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ANALYSIS

ANALYSIS OF PRESERVING BIODIVERSITY IN THE DANUBE RIVER (NEGOTIN'S SIDE), RARE AND PROTECTED SPECIES, MODELS AND METHODS OF LOCAL AND REGIONAL BIODIVERSITY PRESERVATION

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SUSTAINABLE ECO-FRIENDLY REGION

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ABBREVIATIONS

CITES	Convention on International Trade in Endangered Species of Wild Fauna and
CMC	Convention on the Conservation of Migratory Species of Wild Animals
CU	Conservational unit
DHA	Docosahexaenoic acid
DRB	Danube River Basin
DRBMP	The Danube River Basin Management Plans
DRPC	Danube River Protection Convention
EN	Endangered
EPA	Eicosapentaenoic acid
EU	European Union
EUSDR	EU Strategy for the Danube Region
HPP	Hydropower plants
IAD	International Association for Danube Research
ICPDR	International Commission for the protection of the Danube River
IUCN	International Union for Conservation of Nature
LC	Least Concern
NGO	Non-government organization
V	Vulnerable
WFD	Water Framework Directive
WFF	World Wide Fund for Nature

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I. OVERVIEW

The catchment area of the Danube has numerous animal species and in itself consists of a large ecological system. Along the Danube, the habitat is home to around a hundred different species of fish as well as plants, animal species, mammals, breeding birds, a dozen reptiles and amphibians.

The Danube is an extremely important sign for the animal population and in view of the current situation, which consists of man-made changes such as width, water depth and current speed, followed by the construction of dams, weirs and canals, are essential prerequisites for endangering and destroying the diversity of the Species habitats, and it is an obstacle to normal life cycle and lifespan. Over the years, habitat degradation has increased, leading to endangerment, destruction and extinction of fish species with an emphasis on sturgeon. Sturgeon can be described as the natural heritage of the Danube Region (DRB) and has decreased significantly over the past decade, becoming a massive basin-wide issue that has caught the attention of Danube countries and the European Commission.

The prepositions that lead to this situation are man-made, which means that the power and actions of people go against the natural legal route. Such measures are superstructures, illegal fishing, trade and poaching. Other causes include overexploitation, climate change and pollution, which is why preventive measures have been considered and applied in the past decade or more.

In recent years, people have realized the importance of habitat conservation, population growth, protection and support of kinds. The measures, procedures, strategies and projects that are being implemented or are in the process of being carried out underline the central importance of the sturgeon population and focus on the projects of preserving habitats, increasing populations, protecting and supporting species. In addition, it shows the importance of press preserving the environment and improving the habitats of species.

Sturgeon 2020 is a program for the protection and rehabilitation of Danube sturgeons. The aforementioned program was developed with the objective of ensuring viable populations of sturgeons and other indigenous fish species by 2020, it is a framework for action and is based on the Sturgeon Action Plan.

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The program combines environmental aspects with social and The objective of the program is not only to bring benefits to the sturgeon population but also to contribute to the improvement of the economic situation of the interested parties. The attached measures are protection, restoration of migratory routes, support programs for restocking, economic alternatives to sturgeon fishing, fight against illegal fishing and the black market for caviar, ecological education, harmonization of legislation and law enforcement.

The EU Strategy for the Danube Region (EUSDR) seeks to create synergies and coordination between existing policies and initiatives taking place throughout the Danube Region. Priority area 6 "Preserve biodiversity, landscapes and air and soil quality" all species and habitats in the Danube region, involved in the process of restoring at least 15% of degraded ecosystems, so that the increase in habitats will comply with the restoration of the status of the species living in the Danube region. International Commission for the Danube River Sturgeon Protection Strategy (ICPDR) is working to ensure the sustainable and equitable use of the water and freshwater resources in the Danube river basin ICPDR has become a platform for cooperation in water management in the Danube river basin. and administrative level of the national "line ministries for water management and protection" together with leading stakeholders and NGOs, thus actively shaping water cooperation across the Danube.

Considered and executed different approaches for the restoration of their habitats and the implementation of the increasing conditions for a normal life, the ecological and natural terms of continuing the life of endangered species, which means that people are oriented towards the environment and seek ways to support, increase and prevent further damage to nature, flora and fauna.

1.1. OBJECTIVE

The objective of this analysis is to introduction of flora and fauna in the Danube river; introduction of rare river species and natural life cycle; trends in the development and disappearance of certain animal and plant species in the border region; models and methods for the conservation of rare river species.

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The main objective of the study is to present, investigate and analyze the flora and fauna of the Danube River, including rare species of rivers with a dominant population focus sturgeon, which are currently on the brink of extinction, and their conservation status.

This study provides information on the flora and fauna of the Danube River, which consists of information on the natural cycles of the rare species of the river and the prominence of sturgeon species. The examined study area is the Danube in the border region Negotin-Montana with a focus on the negations side. In addition, models for the prevention of rare species of flora and fauna as well as of sturgeon species are presented in the study, which are descriptively specific, strategies and methods that work towards the main idea of the conservation and protection of the endangered member of the species. Ultimately, the study aims at this to investigate the possibility of establishing natural spawning for the sturgeon fish, which is generally dependent on reproductive biology. Environmental conditions and available facilities.

Finally, the study will carry out research and analysis showing the specification of the protection of biodiversity on the Danube-Negotin side, the rare river species in the Danube in the Negotin-Montana border region, and the models and methods for conservation and the possibility of setting up a natural spawning of the sturgeon specimen.

1.2. SCOPE

The study includes the determination of the conservation of the biological diversity in the Danube, the various flora and fauna, the rare river species in the area in the border region Negotin-Montana.

The analysis will present the current state of biodiversity of plants and rare species in the region, including their specification and basic information about their habitats, geography, physical and ecological features, current conservation status and value through various studies, as well as flora and fauna -Analysis. In addition, the study has the priority to present numerous models that prevent the extinction of plants and sturgeon species and contribute to the creation and stabilization of biological diversity in the habitat. It is of great importance to prevent a further reduction of the lost habitat and the prevention of fish species.

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1.3. METHODS

The conducted study used methods to assist in the collection of the necessary information: study of documents, research, analysis and information that are directly related to the subject; archival investigation and secondary data collection; content analysis.

The approaches used contributed to the creation and successful implementation of the analysis.

The aforementioned methods are widely used and have the proven ability to investigate and analyze the diversity of sources of information.

II. INTRODUCTION OF FLORA AND FAUNA ON DANUBE RIVER

The Danube River plays a vital role as a biodiverse habitat for the specimens that inhabit and is home to around 2,000 species of plants and 5,000 animals, including numerous endangered or near-extinct species, most of which are aquatic or dependent. of the water diversity of habitats and ecosystems. Some parts remain practically intact with species and habitats of wonderful ecological value, including a unique heritage.

In general, the level of biodiversity is higher than the lower course of the river, which is a result of the social influence. The basin is composed of around a hundred species of fish, of the variety of fish specimens, some of them are currently considered rare, in danger or on the brink of extinction. an EU-wide registry and are called FFH species.

