



**Close cooperation and
sustainable use**

6

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The conservation of diverse and valuable riverine landscapes

6.1.

6.1. The conservation of diverse and valuable riverine landscapes

Rivers and streams are the lifelines of the Danube basin. They are important for all of us.

Flowing waters are habitats for many plant and animal species. They provide recreation for humans and they supply us with water. Through over-exploitation, however, we have done much damage to our waterways. Many rivers are polluted, modified and dammed. The limits of many waterways have been reached, which has led to major economic damage as a result of floods, poor water quality and the loss of habitats for animals and humans.

However, people are reassessing the way they view rivers and streams. Rivers are no longer seen just as energy sources and disposal routes. Watercourses close to their natural state are again being recognised as important habitats for animals and people. Protection measures are necessary to maintain and improve high quality and diverse watercourses.

The great efforts that have been made in recent decades have brought the first successes. Waste water is increasingly avoided, and it is purified in sewage works. Many natural stretches of river have been placed under protection. Rare species such as the white-tailed eagle and the beaver have returned to the Danube.

Nonetheless, we are still a long way from having a sufficiently careful approach to our treatment of water bodies. Protection measures for species and habitats, as well as active improvement measures for our waters, are required. We have to treat our lifelines with care so that they will provide a high quality environment for ourselves and future generations.

Objectives:

The children learn ...

- ✓ to develop a sense of value for various riverine landscapes.
- ✓ to recognise the threats to our flowing waters.
- ✓ to become familiar with the objectives and challenges of protected areas and to find solutions for nature protection problems themselves.
- ✓ to realise the potential of restoring water bodies to a more natural state.
- ✓ to investigate a body of flowing water and to propose improvements.

Materials:

Activity 1: worksheet, "Wanted: the country's most beautiful river!", geographical map of the nation, pencils

Activity 2: no materials

Activity 3: worksheet "Help for the sneep", pencils

Activity 4: worksheet "More space for rivers!", pencils

Activity 5: worksheets "Together for the river!" and "Animals tell us how our river is doing!", camera, small nets, several bowls of water, identification book for aquatic animals, pencils

Organisational points:

Duration: 4 teaching units

Location: classroom, a watercourse near the school

Activity 1: Group work / discussion

The most beautiful rivers

The children are given the task of finding out which are the most beautiful rivers in the country. The criteria for deciding this are how close a river is to its natural state, whether it has rare animal and plant species and what possibilities it has for recreation. Using the questionnaire (worksheet “Wanted: the country’s most beautiful river!”) the children interview friends and family members, but nobody from the same class as they are in. Together, they look for the rivers that have been chosen on a map. The children consider what they suppose to be the criteria for being an “exceptional” river.



Activity 2: Game

The “Danube Ark”

The children play a variation of the “Memory game”. The “Danube Ark” project is set up in order to protect rare species in the Danube basin. Two individuals of each rare species are selected and moved into a protected area. However, the inexperienced young conservationists do not know the species very well. They have to distinguish them on the basis of their behaviour and their calls.

Two children are the conservationists and briefly leave the room. The other children form groups of two. Each group chooses a species and practises performing its typical call and/or behaviour. It is important that each pair performs the behaviour of their animal in exactly the same way. The class forms a circle (the children from each pair should not stand next to each other).

The conservationists are called back into class. The first conservationist asks two children, one after the other, to act out their animal’s characteristics. If they represent different species, the conservationist has to ask the children to continue to perform until he finds a matching pair. If they represent the same species, the two animal children leave the circle and wait to be taken to the protected area. Now it is the turn of the other conservationist. The game goes on until all the animals have been taken into the protected area in pairs.

Some species whose behaviour is fairly easy to act out are listed on the quartet cards (included with this manual): white stork, pelican, tree frog, grass snake, freshwater shrimp, pike, red deer, wolf, beaver, otter, wild cat, Daubenton’s bat and mosquito.

Together, the children consider whether it would really be possible to protect endangered species by using the “Danube Ark” project. The children think about what else can be done to protect endangered species.



photo: DRP/ Victor Mello

The Danube habitat: Many rare species like the European white pelican have found their ideal habitat on the Danube.



The protection of endangered species

Numerous animal and plant species are endangered or have even completely disappeared from many of our riverine landscapes. For example, 30% of native fish species in the Romanian Danube are at risk. Five species have already become extinct. In Hungary, more than



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half of the Danube fish are at risk. Examples are the beluga sturgeon, the European mud minnow and the Volga zander. Protected areas play an exceptionally important role in the survival of species. In the Danube delta, for instance, there are still more than 300 breeding places, wintering sites or stop-over places for birds.

There are numerous reasons why species are threatened – including direct persecution, over-exploitation, alteration and destruction of habitats. The different threats have to be addressed with different protection strategies. For many species, several threat factors have to be tackled at the same time.

