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Editorial

Dear Readers,

Sturgeons, one of the key groups of fish drawing conservational interest, are the coherent topic of Danube News 28. Authors describe general as well as individual aspects related to these great, but endangered representatives of the fish fauna in the Danube River. And IAD is given a look from the outside and its activities in relation to the European Union Strategy for the Danube Region.

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Photograph: ÖWAV

Message from the president

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Thomas Hein, President of IAD

The focus on the sturgeon species in the Danube River Basin in this issue had several motivations. First, these species are highly under risk to get extinct for various reasons. Already several years ago, the Sturgeon Action plan had been adopted, expressing the most urgent needs. While facing continuing decline and critical situations new threats originate from navigation projects in the Lower Danube. Secondly, as some sturgeon species are migrating over long distances, even linking marine and freshwater systems, they clearly indicate the ecological status of the whole Danube River system, showing severe deficits and needs for management actions. Implementing the right measures fundamental knowledge on sturgeon needs to expand further. This issue intends to summarize current knowledge and provides evidence of critical knowledge gaps. Finally, strong movements exist at present, not only by DSTF, to get in action for the sturgeon. The topic got accepted as flagship project within the EUSDR and several projects and initiatives have been started. To name one example, the Danube Day 2013 was entirely devoted to the sturgeon, raising the awareness with regard to the very critical situation of these species in the Danube region. On behalf of IAD I express our deepest wish that within the next five years significant steps are taken to save these species and their wonderful environment, the Danube River system. Thus, a future issue can be devoted to the success story of how sturgeons can survive and how the entire river system can be improved, including human needs and welfare. A future issue of DN can then be devoted to the success story.

Protecting the living fossils – actions for sturgeon conservation in the Danube River Basin

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A century ago, six species of sturgeon were native to the Danube River Basin. Today, five of them are critically endangered and one is already extinct. Actions for conservation cannot be postponed and require international cooperation on the basin-wide level.

Sturgeons are considered a flagship species for the Danube River Basin and are valuable indicators for water status and the health of the ecosystem. However, sturgeons are today on the brink of extinction inter alia due to over-

Figure 1. Children working on a life-size puzzle of a Beluga Sturgeon at Gabcikovo, Slovakia. Photo: Vodohospodárska výstavba (SK)

exploitation, disruption of migration patterns caused by barriers, water pollution and the loss of habitats and spawning grounds. Hence, urgent measures are needed to reverse the decline and prevent disappearance. The International Commission for the Protection of the Danube River (ICPDR) is the coordinating body for the implementation of the EU Water Framework Directive in the Danube River Basin and plays, together with other partners, an important role in the implementation of the required actions.

Increased attention for sturgeons

The sturgeon issue was already addressed in the frame of the Bern Convention with the adoption of the Danube Sturgeon Action Plan in 2005 as well as in the 1st Danube River Basin Management Plan from 2009, including measures for the reduction of pollution and the improvement of hydromorphological conditions.

Sturgeons lately gained increased political attention in the frame of the EU Strategy for the Danube Region (EUSDR), with the specifically agreed target "To secure viable populations of Danube sturgeon species and other indigenous fish species by 2020". Working towards the achievement of this target, the "Danube Sturgeon Task Force" (DSTF) was created in January 2012 in the frame of EUSDR Priority Area 6 (Biodiversity), where different organizations throughout the Danube basin, including the ICPDR, joined forces to work towards the issue.

Figure 2. A little girl in the Hungarian city of Györ is mesmerized by a young sturgeon on Danube Day. Photo: Viktór Pálinger (Györ/HU)

An integrated approach is needed

Sturgeon conservation efforts can only be successful if an integrated approach is applied. Different water-related sectors have to take environmental concerns on board in making their economic activities more sustainable. Facilitating the required exchange is amongst one of the key objectives of the ICPDR. Practical examples with direct relevance for sturgeon conservation are the "Joint Statement on Inland Navigation and Environmental Protection" from 2007 and the recently adopted "Guiding Principles on Sustainable Hydropower Development in the Danube Basin" from June 2013.

Priority actions identified

Furthermore, urgent priority actions for sturgeon protection have been identified by the ICPDR. These include coordinated ex-situ conservation measures for the stabilization and improvement of the still remaining sturgeon stocks, the monitoring and mapping of existing and historic sturgeon habitats for targeted conservation activities, as well as investigations on the potential feasibility to establish fish migration at the Iron Gate dams.

With regard to the latter, a one-year project has recently be launched which is financed by the Dutch "Partners for Water Programme" and also supported by the ICPDR, aiming to solve some of the related questions in order to gain further clarity on this key issue. More general technical solutions for fish migration are summarized in a respective ICPDR Technical Paper which was recently published.

Danube Day 2013: Get active for the sturgeons!

Conservation efforts need to be accompanied by communication and awareness raising campaigns. The International Danube Day on 29 June is the world's biggest river festival with activities in all 14 countries of the ICPDR. More than 350 partner organizations mobilize ten thousands of people between Black Forest and Black Sea to celebrate successes in protecting Danube Basin rivers and to promote environmental education.

This year, Danube Day followed the motto "Get active for the sturgeons", resulting in campaigns for sturgeons throughout the basin. Activities such as releasing young sturgeons into the Danube through children and NGOs were met with high-level recognition: EU Commissioner for Regional Development Johannes Hahn emphasized the importance of habitat protection, control of poaching and the re-establishment of connectivity in a video message.

The time has come to get actions done

With high political recognition and the strategic approach in place, a promising environment has been created for the implementation of the necessary sturgeon conservation actions throughout the basin. Some of the tools are the 2nd Danube River Basin Management Plan, to be adopted by end 2015, as well as targeted projects addressing the key issues identified. The upcoming EU financial framework 2014-2020 is expected to provide appropriate funding opportunities. Therefore the time has come to get active in taking the next important steps, in particular preparing respective joint project proposals in order to keep with the Danube Day motto "Get active for the sturgeons".

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Video message from EU Commissioner for Regional Development Johannes Hahn on the occasion of Danube Day 2013. Online available: http://www.icpdr.org/main/danube-day-2013

The Global Situation of Sturgeons and Resulting Lessons for the Danube

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A general background

More than 200 million years ago during the Trias, the world looked much different than today, when sturgeons started their appearance on the planet. What is rather more striking than the long time that this family was successful, is the dramatic changes that they persisted. Continental drift, Tertiary catastrophes and associated mass extinction of species, various climate changes and many other impacts were witnessed by sturgeons. Only over the past 200 years one threat has proven increasingly efficient in driving sturgeons to the brink of extinction – men! Environmental alterations attempting to facilitate human needs only, resulted in decline of species diversity which over time commenced in an exponentially increasing speed. Sturgeons are by far not the only group of species suffering from the dramatic impact men imposed upon them, but they reveal a large overlap of their preferred habitats with human settlement. Approximately 50 % of the world's human population lives closer than 3 km to a surface water body, and only 10 % of the population lives further than 10 km away (Kummu et al 2010).

Adaptation to long distance migration and to different environments during the life-cycle has contributed to the diversification that allowed 27 species of sturgeons on the northern hemisphere to develop large populations comprising between 50 and 150 year-classes depending upon the range of the different species. Large individuals of up to 8 meters in length and more than 2000 kg body mass (Pirogovski et al. 1988) have contributed to the fascination of the species not only for fishermen but also for the wider public.

