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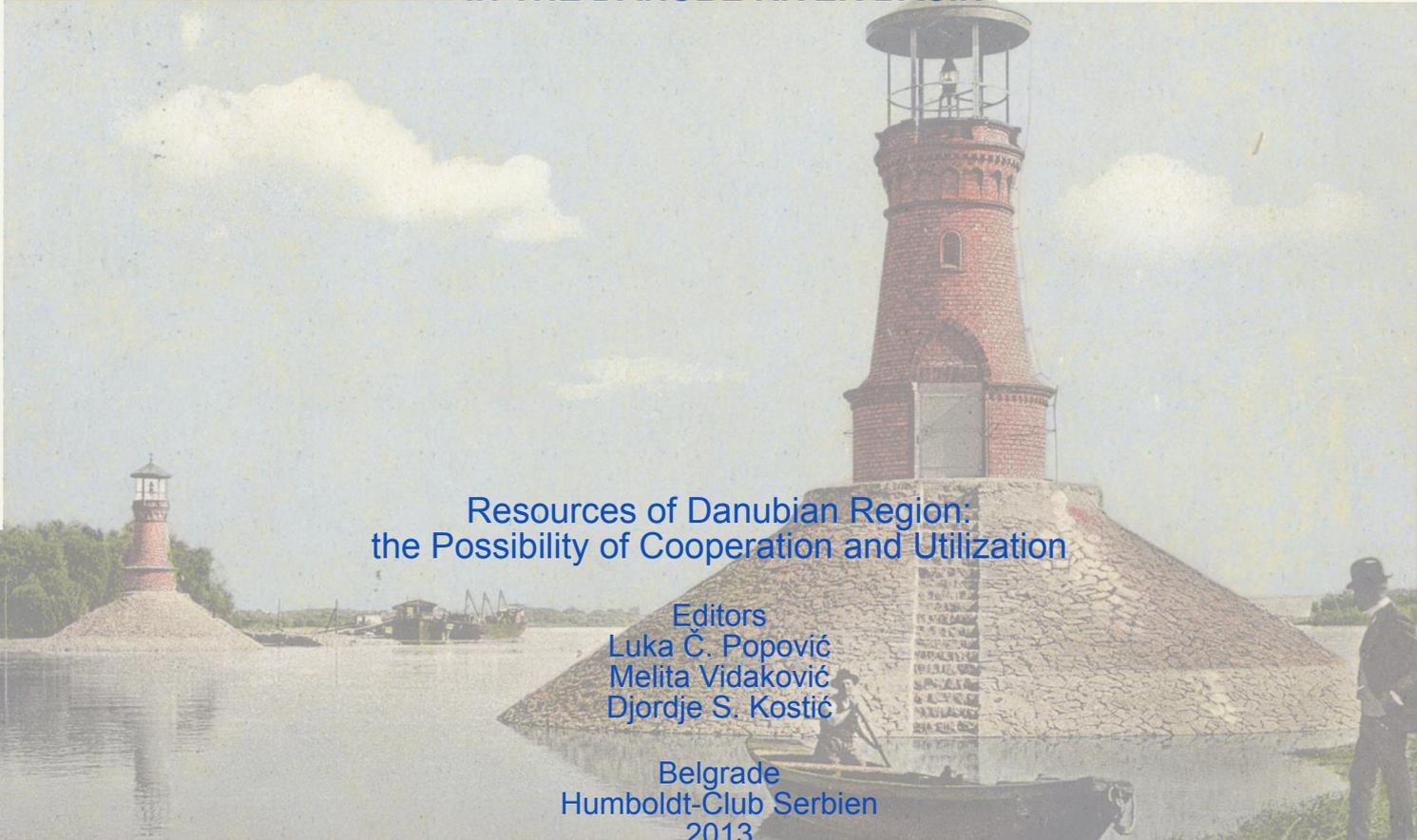
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STURGEON CONSERVATION AND MANAGEMENT COOPERATION IN THE DANUBE RIVER BASIN



**Resources of Danubian Region:
the Possibility of Cooperation and Utilization**

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Abstract. Sturgeons represent the most endangered group of fish species in the Danube River Basin, mainly due to habitat degradation and fragmentation, unsustainable and illegal fishery, and pollution. There has been recently a substantial improvement of communication and cooperation among the countries, partly due to a period of sociopolitical transition in the Lower and Middle Danube countries. Here we present major initiatives in the Danube region regarding sturgeon protection and management, such as the establishment of catch quotas and reporting by CITES, development of a regional strategy and action plans on sturgeons, and the establishment of the Danube Sturgeon Task Force.

