



THE LIFE+ ALTE DONAU PROJECT

A partnership for the Alte Donau



Stadt  Wien

Reeds, rushes and grasses

With some 45 different species, the biodiversity of the lakeshore reed beds is gratifyingly high.

Reeds predominate, with other major species including bulrushes, reed canary grass, sedges, rushes and bur-reed as well as purple loosestrife, iris and common club-rush. The reed zone provides a safe habitat for many rare plants, among them the flowering rush and the yellow flag iris, which are strictly protected by law in Vienna. Species such as the European white waterlily, the yellow waterlily and the fringed waterlily flourish in the waterlily zone. Various protected tree species as well as some endangered ones grow around the lakeshore, including the basket willow, the black poplar and the small-leaved elm.

The Alte Donau: a rich history	4
Water quality over the years	5
The LIFE+ Alte Donau project	6
The Alte Donau Integrated Water Resource Management Plan	7
Near-natural shorelines for the Alte Donau	8
Management of submerged aquatic vegetation	10
New underwater plants	11
Overview map of LIFE+ measures	12
The biological filter bed	14
Recreation on the Alte Donau – new public facilities	16
Getting people on board	18
Public perspectives on the Alte Donau	20
Monitoring: Quantifiable success of the LIFE measures	22



© Felicitas Matern

THE ALTE DONAU is highly popular with the people of Vienna, boasts excellent water quality and provides a habitat for animals and plants in the heart of the city. However, escalating visitor numbers and climate change are posing new challenges for the lake.

Since the launch of the EU LIFE+ Alte Donau project in 2013, the City of Vienna has implemented a large number of measures. The ArbeiterInnenstrand and Strombucht sunbathing lawns have provided new bathing areas with free public access. Refuge zones in the water and re-naturalised stretches of lakeshore have helped strengthen the ecological balance, and an innovative filter bed in the Water Park ensures that a constant supply of fresh water is fed into the Alte Donau from the Neue Donau. With these measures, we are safeguarding the high quality of the Alte Donau for generations to come – an achievement I am very proud of!

Ulli Sima, Executive City Councillor for the Environment

PRESERVING A WATER HABITAT in the middle of a major city requires great vigilance and a lot of effort. The measures we have taken to preserve, and indeed improve, the Alte Donau are based on long-standing experience combined with the latest findings from the field of water resource management. Under the auspices of the EU project we have stepped up these measures and amalgamated them into an exemplary water resource management scheme. Serving as a model for other cities besides our own, our approach views the Alte Donau as a whole system: as a local recreation area, but likewise as a natural habitat of high ecological value, which means that divergent and sometimes contradictory objectives have to be reconciled.

I am convinced that we have succeeded in doing this over the past five years. As the gratifying monitoring results confirm, this concerted effort on behalf of the Alte Donau has entirely paid off.

Gerald Loew, Head of Municipal Department MA 45 – Water Management



© Wiener Wildnis

The Alte Donau: a rich history

Prior to the regulation of the Danube in the 19th century, the Alte Donau was the main channel of the river. When Johann Strauss (the Younger) composed his world-famous "Blue Danube Waltz" in 1867, the river still flowed in the bed of what is now the Alte Donau.



The Danube prior to regulation (1848)

The Danube in Vienna: livelihood and threat

Since time immemorial, the city of Vienna has been inseparably linked with the River Danube. The area around the river saw human settlement as early as the Stone Age. The riverside location brought numerous advantages: the abundance of fish ensured an adequate supply of food alongside the guaranteed water supply, while the river afforded protection from enemies and could also be used for transport and communication. This is why people repeatedly chose to settle at the very points where the mighty river was prone to overflow its banks at any time, destroying everything man-made in its path. Until the major regulation works completed in 1875, the Danube near Vienna consisted of countless main and subsidiary channels forming a constantly changing riverine wetland landscape up to 5km wide. Simple wooden bridges traversing the various arms of the river allowed transport and communications into the Marchfeld plain and onwards into Bohemia and Moravia.

Constant threat of flooding

Periods of extreme high water were a constant danger to settlements and bridges, however, and the region was repeatedly hit by devastating floods. Eventually, as soon as technical progress permitted, the Danube in and around Vienna was regulated from 1870 to 1875. It was agreed that all the various arms should be amalgamated into a single river channel. The so-called Danube Cut separated the old side-arms from the main channel and the system of riverine wetlands was almost entirely lost. Furthermore, the regulation works enabled the Danube to be improved for shipping, brought waterborne traffic closer to the city and, not least, allowed the construction of flood-proof bridges.

The Alte Donau as a new urban district

In 1875, what used to be the main bed of the Danube became the Alte Donau, a large shallow lake with a surface area of around 1.6km² whose hydrological dynamics have since largely been governed by groundwater, precipitation and evaporation. The ship mills there had to be closed down, and new uses such as fishing and ice production gained in importance. Blocks of ice were cut out of the frozen surface of the lake in winter and stored in deep earthen cellars for sale in the summer months.

Over time, the Alte Donau also became a popular destination for people in search of recreation and relaxation. Initial plans to develop the area for industry or use the lake as a major port facility were shelved following the break-up of the Austro-Hungarian Empire in 1918. The built-up areas gradually crept nearer and nearer to the lakeshore, businesses and leisure facilities sprang up, and the Alte Donau evolved into one of the most popular local recreation areas for the Viennese.



Bathers at the Gänsehäufel lido, around 1910

Water quality over the years

Thanks to a sophisticated water resource management scheme, the water quality of the Alte Donau has been good and stable for the last few decades. Yet that has not always been the case.