The Danube flows over nearly 3 000 km from the Black Forest to its delta in the Black Sea, passing through Europe from west to east. It is an international river, flowing through nine countries – Germany, Austria, Slovakia, Hungary, Croatia, Serbia and Montenegro, Bulgaria, Romania, and Ukraine. Thus, the river connects the West, Central, and East European countries. The Danube Basin can be divided into three regions.

The Upper Danube extends from the Black Forest to the Devin Gate below Vienna, the Middle Danube from the Devin Gate to the Iron Gate where it passes in the Southern Carpathians and the Balkan Mountains and finally the Lower Danube through the Romanian and Bulgarian low- lands.

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The Danube Delta at the Black Sea is the second largest in Europe with an area of 5 640 km2. The Upper Danube is characterized by a steep gradient of 0.2-1.1‰, the Middle and Lower Danube by a low gradient, except for the cataracts of Iron Gate (Laszloffy 1967; Liepolt 1967). The Danube river is the second largest river in Europe and it is the twenty-first in Europe with a discharge of 6 500 m2 s1 at its mouth.

The multi-purpose use of the river is of vital importance for the more than 82 million people inhabiting it's 800 000 km2basin. The use of the catchment and the river itself had had powerful collisions on the environmental conditions of the river-floodplain system (Khaiter et.al. 2000; Bloesch 1999, 2001).

One important side of the endangerment is that the impact that is influencing the environmental habitat is leading to the disconnection of the aquatic environment from the spawning ground, which is resulting in a decrease of specimen population. Some fish representatives are put against the peril of illegal fishing and trade of goods.

2.1.FLORA ON DANUBE RIVER

The Danube offers a wide range of habitats that offer a unique combination and diversity of ecosystems. Around 2,000 plants live in the Danube and its tributaries.

The wetland of the Danube in Serbia is one of the last great European floodplains that still exists due to the Danube and its many meanders, oxbows, backwaters and nearby ponds, this area exists as a special nature reserve due to the specific flora and vegetation, including other wild animals "Upper Danube" and has been protecting the country's law since 2001.

The main reason for protection lies in the fact that it is a much larger area of forests, meadows, ponds and swamps, with expanded groups that typically apply to swamps and floodplain ecosystems. To a lesser extent, this area has a fascinating diversity of wildlife that contains more than 1000 species of flora.

There are still well developed wetland forests that form wood such as: Oak (Quercusrobur), White Poplar (Populusalba), Black Poplar (Populusnigra), White Willow (Salixalba), Polish Ash (Fraxinus angustifolia) and White Elm (Ulmuslaevis), as well as different types of shrubs: Dogwood (Cornus sanguinea) and Black Hawthorn (Crataegusnigra).

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For wetlands and wet meadows and along the edge of ponds too, there are among other herbaceous plants, several types of orchids (Genus Orchis), Greater Spearwort (Ranunculus lingua), Iris (Irisspuria), Yellow Iris (Irispseudacorus), Reed (Phragmites communis) and Cattail (Typha genus). The water surface of ponds and backwaters are adorned with many large white and yellow flowers and almost round green leaves of white (Nymphaea alba) and yellow (Nuphar luteum) lilies.

At the moment, polydominant forests are well-developed due to the climatic conditions in the region that are beneficial for the flowering of the flora. Due to the fact that they produce a large number of tree species and the number and distribution of shrubs, creepers and herbaceous plants, the forests are similar to those typical of tropical and subtropical regions.

Iron Gate Polydominant forests consist mainly of wood that are Tertiary relicts: Walnut (Juglans regia), Turkish Hazel (Corylus colurna), Common Hazel (Corylus avellana), Nettle Tree (Celtis australis), Black Ash (Fraxinus ornus) and shrubs: Lilac (Syringa vulgaris) and Smoke Tree (Cotinus coggigrya). Brought by the unconscious and inadvertent human assistance species such as Maple Ash (Acer negundo) low tree and False Indigo Bush (Amorphafruticosa); herbaceous plants, Evening Primrose (Oenotherabiennis) and Goldenrod (Solidago serotina).

2.1.1. WHITE WILLOW (SALIX ALBA)

The white willow grows up to 25-30 meters tall with broad crown, brown-grey furrowed bark and branches with ends bent down. The leaves are alternately arranged with short handles, lanceolate or broad lanceolate, pointed in the base and on a tip and finely serrated on the edge.

The leaves are 4-10 cm long and about 1.5 cm wide, dark green on the face and bright, while on the reverse side they are covered with thick soft whitish hairs. Flowers are monoeciuos (male or female), grouped in separate inflorescences, erect catkins that develop on separate individuals (dioecious species). Grown in valleys of the rivers, floodplain areas, marshes and swamps, White Willow form pure groups or grow with other woody species in wetlands.

White Willow bark contains less than 1% salicin and it is not used in its raw form, but it is a part of tea mixtures and other products used to reduce fever, headache and rheumatic pain.

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2.1.2. MAKLEN TYRDSK (ACER INTERMEDIUM)

The Maklen Tyrdsk is a deciduous tree up to 12 meters that can reach the age of one hundred years. The leaves are palmate veined and pentamerous, with three broad veins clearly visible, each leading to a lobe, serrated shallowly on the edge.

The leaves are long and 3-9 cm wide and slightly leathery. The flowers are grouped in pendulous inflorescences. The fruit consists of two seeds, each with a wing used to carry the seed on the wind.

2.1.3. NETTLE, HACKBERRY (CELTIS AUSTRALIS)

Nettle, hackberry is a deciduous tree growing up to 20 m tall with a high crown. The trunk is smooth and grey even in old age. Leaves are elongated and ovoid, pointed at the top and serrated on the edges. They are 4-15 (20) cm long and 6 cm wide.

Flowers are monoecious (male) and dioecious, grouped in a cluster, although the dioecious appear individually in the axils of leaves. Dioecious flowers bloom at the top of the pole, while monoecious at the lower pole. The fruit is a small rounded stone fruit up to 1 cm wide, and is reddish and edible with a sweetish taste.

The Hackberry tree is heavy, hard, and very tough. It is resilient and very durable, used in cart construction and carving, as well as the making of musical instruments, agricultural tools and sports equipment. It is successfully grown as an ornamental tree in parks and alleys.

2.1.4. WALNUT (JUGLANS REGIA)

This is a deciduous tree up to 25 m tall, with a rich crown. Its leaves are very large, up to 30 cm long, having odd-pinnate with (3) 5–9 (11) leaflets, and a characteristic odor of iodine.

The flowers are monoecious (male) grouped in drooping catkins 5-10 (15) cm long, while female flowers are grouped in clusters of two to five. The fruit is a nut 3-6 cm long, hard and wrinkled, completely wrapped in ripening fleshy green protective husk.

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2.1.5. YEW (TAXUS BACCATA)

The Yew is an evergreen tree that can grow up to 20 m in height. Even though it is relatively slow growing, the yew can be very long-lived (about 2000 years). The leaves are needles, hard and leathery, dark green and about 3 cm long and 3mm wide.

The plant is dioecious, which means that male embryos and semen strobilusi form on different individuals. On so-called female plants, after the pollination, a seed is developed, partly surrounded by a soft, bright red berry-like structure called an aril.