Important measures to protect species diversity:

- protection and re-creation of suitable habitats
- relocation of species into areas where they have become extinct
- sustainable exploitation of wild animals, for example through the regulation of fishing quotas
- sustainable use of our riverine landscapes for the conservation of valuable meadows, fields and water bodies
- reduction of environmental pollution
- breeding programmes in zoos, wildlife parks and botanical gardens; these are a last chance when there are no longer suitable living conditions for the species in the wild.

The appreciation of all life forms and of the natural world is a precondition for the protection of endangered species. Environmental education and protected areas play an important role in this.



photo: Euronatur / Schneider-Jacoby

The beaver: a skilful architect of our riverine landscapes.

Protection of habitats does not mean completely refraining from using these areas and leaving them to themselves, but rather striving for the co-existence of people and nature.

The return of the beaver

Hardly any animal leaves its mark on our riverine landscapes as much as the beaver. It thins out the rows of trees on the bank and builds dams, impounding whole streams and oxbow lakes. However, by the early twentieth century, these skilled river architects had disappeared from the whole Danube basin, and only place names such as Bibberbach (beaver stream) in Germany and Austria, names of regions (so-called field names), and depictions in municipal coats of arms bore witness to their presence. The reason: the beaver was mercilessly hunted for its fur and its meat; and its habitat – floodplain forests close to their natural state – declined.

More than 100 years after the last beaver was sighted in Europe, the species is now returning. In the framework of species-protection projects, beavers from the last naturally occurring colonies in Sweden, Poland and Belarus were trapped and re-released on the Inn, the Danube and later on the Tisza. From there, the beaver is starting to re-colonise the whole Danube basin.

Background information

Activity 3: Group work / discussion

Help for the sneep – the construction of a fish ladder



The sneep is a fish species that owes its (German) name Nase or “nose” to its downturned mouth. It looks as if it has a kind of nose. To spawn, sneeps migrate up-river in great shoals. However, the fish cannot get past weirs and dams.

In the worksheet “Help for the sneep”, there is a diagram of a dam blocking the fishes’ path. The children consider how to enable the fish to get past the obstacle. Creativity is called for!

The children draw their ideas for helping the fish to surmount the obstacle on the worksheet. They can also form construction teams. The children’s solutions are compared with actual, real-life solutions.

Tip: Many animal species such as the beaver, the otter and the white-tailed eagle have disappeared from our riverine landscapes. Place names, town coats of arms and field names still give evidence of earlier inhabitants of a region. School classes can carry out investigations at such sites.

Activity 4: Group work / discussion

More space for rivers – the renaturalisation of a watercourse



Renaturalisation measures are intended to convert embanked and monotonous rivers back into diverse watercourses that are close to their natural state. The children look closely at the two diagrams and enter information on the newly created habitats and characteristic species on the worksheet “More space for rivers!”. In the right-hand picture, the children can see the following improvements:

- Floodplain forests are habitats for birds and insects. Trees provide shade and wood.
- Deadwood in the river offers hiding places for fish and insects and promotes natural flow dynamics.
- Oxbow lakes are colonised by frogs, dragonflies and many water plants.
- Steep banks are habitat for kingfishers and sand martins.
- A river island provides nesting places for the little ringed plover and the common sandpiper.
- Flower-rich bankside vegetation provides a habitat for dragonflies and butterflies.

Tip: In chapter 3.1., there is a worksheet to learn about river animals. Portraits of some animals are found in the family game “Species diversity on the Danube”.

Overall, the river is given more space. This reduces the danger of flooding. Within the broader bed, the river develops its own dynamics again.

Find more at “Additional information for teachers”:

Renaturalisation projects in the Danube basin

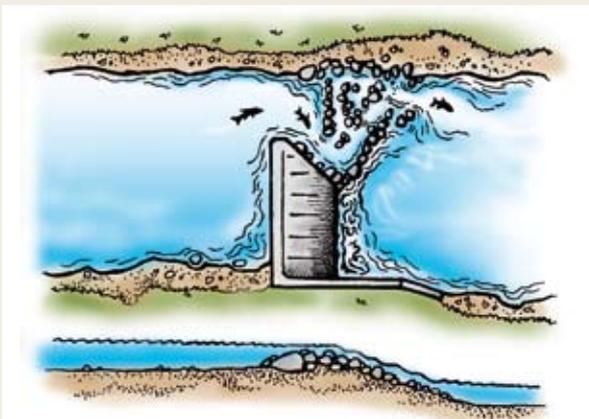
Fish passes for networking bodies of flowing water

Many fish species migrate in the course of their lives. The beluga sturgeon, for example, a large species of sturgeon, previously migrated from the Black Sea up the Danube as far as Ulm. Other fish such as barbel and sneep do not migrate as far, but still travel thousands of kilometres.