Well defined spawning migration periods have rendered sturgeons a prime target for fisheries throughout their ranges in European, Asian and North America. When the caviar craze started by the 1840 the exploitation reached highly unsustainable levels (Jaric & Gessner 2013). Depletion of overexploited populations was quick and to make things worse, the landings of the fishery for spawning migrants did not reveal the true status of the populations since the aggregations commenced as long as there were still sufficient numbers of sturgeons to migrate into the rivers – described as the fisheries hyper-stability phenomenon (Erisman et al. 2011) – so fishery only stopped after virtually the last fish were caught.

On top of the fishery-related impacts, massive changes occurred in the environment since the early 19th century as a result of the industrialization and human population growth resulting in a massive increase of wastes that were discharged into the rivers without purification. Inland navigation resulted in massive habitat loss through the elimination of meanders and the attempt to provide a uniform river channel for ships to allow for mass transport of goods (some-

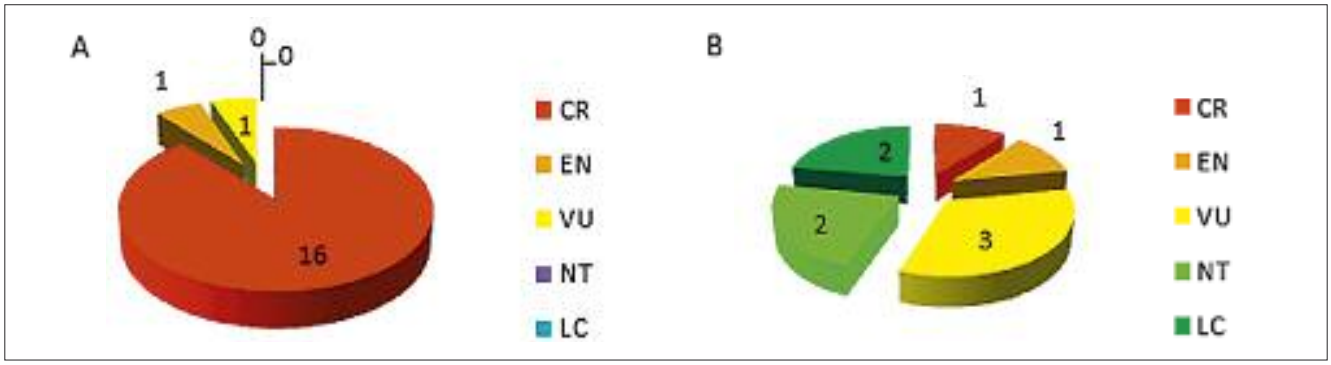

Figure 1. IUCN sturgeon conservation status for A) Eurasian (N=18) and B) North American (N=9) sturgeon and paddlefish species (data IUCN 2010)

times misnamed as an environmentally safe means of mass transportation). Hydro-power dams were constructed either for navigation, water supply or later on for electricity (misleadingly referred to as "green energy"), interfering with the migration of the fish and altering the flow as well as the temperature regime. Rivers were degraded to wastewater channels to facilitate economic growth while the side effects such as the decline of river fisheries and biological diversity were not understood to their full extent. As long as these impacts persist they are preventing the rehabilitation of populations even under otherwise favourable conditions.

Sturgeons of the world – one planet and the same story all over?

So far the picture drawn above has shown similar dynamics and effects all over the planet only at different time scales. Europe and North America developed similarly but the density of the population in Europe resulted in more drastic changes in a shorter time span than in the US and Canada. Russia started its industrialization only after the World War I but caught up at dramatic pace afterwards, while Asia – and especially China – has undergone the transition from an agricultural state to the industrialized phase of the economic development only after the 1970s. It is remarkable though that environmental policy has not been adopted in any of these cases before the effects of industrialization and population growth had been observed, thereby repeating the mistakes of the development in other regions all over.

Today, populations of sturgeons have been reduced to levels that comprise mere fractions of the once abundant wealth. As a result of this development the IUCN species assessment in 1996 (IUCN 1996) indicated that sturgeons worldwide were vulnerable or threatened. The most recent IUCN assessments (IUCN 2010) revealed that 41% of the species worldwide have decreased in conservation status. Especially the conservation status of the Eurasian sturgeon species has continued to decrease over the past 13 years, leaving 89% of the species Critically Endangered *(Figure 1).*

The role of conservation management

Too little has been done too late to effectively counterbalance the development, so it is stated in general. The major impacts have not been put into perspective of what accumulative damage they might result in. Countermeasures were taken only in some cases and even then mostly too late or without considering the overall damage done, searching for mid-term maintenance of the status quo rather than for a long term, self-sustaining solution. Hatchery programs are among these catchy, simple solutions. Although requiring a sincere commitment for research into biotechnologies, for reproduction and rearing, as well as investments into infrastructure these programs were never questioned even when the shortage of spawners resulted in the mixing of different strains and the return rates continued to decline in the Caspian Sea tributaries. The hatchery program in the USSR supported the fishery in the Caspian Sea for more than 30 years but in the long run destroyed the population structures (Ludwig 2006). Summarizing the experience so far, it can be stated that hatchery operations might buy time for the restoration of habitat access and quality but they are by no means a solution for reduced or eradicated natural recruitment over a longer term.

Anyhow, the situation might not be as bleak as it seems. Examples for well managed and even increasing populations of sturgeons are to be found *(Figure 1).* It is not only the initial mistakes that contribute to the development, even more so the response towards the effects that become noticeable that make the difference. The first population decline was observed in North America, Russia and Europe at the end of the 19th century and management started to reveal massive differences. While fisheries were not supposed to be impacted by management in central Europe (Gessner 2000) other regions were more open to substantial management measures and closed their fishery for periods of time (Bain et al. 2000).

During the 7th International Symposium on Sturgeons (ISS 7) stakeholder involvement and management strategies were one of the main foci of the presentations and discussions. It became evident that the understanding of the population characteristics and the pressures acting upon them is only a first step but the selection and execution of proper management measures to ensure undisturbed reproduction and recruitment as well as migration is vital for the population recovery. These measures include the timely involvement of stakeholders as responsible partners, clear responsibilities and targets, legislative and jurisdictional support and responsible control as well as sufficient time for the measures to take effect while monitoring of the performance is essential (Bruch et al. 1999).

Besides of the quality of the measures, the time-factor is a key for any rehabilitation since measures might take 2–3 generation intervals to show their full effect. Due to the long generation intervals this easily translates into 30–50 years that conservation measures have to be maintained and effects to be monitored before the full extent of the results become noticeable *(Figure 2).*

Lessons for the Danube – and beyond

Looking at the overall picture summarized above, the Danube catchment – Europe's only river with natural sturgeon populations still reproducing – is subjected to all of the impacts mentioned. Overfishing started in the 19th century already and continues to date. Fishing bans were initiated but poorly communicated and as such were not efficient up to now. Marine fisheries is not yet fully recognized an essential part of the problem, and regional initiatives for joint management of the resources in the Black Sea have