In addition to protecting the seed to maturation, aril has an important role in its dissemination. Juicy and sweet aril is the only part of the plant that is not poisonous, and the birds often feed on it. Seeds and other parts of the yew contain a poisonous alkaloid thaksin. Although the birds take the seeds, it just passes undigested through the intestinal tract and ends undamaged in their droppings. Because it is a very slow-growing tree, the yew is not used for afforestation, but is often grown as an ornamental park tree.

2.1.6. LILAC (SYRINGA VULGARIS)

This is a deciduous shrub or a low tree growing to 7 m high. The leaves are arranged in opposite pairs, simple, oval to cordate, pointed at the top, with an entire margin, 5-12 cm long, 4-8 cm wide. Its flowers are dioecious, small, lilac, with a very nice smell, grouped by 100-400 in large (10-20 cm long) pyramidal panicles.

The fruit is a small brown shiny capsule. Because of its decorative and aromatic flowers, it is widely cultivated as an ornamental plant – almost 350 varieties that differ in color (white, purple), shades (from light to dark purple), flowers, body ("doubled") and intensity of smell.

Essential oils from the flowers are used in the cosmetic industry, while a tree, that is hard, solid and lilac-brownish color, is used in turnery.

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2.1.7. TURKISH HAZEL (CORYLUS COLURNA)

The Turkish hazel is a deciduous tree 25 to 35 m tall with large broad rounded crown. Its leaves are broadly ovoid or nearly round, coarsely double serrated on the edges. The leaves have a heart-shaped babe and are 6-15 cm long and 5-13 cm wide.

Flowers are monoecious, the male grouped in single-sex catkins, while the female make a very small inflorescence and are largely concealed in the buds with a tuft of red columns of the pistil. The fruit, known as the hazelnut, is edible and very tasty, although smaller than that of ordinary hazel. It is egg-shaped, widest in the middle or lower part, light brownish/yellowish, 17-20 mm long, surrounded by a thick, softly spiny and bristly involucres (husk).

The Turkish hazel tree is tough and strong, with a very beautiful pink nuance. It is therefore used for making furniture, veneer lathes and a variety of products. It is planted in certain areas as a wind protection, but also as an ornamental tree in alleys, parks and gardens.

2.2. FAUNA ON DANUBE RIVER AND RARE RIVER SPECIES

Danube river and its tributaries is a home to around 5 000 animal species, including numerous endangered or nearly extinct species most of which are aquatic or are depending on water. Many mammals live along the shores of the Danube River and in the higher areas of the Danube Delta that cannot be reached by waters. Along the territory animals like otters, minks, muskrats, foxes, black bears, wolves, polecats, hares, tortoises, adders and colonies of snakes, can be found.

The extremely diverse ornithological fauna of the Danube Basin and particularly its delta, counts over 250 species of birds such as herons, eastern flossy ibises, small cormorants, golden eagles, black-winged eagles, avocets, shelldrakes, pelicans, reed nightingales, buntings, sea swallows, seagulls, fishing eagles, sea eagles, singing swans, plovers, polar grebes, half snipes, cranes, golden eagles, saker falcons, egrets, mute swans, large cormorants or Mandarin ducks.

In the Danube river and in the lakes, streams and channels in the delta can be found 110 species of fish such as Sterlets, large beaks, great sturgeons, common sturgeons, sevrugas, mackerels, carps, sheat fish, perches, pikes, barbles, rapacious carps, aspruses, crucians, perches, breams, pikes and carps.

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The marine area in front of the delta shelters the Danube mackerel as well as five different species of sturgeons, which yield fine black roe, commonly known as caviar.

The Danube River Basin is home to more than 100 different species of fish including five sturgeon species, and it is home to not only rare birds like the white pelican, white-tailed eagle or black stork but also to river species such as Nase (Chondrostoma nasus), the Danube salmon (Hucho Hucho), the Schraetzer (Gymnocephalus schraetser) and the European eel (Anguilla anguilla). The above-mentioned specimens are considered rare because there is a reduction of their population and some of them are considered critically endangered based on the fact that they are experiencing challenges having a normal life cycle.

The species are facing obstacles that are resulting not only because of the changes of nature but also because of manmade prepositions that are disturbing their existence. Thus, meaning that the natural life span of the species is interrupted by various reason and they cannot conduct a normal life cycle.

2.2.1. STURGEON GENETICS

The karyotypes of the Acipenseriformes are uncommon for vertebrates. The basic chromosomic complement consists of 10 pairs of large sized metacentric chromosomes, 22-25 pairs of small meta-, submeta- and acrocentric chromosomes and 60 macrochromosomes. This makes the determination of an exact chromosomal amount in octoploid species almost impossible. The karyotype may thus be better characterized by chromosome banding, in situ hybridization with DNA probes and analyses of synaptonemal complexes.

Three groups of chromosome configuration can clearly be distinguished:

(A) a number of chromosomes close to 2n=120 (60 macro and 60 macrochromosomes and 3.2-3.8 pg DNA);

(B) an octoploid with approximately 4n=240 and twice as much DNA;

(C) measurements of DNA (14 pg) suggest a 16-n ploidy and 500 chromosomes.

Data on nuclear DNA and enzymatic polymorphism suggest that the present Acipenseriformes originated from a tetraploid ancestor which had a 120 macro- and micro-chromosomes and DNA content of 3.2-3.8 pg nucleus-1.

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This was interpreted as the result of the diploidization occurring twice from a common extinct ancestor which had 60 chromosomes. However, the possibility of grouping silver stained NOR chromosomes into pairs and quadruplets in, respectively, 120 and 240 chromosomes karyotypes would support a diploid-triploidy condition in Acipenseriformes.

The small level of heterozygosity, the existence of polyploid states and the presence of a very high microchromosome proportion in association with chromosomes of large size are characteristics usually found in ancient groups such as lampreys and suggests that the Acipenseriformes are genetically "living fossils". (IAD)

2.2.2. COMMON NASE (CHONDROSTROMA NASUS)

The Common Nase is also known as Sneep and is situated in the mountain waters, hilly areas, and on the Danube River. These species of fish can be found on the bottom, surrounded by cold water and strong water flow. Many representatives are spawning in the tributaries of the Danube River, but unfortunately, it is quite difficult to reach the spawning areas upstream, due to the construction of dams.

The Common Nase lives in the deep-sea bottoms found in the upper regions. It is quite difficult to find food, resulting in countless turns of rocks and small stones. Their diet consists mainly of algae growth. 40 to 4 Common Nase fish are circulating in groups and it is easy to monitor them due to their appearance because when the sun is shining a silver reflection appears through the water. Its body length can reach up to 60 cm. weighing up to 1.5 kg.

The common nose has a slender body with a high back that has lips recognizable because they are round, thick, and firm. Their position is below and is typical of bottom fish. The common nose has a snout that is very interesting and gives the illusion of a nose-like appearance. The back of the fish species is dark green, the dorsal fin is gray, and the other fins are orange.

The average life expectancy of the nose is between 10 and 15 years. They reach sexual maturity around the ages of 3 and 4 years old while their body length is 15-17 cm.

The common nose spawns during the spring season when the water is above 5 degrees Celsius. Each female lays around 50,000 to 100,000 eggs, which are immediately fertilized. Incubation The life span of the common nose is faced with the problem of dam construction.