Key words: sturgeon; *Acipenser*; *Huso*; management; unsustainable fishery; caviar trade; Action plan; Black Sea; Danube; CITES.

1. Introduction

Sturgeons (order Acipenseriformes) represent the most endangered group of fish species, as well as the commercially most valuable one (Jarić and Gessner 2012). Due to their vulnerability towards overfishing, habitat degradation and fragmentation, the majority of them are nowadays classified as critically endangered (63%; IUCN 2011).

The Danube River basin, originally inhabited by six sturgeon species, is considered as the key habitat of sturgeons in Europe (Williot et al. 2002; Lenhardt et al. 2006a). However, during the twentieth century, populations of beluga (*Huso huso*), Russian sturgeon (*Acipenser gueldenstaedtii*), stellate sturgeon (*A. stellatus*) and ship sturgeon (*A. nudiventris*) have experienced a severe decline in the Danube, while the European sturgeon (*A. sturio*) became extinct (Lenhardt et al. 2006b; Jarić et al. 2009). Sterlet (*A. ruthenus*) is the only sturgeon species in the Danube that is still an object of commercial fishery (Smederevac-Lalić et al. 2011).

One of the major threatening factors was the construction of the Iron Gate I dam in 1972 (rkm 942) and Iron Gate II dam in 1984 (rkm 863), which obstructed their migratory routes and confined migrations of anadromous species in the Danube to only 863 km of the river flow (Lenhardt et al. 2006b). Significant contributor to their decline were also highly unsustainable fishery levels in the Danube over the 20th century, which have been further compounded by a significant illegal fishery that, at certain points, likely represented up to a 90% of the actual total catch in the Danube (Bacalbasa-Dobrovici and Patriche 1999; Navodaru et al. 1999). There is a lack of clear data on the influence of the water and sediment pollution, although some recent studies have indicated substantial accumulation levels in sterlet of both organic

and inorganic pollutants, as well as the presence of chronic and sublethal effects of pollution (Poleksic et al. 2010, Janković et al. 2011).

However, all impacts have been further exacerbated in the past by a lack of cooperation among the countries from the Danube River Basin on the establishment of a common management strategy and activities, which was to an extent caused by a complex socioeconomic and political situation in the region. In this paper, we present an overview of the major initiatives in the Danube region regarding sturgeon protection and management. We outline the main national and international activities conducted so far, as well as ongoing research activities, and suggest the future management priorities.

2. Milestone regional initiatives regarding sturgeon management and cooperation in the Danube

Over the last few decades, there has been a substantial improvement of communication and cooperation among the countries in the Danube region regarding sturgeon protection and management, partly due to a period of sociopolitical transition in the Lower and Middle Danube countries. Significant contribution to the efficiency of this process was provided especially by the intensified cooperation between the Lower Danube countries (Serbia, Romania, Bulgaria and Ukraine) and the Upper Danube countries, primarily Austria and Germany. The key international organizations that have contributed to the establishment and improvement of cooperation, communication and common research, policy and management measures and activities were:

- The Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES);
- International Association for Danube Research (IAD), established in 1956 as an international scientific network;
- International Commission for the Protection of the Danube River (ICPDR), established in 1998 as a transnational coordination body;
- World Wide Fund for Nature, Danube-Carpathian Programme Office (WWF DCPO), established in 1998 as a programme of the WWF for the Danube and Carpathian regions;
- Black Sea Sturgeon Management Action Group (BSSMAG), established within CITES in 2001 as an international dialog group on sturgeons;
- Danube Sturgeon Task Force (DSTF), established in 2012 as a scientific and NGO international cooperation, communication, public awareness improvement and lobbying body for sturgeon protection in the Danube.