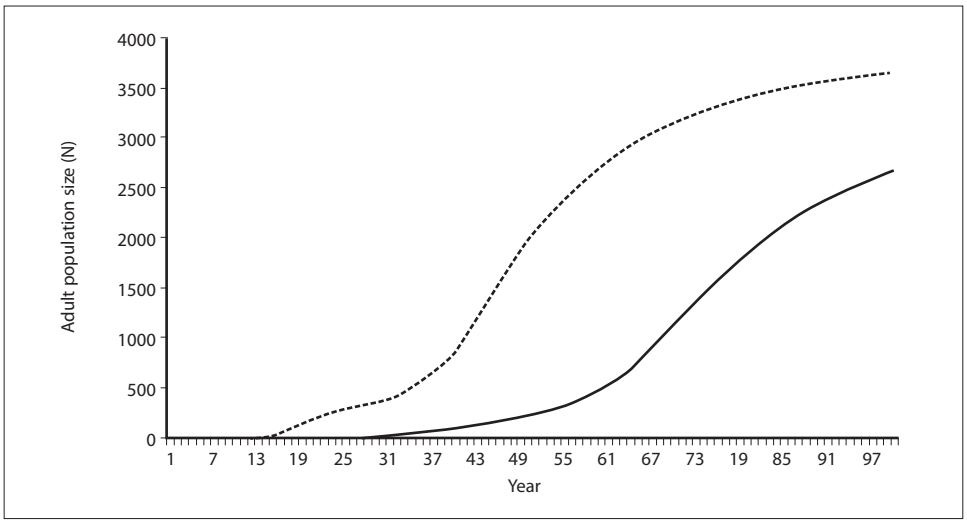

Figure 2. Time lag between onset of juvenile release and response in adult population for A. sturio (dotted line: continuous annual release, solid line: single release). Source: Jaric & Gessner 2013

repeatedly been brought to a halt by the attitude of some of the range countries towards cooperation.

Hydropower development started at a large scale in 1968 with the Iron Gate dam being built and has been intensified ever since due to the fact that the need for energy is growing exponentially. The Iron Gate dam inhibited sturgeon migration into the Middle Danube but in the meantime also tributaries are massively subjected to hydro-development without any functional fish passage or effective functional longitudinal connectivity. The species that has responded to this habitat change most drastically is A. nudiventris which is already considered functionally extinct in the Middle and Lower Danube today. Also the effects of the ongoing dyking and navigation projects that completely fail to take into consideration the adverse impact that these measures have on lateral connectivity and river functionality are putting additional stress on the weak sturgeon populations and with them also on the rheophilic fish community of the Danube catchment. For none of these developments the cumulative damage that these projects result in has been thoroughly investigated.

Perspective

Although there is awareness about the impact of human activities upon the environment up to now the mitigation of these effects has not been attempted with the required consequence although the programme "Sturgeon 2020" has been developed under the EU Strategy for the Danube Region (EUSDR). To implement this programme, the Danube Sturgeon Task Force (DSTF) and associated experts are working together to provide a better understanding of the needs of biodiversity in the river catchment – symbolized in the fate of the sturgeon as an umbrella species – but it has to be recognized that this volunteer activity can only be the initial spark to alter the approach and to increase the integration of the different sectors in the decision making process.

For this, we are obliged to ask ourselves if it is worthwhile to save these unique symbols of the large river systems. If we agree to do so, we need to address their needs first when looking for solutions for the development of the river. Functionality of the river system is imperative prior to its utilization in this case.

In 2017, the 8th International Sturgeon Symposium (ISS8) will be hosted in Vienna by the BOKU together with a truly European group of host organizations, addressing the role that sturgeons play in our world and the pre-requisites for their persistence – also as a symbol for functional river systems – worldwide. In this respect the Danube has the option to become a flagship for transnational development.

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Sturgeons: The Upper Danube Situation

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The Upper Danube

The Upper Danube basin extends from the source in Germany to Bratislava, the capital of Slovakia. Here, many important tributaries unite with the Danube like e.g. the Altmühl, Naab, Regen, Kamp and Morava rivers from the north and the large alpine rivers Iller, Lech, Isar and Inn from the south. It is the Danube section with the highest slope in the basin, but is also most heavily modified by a chain of hydropower impoundments in Germany and Austria with only few free-flowing stretches remaining.

Generally the number of fish species increases with the length of the Danube from source to mouth, yet the native fish biodiversity of the Upper Danube basin, including a number of endemics, already has to be classified as being rich to European standards with currently 45 species in the Danube between Vienna and Bratislava (Tockner et al. 2009).

For the fish communities of the Danube the native sturgeons (Acipenseridae) were the only fish species group linking the Upper Danube with all other sub-basins downstream and the Black Sea. This holds true for both the large sea-running animals, living in the Black Sea and ascending the Danube for overwintering and spawning, as well as for the pure freshwater sturgeons also covering large distances within the whole riverine system of the Danube and its tributaries (Reinartz 2002).

Sturgeon history in the Upper Danube

It is impossible to determine the exact past distribution and frequency of occurrence for each species from historical records. However, the following information could be retrieved by the analysis of literature, historical records and the documentation of sub-fossil remains (Reinartz 2002, Reinartz 2008, Friedrich 2012).

From the six native sturgeon species in the Danube, five also occurred in the Upper Basin in the past. These were the three large sea-running species Beluga sturgeon *(Huso huso),* the Danube- or Russian sturgeon *(Acipenser gueldenstaedti),* the Stellate sturgeon *(Acipenser stellatus)* as well as the two freshwater species Ship- or Fringebarbel sturgeon *(Acipenser nudiventris)* and the Sterlet *(Acipenser ruthenus).*

Beluga and Russian sturgeons migrated as far as Bratislava for spawning and appeared regularly also in the Austrian and German Danube including some of the larger tributaries. Beluga sturgeons were well known in the Austrian Danube in the Middle Ages and a great demand existed for Beluga meat, because of its tastiness. For example, Beluga sturgeons were mentioned as a haversack ration for the troops of the emperor Henry III, who marched along the Danube in 1053. According to a contemporary report, the soldiers *"would most probably have starved to death had they not received fifty huge Belugas".* In centuries to come, fishing pressure on the Beluga along the whole Danube increased, when nets, rods and fishing weirs were used. In this "weir fishing" the whole river was blocked by fence-like obstructions to get access to the migrating sturgeons. A decline in the occurrence of the Beluga could already be documented for the 16th century, when such fishing methods initiated international disputes, with upstream parties complaining about downstream parties for cutting off valuable resource. A similar stock development in the Upper Danube has to be assumed also for the Russian sturgeon. During the 18th century the fishing of migratory sturgeons in Austria collapsed, and as early as by the beginning of the 19th century, the Beluga and the Russian sturgeons could only rarely be observed in the Middle and Upper Danube River.

Single specimen of the Stellate sturgeon were also documented in the Austrian and German Danube as well as in some tributaries, but this species was always the rarest of the Black Sea sturgeons to reach the Upper Danube.

With the completion of the Iron Gate dams on the border between Serbia and Romania in 1972 and 1985 and the begin of operation of the Gabčíkovo dam downstream from Bratislava in 1992, sea-running migratory sturgeons were rigorously locked out of the Upper Danube and only single fishes could be documented in the Middle Danube, that obviously had managed to negotiate the Iron Gate locks somehow.

The Ship sturgeon has always been the second rarest species in the Danube River Basin, although some authors suspect confusion with other big sturgeon species by fishermen. This large sturgeon lives as pure freshwater form in the Danube and is known to reach two meters in length. The "Ship" migrated far within the Danube river system and was documented as far as Vienna still in the 20th century. Some authors even claim its occurrence as far upstream as Regensburg. Nowadays this species is sometimes called the "Phantom of the Danube" as it is confined to the Middle Danube and extremely rare. Just incidental catches of individuals, with extended time intervals of several years in between, document the persisting presence of this secretive species. Experts agree that this sturgeon is on the brink of extinction with an unknown number of individuals still surviving.