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They have difficulty reaching their spawning site as the route they take has obstacles along the way. So, which means you are making spawning difficult, but not impossible. People created barriers that put the common Nase in a difficult situation. The IUCN Red List of Threatened Species considered them of Least Concern (LC).

2.2.3. THE DANUBE SALMON (HUCHO HUCHO)

Danube salmon is also known as Huchen, and it is the largest representative of the Salmonidae family in Europe. Fish species span more than twelve countries, including Germany, Austria, Slovakia, Poland, the Czech Republic, Romania, Slovenia, Western Ukraine, Bosnia-Herzegovina, Montenegro, Croatia and Serbia.

The distribution of Danube salmon is reduced to Danube drainage and has experienced a massive population decline that started more than 100 years ago. The occurrence happened due to activities such as overfishing, pollution, and construction leading to limitation of the movement of specimens, which is of key importance when it comes time for Danube salmon to reach spawning grounds. Danube salmon can live up to 20 years, begins to eat fish at an early stage.

The species feeds on fish, amphibians, reptiles, waterfowl and small mammals. Throughout the years Danube salmon had reached 60 kg, but at this time specimen over 30 kg are considered quite rare. Danube salmon have a slender, cigar-shaped body, and their wide mouth contains a dense arrangement of teeth. Male Danube salmon begin to mature sexually at four years, and female representatives become sexually mature at five years.

Huchens are iterative spawners, which means that they will repeatedly attempt to spawn and continue during their mature stages. During spring, the female Danube salmon lay eggs on the basal grains of mountain rivers. Besides, the small salmon develop extremely quickly once they have hatched. Within a year they are nearly 13 cm long and by the end of their second year, they almost double in size. Today the Danube salmon population is closely related to the stock of farmed fish. Self-supporting specimens are rarely found, although spawning grounds are found in the Balkans region and people may have difficulty seeing or identifying them.

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There are often populations in which some populations are dependent on artificial reproduction and stocking programs.

For the Danube salmon, the main threat (HPP) is hydropower plants, which greatly alter the natural flow regime of rivers. This situation leads to the destruction of habitats weirs and dams ionically disrupt the migration routes of the Danube salmon and its prey. When considering all the obstacles the fish samples face, they have been classified as Endangered by the IUCN Red List of Threatened Species.

2.2.4. THE SCHRAETZER (GYMNOCEPHALUS SCHRAETSER)

The Schraetzer is also known as a striped riffe that can be found in large permanent rivers such as the Danube drainage. According to the Republic of Bulgaria Red Data Book, only one specimen was found in the Danube river along the entire stretch from the village of Vrav and the village of Vetren in the period 2005-2006. Schraetzer life expectancy is 10-15 years' maximum. During the spring season, the Schraetzers are spawning.

The female Schraetzer can lay around 8,000 eggs which are laid in the broad The Schraetzer feeds on small animal organisms such as dragonfly larvae at night, but can also feed during the day.

The Schraetzer is experiencing a negative impact from the river regulation, consisting of dams and dams, leading to loss of habitat. In addition, the problem of water pollution also has a destructive collision in Schrae tzer, which is creating prepositions and obstacles to the development of its normal and full life cycle.

Considering the conservation measures that were carried out, the Schraetzer was included in Annexes II and IV of the Biological Diversity Law (2002). Additionally, the IUCN Red List of Threatened Species considers the Schraetzer as a specimen of Least Concern (LC).

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2.2.5. EUROPEAN EEL (ANGUILLA ANGUILLA)

The European eel is found in the parts of the Atlantic Ocean closest to the north, in freshwater in Europe, North Africa, England, the island, and the Baltic Sea. It also occurs along the coastal areas of the Atlantic Ocean off the Black Sea, Mediterranean, and Azov Seas.

In recent years the European eel has been found in the Danube and other river basins and coastal lakes. The European eel disappeared due to the result of, in many of its habitable places, the immense drainage of the wetlands. Over time, the specimen reappeared, but only one per record. The European eel population has declined to less than one percent and is therefore classified as critically endangered (CR) by the IUCN's Red List of Threatened Species.

The European eel is a catadromous fish, which means that it is born and spawned at sea, but migrates into inland waters to guide its feeding and growth stages, which are different and can be recognized by the changes in the appearance as they move are in the larval stage, the eel baby can drift around the sea between seven months and three years. The next stage for the eel is, as it gets bigger, its body becomes translucent, which means it is see-through.

For this reason, this stage is called "glass eel". When the fish species get into the freshwater system, they have another transformation which is their body becoming pigmented again. During this time the eel is known as "Elvers". The body structure of the eel is extremely impressive as it has a thin head and a wider body that becomes thinner and longer as it ages.

The European eel spends most of its adulthood in freshwater rivers, streams, etc., from which their bellies turn yellow. This stage of the eel is known as the "yellow eel". The final transformation can be seen when the eel changes its color back to a metallic sheen and large eyes are their final transformation and after that, they are sexually mature to spawn and lay eggs in the sea. The average lifespan of the specimen is up to 80 years and can be up to 130 cm long. The European eel population has declined dramatically and they are critically endangered. For this unfortunate event, experts cannot point to just one reason, it is more likely that it is an aggregation of a variety of factors. Although there is no specification of the reasons, it is believed by the majority of respondents believe that the obstacles to migration routes such as dams and water turbines are serious business that leads to sample reduction.

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Also, climate change, pollution, disease, and parasites have severely affected the situation. Last but not least, the loss of habitat and the exploitation of the European eel for food.

In conclusion, people have recognized the importance of conserving the specimen and it is for this reason that the IUCN has recommended the surveillance and conservation efforts so that the recovery of the European eel can be successful.

2.3. RARE RIVER SPECIES WITH EMPHASIS ON STURGEONS

The most important spawning ground for three of the world's sturgeon specimens is in the Lower Danube basin. “Most sturgeon species are anadromous, which means that they hatch and spawn in fresh water, but migrate to the sea to feed, usually for 10 years or more. before they migrate back to the rivers to spawn for the first time. Anadromous species, all of which are included here in the freshwater fish group, are known from several families of fish, including lampreys. Sturgeons are one of the oldest families of fish. In existence, over 200 million years old, they form one of the most primitive lineages of bony fish. Sturgeons are considered the natural heritage of the Danube river basin. His qualities and abilities are highly valued around the world. their environmental environment due to their slow growth and maturity that leads them to be living indicators of healthy rivers. Unfortunately, these ancient fish species are on the brink of extinction and their habitat is threatened by a variety of problems such as overbuilding, illegal fishing, trade, and poaching. Additional causes are overexploitation, climate change and pollution. Furthermore, sturgeons are included as the most threatened group of animals on the IUCN Red List of Threatened Species with more than eighty-five percent of their family representatives.

There are six sturgeon species that are native to the Danube basin and are considered the most important worldwide due to their viable wild population. Currently five of them are currently at risk. The most popular and recognized species of sturgeon is the beluga, known as the European sturgeon (Huso Huso1). The other species come from the Acipenser family, the Russian sturgeon (A.gueldenstaedtii), the sterlet (A.ruthenus), the star sturgeon (A.stellatus) and the Atlantic sturgeon (A.sturio) - the latter is considered to be extinct in the Danube basin. Even if sturgeons are very old and ancient species of fish, their appearance has hardly changed.

