Goal to be achieved
<i>In the Lower Danube & Black Sea:</i> to restore & maintain stocks	Anadromous sturgeons are ready to migrate
<i>In Iron Gate dams I and II (Middle Danube):</i> to ensure upstream migration	Waiting sturgeons can pass upstream
<i>In the Upper Danube:</i> to provide spawning habitats	Arriving sturgeons can spawn
<i>In Iron Gate dams I and II (Middle Danube):</i> to ensure downstream migration	Young sturgeons & spent adults can migrate back to the sea

An international and interdisciplinary “sturgeon networking” is of crucial importance to ensure optimum information flux, communication, and coordination of measures, and all stakeholders need to participate. This encompasses not only a basic foundation through science but also social, economic and ethical aspects, within the framework of sustainable use and with respect to the livelihoods in the Lower Danube River and its Delta who depend on the commercial use of sturgeons (NAVODARU et al. 2001). Strengthening and harmonizing national legislation and the implementation of the Action Plan are also in line with the European Union’s Water Framework Directive (EU-WFD). Presently, all these efforts are focused in the International Commission for the Protection of the Danube River (ICPDR) and sustained by IAD through its observer-ship.

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