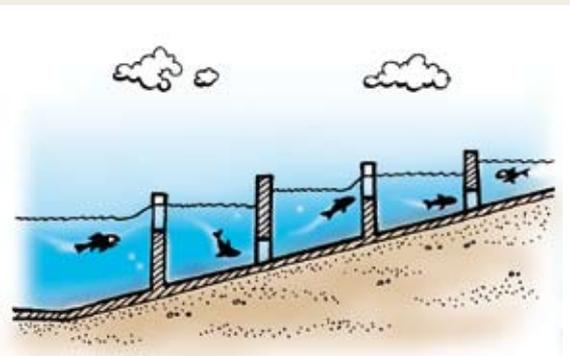
Dams and weirs are used mainly to produce electric power or to divert the water. Many of these constructions form impassable obstacles for fish. In the water-courses in the Danube basin, there are 700 large and

many thousand small dams. In order to connect different stretches of river, some dams have been equipped with fish ladders. In order for these fish passes to work, it is essential that there is a sufficient supply of water. The fish are able to sense the current, which helps them to find the fish pass. The position of the inflow and outflow openings is also critical. The maximum height for obstacles and steps is 10–30 cm; these can be overcome by the fish.

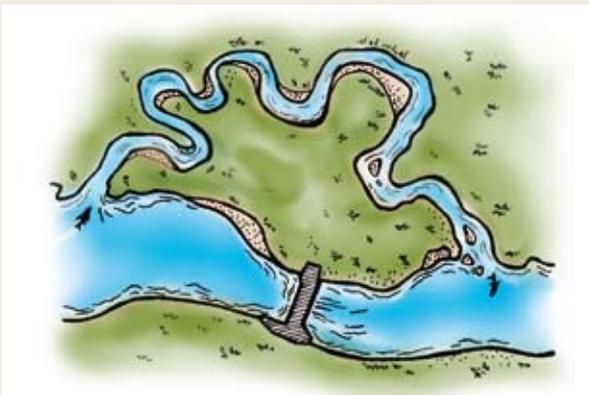
Various constructions are used:



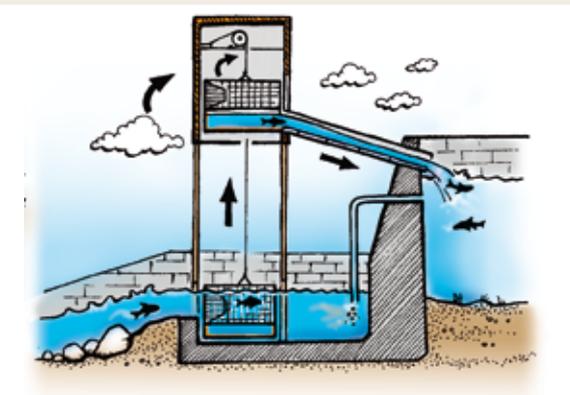
Ramps: low weirs can be configured to be more natural and surmountable through longer ramps.



Fish ladders: part of the water is directed over a fish ladder, a series of ascending pools, next to the power station. By leaping from step to step, the fish can overcome the difference in height.



Bypass channels: by constructing near-natural side-arms, a diversion for water organisms is created.



Fish lifts: in fish lifts, the fish are attracted by the current, trapped, and raised over the dam in tubs.

Sometimes, fish are also captured and transported around the dam in trucks. In some cases, the dams can be completely demolished. This not only re-

moves the obstacle to the fish, but the water, sand, gravel and suspended material can again be transported naturally.

Background information

Activity 5: Outdoor activity, group work / discussion

Together for the river!



As river experts, the children can now use their previously accumulated knowledge to investigate a water body near the school. Together, an approximately 100-m-long section is chosen. Based on the worksheets “Together for the rivers”, the stream is investigated. The children can also ask for more details at the local municipality.

The results will be presented by the children to the local council. If the evidence shows that there is a lot of support for action, the council will be asked to do more to improve the waterway. The children can also promise their voluntary support and to take part in a cleaning-up operation.

Tip: The subject can be extended with hands-on activities, for instance with cleaning activities, a newspaper article or other publicity for renaturalisation. This requires a great deal of time and stamina from the class, however!

Renaturalisation of riverine landscapes

Renaturalisation is intended to bring bodies of flowing water closer to their natural state again. Monotonous channels are to be turned into living rivers once more. With the increasing diversity of habitats, species diversity in renaturalised rivers rises again. Endangered species find better living conditions.

A particularly promising example of renaturalisation, welcomed by hydraulic engineers, residents and ecologists, is the project on the Isar near Munich, in the broadened bed in which beavers, dippers and demoiselles now cavort alongside water-sports enthusiasts. Renaturalisation requires different measures depending on the initial situation:

- Embanked river banks are dismantled, planted with native plant species, and if necessary secured with natural material.
- Oxbow lakes and backwater pools are connected to the river again.
- The river bed is broadened in order to give the river more space for dynamic processes to take place. This promotes the diversity of habitats and species.
- Dams and weirs are converted so that they no longer represent barriers to fish and water organisms.

Riverine landscapes that still contain remnants of floodplain forests and oxbow lakes offer the best conditions for successful renaturalisation. These can be linked to the river again and are a starting point for recolonisation.

In cities and municipalities there is often not enough space for large-scale renaturalisation; nonetheless a more natural configuration is possible.