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Sturgeons are Osteichthyes fish, which means they are very bony fish. Its bone structure is made of cartilage, which is the same skeleton as a shark. Sturgeons have a long nose with a toothless mouth underneath. Under the nose, sturgeons have 4 whiskers that serve as bait for crustacean funding. It has bony plates that cover the head and five longitudinal rows of similar plates along the body, which are used to protect against predators, who are trying to attack and harm them.

Compared to other families of fish, representative fish sturgeons do not have scales, instead, they have soft, thick layers of skin. The body structure of the lugs has a kidney similar to sea bream and flounder, which is a great advantage, because all the waste is excreted outside the body, resulting in a meat that does not smell and has a slight taste. Sturgeon meat is very healthy for the human body because it contains some of the long-chain omega-3 fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

Sturgeons contain vitamins A, B 12, E, calcium, selenium, and iron that have a positive influence and impact on strong bones, teeth, and a healthy immune system. Eating fish can maintain healthy heart function. Eating fish has also been associated with a reduced risk of sudden cardiac death. in healthy people. There is some evidence that regular consumption of fish during pregnancy or by women who might become pregnant may play a role in the normal development of the fetus's brain and eye.

Sturgeon meat is suitable for children due to its healthy diet, easy consumption and lack of smell. Although there is a positive aspect of sturgeon, they are faced with extremely growing difficulties and hardships hindering the performance of their normal lifespan and life cycle. With the stable increase in the harmful activities of humans and another risk, the sturgeon population decreases, which decrease leads to extreme extinction and endangerment of a species older than mankind.

Sturgeons not only have difficulty living a normal life span, but are critically endangered due to the various man-made obstacles and also some climate changes. One of the main reasons for the population decline of the sturgeon is the loss of habitat, which is a major ecological problem that not only increases the loss of their natural environment but also increases the hazards to which they are exposed.

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The changes in the Danube basin and in the river, profile can significantly disrupt the aquatic environment by separating the animals from their spawning areas. This leads to a decrease in aquatic habitats, which leads to prepositions of extreme difficulty in carrying out a full life span. The changes that can be marked are differences in the width, depth of the water and the speed of the current. In addition, the natural environment is disrupted by the construction of dams, levees, weirs and canals that are so obsessed that complications for natural water flow arise.

In addition, the negative human impact that can be observed on river species consists of overexploitation, illegal fishing, trade and poaching, taking into account that sturgeons are exceptionally valued specimens due to the large production of fish eggs per representative specimen. and meat quality. As a result, sturgeons can be over-exploited. Sturgeons are also a target group for illegal fishing and poaching. Sturgeons have a high monetary value and people are easily tempted to profit from them even if it means using illegal methods for it.

Additional causes are climate change and pollution, which can be improved with actions that are focused on the preservation of the natural environment and the acceptance and execution of measures that prevent man-made pollution, in this way, over time the environmental condition will improve and the enforcement of habitat loss will decline over time.

In 1994 the Danube River Protection Convention (DRPC) was signed in Sofia, Bulgaria and entered into force in 1998. All parties that have signed The Danube River Protection Convention agreed to cooperate on fundamental water management issues by taking "all appropriate legal, administrative and technical measures to at least maintain and, where possible, improve the current water quality and environmental conditions of the Danube River and of the waters of its catchment area, and to prevent and reduce as far as possible the impacts and adverse changes that occur or may occur. "

Although the spurious samples have gone through these major challenges, over the past decade various organizations, programs, and strategies have highlighted the importance of environmental improvement for sturgeon species in order to prevent habitat loss and the reduction of sturgeon populations, both illegal fishing and illegal fishing Limit trading in sturgeon.

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The expected positive effects are to exclude the sturgeon from the critically endangered environment and create a safe, clean and natural environment for the full life cycle of the representative of the species to complete.

2.3.1. BELUGA STURGEON

The beluga sturgeon is the most famous member of the sturgeon family, as it produces one of the most sought-after and valuable caviar in the world. The beluga lives up to 100 years and due to its fact, it is one of the largest predatory fish species that actively eats other fish and only faces a few natural predators during its lifespan. Beluga sturgeon reach maturity later than other fish species - the male at 12 to 14 years of age and the female at 16 to 18 years of age.

The generation interval is four to five years. Beluga used to reach a length of up to 8 meters and a weight of 3.2 tons. In the Danube, the largest detected fish was a beluga sturgeon, about 1 ton and 8 meters long (Antipa 1909, Bănărescu 1964, Otel 2007), but usually, the body size of the caught individuals exceeds 3 m and 300 kg (sturgeon and catfish). The reduced individual size of the fish in the catch is evident as a result of overfishing, which has become more aggressive over the past century. The large beluga sturgeon is known o carry several hundred pounds of caviar, the value of which can be extremely high. As you prepare to spawn upriver, the beluga sturgeon is at risk of being illegally caught by nets or harpoons, resulting in rapid decline and endangerment of the beluga species.

The Beluga sturgeon has been overexploited and more than 90% of the population has declined. Right now, the Beluga sturgeon is considered a critically endangered species on the IUCN Red List of

2.3.2. RUSSIAN STURGEON

The Russian sturgeon is also known as the diamond sturgeon or Danube sturgeon. The Russian sturgeon was formerly the most widely distributed sturgeon species in the Danube river. It is about the same size as the common sturgeon and is found particularly in the rivers filling the Black and Caspian seas, where the species migrate for spawning.

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In the past, the Russian sturgeon could have been found frequently in the Danube river that is along the Bulgarian territory. Under natural conditions, the Russian sturgeon reaches maturity- for males at 8- 13 years, and 10-16 for females. Some of the reported issues for the rapid decrease of this fish's population for the past few years are overfishing, pollution, and destruction of spawning habitats.

This population decline and the resulting increase in world caviar prices have brought about the need for sturgeon aquaculture and protection. In recent years, more than a few attempts were made to initiate Russian sturgeon culture in ponds; however, farmed caviar from this species is not yet available in significant amounts. Currently, the Russian Sturgeon is considered a vulnerable species on the IUCN Red List of threatened species.

2.3.3. STERLET STURGEON

The Sterlet is the smallest from the sturgeon species in the Danube River Basin, which exclusively inhabits freshwater habitats. While the other sturgeon species are present only on single continents, sterlet is the only sturgeon species that inhabits two continents, both Europe and Asia (Bemis & Kynard 1997).

The Sterlet is also known as the Albino sturgeon, it is considered to be the slowest growing representative of the sturgeon, and it is believed to be ideal for a smaller basin, because it only reaches 1.2m length and that is after an extremely long period of time. Sometimes they can maximum reach 60 cm, which is the reason why they are recommended for garden ponds and their weight can reach 16 kg. The Starlet sturgeon can be easily mistaken with the Siberian sturgeon, even though at first glance they can be quite undistinguished, especially the similarity that they have with their shape.