The Sterlet is the second pure freshwater sturgeon and also the smallest species in the Danube. However, besides the Beluga it once was the most widespread sturgeon

species occurring from the Danube Delta as far upstream as Ulm in Germany. A recent study on the genetics of this species even revealed that the different sub-populations are closely related and form a consistent population along the whole course of the Danube (Reinartz et al. 2011). The Sterlet appeared regularly in the Slovakian and Austrian Danube. An analysis of historical records also revealed a former native population of the Sterlet for the German Danube between Passau and Regensburg. Unfortunately, the decline of sterlet stocks in the Upper Danube is not well documented and several interacting reasons might have been responsible for this development. However, it is widely agreed that the loss of spawning grounds respectively the blocking of access to them in combination with a fragmentation of the Danube by impoundments and channelization have played a major role.

Today, only the Sterlet is still present as native sturgeon species in the Upper Danube River with one last surviving reproductive population below the hydropower dam of Jochenstein (Aschach impoundment) on the border between Austria and Germany. All other documented occurrences of this sturgeon in the Upper Danube basin depend on stocking of fishes from pond culture (Reinartz 2002, Reinartz 2008, Friedrich 2012).

Threats and activities

It is difficult to relate the threatened status of a given sturgeon species to a single cause or change in the environment. It is unquestionable however, that all Danube sturgeons have suffered severely from losses of habitat, by the blocking of migration routes as well as from overfishing. Another current threat to native populations is the introduction of foreign sturgeon species and genotypes. An increasing number of these animals is used in aquaculture and also appear in the ornamental fish trade. Thus, foreign sturgeons have started to appear in the rivers of the Upper Danube basin, either by unintentional or intentional release, and hybrids between exotic Siberian sturgeons and native Sterlets have already been discovered in the Jochenstein population (Ludwig et al. 2009).

Up to now, the countermeasures consisted mainly of stocking activities focusing on the Sterlet, but these introductions have not resulted in the establishment of viable populations (Friedrich 2012). Some scientific analyses and plans were elaborated to determine the potential and best strategies to conserve and revive the sturgeon populations also in the Upper Danube (Reinartz 2002, Bloesch et al. 2006, Reinartz 2008, Friedrich 2012).

Outlook and conservation needs

There is a realistic chance to re-establish river continuity at the Iron Gate dams and to open the long middle section of the Danube for the sea-running sturgeons for spawning again. However, with the current situation in Austria and Germany and the constant demand for hydropower, there is only little hope to bring the large Black Sea sturgeons back to their former distribution area in the Upper Danube. Sturgeon conservation in the Upper Danube should therefore primarily focus on the Sterlet and the Jochenstein population in particular. However, even if Black Sea sturgeons might not return to the Upper Danube they are a common heritage and all Danube countries should cooperate in their conservation by the principle of solidarity.

An important issue in the conservation of aquatic communities is the implementation of operational passing technology at obstacles. Thus, more research is needed to ensure the up- and downstream passing of sturgeons of all life stages at dams.

Little is still known about the exact causes for the decline of the Sterlet and the characteristics of its habitat, its location in the Upper Danube and the nature, extent and timing of the actual habitat use. Scientific analysis and research should provide more insight into this matter and the related aspects of the sturgeon life-cycle.

Planned future activities in Germany, Austria and Slovakia therefore will focus on the conservation of the last surviving reproductive population of the Sterlet, on understanding the life-cycle and habitat use of this species in the Upper Danube as well as on appropriate strategies for the reintroduction of this species into new ranges of its former distribution area.

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The Middle Danube: Sturgeons and Habitat

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Danube sturgeons are endangered

The Middle Danube mostly has a lowland character within the Carpathian basin, extending from the Devin Gate at the tributary of the Morava river (r.km 1842) to the Iron Gate (r.km 942). The fish fauna of this 900 km long river stretch includes more than 80 species, according to historical records and recent surveys. It contains several additional elements from the mountain stretch of the Upper Danube as well as Black Sea migratory species, such as the anadromous sturgeons.

Sturgeons were one of the most important subjects of the historical fishery along the Middle Danube from the Paleolithic Age to the Post-Medieval times. Their socio-economical relevance well known, because of their caviar is a famous luxury delicacy for hundreds of years. Nowadays Danubian sturgeons are critically endangered species according to IUCN Red List except sterlet *(Acipenser ruthenus)* which is vulnerable. Sturgeons have a strategic importance for nature conservation as indicators of healthy rivers.

Figure 1. Marsigli's map from the Danube at downstream of Budapest at the end the 17th century. Six sturgeon fishing sites (Husonum Piscario) are indicated in 70 km. According to contemporary descriptions, 50-60 specimens of sturgeons were caught daily per site during the fishing seasons.

There are six native sturgeon species in the Middle Danube. Atlantic sturgeon *(Acipenser sturio)* occurred only in the lower stretch of the Middle Danube and its last appearance dated from 19 century (Petrovic1998), but six specimens were caught in the upper part of the Lower Danube between r.km 886 and 944 from 1948 to 1954 (Ristic 1963). Occurrence of ship sturgeon *(Acipenser nudiventris)* is recently known along the Middle Danube, but less than 25 observations indicated its presence in the last hundred years. It is very close to extinction and disappearance may occur within a few decades (Guti 2008, Jaric et al. 2009). Its rarity is a substantial problem in direct survey of its population, therefore success of special conservation actions for this species is questionable. The anadromous species, as beluga sturgeon (Huso huso), Russian sturgeon *(Acipenser gueldenstaedti)* and stellate sturgeon *(Acipenser stellatus)* are extremely rare and their upstream migration from the Black Sea is practically blocked by the Djerdap II dams at 863 rkm (Hensel and Holcik 1997). Nowadays sterlet is the most widely distributed sturgeon in the Middle Danube. Its populations were formerly very abundant, but it is now a vulnerable species, however it is a subject of fishery. Development of a special action plan for sterlet conservation is an urgent task, mainly in the Middle Danube (Guti and Gaebele 2009, Lenhardt et al. 2010).

Since the beginning of the 21 century, an Asian and a North-American origin non-native sturgeon species have appeared in the Middle Danube. Since the detection of first specimen of Siberian sturgeon *(Acipenser baerii)* in the Slovak-Hungarian stretch of the Danube (Masár et al. 2006) several catch information from anglers has indicated its sporadic occurrence. First appearance of paddle fish *(Polyodon spathula)* in the Danube was reported in the Serbian section of the Lower Danube (Simonovic et al. 2006) and two specimens were caught in the Hungarian section of the Middle Danube in 2011.

Long-term downtrend of sturgeon populations indicates deteriorating state of Danube ecosystem and several threats to fluvial fish. Harsh overfishing resulted a significant decline in anadromous sturgeon populations between the 16th and 20th centuries in the Middle Danube *(Figure 1).* From the 19th century, further serious threats to sturgeon populations include habitat loss and alteration of sediment transport due to river engineering *(Figure 2),* the disruption of spawning migrations by dams, bio-accumulation of toxic substances, and potential degradation of the genetic diversity of population by introduction of exotic species and genotypes possibly through inadequate hatchery practice (Suciu and Guti 2012).