Dynamic rivers also have the power to renaturalise themselves. During flooding, banks are carried away and sand and gravel are deposited elsewhere. If there is no danger to people, these natural processes should be permitted. As a result, habitat diversity increases without expensive measures having to be undertaken.

Renaturalisation doesn't only benefit nature and the species diversity of the riverine landscapes: humans also benefit from such measures. The self-purification power of watercourses that are close to their natural state is higher. Flowing waters that have more space on either side flood their banks less easily. In addition, living rivers invite us to ramble, swim and enjoy nature.

Background information

Nature protection – a job for us all

The responsibility for protecting nature does not lie only with federal states, which create protected areas. Everybody can make a contribution to conserving a diverse environment – in their gardens, in the schoolyard, or the next time they go shopping.

- A natural garden offers a suitable habitat for many species. A flower meadow benefits butterflies and bees. A small pond helps dragonflies and amphibians. Native shrubs are a source of food for birds and insects.
- Habitat can also be actively created for some species.

Nest-boxes can be made by hand. Nesting opportunities for insects can be created by providing perforated clay bricks. Old trees offer shelter to many species, so they should not be thoughtlessly chopped down.

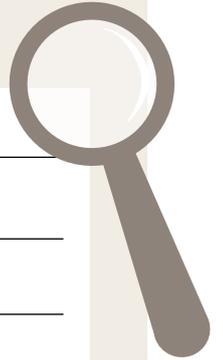
- Renouncing pesticides and aggressive cleansers protects insects and birds from poisoning, and waterways are less polluted.
- Organically grown food is produced without environmental poisons and mineral fertilisers. Livestock are kept under animal-friendly conditions. By buying sustainably produced products, everyone can make a contribution to nature protection.

Background information

"Wanted: the country's most beautiful river!"

To find out which river is the most beautiful in the country, you should interview your friends or family.

Enter the answers on the following record sheet and bring it to class.



My interview partner: _____

How many different rivers do you know? _____

Which is your favourite river? _____

What region does the river flow through? _____

What connects you to your favourite river?

What is your favourite activity on or near this river?

Are there any particular or rare animals and plants on this river? If yes, what are they?

Are there any problems on this river?

- none
- polluted water
- flooding
- dangerous rapids

other _____

Is the river in a protected area? Yes No

If not, should the river be protected? Yes No

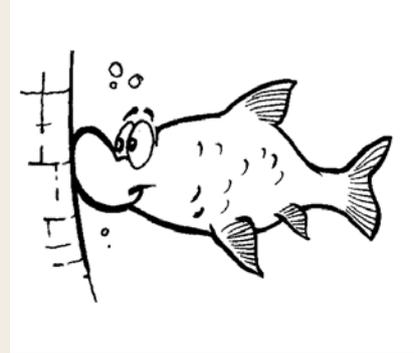
Your name: _____

"Help for the sneep: how can we help fish to get past dams?"

The sneep is a fish species that owes its (German) name (Nase, or nose) to its lower jaw. It looks as if the fish has a nose. Like many other fish, sneeps migrate many kilometres through the river in search of food and to reproduce. Weirs and dams, however, represent impassable obstacles. What can we do to help the fish to get past these obstacles?

Think of a construction that would make it possible for the fish to get past the weir. Fish can get over small steps up to 10 cm high.

Draw a riverbed, a dam and your construction and draw in the route for the fish in blue, so that they can find it more easily.



The "Nase" needs your help!

"More space for rivers!"

Restoring a living stream.

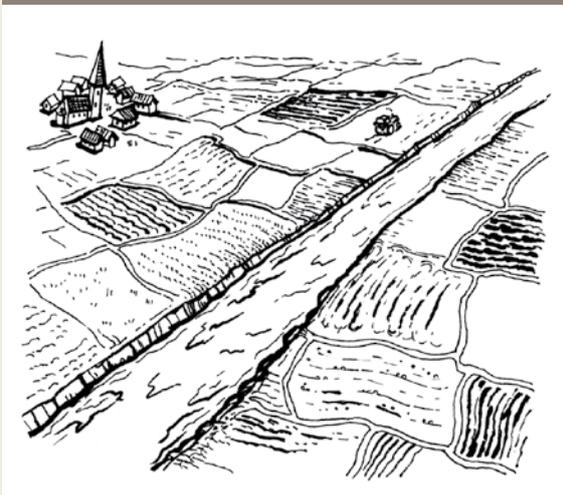
Many rivers and streams now look like the one in the picture on the left. The banks have been straightened and modified. Farmland and meadows reach down to the bank. Birds cannot find trees to build their nests and there are no small tributaries or outlets for fish to hide in. Furthermore, there are no more gravel islands for sunbathing.

In the picture on the right you can see a stream that has been restored or, in other words, renaturalised. This means, for example, that embankments and dams have been removed, creating new habitat for animals and plants.

Compare the two pictures closely.

What habitats for animals and plants can you find in the right-hand picture that are missing in the one on the left?

an embanked river



a natural river



Which habitats have been restored by the renaturalisation measures?
Which species have benefited from them? How do people benefit from them?