The most noticeable difference between the two species is expressed with the white edges to the petoral- fronts fins, and with the paler scutes, also there is a scutical line that is quite visible along the whole length of the body of the Sterlet sturgeon. The Sterlet sturgeon have scutes and scutical lines, consisting the same body colour as the surrounding skin. The Sterlet's snout is long and pointed with fimbriated barbells and lower lip that is split.

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The colour of their body varies from dark brown to grey, sometimes it can be seen with a dark green tint on the back, and with white fin edges and belly, which is quite different from the appearance of the Siberian Sturgeon.

Considering the fact that the sturgeon population has experienced a serious decrease in numbers, leading to receiving more attention and becoming popular in the field of aquaculture cultivation. The main problems that need to be overcomed are overfishing, habitat destruction and pollution (Pikitch et al. 2005).

In some countries at the aquaculture facilities unintentional introductions is made between exotic species and their hybridization with natural species and populations (Ludwig et al. 2009). Danube sterlet is known to hybridize with other sturgeon species, such as the Siberian sturgeon (Acipenser baerii), which can lead to a rapid erosion of their autochthonous genetic diversity through the introduction of exotic genotypes (Ludwig et al. 2009).

At the moment the Sterlet sturgeon is considered as a vulnerable species on the IUCN Red List of threatened species. The Serbian Ministry of Environmental Protection this year implemented a ban on fishing one of the critically endangered Danube sturgeon species, the sterlet (Acipenser ruthenus). Alongside existing permanent and temporary restrictions on catching and selling wild sturgeon in Ukraine, Bulgaria and Romania, this means that all sturgeon species are now under protection in the whole Lower Danube region. Even though sturgeon population in the Middle Danube has become dependent on stocking measures, they are considered as insufficient to compensate the impact of unsustainable fishery and other negative factors (Vassilev 2006).

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III. TRENDS IN DEVELOPMENT AND DISAPPEARANCE OF CERTAIN ANIMAL AND PLANT SPECIES IN THE BORDER REGION

In the past, many projects were implemented through cross-border cooperation within the framework of EU programs that focused on the preservation of natural biodiversity with an emphasis on the preservation of endangered habitats and inhabitants. Working towards solutions to the causes, resulting in population decline and factors at risk., establishment of natural spawning grounds and monitoring of the species, the sturgeon population will have a good chance of reproducing, increasing their population numbers and having a complete life cycle.

Different approaches have been considered and implemented for the restoration of their habitats and the implementation of the increasing conditions for a normal life, ecological and natural conditions to continue the life of endangered species. Sturgeons are species of great value that need to be protected because they not only have the high prices and quality they offer, but also because they are an ancient specification originated over 200 million years ago.

Throughout history, sturgeon fishing helped many families financially and provided income that they could invest in property, education, improved lifestyle, etc. Historically, the countries of the Caspian and Black Seas and beyond have long depended on significant income from the sturgeon industry. Sturgeon specimens take a long time to recover from environmental and human stresses and changes due to their long life cycles, late maturity and long intervals between spawning. Sturgeons are considered to be valuable indicators of river health, as well as changes in a particular species habitat, continuity of river and habitat ecology and changes in hydrology.

Over the past decade, various organizations, programs, and strategies have highlighted the importance of environmental improvement for sturgeon species to prevent habitat loss. Reducing the sturgeon population, curbing illegal fishing and trafficking in sturgeon. The expected positive effects are to endanger the endangered environment of the species and to create a safe, clean and natural environment for the full life cycle of the species representatives to complete. The beluga sturgeon is the most famous member of the sturgeon family, as it produces one of the most sought-after and valuable caviar in the world.

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The beluga lives up to 100 years and due to its fact, it is one of the largest predatory fish species that actively eats other fish and only faces a few natural predators during its lifespan. Beluga sturgeon reach maturity later than other fish species - the male at 12 to 14 years of age and the female at 16 to 18 years of age. The generation interval is four to five years. Beluga used to reach a length of up to 8 meters and a weight of 3.2 tons. In the Danube, the largest detected fish was a beluga sturgeon, about 1 ton and 8 meters long (Antipa 1909, Bănărescu 1964, Otel 2007), but usually, the body size of the caught individuals exceeds 3 m and 300 kg (sturgeon and catfish).

The reduced individual size of the fish in the catch is evident as a result of overfishing, which has become more aggressive over the past century. The large beluga sturgeon is known o carry several hundred pounds of caviar, the value of which can be extremely high. As you prepare to spawn upriver, the beluga sturgeon is at risk of being illegally caught by nets or harpoons, resulting in rapid decline and endangerment of the beluga species. The Beluga sturgeon has been overexploited and more than 90% of the population has declined. Right now, the Beluga sturgeon is considered a critically endangered species on the IUCN Red List of Threatened Species.

In conclusion, sturgeons are an ancient species that are experiencing difficulties with the conduct of their normal life, making all possible to overcome natural and man-made obstacles In 1997, they were included in the species protection system of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). between stakeholders, transboundary countries, governments, strategies and measures of the EU, and raising awareness on the subject, the sturgeon population will advance towards stability considering its population number and its habitat environment, and the improvement of the management of its life cycle The implementation of strategies and measures for preservation of sturgeon fish is already underway, which translates into a positive improvement in their situation, although they still face difficulties such as overexploitation, loss of migratory routes and habitats, genetic changes.

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IV. MODELS AND METHODS FOR PRESERVATION OF RARE RIVER SPECIES

The effects on humans have a serious impact on the environment and life in it. The negligent attitude towards the other inhabitants and the selfish handling of resources have led to prepositions for the loss of habitats, the overexploitation of species, and especially of fish species. Illegal fishing, poaching, and heavy pollution of the water basins. Besides, the construction of a multitude of water barriers has resulted in some species creating barriers and impossibilities to reach the area where they spawn, leading to a decline in the fish population.

The EU Water Framework Directive (WFD) developed management plans for the Danube region (DRBMP) that require a continuous improvement of the environmental conditions for all flora and fauna in the Danube region.

Measures that must be taken by the Danube countries to conserve the species should provide a clear passage which is a necessity for the migration of fish species up and down the river, e.g. ensuring the continuation of the population by protecting their normal life cycle management and reproduction on their natural habitat. Besides, this includes the viability and integration of migration routes. This means that there should be adequate spawning conditions including adequate ecology and water quality along the routes where the fish species spawn and the areas where fish farming is located.

To restore the migration routes for the fish species, we can do not diminish the human impact of the creation of structures restricting the ability of fish species to reach their spawning grounds.

The Iron Gate I and Iron Gate II hydropower plants, which define the border between Serbia and Romania, harm the region, although they ensure reliable and sustainable energy for the region on the sturgeon as migratory fish in the Danube basin. The dams block access to the migration routes and tributaries of the Drava, Save, and Tisza rivers, all of which are important spawning and rearing areas for migratory fish. The ICPDR has taken this problem into account and has facilitated the development of terms reference for a feasibility study to analyze the possibilities to allow fish to migrate through the dams. They were built in the 1970s and 1980s and form the largest hydropower and reservoir system along the entire Danube.