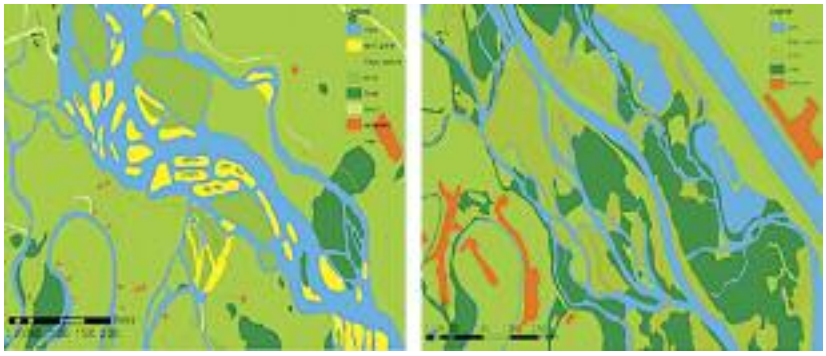

Figure 2. Change of the Cikola branch system in the Szigetköz section of the Danube from the pre-regulation period (1783) to the present days (2010). The river section was one of the most significant spawning grounds of the anadromous sturgeons in the Medieval times.
Natural hydro-morphological processes were altered by river engineering in the last centuries, therefore some key habitats, like gravel bars disappeared and stabilized branches became narrower. Since the operation of the Gabčikovo hydropower dam, 80% of river discharge has been diverted to its bypass canal.

Need of efficient habitat restoration

Information about locality and condition of sturgeon habitats is limited along the Middle Danube, however modified flow and sediment regime can result degradation of sturgeon spawning habitats, as it was observed in the impact area of the Gabčikovo hydropower dam from the beginning of the 1990s. The Szigetköz section of the Danube (r.km 1850-1768) was one the most important historical spawning ground for sturgeons in Hungary. Annual catch of sterlet (Acipenser ruthenus) increased to 2000 kg in the 1980s, but declined sharply to 10 kg by the beginning of operation of the Gabčikovo hydropower dam in 1992 *(Figure 3).* Changes of hydraulic conditions by running of the hydropower station resulted intensive sedimentation and accumulation of 400,000 m^3 silt in 10 years on former gravel substrate in a 4 km long side arm, which was the only and last spawning site of sterlet in the Szigetköz section of the river (Guti 2008).

Identifying, protecting and restoring of essential wintering, spawning and nursery habitats of sturgeons are basic requirements for their successful conservation, but realisation of this tasks is difficult due to limited knowledge and information gaps concerning the key habitats (location, hydraulic specifications, hydro-morphological processes governing habitat development, etc.). Sturgeons have special habitat requirements due to their particular life history and long-distance migration. Their spawning sites are usually characterized by well-oxygenated gravel or clay substrate with many crevices. These areas are in the main river bed or in the larger eupotamic side arms. We know some historical sturgeon fishing site and we can identify a few historical spawning area by rough approximation from ancient documents and maps. However we do not have sufficient information and description about the existing habitats of sturgeons for reproduction or wintering. Key habitats can be localised by radiotelemetry study of migration of individual fish and results of habitat surveys. Localisation and mapping of key habitats allows survey and description of special hydraulic conditions, and evaluation of hydro-morphologic processes of key habitats.

Inadequate funding of in-situ surveys is a critical issue in realisation of successful sturgeon conservation in the Middle Danube region. Multidisciplinary scientific support, improvement of research capacities and development of regional as well as wider international cooperation are essential requirements of future success.

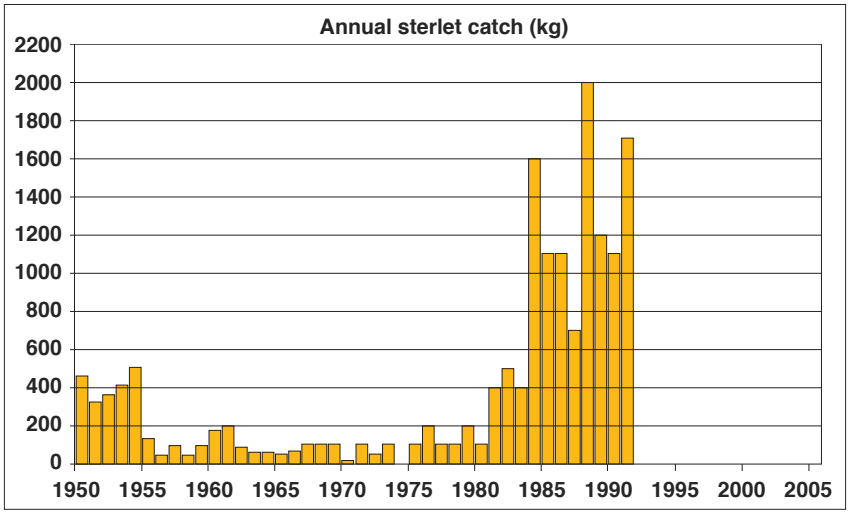

Figure 3. Sterlet catches of commercial fishery (data of the fishery cooperative of Győr) in the upper part of the Middle Danube (rkm 1850–1768) between 1950 and 2005.

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Sturgeons in the Lower Danube River

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Introduction

Six species of sturgeon once migrated in the Danube River for spawning: the anadromous species beluga, *Huso huso;* Russian sturgeon, *Acipenser gueldenstaedtii;* stellate sturgeon, *A. stellatus,* and the European Atlantic sturgeon, *A. sturio,* and the river resident ship sturgeon, *A nudiventris* and sterlet, *A. ruthenus* (Bacalbasa-Dobrovici 1997). Although considered as critically endangered, beluga – Russian – and stellate sturgeons still survive in the North-Western Black Sea and enter for spawning in the Lower Danube River (LDR), while the resident sterlet is considered only as vulnerable (IUCN 2010).

During the 20th Century, world demand for sturgeon meat and caviar has inflated the economic value of sturgeon fishing, with the value of beluga caviar estimated at US $ 1000 per 100 grams (Suciu 2008). This, when coupled with the development of intense fishing pressure following a lack of fishing controls after the Romanian revolution in 1989 (Kynard et al 2002), has caused, despite listing in year 2009 of all remaining LDR species in Annex II of the Convention on International Trade with Species of Endangered Fauna and Flora (CITES), the sharp decline in recent documented catches of sturgeon *(Table 1).*

Despite these problems, Lower Danube River remained the only and the last possibility of natural spawning of sturgeons in the Black Sea region (Vassilev 2006; Bronzi et al. 2011; Smederevac-Lalić, Jarić et al. 2011).

Moratorium on commercial catches

To prevent extinction of sturgeons spawning in the LDR, in May 2006 Romania declared unilaterally a 10 year moratorium on commercial catches of sturgeons, while starting to implement in the same year a supportive stocking programme (SSP). A few years later all other LDR countries followed this catch moratorium. To obtain young-of-the-year (YoY) sturgeons for the SSP implemented by Romania capture of wild brood stock was allowed with special permit. After controlled propagation all wild brood stock was individually tagged with passive integrated transponder (PIT) tags and released back in the LDR, preserving this way the wild gene pool represented by adult specimens. When recaptured in subsequent year adults sturgeons carrying a PIT tag will not be used again for controlled propagation, avoiding this way deterioration of genetic diversity of the overall population by repeated use of the same brood stock. Due to lack of compensation measures and overall weak involvement of traditional fishermen communities by the fishery management authorities, in understanding the reasons of and respecting the moratorium illegal fishing became rather common in many of these communities.