"Together for the river!"

You have already learnt a lot about flowing waters. Welcome to the circle of river experts!

How would you rate the quality of a watercourse in your area? Is there enough space for animals and plants?

Use the following sheet to check a section of your local watercourse. After an inspection, you will be able to answer some of the questions yourselves. If you are unsure, ask your teacher, your parents or someone from the local authority.

Name of the watercourse: _____

The section investigated stretches from _____

to _____

Name of the locality: _____

Is the stream section in a protected area? _____

Are there rare animal and plant species in the area? _____

The water quality in your watercourse:

What does the watercourse look like?

- natural, with islands, steep banks, deadwood and oxbow lakes
- \triangle near-natural, with sandbanks and stones
- \circ canalised, with a concrete bed

Is the river course interrupted by dams or weirs?

- no
- \triangle yes, but with fish passes
- \circ yes, without fish passes

Are the banks of the waters natural?

- yes, with different habitats
- \triangle no, fortified with natural material
- \circ no, fortified with concrete walls

Is there a floodplain forest next to the banks?

- yes
- \triangle no, just individual trees and fields
- \circ no, farmland and settlement areas reach down to the banks

Is there waste and rubbish in the riverbed?

- no, or very little
- yes, limited amounts
- yes, large amounts

Water management:

(ask your teacher or the local authority)

Does untreated waste water get into the water?

- no
- yes, limited amounts
- yes, large amounts

Is water taken out?

(for example for power stations or irrigation)

- no
- yes, limited amounts
- yes, large amounts

Results:

Add up the quadrants, triangles and circles.

Number of squares: _____ Number of triangles: _____ Number of circles: _____

1. Mainly squares and no circles: your water is in good condition!
 2. Many triangles but no circles: your water is somewhat spoiled.
 3. Some circles: your water is not in good condition, improvements are needed.
- Consider together which improvements to your water are necessary and feasible.
How could your stream be changed to be closer to its natural state?

Submit your research findings and suggestions for improvement to the local authority. Perhaps you can be actively involved in carrying out the improvements!

"Animals tell us how our river is doing!"

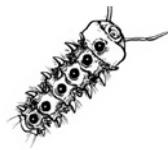
We can gain much information about the condition of our river by looking at the small aquatic animals that live there. Some live only in very clean water, others can withstand heavy pollution.

So let's check how clean our river is.

Thoroughly investigate a stretch of your river for about 15 minutes, checking for small animals on or under stones, hidden in the mud or under leaves, or sitting on water plants. Use a net, and carefully put the animals you have caught into bowls of water. Now compare the animals you have found with the diagrams below.



stonefly larva



net-winged midge larva



mayfly larva



long-toed water beetle



freshwater nerite



freshwater shrimp



dragonfly larva



water louse



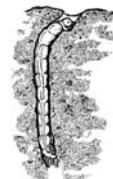
freshwater leech



soldier fly



sludge worm



red midge-fly larva



hoverfly larva

You can now give your river marks based on the most frequently occurring animals.

If you have found many stonefly larvae and net-winged midge larvae, your river gets **mark 1**.

If there are a lot of mayfly larvae, long-toed water beetles or freshwater nerites, you can **mark your river 1-2**.

If there are many freshwater shrimps or dragonfly larvae in your nets, your river **gets a 2**.

If there are a lot of water lice, **give your river a 2-3**.

If you have found many freshwater leeches or soldier flies, **give the river a 3**.

For a lot of sludge worms or red midge-fly larva, **your river gets a 3-4**.

If there are a lot of hoverfly larvae in your river, unfortunately you must **mark it as a 4**.

mark 1 = very clean water

mark 4 = very polluted water

Danube tales

Danube: border or link? The Danube as the border with the Ottomans

During the time of the Romans the middle and the lower Danube became the border river against hostile attacks from the north and north east. With the growing power of the Ottoman Empire in the 14th and 15th centuries, however, the opponent was suddenly pushing forward from the south! This was a completely unprecedented situation, because the road along the Danube, which followed the course of former Roman roads, ran along the southern side of the river. And most settlements and cities that were now directly exposed to the onslaught from the Turks were on the southern bank.

If one travels by ship up the Danube today one can see 30 castles and castle ruins on the Hungarian–Croatian border, including Vukovar, Petrovaradin (Novi Sad), Belgrade and the stupendous ruins of Golubac at the Iron Gate, which today, owing to the backwater of the power station, are “standing with their feet in the water”. Most of these are on the southern

side of the Danube. The Turks were attacking from the “wrong side”, and the Danube, which until then had safeguarded the people living there at that time against attack, no longer offered any protection.

With the conquest of Bosnia in 1463, the whole inland landmass south of the Sava and the Danube came under the Ottomans. In 1521, after a one-month siege, the Turkish warriors entered the strategically important city of Belgrade, which served them as a “bridgehead to Europe”. It would be many hundred years before the Ottomans were repelled from central Europe.