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The reimbursement of the migration area by the dams would thus restore access to 800 km of the traditional habitat and spawning grounds of the sturgeon in the Middle Danube would increase the current freshwater area and offer an extremely positive chance for a recovery of the population acceptance of the new route by the Fish species taking into account the fact that the wild populations are gene. Even if there is a possibility that the sturgeon species will reject the interaction of their natural route, there is a possibility that they will accept the artificial solution taking into account their migration process and the existing barriers. There are examples from other river systems in which the sturgeon species have adapted the artificial route to their spawning route. This solution creates the prepositions for the selective and submissive intervention in the free-flowing river, which means that even the best solution for the migration process will be successful up to a certain length, since the fish species are selective, the foreign decision to carry out theirs Accept and adapt migration routes.

Restoring migration routes can dramatically increase the population, but the risk factors mentioned above remain as an artificial route always includes the possibility of being rejected by the species or using a selective method of use. Also, this method will improve the situation of fish species, but for the conservation of the species as a whole, it is necessary to work on the diversity of weak links and factors that cause the decline in its population and are considered as a whole process with more than one activity, which contributes to the conservation of fish species. It is necessary to eliminate all risk factors or to keep the percentage of them as low as possible. Another important problem is the overexploitation of fish species. The rare species of river fish featured in the following investigation are subject to extreme exploitation resulting in Overexploitation hides other risks such as illegal fishing and poaching, which are also causing a significant decline in fish species. fishes. While most caviar today comes from aquaculture facilities, caviar from systematic poaching is still finding its way to a 2013 study by the World-Wide Fund for Nature (WWF) found that illegal fishing activities and the caviar trade were a serious threat to the future of Danube sturgeons, which means that sturgeons are vulnerable not only because they have a high economic value, but also because their meat and fish eggs are considered a delicacy.

Profitable black markets are spread across the region of Bulgaria, Romania, and Ukraine.

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In 2011 a TRAFFIC report was produced for WWF, which indicated that there were a total of 14 invasions of illegal caviar originating from Bulgaria and Romania. In 2006, Romania announced a ban on sturgeon fishing. The ten-year ban expired at the end of 2015 but lasted for another five years. The Bulgarian authorities followed suit, and in 2011 they announced a one-year ban, which was then extended until the end of 2015 and then for another five years.

In Serbia, a full permanent ban was introduced in 2005 for five species of sturgeon through the 'Regulation on the declaration and protection of strictly protected and protected wild species of plants, animals, and fungi'. The Sterlet can still be caught with restrictions: individuals larger than 40 cm and not during the spawning period (March 1 - May 31). Control of Sterlet catches is inadequate and there is an obvious drop in population size and average size of individuals due to overfishing. Except for sporadic catches, the greater sturgeon can only be found in the remaining 17.5 km of the Lower Danube below the river. Iron Gates Dam II. Currently, sturgeon fishing is an illegal action that was accepted by the majority, having real facts can be difficult to obtain, most of the information is anecdotal, however, poaching continues to occur. You study quite extensively and this is demonstrated in interviews with fishermen and fishery inspectors, also by illegal fishing gear targeting sturgeon that is regularly confiscated. Up to 90% is an illegal or undeclared sturgeon catch, and this fish specimen will not survive unless fishing pressure is greatly reduced.

Another method of sturgeon population preservation is to establish a facility ex-situ for migratory species and establish in situ monitoring of habitats and population behavior along the Danube and its main tributaries. of ex-situ ("off-site") measures that are also known as conservation breeding, as there is already an inventory of sturgeons in captivity provided for by the Sturgeon Action Plan under the Berne Convention.

Ex-situ measures serve two main purposes (Reinartz 2015).

Preservation of endangered sturgeon populations or populations threatened with extinction by establishing life cycle units in captivity and ensuring the survival of adult spawners of each population unit, also known as the conservation unit (CU) - the stabilization of CUs by compensating for deficits in natural reproduction by releasing young animals that are adapted to wild conditions (capable of survival) and thus viable annual classes of future wild spawners.

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It is of paramount importance to maintain these and to protect the genetic identity and diversity, as well as the morphological and behavioral characteristics of the respective CUs, both in captivity and in the wild. The measures must be in line with the existing life cycle of CUs and be synchronized with everyone in-situ (“on-site activities) and carried out over the long term until the stocks have recovered.

Ex-situ operations must be clearly distinguished from commercial aquaculture operations, such as the desi the red characteristics of the offspring produced differ considerably. For aquatic animal reproductive practice, there is another method which is used in practice and which has an important application for has the reproductive advancement, which consists of the maintenance of cryobanks, which means that the genetic resources of fish species are extracted are kept under suitable conditions and create biodiversity conservation and assisted reproduction with the help of a variety of biotechnologies.

Cryopreservation has the potential to become a safe way of conserving the genetic material of endangered species that are exposed to various dangerous factors that create obstacles to the normal life cycle, including reproductive progress. Besides, this offers the possibility of obtaining representative samples and further reconstructing the original strain, population, or biodiversity.

The management of the cryobanks requires a specific technical capacity in genetics, reproductive psychology, cryobiology, and data management. The cryopreservation method should be carefully designed for each sample individually according to its characteristics, needs, and specifications, as there is no universal method for successfully performing cryopreservation. The natural sturgeon stocks are threatened by the long-term adult life they go through, vulnerable life cycle, anthropogenic effects, global warming, etc.

Cryopreservation of the seeds of endangered species will support breeding activities and, according to studies, the sustainability of natural stocks. In addition to the success of cryopreservation studies with sturgeon sperm, the techniques and related methods still need to be refined to avoid negative effects on individuals and species-specific cryo-resistance heterogeneity, but also to achieve reproducible results. There is still a lot to be done to improve this technology. Species-specific optimizations of the technology are required, which are developed during the working process and prior research and analysis.

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Additionally, the conservation of biodiversity for sturgeon fish species aims to create conditions and measurements that improve their population numbers, their habitat, their spawning process, etc. This leads to the preservation of the deletion of the interference sample and the successful implementation of the reproduction process. Natural biodiversity is an import an aspect of the environment and the containment of biodiversity productively stimulate the ecosystem, as every living organism enriches natural sustainability and has greater potential for recreation in the event of disasters.

Mean annual sturgeon catches from the Serbian section of the Danube River (IAD

Period	Huso huso		A. gueldenstaedti		A. stellatus		Total
	kg	%	kg	%	kg	%	Kg
1958-1969	6.306	56	4.488	40	374	4	11.168
1970-1983	10.847	54	8.899	44	494	2	20.240
1984-1987	4.427	68	1.913	30	184	2	6.488

4.1. NEGOTIN REGION STURGEON BIODIVERSITY PRESERVATION

In Serbia, the Nature Protection Law regulates the protection and conservation of the diversity of nature, biological, geological and landscape as an integral part of the environment.

The Environmental Protection Law regulates the comprehensive environmental protection system that will guarantee the human right to live and develop. in a healthy environment, as well as balanced economic growth and protection of the environment in the Republic The environmental protection system will include measures, conditions and instruments for sustainable management, preservation of the balance of nature, integrity, diversity and quality of natural values and conditions for the survival of all living beings; prevention, control, reduction and rehabilitation of all types of environmental pollution; the sustainable management of natural values and the protection of the environment.

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Relevant EU legislation and policy is the EU Biodiversity Strategy 2020, which is a strategy aimed at halting the loss of biodiversity and improving the status of species habitats, ecosystems and the services they provide in Europe in the next decade, while the EU's contribution to prevent the loss of global biodiversity is intensified.