Recruitment from natural spawning

By capturing larvae downstream of potential spawning grounds, the Sturgeon Research Group (SRG) of the Danube Delta National Institute (DDNI) Tulcea has identified during 2004–2008 two sites in the LDR, at river Km (rKm) 311/ Rasova and rKm 100/Isaccea, were beluga sturgeons and sterlets were spawning on rocky substrate. The existence of other spawning sites used by sturgeons was further documented in the Bulgarian sector of the LDR by Vassilev (2006).

To monitor abundance of YoY sturgeons born annually in the LDR the DDNI SRG identified a suitable nursing ground at rKm 123 and developed there a fishing gear (bottom drifting trammel net) and standardised fishing procedure which was followed since year 2000, resulting today in a 14 year long record called the juvenile production index (JPI) of LDR sturgeons (Suciu & Guti 2012) *(Figure 1).*

Table 1. CITES catch quota and actual catches of sturgeons in the LDR / Romania during 2002–2005

Year	Species	CITES approved catch quota (kg)		Catch reported (kg)		Percent of achievement of approved quotas (%)	
		Total	Caviar	Total	Caviar	Total	Caviar
2002	H huso	25 000	2180	21 343	2628	85.37	120.55
	A. gueld.	13 800	1200	3 736	579	27.00	48.28
	A. stell.	17 000	1470	12 471	1148	73.36	78.12
	A. ruth.	00 500	45	00 0.00	0.00	0.00	0.00
	Total	**56 300**	**4895**	**37 541**	**4355**	**66.63**	**88.96**
2003	H huso	28 500	2430	24 007	2942	84.24	121.09
	A. gueld.	11 700	1000	1 499	280	12.82	28.07
	A. stell.	14 000	1190	4 306	269	30.76	22.65
	A. ruth.	800	50	0.00	0.00	0.00	0.00
	Total	**55 200**	**4670**	**29 813**	**3432**	**54.01**	**73.49**
2004	H huso	28 500	2430	13 293	1244	46.64	51.19
	A. gueld.	1 500	220	440	46	29.33	20.90
	A. stell.	12 600	1060	3 786	192	30.04	18.11
	A. ruth.	00 2 000	200	0	0	0	0
	Total	**44 800**	**3910**	**17 518**	**1482**	**39.10**	**37.90**
2005	H huso	24 225	2066	8 396	639	34.65	30.93
	A. gueld.	1 500	220	37	0	2.50	0
	A. stell.	12 600	1060	3 430	124	27.20	11.70
	A. ruth.	2 000	200	12	0	0.60	0
	Total	**40 525**	**3546**	**11 875**	**736**	**25.52**	**20.75**

A total number of 2766 YoY of the four sturgeon species were captured during the period of 14 years. The largest number were sterlets (N= 1778), followed by beluga sturgeons (N=887), stellate sturgeons (N= 75) and Russian sturgeons (N=26). Catch data were used to construct the JPI graphs *(Figure 1),* showing the relative abundance of YoY, at an age of about 30 – 45 days and total body length of 4 – 26 cm, having direct relevance to the size of annual recruitment from natural spawning in the LDR of each species. All species showed a marked variation of annual recruitment. The years with the best recruitment in beluga sturgeon were 2000, 2005, 2010 and 2013. Estimates of YoY abundance derived from catch data help to evaluate the health of stock and might be used in predicting future commercial abundance. To our knowledge this is worldwide the longest series of JPI recorded in any species of sturgeon in the wild.

Distribution in the Black Sea

In year 2012 investigations in cooperation with the Romanian Marine Research Institute of Constanta the distribution of juvenile sturgeons in the Black Sea coastal waters in front of the Danube delta were conducted. Two areas, Sahalin and Zatoane, were identified as feeding grounds especially for stellate sturgeons, requiring special consideration as marine protected areas (MPAs). Further studies should continue to investigate the dynamics of sturgeon population along the Black Sea coast as well as behavioural, ecological factors influencing the seasonal distribution as a prerequisite for improved management and sustainable use of these most valuable resources of the Black Sea (Holostenco et al. 2013).

Bio-contamination with heavy metals

Fish as part of the aquatic food web are the most likely route of human exposure to contaminants. Due to urbanization, industry, agriculture or mining, human activities dictate the frequency and intensity of water contamination by heavy metals (Zrnčić et al., 2013). The high content of lipids in sturgeon body makes them prone to bio-accumulation of heavy metals in their organs, including the gonads.

Due to the species ecology, stellate sturgeon and Russian sturgeon prefer marine habitats located close to the Danube River mouths, feeding mainly on bottom fauna. After downstream migration to the sea during the first year of their life, beluga sturgeons feed mainly on pelagic fish, such as anchovy, horse mackerel, Pontic shad and sprat shoals, which feed on other pelagic organisms as well. As a consequence beluga sturgeons show less heavy metal bio-accumulation of tissues (Onără et al. 2013).

On the other hand, males of all anadromous species seem to accumulate more heavy metals in their tissues than females. We explain this to be the effect of more frequent spawning migration of males in the LDR, the major contamination source (Wachs 2000). However confirmation of this hypothesis needs further investigations (Onără et al., 2013).

Supportive Stocking Programme

Hatchery supplementation programme is one of the approaches used for restoring of endangered sturgeon stocks. Although there is evidence of sturgeon natural spawning in the LDR, it is mandatory to estimate the annual recruitment and to support the population with hatchery produced young sturgeons, when necessary.

For supportive stocking of LDR with young sturgeons produced by controlled propagation, over 400 000 young sturgeon of the four native species of the Lower Danube were released into the River by the Romanian Fishery Agency during 2006 – 2009. This SSP was stopped in year 2010 for three years due to financial issues. However, in September 2013, within a project funded by the EC Fishery Operational Programme of Romania, 90 000 young sturgeons were released into the river in 5 locations in order to estimate in year 2014 their survival – and growth rate, as well as their distribution in the river and in the sea, involving experts from all Black Sea countries.

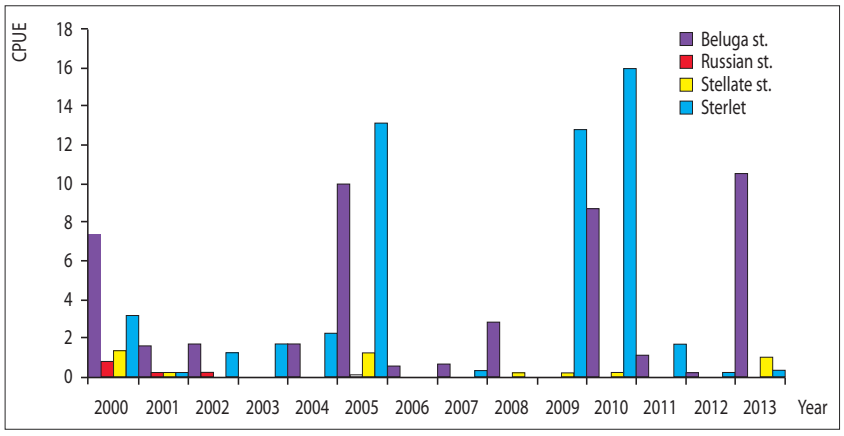

Figure 1. Juvenile production index YoY sturgeons born in the LDR during 2000–2013, expressed as catch per unit of effort (CPUE). The mean number of YoY sturgeons captured in a 96 m long trammel net with 20 mm mesh size, while drifted over a 850 m long stretch of the bottom of LDR at rKm 123*

Perspective of re-opening migration route at Iron Gates dams

The Danube river system has long been subjected to anthropogenic influence from a number of sources altering the entire ecosystem. The fish community, in particular sturgeon species, has been greatly impacted by these changes. Loss of habitat has occurred throughout the system and in particular, historical spawning grounds are no longer accessible due to the construction of the hydroelectric dams Iron Gate I & II at river kilometres 942 and 863 in 1970 and 1984 respectively (Hensel & Holcik 1997). These barriers divide the lower and mid

Figure 2. YoY Beluga captured at Danube rKm 118 (May 31, 2007). Photo: Suciu

Danube halving the historic spawning migrations of sturgeons which were documented extending as far upstream as Vienna (Bacalbasa- Dobrovici 1997). Recently (Sept. 2013) a first pilot feasibility study to construct fish passage facilities at Iron Gate II HP dams is underway with financial support from the Dutch Partners for Water Programme and ICPDR Vienna.

