

Liveable Rivers

15 years of subsidising river restoration
in Austria



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To invest in our rivers and streams is to invest in our future

Rivers and streams shape our landscape and not only provide habitats for various animals and plants, they are also of immense importance to humans. Near-natural rivers and streams provide space to engage in recreational activities, thus increase our well-being and health, and attract tourism.

For centuries, rivers and streams have been altered by society, resulting in the loss of habitats and biodiversity. Today, riverine landscapes are among the most endangered ecosystems. To improve the ecological status of rivers and streams in Austria, numerous measures need to be implemented. River restoration aims to give rivers and streams more space to achieve improved natural water retention as well as improved habitat diversity and upstream and downstream connectivity.

To reduce possible financial obstacles regarding the implementation of measures to improve the ecological status of rivers and streams, the Austrian Federal Government created a funding programme for river restoration within the framework of the “Umweltförderungsgesetz” (UFG) – the Austrian Environmental Support Act. These subsidies have led to the implementation of numerous projects within the last 15 years. Consequently, continuing financial support for investments in the improvement of riverine ecosystems remains important. To invest in river restoration is to invest in both humans’ and animals’ quality of life. Additionally, it is a driving force for the Austrian economy and an investment in the future.

This brochure provides information on successfully implemented projects and their positive impact on the environment and the economy. Every contribution to intact aquatic ecosystems is essential and ensures lively riverine landscapes and floodplains for all of us.

Norbert Totschnig

Federal Minister for Agriculture, Forestry, Regions and Water Management



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Why are our waters so important?

Rivers, streams and floodplains are life: They are characteristic of Austria's landscape, places of recreation and they offer important habitats for numerous animals and plants – Austria's riverine landscapes are vital and versatile ecosystems. However, over the course of the last centuries, human interference has led to a drastic deterioration of the ecological status of our rivers and streams. River restoration measures must be implemented to ensure that future generations will also be able to use and enjoy rivers as valuable recreational and living spaces. Many improvements have already been achieved, but there is still much to do. This brochure displays the successes achieved in the last 15 years through the UFG subsidy programme and provides best practice examples for river restoration.

What is the role of aquatic ecology?

Aquatic ecology regards waters as ecosystems and habitats and illustrates how aquatic structures and the animals and plants that inhabit them mutually influence each other. Austria's riverine landscapes are home to many living creatures, such as fish, insects, mussels, crayfish, algae or aquatic plants. Each living being has its own set of needs regarding its habitat. Some need cold, fast-flowing waters, while others need warmer, slow-flowing ones. However, when the conditions in a body of water change due to human interference, such as river regulations or river engineering measures, certain organisms cannot survive in the altered environment – as a result, they disappear from their natural habitat.

The ecological status of waters is rated following the Austrian grading system: 1 = very good, 5 = bad.

The “ecological status” describes these changes in the prevalence of animals and plants in waters. It indicates the quality of rivers, streams or lakes and measures their functionality as a habitat. The more a river or stream differs from its natural state, the worse it is reflected in its ecological status.

In what condition are Austria's rivers?

In 2000, all member states of the EU committed to the European Water Framework Directive, striving to restore the good ecological status of all waters and prevent further deterioration.

At present, however, almost 60% of Austria's rivers do not achieve the good ecological status. This emphasises the need for improvement measures concerning river restoration. Austria is tackling this problem with the National River Basin Management Plan, which is published every six years: By 2027, all water structures should be sustainably improved and natural habitats in and around rivers and streams should be protected or restored.



Why should we invest in rivers and streams?

Many benefit from improving the ecological status of our rivers and streams: nature, the climate, humans, and the economy.

Positive effects on nature

Being our landscape's lifelines, rivers and streams have many ecological functions. Natural bodies of water are home to a large variety of living organisms and are exceedingly valuable to biological connectivity. Rivers and their surroundings are tightly interrelated and influence each other. Many organisms rely on this connectivity for nourishment, reproduction, or dispersion. The transition zone from land to water is a hotspot of biodiversity.

Positive effects on the climate

Intact rivers and streams are more resilient and fitter for dealing with the effects of climate change. They can also better compensate for higher temperatures by providing vital refuge for organisms in deeper, cooler areas. In addition, natural surface water retention can help mitigate the impact of dry periods. Microclimates also benefit from near-natural river landscapes: evaporation and shade create a cooling effect. These cooler microclimates are becoming increasingly important for people, particularly in densely populated areas.