The major contribution by the CITES Secretariat was the enforcement of a stronger control of sturgeon caviar and meat trade since 1998, as well as the establishment of sturgeon trade quotas and reporting for the Lower Danube countries (Ukraine, Romania, Bulgaria and Serbia) since 2001. During 2001–2006, total quotas for beluga, Russian sturgeon and stellate sturgeon experienced a constant decline, with no prescribed quotas for sturgeon fisheries since 2007 (Figure 1), which was the result of a total sturgeon fishery moratoria imposed by most of the Lower Danube countries (Smederevac-Lalić et al. 2011). In cooperation with governments of member countries, CITES also facilitated organization of meetings for

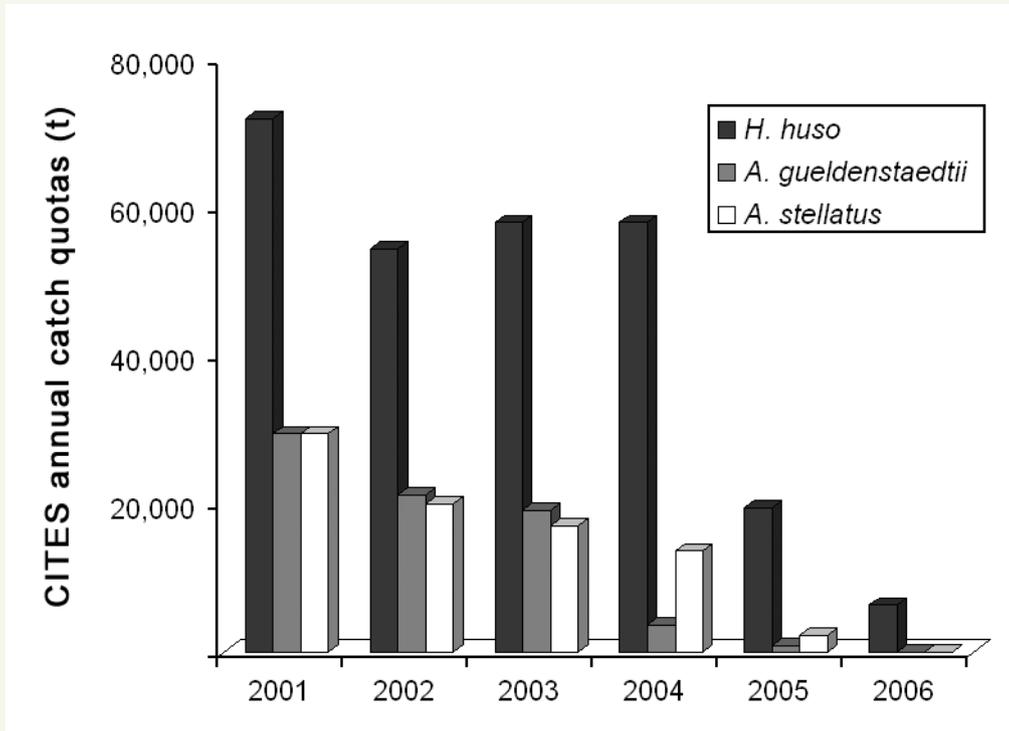


Figure 1. Annual CITES catch quotas for beluga (*Huso huso*), Russian sturgeon (*Acipenser gueldenstaedtii*) and stellate sturgeon (*A. stellatus*) of the N-W Black Sea and the Lower Danube River (total quota for Ukraine, Romania, Bulgaria and Serbia).

scientists and governmental representatives. On one of the meetings, the First Regional CITES Meeting on Sustainable Management of Black Sea Sturgeons held in 2001 in Sofia, BSSMAG was established as a consultative body of sturgeon range countries. In 2003, CITES initiated development of the "Regional Strategy for the Conservation and Sustainable Management of Sturgeon Populations of the NW Black Sea and Lower Danube River in Accordance with CITES", as the first regional strategic document that deals specifically with the management of Danube sturgeon populations. The development of the Strategy further stimulated the development of national strategic documents on sturgeons in the following years.