Whereas the course of the river from Vienna to Belgrade remained familiar to the people in the west as many people travelled along it, the area of the river behind the Iron Gate became terra incognita. The countries in the lower course of the Danube, such as Bulgaria, remained under Ottoman rule for many hundreds of years.

The Danube in figures

Length:

2,786 km from the confluence of the Breg and the Brigach in Donaueschingen;

2,888 km from the source of the Breg.

The Danube is therefore the second-longest river in Europe (only the Volga is longer).

Navigable length of the Danube:

2,588 km (from Ulm)

Countries neighbouring the Danube:

The Danube is the most international river in the world and flows through 10 countries:

Germany, Austria, Slovakia, Hungary, Croatia, Serbia, Romania, Bulgaria, Republic of Moldova and Ukraine.

The Danube marks one border of these countries for the following distances:

Germany:	584 km
Austria:	357 km
Slovakia:	172 km
Hungary:	417 km
Croatia:	137 km
Serbia:	587 km
Romania:	1,075 km
Bulgaria:	472 km
Republic of Moldova:	0.6 km
Ukraine:	54 km

(figures from www.danube-river.org and the ICPDR Roof Report, rounded)

As the state boundaries often run on both sides of the Danube, the sum of the kilometres given does not correspond to the length of the Danube!

The catchment area:

In the Danube catchment area (Danube basin) there are 19 states. The Danube catchment area is the term for all the areas from which water gets into the Danube, through rivers, streams and groundwater.

The size of the catchment area is 801,463 sq. km, or almost 10% of continental Europe.

It includes:

- the whole of Hungary (100%)
- almost the whole of Romania (97.4%)
- Austria (96.1%)
- Slovakia (96%)
- Serbia (92%)
- Montenegro (50%)
- Slovenia (81%)
- Croatia (62.5%)
- a significant part of Bosnia and Herzegovina (74.9%)
- Croatia (62.5%)
- Bulgaria (43%)
- Republic of Moldova (35.6%)
- Czech Republic (27.5%) and parts of Germany (16.8%) and Ukraine (5.4%)

With less than 2,000 sq. km each, five other countries are partly in the Danube catchment area:

- Switzerland (4.3%)
- Italy (0.2%)
- Macedonia (0.2%)
- Poland (0.1%)
- Albania (0.01%)

Inhabitants of the Danube basin:

81 million people

Tributaries:

In all there are 74 major tributaries to the Danube. The main tributaries are the rivers:

Inn:	length 515 km
Morava:	length 329 km
Drava:	length 893 km
Tisza:	length 966 km
Sava:	length 861 km
Velika Morava:	length 430 km
Iskar:	length 368 km
Siret:	length 559 km
Prut:	length 950 km

Size of the Danube delta:

650,000 hectares

Altitude difference from source to mouth:

678 metres

Bridges over the Danube:

Today there are about 100 fixed bridges over the Danube from the source to the mouth.

Northernmost point:

The German city of Regensburg

Southernmost point:

The Bulgarian town of Svištov

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6.2. Together for our rivers

We all bear responsibility for the Danube basin

The Danube catchment area is the living space for more than 81 million people. In order to ensure the sustainable exploitation of its natural resources, it is important that all 19 countries of the Danube basin cooperate. We have to use our joint efforts to achieve sustainable and environmentally friendly forms of economy that correspond to our current needs without compromising the chances of future generations.

The Danube basin is characterised by ecosystems that are of high ecological, economic and social value. Sustainable use can safeguard this value for the future.

Objectives:

The children learn ...

- ✓ that only through rational exploitation of natural resources can the needs of all people be met.
- ✓ to understand the interconnectedness of the waters of the Danube basin and the Black Sea.
- ✓ that despite the most divergent interests, cooperation and discussion make it possible to make decisions about sustainable development.

Materials:

Activity 1: jugs, glasses, the children's favourite drink

Activity 2: jugs, water, various food colourings, Danube poster

Activity 3: role cards, activity cards, tokens in different colours

Organisational points:

Duration: 3 teaching units

Place: classroom

Activity 1: Game

Sustainable use is clever!



Divide the class into groups, with at least five children per group. Give each group a jug with a quarter of a litre of the children's favourite drink, and all children can pour into their glasses as much of it as they want.

Refill the jug with an eighth of a litre of the drink. The drink represents a valuable renewable natural resource, for example clean drinking water, and each child must get some of the drink in order to stay in the game. At the end of a round, the children who have not had anything to drink are out.

After three rounds check whether all the children are still in the game or whether some of them have been eliminated. Are there any groups where all the children are still in the game? What strategies did these groups use? Was there a group leader or did the game work out without mutual agreement between the children? Which group is confident that they will always have enough of the drink as long as the natural resource keeps renewing itself?

Discuss with the children what natural resources people need to live, how one can use these resources sustainably, and how the renewal of natural resources, for example drinking water, is threatened. Write the suggestions they make on the blackboard.

Sustainable exploitation of natural resources – what's that?