Positive effects on humans

Intact riverine landscapes play various vitally important roles. For many people, nature experiences are valuable components of recreation. As spaces for relaxation riverine landscapes support mental health and physical well-being. They offer the necessary space for a number of recreational activities, such as hiking along the water, water sports or fishing. Furthermore, waters are also characteristic of the landscape and connect humans to the environment.

Positive effects on flood control

Restored near-natural river landscapes are also beneficial for flood retention. Reconnecting floodplains and larger river widenings support natural water retention and can help mitigate flood waves. By creating natural floodplains, the landscape can retain more water, positively affecting the groundwater and soil.

Positive effects on the economy

The local economy benefits as well: subsidising measures for river restoration leads to additional investments and secures jobs.



What challenges is aquatic ecology facing?

Humans have been using riverine landscapes intensively for centuries. Interfering with natural waters has improved many aspects of our lives, such as navigation, agriculture, hydropower use and flood control. However, it has also had a dramatic impact on the ecological status of our rivers and streams by limiting and altering habitats of animals and plants. In the last years, some of the damage has been reversed through the implementation of river restoration measures. However, there is still a lot to do – what has been altered over centuries cannot be restored to a near-natural state within a few years.

Modified water structures

30% of the Austrian river network have been significantly modified.

Man-made changes to the structures of rivers and streams, the so-called river morphology, are very problematic for aquatic ecosystems. River trainings and regulations, as well as riverbank and riverbed reinforcements, significantly affect a river's condition. This can cause qualitative and quantitative loss of habitat. In Austria, 9,408 kilometres of river stretches have been structurally modified to a large degree.

All aquatic organisms suffer from the effects of these structural deficits. This especially shows in fish: Loss of habitat, which also leads to a loss of spawning and nursery grounds, has noticeably reduced the fish population. At worst, structural changes to rivers can cause an absence of fish species in the affected area which is particularly alarming when

it comes to endangered or rare fish species. Restoring our rivers and streams to their near-natural states is therefore essential for functioning ecosystems. Improved river habitats have numerous positive ecological effects:

- revitalising the fauna and flora in the streambed leads to a better self-cleaning capacity of waters
- the improvement of habitats protects endangered animals and plants
- enhanced resilience against other negative influences, such as climate change, invasive species or natural predators

Lack of river continuity

When a river's or a stream's continuity, also called river continuum, is interrupted, it poses additional challenges to the ecological status of water bodies. Transverse structures such as weirs for hydropower use, water withdrawal, flood control or riverbed stabilisation are the main reason for the lack of continuity.

About 28,000 artificial transverse structures in Austria's rivers and streams do not allow fish passage. Consequently, fish are particularly affected by this lack of continuity. This is because all organisms need to be able to move around in river systems to find nourishment, procreate and grow. Obstacles interfere with this need and isolate fish from their vital habitats. For many species, this leads to a decreased fish population – at worst an entire fish species can become extinct. Barriers also interfere with bed load transport, affecting the availability of different habitats.

Continuous river systems and the interconnection of existing and newly created or improved habitats are essential to achieve the good ecological status in Austria's rivers and streams. Many positive effects accompany a restored river continuum:

- preservation or enhancement of biodiversity and the genetic variety in populations
- increase in the stability of fish populations in case of critical events, e.g., floods or droughts
- amplification of the ecological effect of existing and newly created habitats



What funding opportunities are there?

Various restoration measures must be implemented to achieve a good ecological status in Austrian rivers and streams. Experience has shown that the UFG subsidy programme is an essential driving force for the implementation of river restoration projects. It takes a sufficient budget for subsidies to be able to guarantee incentives for the improvement of rivers and streams. To invest in river restoration is to invest in humans' quality of life, in intact animal and plant habitats, poses an incentive for the Austrian economy and is an investment in the future.

15 years of successfully subsidising river restoration projects

To support the implementation of river restoration measures 15 years ago the subsidy programme for the promotion of aquatic ecology was legally anchored in the “Umweltförderungsgesetz” (UFG – Environmental Support Act) in 2008. Until 2027, the Federal Ministry of Agriculture, Forestry, Regions and Water Management will pay out 340 million euros in subsidies for projects aiming to improve the ecological status of rivers and streams.