In 2005, IAD and WWF DCPO organized a workshop to develop an action plan for the Danube sturgeons, with the participation of sturgeon experts from each of the Danube River basin countries. As a result of the workshop, the "Action Plan for the Conservation of Sturgeons (Acipenseridae) in the Danube River Basin" (APCS) was developed and endorsed in the same year by the Standing Committee of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention;

Bloesch et al. 2006). The Action plan represents the most important international strategic document on Danube sturgeons to date.

During 2008-2012, IAD and WWF DCPO developed the project “Danube-Reconnect”, with the aim to conserve and protect the Danube through a network of protected areas, to reconnect the river with its floodplains, to strengthen community fisheries, and especially to restore sturgeon migration. In 2011, IAD also developed and submitted a proposal for the project “LinkStur”, aimed at linking transnational strategies and activities to protect and restore Danube sturgeon populations. In 2012, WWF initiated the Life+ project “Joint actions to raise awareness on overexploitation of Danube sturgeons in Romania and Bulgaria”, which will be implemented by WWF in Austria, Bulgaria and Romania during 2012-2015. Project target groups are fishing communities, law enforcement agencies, decision makers, sturgeon breeders and caviar processors and traders in Romania and Bulgaria, and its main aim is to tackle overfishing and illegal fishing of sturgeons in the two countries. Since 2006, IAD and ICPDR are jointly making an effort to initiate a feasibility study on making the Iron Gate dams passable for sturgeons and other fish species.

During the last two decades, a number of international projects dealing with sturgeon research and management issues have been implemented throughout the Danube, such as:

- GEF/WB/DDBRA No. 131/1997 (1997–2000) “Location of essential habitats of Danube River sturgeon populations in the river and their genetic structure”;
- GEF/WB/DDBRA project OGCA 97A0706 (1998–2000) “Migration and habitats of Danube sturgeons in Romania”;
- Grant of the Royal Society, London (1998–2000) “Genetic population structure of endangered sturgeon species of the Lower Danube”;
- Norwegian Research Council (2000–2001) “Endangered species: oocyte maturation of the beluga sturgeon (*Huso huso*) – Evolutionary significance of egg yolk proteins”;
- European Agency for Reconstruction (EAR) (2007–2008) “Sustainable use of sterlet and development of sterlet aquaculture in Serbia and Hungary”;
- Norway through the Norwegian cooperation programme for economic growth and sustainable development in Romania and by the Romanian Ministry of the Environment and Forestry (2009–2011) “The BEST COMBAT project (BEluga STurgeon COMmunity BASEd Tourism)”.

European Union adopted the EU Strategy for the Danube Region (EUSDR) in 2010. One of the EUSDR Priority Area 6 targets was to secure viable populations of Danube sturgeon species by 2020. As a response, DSTF was established in 2012 by a group of sturgeon experts, NGO delegates, and representatives of the ICPDR, the Danube Strategy and national governments. The main objective of DSTF is to implement “Sturgeon 2020” program, and to coordinate and foster the conservation of native sturgeon species in the Danube River Basin and the Black Sea.

Currently, DSTF is finalizing the development of the Strategy to implement the “Sturgeon 2020” program. The DSTF Strategy is based on the APCS key objectives and actions (DSTF 2012): 1) basin-wide coordination of sturgeon policy and best-practice management, 2) legislation and enforcement controls for sturgeon fisheries and trade, 3) conservation of sturgeon species and populations, including

their genetic integrity, and 4) protection, management and restoration of sturgeon habitats, including reopening of migration routes.

3. National activities

Beside international and regional activities and initiatives, substantial effort regarding Danube sturgeon management and protection was also made through various nationally based activities in each of the countries, such as development of national strategic documents on sturgeons, implementation of national research projects, establishment of sturgeon fishery control and moratoria and supportive stocking.