We all use water as a natural resource

Unspoiled natural water bodies of the Danube basin serve as drinking water reserves for people. In industry, water is used as a coolant and working agent; farmers need water to irrigate the fields. On rivers, electric power is produced by hydro-electric power stations; furthermore, the Danube and its major tributaries are important trade routes with a long shipping tradition. Natural inundation areas provide flood protection, and riverine landscapes are recreational areas for people.

The great natural diversity in the Danube basin, with more than 5,000 species of animal, some 2,000 species of higher plants and many different habitats (e.g. riverine floodplain forests, mountain streams, moors, or the Danube delta with its gigantic reed belt), represents a unique natural treasure that should be preserved and protected against pollution and destructive forms of exploitation.

The principle of sustainable exploitation is based on using natural resources only to the extent that they

can renew themselves. A sustainable economy is characterised by the fact that consideration is given to preserving basic resources and applying technological advances so that the system of sustainable exploitation is continually improved.

For the Danube basin, this means first and foremost ensuring that the pollution of waterways through nutrients and harmful substances is reduced, in order to maintain the water quality in the future, for people and for the natural world. Regarding flood protection, the first priority is limiting flood damage as much as possible in order to avoid personal and economic damage. Advance warning systems for floods and the re-creation of natural inundation areas can contribute to this goal.

The exploitation of water itself must be based on the availability of this resource. Important steps in this direction would be regulating demand through realistic water charges, measuring water consumption and educating consumers to use water economically.

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Background information

Regarding water pollution, the polluter-pays principle should be applied. Whoever is responsible for environmental pollution must also pay for its removal. In industrial plants, for example, a closed water cycle waste management would be the ideal implementation of the polluter-pays principle.

In all such efforts, it must be remembered that only policies and actions encompassing the whole river catchment area can be successful. In order to arrive jointly at solutions that facilitate a successful, growing economy without destroying the natural treasures of the Danube basin, international, cross-border directives have been agreed.

The European Water Framework Directive

On 22 December 2000, the Water Framework Directive came into force in all EU Member States. In addition, all states of the Danube basin, including non-EU members, have agreed to implement the Water Framework Directive.

The aim of this directive is to ensure cooperation between the countries sharing the catchment area and to agree jointly on its management.

The central element of the Water Framework Directive is to take into account the entire river catchment area when considering management activities, as water and water quality do not respect political boundaries.

The most important environmental aims of the Water Framework Directive are:

- to prevent deterioration of the condition of surface waters and groundwater
- to protect, enhance and restore all bodies of water
- to achieve good chemical and ecological status of all surface and ground waters by 2015.

The Danube River Protection Convention

The convention was signed on 29 June 1994 in Sofia and came into force on 22 October 1998. The aims of the

Danube River Protection Convention include:

- the conservation, improvement and rational use of surface waters and groundwater in the catchment area
- preventive measures to control hazards originating from accidents involving floods, ice or hazardous substances
- reducing the discharge of pollutants into the Black Sea.

The International Commission for the Protection of the Danube River (ICPDR) was founded in order to ensure that the Danube River Protection Convention is implemented. Every year, on 29 June, “Danube Day” is celebrated to mark the signing of the Danube Protection Convention.

Sustainable development

Sustainable development is a world-wide concept that is gaining more and more recognition.

Various definitions are given to the term “sustainable development”; however, the most internationally well-known definition is the one given by the Brundtland Report *Our Common Future*: sustainable development is “development which meets the needs of the present without compromising the ability of future generations to meet their own needs”.

Since the publication of the Brundtland Report (1987) and the UN Conference on the Environment and Development (UNCED) in Rio de Janeiro in 1992, the concept of “sustainable development” has received great attention.

The concept of sustainability has for some years been considered the model for the sustainable development of humanity. The objectives of sustainable development are social justice, ecological compatibility and economic efficiency. Moreover, a sustainable form of economy and lifestyle only consumes as many resources as nature can replenish.

Sustainable development represents a global challenge for all of us – to create a future life worth living.

Background information

Activity 2: Experiment

The Black Sea as final destination



On the Danube poster, the children look for their country and the river that is closest to their home. They follow the course of the river down to the Black Sea and note how many countries (or towns) the river passes before it flows into the Black Sea. For every country (or every town) between the place where the children live and the Black Sea, they pour some water dyed with food colouring into a large bowl and watch how the colour of the water changes (for each town or country there is a jug of water of a different colour). In the end, the water in the bowl has turned brown or grey, and the children see that the polluted waters ultimately end up in the Black Sea and that we are all responsible for water quality in the Black Sea.

The children consider what can be done and how they can help to minimise the pollution in the waters of the Danube basin. Their suggestions are written on the blackboard (for example, building modern sewage plants to treat waste water better, using washing agents in the household as sparingly as possible, conserving natural water bodies that have a high level of self-purification, and preventing chemical accidents by implementing safety measures).

Find more at “Additional information for teachers”: Situation of the Black Sea

The Black Sea

This sea into which the Danube discharges is a very special one. It is connected to the Mediterranean Sea only by the Bosphorus and the Dardanelles, and with 18 grams of salt per litre of seawater in the upper water layers its salt content is lower than that of the other seas of the world, whose average salt content is 35 grams per litre of seawater.