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Danube Sturgeon Actions – an issue of implementation

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studies was not available. Sturgeon actions are urgently needed across the DRB and the adjacent Black Sea (BS). They can only be successful with governmental support and long-term commitment of all stakeholders involved.

The actual basis for sturgeon actions

The preceding review articles provide an updated scientific survey about the current populations and problems of sturgeons, globally and in the Danube River Basin (DRB). Without doubt, the status of sturgeon populations is still worsening (http://www.iucnredlist.org), particularly in the DRB. The corresponding political framework for sturgeon protection was created by the Sturgeon Action Plan SAP (Bern Convention; Bloesch et al. 2005), CITES and TRAFFIC regulations, the Bonn Convention, IUCN Red List (1996), sturgeon fishery bans of Romania (2006), Serbia (2009) and Bulgaria (2011), regulations of the UNESCO Biosphere Reserve in the Danube Delta, the EU Strategy for the Danube Region (EUSDR), and the newly founded Danube Sturgeon Task Force (DSTF; www.dstf.org, see Danube News 27) with the Program "Sturgeon 2020" (Sandu et al. 2013). However, most of these valuable contributions to achieve the common goal of Danube sturgeon rehabilitation and conservation *(Figure 1)* have not yet been fully implemented. Action means the timely implementations of ideas and concepts into reality and in situ; it requires considerable amounts of money and the willingness of responsible people. For example, restocking programs in the DRB were not coordinated and the money for extended field

What does 'sturgeon actions' mean?

Danube sturgeon actions can be reactive or proactive. The first approach is mainly related to interventions in large infrastructure projects of the key pressures navigation, hydropower and flood protection schemes to prevent or mitigate adverse effects on sturgeon populations and their habitats. Another significant pressure is overfishing and inherent poaching requiring adequate law enforcement and regulations for sturgeon protection (e.g. bans). The second approach implies initiating and conducting field studies to gain a sound basis for the implementation of sturgeon protection and restoration measures. In this context, it is important to note that we need basic and applied transdisciplinary research; e.g. on the life cycle of different sturgeon species (in-situ conservation, focused on habitats and migration routes), support for hatchery concepts and restocking programs (ex-situ conservation providing gene banks), and socio-economic problems of local communities including sturgeon poaching and caviar black market. Raising public awareness by actions of public relations will bridge the gap between theory and practice. Despite considerable gaps in knowledge, we know enough to act now and to proceed step-by-step towards truly sustainable Danube sturgeon management.

Figure 1. The aim of the Sturgeon Action Plan (SAP) is to complete the natural life cycle of sturgeons. Sturgeon protection and conservation require joint and simultaneous actions in the Upper, Middle and Lower Danube. Supportive restocking programs cannot be based on spontaneous actions; they need a basin wide strategy. From Bloesch (2009)

Action NOW!

For successful action, the environment must be ready, people must be keen to tackle the problems, and the financial resources must be available; in other words, the time must be ripe. When the SAP was adopted by the Bern Convention in 2005, this was not the case. Hence, very few measures could be implemented and too few to stop sturgeon decline. After nearly 10 years of hard work, recent documents within the EU framework of the EUSDR and the ICPDR have triggered real actions yet to come. Action also means activities balanced between top down and bottom up; i.e. good cooperation and teamwork between governments, local communities and NGOs. Thus, this is a call for action addressing Danube and Black Sea public, managers, politicians, teachers, and scientists: it's time to take action for the sturgeons NOW!

The Program "Sturgeon 2020" (Sandu et al. 2013) lists six key topics including the following key actions:

- (1+2) strengthen and expand existing international networks and cooperation by acquiring political support at local, national and international levels; harmonize national and international legislation on sturgeon protection and transboundary monitoring;
- (3+4) research into basin-wide sturgeon life cycles (in-situ conservation, in particular habitats and migration routes) and hatchery performance (ex-situ conservation; IUCN 1998; Chebanov et al. 2011);
- (5+6) socio-economic analysis and support of local people (particularly in the Lower Danube and the Danube Delta); education and raising public awareness.

Ongoing sturgeon activities

Presently, two projects are of highest priority: the elaboration of a feasibility study to restore sturgeon migration at the Iron Gate Dams, and monitoring/measures to mitigate the impact of technical constructions planned in the navigation projects "Danube I and II" in the Lower Danube. Both projects are interlinked and aimed to ensure long- distance sturgeon spawning migration. The Iron Gate study was included in the Joint Program of Measures of the DRB Management Plan of the ICPDR and will hopefully start soon (see article by Mair & Mandel). In contrast, the planned bottom sill on Bala Branch to divert 30 % of its discharge into the Old Danube Branch (the main navigation channel) will disrupt sturgeon migration. Modeled flow velocity (2.4-3.5 m/s) and sturgeon swimming capacity (<1.5 m/s) show that the drastically increased currents over the sill will be an impassable obstacle for sturgeons (Bloesch 2013) and other fish. Alternatives are badly needed and presently debated.

Apart from scientific studies (on sturgeon populations, habitats and migration) some socio-economic studies are being conducted. Recent inquiries amongst fishermen in the Lower Danube and Danube Delta surveyed by WWF revealed various social problems of local people who traditionally based their existence on the fishery. The 10 year ban in Romania, effective since 2006, had severe ramifications on local fishermen without any compensation. Action is required to provide a fair alternative and recognition by the respective authorities. Similar studies are ongoing in Bulgaria (EU-LIFE Project, WWF).

In recent years, many new sturgeon hatcheries have emerged in Europe and the DRB, particularly in Romania. Apparently, this private aquaculture became profitable since the caviar market cannot be supplied sufficiently with wild catches today. These enterprises could be quite beneficial if they can release pressure on wild sturgeon stocks by producing farmed meat and caviar. An informative non-representative inquiry yielded more than 20 private and state-owned sturgeon hatcheries in the DRB. However, they are not clearly separated between commercial hatcheries producing meat and caviar of native and exotic species for the market from those hatcheries providing gene pools and fingerlings of native species for sturgeon restocking. Thus, there is high risk of introducing intentionally or unintentionally hybrids and exotic species into river ecosystems. Various caviar producers lack transparency, and it is unknown how they farm sturgeon. Many retailers and vendors produce at least 8 sturgeon species that are traded across Europe. Future action is necessary to coordinate restoration programs

Figure 2. Young sturgeon offer a fascinating touch of their bony plates (scutes).Their fate is in our hands – let's go for Action NOW!

with some of them by introducing and harmonizing best practice principles in sturgeon aquaculture (Pikitch et al. 2005). Involving fishermen's associations like in Slovakia is recommended to make restocking common and effective.