In order to implement the Regional Strategy for the conservation and sustainable management of sturgeon populations of the NW Black Sea and Lower Danube River in accordance with CITES, national action plans for the management and protection of sturgeon populations were developed in most of the Lower Danube countries: in Bulgaria in 2003 (Raikova et al. 2004), in Serbia in 2005 (Lenhardt et al. 2005), and in Romania in 2006 (CITES 2006). In Germany, a conservation programme for sterlet was initiated by the Landesfischereiverband Bayern e.V. (Bavarian Fisheries Association) in 2004 (Reinartz 2003; Reinartz et al. 2011).

To compensate for the decline of sturgeon populations in the Danube, there were substantial stocking efforts made during the 20th century by a number of countries in the region. In the Middle Danube, stocking effort has been focused on sterlet, whose stocks have become dependant on supportive stocking measures (Reinartz 2002). The majority of fish were released by Hungary, and to a small extent by Slovakia, Bulgaria Austria and Germany (Reinartz 2002; Williot *et al.* 2002; Raikova et al. 2004; Guti 2006; Holčík *et al.* 2006). In the Lower Danube, more than a million larvae, fingerlings and juveniles of Russian and stellate sturgeon, as well as smaller amounts of beluga and sterlet have been released (Vassilev 2006). However, positive effects of past stocking activities are considered questionable, and the stocking effort has been deemed insufficient to compensate for the population decline (Vassilev 2006). During the past few decades, the stocking intensity was reduced to only sporadic activities (Guti and Gaebele 2009; Smederevac-Lalić et al. 2011).

One of the major positive steps regarding sturgeons made to date in the Lower Danube River was the announcement of moratoria on sturgeon catch in 2006. In April 2006, Romania banned sturgeon fishing for 10 years. This was followed by Serbia and Bulgaria, although the moratoria in the two countries were based on decisions imposed on a year-to-year basis. Since 2009, complete and permanent ban on sturgeon fishery was incorporated in the Serbian legislation, with the exception of sterlet fishery. Nowadays, the only existing sturgeon commercial fishery in the Danube is that of sterlet, in Serbia and Hungary (Jarić et al. 2010). After the introduction of sturgeon fishery moratoria, information exchange among the Lower Danube countries was somewhat diminished (Lenhardt et al. 2012).

4. Ongoing research activities on sturgeons in the Danube River basin

Improved cooperation, communication and knowledge exchange in the Danube River basin have facilitated introduction of common research activities, employment of novel research methods and

techniques, as well as the application of basin-wide research projects. This has all contributed to the observed recent increase in publication output of the Danube countries regarding sturgeon research, followed as well by a growing contribution of research based on international cooperation (Jarić and Gessner 2012). Research activities were also facilitated by a growth in international funding for sturgeon related projects.

Research of sturgeon populations nowadays spans various methods and techniques, such as tagging and telemetry, morphometric analyses, age determination, assessment of microelement accumulation in fin rays as an indicator of spawning migrations, habitat characterization, molecular genetic analyses, toxicological and histopathological analyses of the impact of pollutant accumulation, assessment of the use of sturgeons as indicators of pollution and the state of environment, population modelling, as well as the research on aquaculture, broodstock development and supportive stocking techniques. Endangered status of sturgeon populations in the Lower Danube and the diminished access to sturgeon populations, imposed by moratoria, has also stimulated studies involving the population viability analysis, through simulations of virtual sturgeon populations (Jarić et al. 2010; Lenhardt et al. 2012)

5. Conclusions

The past few decades witnessed an improving atmosphere for cooperation and common management and research initiatives of all interested parties in the Danube River basin. Nevertheless, there is still a lack of nongovernmental sector involvement and public awareness on sturgeon protection issues, while cross-sectoral cooperation is still undeveloped, especially regarding the problem of fish passes, which requires involvement of the electric power industry and hydro-engineers (Lenhardt et al. 2008). To overcome present problems and to achieve the recovery and sustainable management of sturgeon populations in the Danube, future efforts should cover a wide range of issues, such as control of illegal fishery and bycatch, construction of fish passes on Iron Gate dams, pollution control and monitoring, habitat restoration, and broodstock establishment and supportive stocking. To achieve such a complex set of targets, effective cooperation among all countries and stakeholders in the region will be crucial.

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