Below a depth of 100 metres, the Black Sea has a salt content of 38 grams per litre. As a result of the difference in the density of salt in the Black Sea, there is no exchange of water between its lower and the upper layers. Although the Black Sea is 2,212 metres deep at its

deepest point, most animals only live in the upper 100 metres of the sea. Below this the water of the Black Sea is saturated with hydrogen sulphide, which was formed over millennia by the decomposition of organic material. But we still know much too little about life in the depths of the Black Sea.

The Black Sea gets its water mainly from the great rivers, the Danube, the Dnieper and the Don (through the Sea of Azov). All these ecological characteristics make it particularly vulnerable to inflows of pollutants and nutrients from the rivers.

Background information



Activity 3: Group work / discussion

The big river role play

The children are divided into seven groups. The class decides who will represent the “mayor”, then each group draws a role card.

On the role cards, the interests and needs of different inhabitants of a village on a river in the Danube basin are described. Everybody is aware that they need the river as the basis of their existence; however, because there are many differing interests it is often not easy to agree on a course of action.

In each round of the game, a situation described on one of the activity cards is read out. The groups have time to consider arguments for or against the measures described. Under the direction of the mayor, the situation is discussed and decisions for measures are made, based on a majority vote. The children are helped to identify with their role by looking at the illustrations of tools or attributes characteristic of the people they are representing (for example: a small net for the fishermen, a bell for the mayor, sunglasses for the tourists, and so on).

Differently coloured tokens symbolise the natural diversity of the river. At the start, there are one-and-a-half times as many tokens as there are children in the class, representing the available capital of nature. For every decision that harms the river, one token is removed. For every decision that does not harm the river, one token is added. The role play ends when the last activity card has been drawn. If there are more tokens left than there are children, the community has handled the natural resources of the river sensibly and has been able to manage its economy in a sustainable way. If there are fewer tokens than there are children, the ecosystem of the river has been damaged and sustainable exploitation is no longer possible.

After the role play, discuss with the children how they found their roles and how realistic the role play is.

The fishermen

Fishermen need a river with clean water for fishing. Natural wetlands and floodplain forests are important for the fishermen because many species of fish need these habitats. The fishermen want many tourists to visit the area, so they are able to sell more fish to the restaurants.

The power-station operators

In order to provide more electricity for the population, power-station operators want to build a new power station. Electric power is very important for the village.

The farmers

Farmers are dependent on clean groundwater for irrigating their fields. They would like to have a greater yield from their fields in order to be able to grow more cereals for the population.

The tourists

The natural floodplain forests and wetlands around the village with their many species of birds are an attraction for many tourists. In order to be able to board the excursion ship more easily, they would like a new, bigger, harbour facility.

The mayor

The mayor is most interested in the well-being of his or her fellow citizens. There must be enough drinking water for the people and large companies should move to the area. Naturally, it is also important that many tourists visit the area.

The residents

The last major floods have damaged their houses. Now the residents would like the whole river to be regulated. Apart from this, the residents are happy when a lot of tourists visit the village and when new jobs are created.

The factory owners

The factory owners plan to build a big factory in the area, which would create many jobs. As there is little land available for building, some wetlands would have to be drained.

The construction company

The construction of factories, harbour facilities and river regulation projects provide good business for the construction company. Of course, clean water is important to them too.



Activity card

A new hydroelectric power station is to be built near the village. The construction of the power station will take its toll on the floodplain forests and wetlands. This measure costs one token.

Alternative: electricity- and energy-saving appliances and solar collectors on the roofs could make it possible to get by without a new power station. This measure brings one token.



Activity card

The farmers would like to use more mineral fertiliser on their fields in order to achieve bigger harvests. However, the mineral fertiliser will pollute the groundwater and the river, and thus represents a danger for the drinking-water supply. This measure costs one token.

Alternative: by converting to farming without mineral fertilisers and pesticides the farmers would produce less, but the quality of the products would be better and they could sell them at a higher price. This measure brings one token.



Activity card

A new harbour facility is to be built on the bank of the river. In the process, a bird colony would be destroyed and there would be fewer habitats for aquatic animals on the artificial banks. This measure costs one token.

Alternative: the old harbour is renovated and the tourists will have to accept that there is a longer walk to their excursion ship.

This measure brings one token.





Activity card

A long stretch of the river is to be regulated in order to provide better flood protection. The side-arms of the river would be cut off and the floodplain forests would dry out. This measure costs one token.

Alternative: flood-protection measures include the use of natural wetlands as inundation areas and give the river space so that the floodwater can be diverted. This measure brings one token.

Activity card

A big factory is to be built in the area. In order to obtain building land, however, wetlands would have to be drained. The factory's waste water could pollute the river. This measure costs one token.

Alternative: the latest technology for clean production is used in the factory, and waste water is recycled. The factory is built at a site in the village where no wetland areas have to be destroyed.

This measure brings one token.