Concluding remarks: Our Danube – Our Sturgeons

Since most sturgeon are long-distance migratory fishes, their rehabilitation and conservation clearly need a basin-wide approach that is in line with the DRB Management Plan of the ICPDR and EU Water Framework and Floods Directives. The implementation of significant actions is only at the beginning, and solidarity between Danube countries is crucial. As a natural heritage and flagship species in the DRB, the extinction of sturgeon must be prevented. They are Our sturgeons in Our Danube, and their life is in Our hands *(Figure 2).* The mission of the DSTF is to provide the appropriate platform for basin-wide coordination of sturgeon conservation, and together with WSCS (World Sturgeon Conservation Society; www.wscs.info) and CACFish (Central Asian and Caucasus Regional Fisheries and Aquaculture Commission; www.fao.org/fishery/rfb/cacfish/ en), we hope this will help making significant progress into the future.

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The IAD as seen from outside – Experiences from the EU Strategy for the Danube Region

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Preserving and developing the green backbone of the Danube Region

Nature and a rich biodiversity form the green backbone of the Danube Region, which provides highly attractive natural spaces and diverse habitats for animals and plants. The Danube Region is home for pelicans, wolves, bears and sturgeons, partly in some of their last remaining territories in the EU. It provides large areas of specific ecosystems, which in some cases have an outstanding significance for Europe, as the Danube Delta impressively exemplifies. Furthermore, the Danube Region also features patterns of wetlands, meadows and riparian forests in the landscapes along the Danube as well as mountainous and steppe areas in the wider catchment basin. These natural regions and their biodiversity provide the Danube Region with a precious natural heritage and a source of well-being and prosperity and at the same time call for joint activities for their protection and development.

The EU Strategy for the Danube Region – new opportunities for cooperation

The EU Strategy for the Danube Region (EUSDR) was launched in December 2010 and endorsed by the Member States in April 2011 with the aim to develop the Region[1] by the means of 11 Priority Areas and several actions as defined in the Action Plan for the benefit of their inhabitants, the environment and economy (EUROPEAN COMMISSION 2010, 2010a). This ambitious goal shall be achieved by joint efforts of Stakeholders, NGO´s, policy and administration, from local to EU level. Environmental topics are gathered in so called Pillar 2 "Protecting the Environment in the Danube Region", in which three Priority Areas are dedicated to ensure the quality of water (Priority Area 04), to manage environmental risks (PA 05) and to preserve biodiversity, landscapes and the quality of air and soil (PA 06). One of the main tasks of the Priority Area Coordinators (PACs) is to literally coordinate current activities in their respective fields of responsibility, to initiate and develop new activities and to explore and take care about funding opportunities. Furthermore, policy discussions and policy development based on the individual activities and projects shall be ensured by the PACs, as this actually specifies one major added values of the EUSDR concept.

Preserving biodiversity and nature protection imply broad and complex fields of activities. The Action Plan for PA6 foresees not less than 16 exemplary actions, which makes PA 06 to one of the broadest Priority Areas within the EUSDR.

* The Danube Region according to the EUSDR geographically primarily concerns 9 EU member states: DE, AT, HU, CZ, SK, SI, HR, BG, RO and 5 non-member states: RS, BA, ME, UA, MD

Furthermore, many interrelations are given: measures for sturgeon conservation and protection are linked to aspects of habitat networks, water quality as well as to interests and needs of navigability and hydropower. In practice, PA 06 sought for integrative projects and activities from the beginning on, combining different perspectives from science, practice and administration and the policy sector as well as from different sectors.

The IAD´s contributions to the EUSDR

The IAD as the longest existing international scientific network in the Danube Region is a natural born partner of PA 06 and also the other environmental-related Priority Areas of the EUSDR. With its broad expertise on ecological and biological topics the IAD provides the hard facts and moreover proposes solutions and opportunities in a larger context of a sustainable development for the Danube Region.

In the initial discussions between the PACs and various stakeholders from different countries about projects and strategies related to PA 06, e.g. on sturgeon protection and conservation measures, tackling the issue of invasive alien species in the river systems and connecting habitats as green corridors, the IAD continuously took an active role. Actually, it turned out that several stakeholders are directly involved as members in the IAD network, which eased the scoping phase in the beginning, as we as PACs could easily connect to the IAD activities in several countries.

EUSDR and PA 06 try to find a balance between concrete activities taking place in the region and with regards to the respective targets and actions of the PA on the one side and connecting these concrete activities with the policy level and decision makers on all administrative levels, including national and EU level on the other side. Due to the cross-cutting issues relevant for PA6, competing and in some cases conflicting interests might arise. This in turn implies that pure and therefore neutral scientific facts are needed before addressing the policy level on a reliable basis, e.g. in regard to interests of navigability of the river and the need to preserve and protect healthy ecosystems and habitats. The IAD and its Expert Groups can provide the hard facts on regular and dependable basis, which is an indispensable contribution for the single activities.

Due to its long history, the members of the IAD are well networked throughout the Danube Region and beyond. This also is very useful for the further work within PA 06 as in many cases “our” main IAD contacts know somebody from the larger IAD network with a specific expertise in a certain field or certain region, who can contribute to a significant improvement of existing knowledge or who might become a project partner, when appropriate. It is the EUSDR approach to bring together the existing knowledge which is fragmented all over in the Danube Region in order to achieve the targets and actions in an integrated perspective and thus to overcome the sectoral thinking and acting.

The Danube Sturgeon Task Force as the EUSDR in a nutshell

The newly established Danube Sturgeon Task Force (www.dstf.eu) is directly connected with one of the four main targets of PA 06; to “Secure viable populations of Danube sturgeon species and other indigenous fish species by 2020” and several IAD members are actively involved in the DSTF, which is furthermore currently coordinated by Dr. Cristina Sandu (Institute of Biology Bucharest, Romanian Academy) in close cooperation with Thomas Hein and Jürg Bloesch, to name just a few IAD members involved in the DSTF. Furthermore, several links and a longer history of cooperation are given to other highly PA 06-relevant organizations and Danube wide-players, such as the ICPDR and the WWF Danube-Carpathian Programme office.

It is actually this integrative mix of members of the DSTF, which makes a difference and could be seen as the EUSDR in a nutshell. The DSTF encloses representatives from Science, NGO´s and from regional and national authorities and this composition leads to the addition of different viewpoints, joined forces and thus to a clear added value. The IAD obviously represents the scientific perspectives. Concrete contributions of IAD to the DSTF include profound expertise and research for in-situ and ex-situ conservation measures, which include among others a comprehensive analysis of the sturgeon life cycle for all species and forms, sturgeon monitoring in regard to habitat requirements and migrations between different habitats as well as an evaluation of the performance of ex-situ facilities and the monitoring of stocking measures (DSTF 2013).

In conclusion, the EUSDR provides an excellent platform and opportunity to unite relevant stakeholders and authorities as well as the policy level to develop the Danube Region in a sustainable and holistic way. The IAD is an important partner to PA 06 for the provision of scientific hard facts as well as proposals for sustainable development and the involvement of the public. This is a solid basis for further activities and concrete implementations in the Danube Region. In this perspective I am looking particularly forward to continue the cooperation with the IAD.

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Hydrological catchment of the River Danube

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