The subsidy programme for river restoration supports communal projects led by municipalities, associations and cooperatives as well as those presented by competitors who are subject to the EU's subsidy regulation (such as hydropower providers). In addition, measures within the responsibility of the federal government are also financed. The subsidised and financed projects' main objectives are restoring continuity in rivers and streams and improving river structures. Moreover, measures to mitigate the impacts of water withdrawals, impoundments and hydropeaking are subsidised. The UFG subsidy programme for river restoration supports communal restoration projects by paying 60% of the eligible investment cost while the respective regional government grants an additional subsidy. Depending on the company's size, projects conducted by competitors receive subsidies covering 15% to 25% of the eligible investment cost. The respective regional government grants further subsidies to these projects as well.

Aside from subsidies for projects aiming to improve aquatic ecology, there are also grants for research projects relating to aquatic ecology since these build a foundation upon which further successful measures can be based.

Numbers, data and facts on the subsidy programme for river restoration

The UFG subsidy programme for river restoration has already had a positive impact in the last few years. The implemented measures play an important role in preserving and improving habitats as well as adapting to climate change. Further, they are increasing the recreational function of waters for humans.

The positive effects are not limited to aquatic ecology. A study on the economic importance illustrates the relevance of these investments to the local economy: For instance, investing one million euros in river restoration measures generates 1.22 million euros of added value and also creates and preserves 16 full-time jobs. This means the investments made due to the UFG subsidy programme to improve aquatic ecology have generated more than 480 million euros of added value. Furthermore, roughly 6,230 full-time jobs have been created and preserved in Austria.





The achievements at a glance

- 1,311 measures have been implemented so far
- 30% of the measures improve morphological structures
- 70% of the measures improve the continuity of rivers and streams
- 395 million euros have been invested as a result of the subsidised measures
- 316 kilometres of river stretches have been restored to a more natural state
- 1.8 square kilometres of space were given back to rivers
- 921 transverse structures have been modified to enable fish passage, allowing them to surmount an altitude of 2,400 metres

Further funding opportunities

Aside from the UFG subsidy programme for river restoration, there are more options available for those applying for subsidies.



CAP strategic plan

The subsidy programme for river restoration measures, which is part of the CAP strategic plan, mainly targets small and medium-sized bodies of water in rural areas. In this context, measures to improve aquatic structures and to achieve continuity at existing small hydropower plants with a bottleneck capacity of up to 500 kilowatt are subsidised.

Federal law promoting hydraulic engineering (Wasserbautenförderungsgesetz)

In the course of implementing flood protection measures through the “Wasserbautenförderungsgesetz”, the federal law promoting hydraulic engineering, measures to improve the ecological functionality of rivers and streams are also financed. This encompasses restoring fish passage over or around transverse structures or widening existing waterways to create additional water surfaces.

Biodiversity fund

The biodiversity fund of the Ministry for Climate Action also entails a funding opportunity for measures related to aquatic ecology. Projects carried out by municipalities, which are subsidised by the Federal Ministry of Agriculture, Forestry, Regions and Water Management’s UFG subsidy programme for river restoration, may receive an additional subsidy from the biodiversity fund. This can reduce the equity capital needed by a municipality to a range of 5% to 2%.

The European Union’s LIFE-Programme

Within the framework of the LIFE subsidy programme, the European Union has supported environmental and climate action in its member states since 1992. The projects vary from smaller local measures, such as connecting bodies of water and reconnecting tributaries, to large-scale structural improvements by restoring the natural river type and creating natural floodplains. Especially for large and comprehensive projects, LIFE financing is an essential further component when implementing measures to improve aquatic ecology.

As important as subsidising measures regarding river restorations may be, they are only one part of the efforts required to sustainably and comprehensively improve the ecological status of our rivers and streams. In particular, the implementation of measures to restore natural waters and typical habitats depends on the availability of land along the respective stretch of water. However, this often proves difficult due to intense land use and ownership statuses. Different parties need to collaborate in these situations to implement effective measures for the people and the environment.



What are some successful projects?