For the successful achievement of the goal of saving biodiversity in the Danube part, located near Negotin Municipalities, monitoring and control measures will be taken, which will provide crucial information on the current status of vulnerable fish species and other fish inhabitants. A regular and periodic control of the passages of the fish specimens that will pass through the control sections of the river will be organized, which will result in the establishment of the real quantities of the vulnerable fish investigated and the other inhabitants in the river

The information that is collected will be used to help form a common policy on the use of fish stocks in the transboundary region and will be processed through GIS technologies. Furthermore, the methods undertaken for the conservation of biodiversity are measures that will contribute to the growing population of fish species in danger of extinction.

V. VIABLE ESTABLISHMENT OF NATURAL SPAWNING

Spawning is a key stage in the continuous process of each specimen, there are several methods for rearing or propagating cultured fish, depending on the reproductive biology of the fish species, environmental conditions and facilities available at the choice is made according to the particular facts and needs. The methods can be organized into three categories based on their specifications: natural propagation, semi-natural propagation, and artificial propagation. We will further examine the natural propagation of fish species. that represent the process of placing female and male spices in a breeding area, such as a small pond or an enclosure where they have the opportunity and the environment to spawn with natural means. The current process is controlled by a number of environmental factors that may depend on the needs of the fish species.

Most Danube sturgeon species spawn during the warm periods of the year from spring to summer.

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Some of them are recognized as winter breed fish species are reproducing during the cold months in the end and the beginning of the year. in the river, hibernating in holes or deeper bends in the river. They breed upstream the year after entering the river. Spring breeds do not hibernate and only enter the river when temperatures are rising. The two behaviors do not represent different species, but rather different strategies for migration before spawning. Observation of some populations shows that sturgeons visit the same spawning sites every time they enter the river to spawn.

The "location loyalty" can result from the fact that sturgeon survive in the river due to a genetically determined survival strategy in the early stage of life, which is adapted to the location within a certain range of the river.

The life cycle of Acipenseriformes is very long, with puberty occurring late in life. Individuals spawn repeatedly, but most females do not spawn annually. Sturgeons have also shown a tendency to hybridize with other species of sturgeon. This occurs all the more if spawning habitats are lost and different species are restricted to only a few suitable locations or if one species is too rare compared to another species.

There is no information on the exact location of the main sturgeon habitats in the Danube catchment area. A key component is the appropriate spawning habitat for Acipenseriformes to reproduce. Spawning grounds are often hard surfaces covered with clay, gravel, and boulders, with many crevices where larvae find shelter from predators or flooding. The location of the spawning sites depends on the hydromorphological characteristics of the various river sections. The water depth at the spawning sites varies from a few meters to 26 m, and the current speed required is quite high, which allows for a wide spread of fertilization eggs.

Eggs are sticky and settle on the bottom after spawning sites are distributed, usually on coarse substrates with a much slower water velocity. They stay there until they develop into larvae and start feeding. River regime and water temperature are important factors in the development of early life stages of sturgeon.

Fluctuations in the water level due to river management by hydropower plants can have a negative effect on the spawning and reproductive success of adults.

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The possible establishment of natural spawning has a positive effect on the sturgeon population, since when the process of natural hybridization shows the depressed state of sturgeon spawning based on the obstacles, the sturgeons are confronted with the possibility during the spawning season that they will not find a partner of their own species when reaching the spawning grounds and are forced to hybridize with other fish species. This can lead to further distortion of the endangered species. A natural spawning facility will provide the sturgeon species with controlled environmental conditions and prepositions for successful spawning.

CONCLUSIONS

Danube river has a significant importance for the ecological system that is taking place along the whole length of the river and its tributaries, including around a hundred various flora and fauna representatives. The endangered factors for the species and the habitat loss are the main issues that can be observed in the recent and not so resents, leading to the aquatic flora and fauna to reduce their population and growth.

The emphasis on the sturgeon species focus of the impossible environmental settings and conditions that are forced over the innocent specimen, especially the high economical and market value, which is tempting many to break the applied measurements and law, and it is creating gap between the stages of the sturgeons' life cycle considering the extended sexual maturity process that makes them excusably vulnerable. The whole situation has been bought massive attention and currently, there are many measurements, procurements, plans and strategies that are working for the improvement of all factors that are having bad impact on the endangered species, covering and working together toward the solving of the present situation, creating sustainable solution for the improvement of the conditions, environment and protection of sturgeons. One important aspect of the process for saving the sturgeons population is that united the countries to work on an international level, comprehending the situation from all sides. This agreement between the cross-border countries under EU programmes are including the stakeholders recognizing their roles and stand in a situation like this, their support to the matter is really appreciated and valued because they possess different position and the inside of their thoughts can lead to a solution that might not be yet included in the preservation process.

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In the past, many projects were implemented through cross-border cooperation within the framework of EU programs that focused on the preservation of natural biodiversity with an emphasis on the preservation of endangered habitats and inhabitants. Working towards solutions to the causes. , resulting in population decline and factors at risk., establishment of natural spawning grounds and monitoring of the species, the sturgeon population will have a good chance of reproducing, increasing their population numbers, and having a complete life cycle.

Different approaches have been considered and implemented for the restoration of their habitats and the implementation of the increasing conditions for a normal life, ecological and natural conditions to continue the life of endangered species. In conclusion, sturgeons are an ancient species that are experiencing difficulties with the conduct of their normal life, making all possible to overcome natural and man-made obstacles.

In 1997, they were included in the species protection system of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). between stakeholders, transboundary countries, governments, strategies, and measures of the EU, and raising awareness on the subject, the sturgeon population will advance towards stability considering its population number and its habitat environment, and the improvement of the management of its life cycle.

The implementation of strategies and measures for the preservation of sturgeon fish is already underway, which translates into an improvement in their situation, although they still face difficulties such as overexploitation, loss of migratory routes and habitats, genetic changes. Sturgeons are species of great value that need to be protected because they not only have the high prices and quality they offer but also because they are an ancient specification Men originated over 200 million years ago. Years ago, sturgeon fishing helped many families financially and provided income that they could invest in property, education, improved lifestyle, etc.

Historically, the countries of the Caspian and Black Seas and beyond have long depended on significant income from the sturgeon industry. Sturgeon specimens take a long time to recover from environmental and human stresses and changes due to their long life cycles, late maturity, and long intervals between spawning.

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Sturgeons are considered to be valuable indicators of river health, as well as changes in a particular species habitat, continuity of river and habitat ecology, and changes in hydrology.

It is envisaging that the environmental challenges and habitual loss will be prevented in the upcoming years finding solutions and applying measurements for the restoration of the natural resources and ways to prevent the decreasing sturgeons' population which is now critically endangered and going through many different negative impacts though their life cycle stages. Over the past decade, various organizations, programs, and strategies have highlighted the importance of environmental improvement for sturgeon species to prevent habitat loss. Reducing the sturgeon population, curbing illegal fishing and trafficking in sturgeon.

The expected positive effects are to endanger the endangered environment of the species and to create a safe, clean and natural environment for the full life cycle of the species representatives to complete.

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