Through the UFG subsidy programme for the promotion of aquatic ecology, a lot has been achieved already. The projects contribute to creating and preserving intact aquatic habitats and safeguarding near-natural riverine landscapes and floodplains for all of us. A few selected measures and their positive ecological and economic effects are presented below.

Fish migration facility in Altenwörth

What were the deficits?

Ever since the hydropower plant in Altenwörth was built several decades ago, the continuity of the Danube had been suspended. Typical fish species in the Danube were no longer able to migrate upstream and reach areas of the Danube and its tributaries, which are essential habitats for them. Because the fish could not pass through this structure, their habitat was significantly restricted. If this is the case for an extended period, the fish population will decrease.

Which measures were implemented?

To allow fish passage again, the company VERBUND Hydro Power GmbH built a 12.5 kilometres long fish bypass as part of the project LIFE Network Danube Plus. This bypass starts at the Danube power plant in Altenwörth and ends at the power plant's reservoir in Greifenstein, enabling aquatic organisms to migrate upstream again. The created structure is currently the longest fish migration facility in Lower Austria.

In addition, structural measures such as creating gravel banks or various depths were implemented, considerably improving the aquatic habitats. The reconnection of the tributaries in Krems, Kamp and Mühlkamp and the measures surrounding the Danube's oxbow lake in Altenwörth were part of the project as well. In addition, modifying four culverts by the oxbow lake in Greifenstein, the so-called "Gießgang", significantly promotes the continuity between the Danube and its tributaries Schmida and Göllersbach.



Fish migration facility at the power plant Altenwörth during the construction phase

The fish bypass enables aquatic organisms to reach the habitats that are important to them and preserve their populations. The reconnection of the tributaries supports the large-scale ecological interconnection between the areas along the Danube, significantly improving the river's ecological status.

Project summary

- River: Danube
- Project area: Kirchberg am Wagram, Lower Austria
- Implementation period: 2020 to 2022
- Costs: roughly 11.84 million euros
- UFG subsidy: roughly 888,000 euros
- Financed by: VERBUND, the EU, the Federal Government, the Regional Government and Lower Austria's fishing association "Niederösterreichischer Landesfischereiverband"





The Naarn in the renaturation stretch in Hauswiesen

Renaturation of the Naarn in Hauswiesen

What were the deficits?

In the 1960s, the river Naarn lost its natural structures due to river training measures. It was straightened and moulded to a trapezoidal profile, and the riverbank was enforced by stones. This reinforcement affected the river ecosystem's functionality and led to decreased biodiversity.

Which measures were implemented?

To restore the river Naarn to its natural state, the left riverbank was lowered, giving the river more space to meander. The river can now traverse adjacent tributaries again when there is a high flow rate. In addition, preliminary steps towards creating gravel and sandbanks were taken, and suitable deciduous trees were planted at the riverbanks.

Elements to control the current and promote structural development, such as rhizomes, tree spurs, boulder baffles and wooden groynes, diversified the Naarn habitat. Varying widths and creating deeper potholes and shallow zones resulted in different depths with

varying flow velocities. This improved the available fish habitats significantly. Humans also benefit from the renaturation: the Naarn in Hauswiesen has become a popular place for recreation and swimming.

The water association “Wasserverband Machland” has also implemented renaturation measures in other stretches of the Naarn. These achieved longitudinal river connectivity as well as improvements for the riverine vegetation and fauna.



Structural river restoration measures in Hauswiesen

Project summary

- River: Naarn
- Project area: Perg, Upper Austria
- Implementation period: 2013 to 2014
- Costs: roughly 867,000 euros
- UFG subsidy: roughly 520,000 euros
- Financed by: the Federal Government, the Regional Government and the water association “Wasserverband Machland”



Renaturation of the Emmebach in Altach

What were the deficits?

Due to the continuous bank reinforcement with dams, the Emmebach's bed and bank dynamic in the municipality of Altach was very restricted. Stream regulation and bed load management in the upper reaches, a lack of shade and obstacles to fish migration enhanced this effect. As a result, habitats were lost and the connectivity between important biotopes was destroyed.

Which measures were implemented?

Measures to improve the Emmebach ecologically have been implemented along a roughly 2.5 kilometres long stretch in the municipality of Altach. The river was widened in two sections, and the river dynamic was supported by reinstalling a type-specific gravel bed and creating low and medium water channels with slightly meandering line structures. In addition, measures to improve the river's structure, such as the introduction of deadwood, were implemented. Along the riverbanks, dry locations, wetland habitats and a reed zone were created. Additional trees have increased the amount of shade. Moreover, flood control was improved.

These measures significantly enhance the habitat for aquatic organisms, the introduced deadwood contains microhabitats for typical fish species. Diverse new habitats were also created in the riparian zone. Additionally, the river benefits from more shade because type-specific trees and shrubs, such as white willows or black alders, were planted. Finally, by building a new cycle path along the riverbank the Emmebach can be experienced and enjoyed by the population again.



Renaturation project at the Emmebach in Altsch

Project summary

- River: Emmebach
- Project area: Altsch, Vorarlberg
- Implementation period: 2021 to 2023
- Costs: roughly 5.35 million euros
- UFG subsidy: roughly 3.21 million euros
- Financed by: the Federal Government, the Regional Government and the municipality of Altsch





Restored river gradient in the area of the former transverse structure in Kerschbaum

Continuity of the Sulm, Gasselsdorf/Kerschbaum

What were the deficits?

The Sulm was once a mostly meandering, vivid lowland river with lots of river loops, but it has been drastically changed due to numerous human interventions over the course of the last decades. In addition to being straightened, the river was also stabilised with bed sills and check dams, limiting its continuity.

Which measures were implemented?

To restore the river's continuity, the water association "Wasserverband Sulm" removed two transverse structures in the river Schwarze Sulm that did not allow passage for fish and replaced them with a boulder ramp, including restructuring measures. In Gasselsdorf, approximately 1.2 metres of the original check dam was removed, and its foundation was used as the base for the new 60-metre-long boulder ramp that allows fish passage.

In Kerschbaum, the river was restored to its original gradient, enabling continuity. In addition, five downstream transverse structures were modified to allow fish passage. By narrowing the riverbed, these stretches remain passable even during low flow periods. Moreover, the restructuring measures using deflecting groynes also significantly improved the quality of available habitats, especially for fish. Aside from the ecological continuity, the riverbed dynamic in Kerschbaum can now be classified as near-natural as a result of the implemented measures.



Boulder ramp in the area of the former transverse structure in Gasselsdorf

Project summary

- River: Sulm
- Project area: St. Martin im Sulmtal and St. Peter im Sulmtal, Styria
- Implementation period: 2018 to 2020
- Costs: roughly 195,000 euros
- UFG subsidy: roughly 117,000 euros
- Financed by: the Federal Government, the Regional Government and the water association “Wasserverband Sulm”



Improving the Pinka's ecology in Oberwart

What were the deficits?

Within the last decades, various usages have caused the river Pinka's ecological status to deteriorate within the municipal territory of Oberwart. The lack of continuity was also a major contributing factor. In addition, the town's residential areas, industrial zone and infrastructure were afflicted by several floods.

Which measures were implemented?

In order to achieve a near-natural river characteristic, meanders including a type-specific riverbed were created. The vast range of depths and flow velocities enabled the development of different habitats for aquatic flora and fauna. Gravel banks serve as suitable connectors between these habitats and their surroundings. Furthermore, a transverse structure was removed. An analysis conducted two years after these measures were implemented revealed that selective riverbank stretches were to be secured due to the river's development. These were designed neither to endanger the use of adjacent areas nor the ecological integrity while maintaining the improvement measures for a longer period of time.

In a parallel project, flood control measures were implemented to protect the municipality of Oberwart from a hundred-year flood event. To ensure river continuity, bypasses and a fish migration facility were added to allow fish passage around transverse structures. This project shows how important it is to treat topics related to aquatic ecology and flood risk management in an integrative manner.

These measures restored near-natural conditions in the river Pinka and significantly improved its ecological status. In addition, the spacious river stretch has become a popular recreation area.



Meanders of the Pinka upon completion of the construction process

Project summary

- River: Pinka
- Project area: Oberwart, Burgenland
- Implementation period: 2011 to 2020
- Costs: roughly 3.23 million euros
- UFG subsidy: roughly 1.94 million euros
- Financed by: the Federal Government, the Regional Government and the municipality of Oberwart