The Alte Donau – fed by groundwater

As a result of the straightening works, the bed of the River Danube deepened over the years. This had the effect of reducing groundwater levels in the areas north of the Danube, which in turn depleted the water level in the Alte Donau. In the 1960s and '70s the water level in the Alte Donau periodically became so low that swimming was impossible. The construction of the Neue Donau flood relief channel from 1972 to 1988 had a positive effect on the groundwater dynamics and the water balance in the Alte Donau. The water balance was additionally improved by the completion of the Freudenau barrage and hydroelectric plant in 1998.

Eutrophication of the Alte Donau in the 1990s

On the other hand, however, the flood protection measures and the construction of the hydroelectric plant kept the water level in the Danube constant, which greatly diminished the natural fluctuations in the groundwater table that had been largely dependent upon the varying level of the river. The exchange of water in the Alte Donau via the groundwater pathway thus declined, with the consequence that nutrients entering the water – e.g. from cesspits and contaminated sites – were no longer washed out to the same extent. The lake was thus overloaded with nutrients and subject to increasing eutrophication. By the early 1990s the Alte Donau was already attracting negative headlines in the media due to extensive blooms of cyanobacteria causing severe clouding and discolouration of the water. The water plants, so-called macrophytes, which until then had been the predominant vegetation in the lake, were no longer capable of binding all the nutrients. The free-floating microscopic plankton algae thus proliferated, the water became turbid and the macrophytes died off.

Restoration of the Alte Donau

In 1993, at the peak of this unfortunate development, the City of Vienna launched a comprehensive

programme of remedial measures. Within just a few years the nutrients had been extensively reduced with the aid of chemical water treatment using the so-called RIPLOX method. At the same time, measures outside the lake were initiated to minimise the inflow of nutrients. These included completing the local sewage system and connecting the nearby allotment garden plots to the public sewer network. A series of barrier wells was also installed near the former Donaupark/Bruckhausen rubbish tip to prevent inflow of nutrient-rich groundwater from the site.

Eventually, with the aid of an ongoing, comprehensive Water Resource Management system, it was also possible to stimulate the regrowth of the macrophytes. After just a few years the outstanding quality of the water in the Alte Donau had already been restored, and it has remained stable ever since.



© MA 45 – Archiv



© MA 45

A programme of remedial measures helped to significantly reduce the lake's nutrient load.



© MA 45

The lower section of the Alte Donau with the Dampfschiffhafen and Gänsehäufel islands

change is also having an effect on the Alte Donau, with higher water temperatures stimulating the growth of the underwater plants. As a shallow lake with an average depth of just 2.3 metres or so, the Alte Donau is already recording peak temperatures of up to 30°C. This causes problems for many aquatic animals, representing a further stress factor to compound the pressure of high visitor numbers.

Sustainable quality of life for all

The measures undertaken since 2013 within the framework of the LIFE+ project are playing an important role in safeguarding the Alte Donau for the long term, both as an ecologically valuable habitat and a popular local recreation area. One of the project measures, for instance, was the creation of near-natural refuge zones in the lake that can be used as shelter by the lake-dwelling animals. Numerous other measures are aimed at safeguarding the excellent water quality for swimmers and maintaining the good ecological status of the Alte Donau. These include, among others, the installation of a biological filter bed, new approaches to the management of the vital aquatic plants, planting of vegetation in the littoral zone and planting of habitat-appropriate tree species on the lakeshore. At the same time, the visitor facilities have been expanded, e.g. by opening up new grassy areas for public use. A dedicated set of measures served to inform and obtain feedback from the public and local businesses.

The LIFE+ Alte Donau Project

Like all bodies of water in urban areas, the Alte Donau is facing major challenges. The project "Integrated Management of the Urban Lake Alte Donau" – the LIFE+ Alte Donau project for short – is co-financed under the European Union's LIFE+ Programme and serves to manage the long-term development and safeguard the quality of the Alte Donau.

With a surface area of approximately 1.6km², the Alte Donau is one of the largest urban lakes in Europe. Its scenic beauty, near-natural surroundings, large number of grassy areas with public access and good transport links make it one of Vienna's most popular local recreation areas.

Challenges: escalating visitor numbers and climate change

Vienna's rapid population growth and the lake's central location mean that numbers of people visiting the Alte Donau have escalated over the past two decades, however, and are set to rise further in the future. Already today, up to 1.2 million bathers visit the lake in hot summers. Alongside the growing visitor numbers, climate



Key data

- Project title: Integrated Lake Management of the Urban Lake Alte Donau/Integratives Gewässer management des urbanen Stillgewässers Alte Donau (LIFE12 ENV/AT/000128)
- Short project title: LIFE+ Alte Donau
- Duration: July 2013 to March 2018
- Budget: EUR 3.6 million, 50% co-funded by the EU
- Coordinator: City of Vienna, Municipal Department MA 45 – Water Management

The Alte Donau Integrated Water Resource Management Plan

Alongside the measures implemented in and around the lake itself, the LIFE+ project also involved drawing up a so-called Integrated Water Resource Management Plan for the Alte Donau.

Integrated Water Resource Management

Integrated Water Resource Management is a strategy which does not focus solely on elements specific to the water resource itself (e.g. the water quality of the Alte Donau), but goes beyond that to look at the waterway as part of a wider whole system, including, for instance, the economic and/or social importance of an urban body of water. This sometimes gives rise to conflicting objectives, and calls for careful co-ordination of the resulting measures.

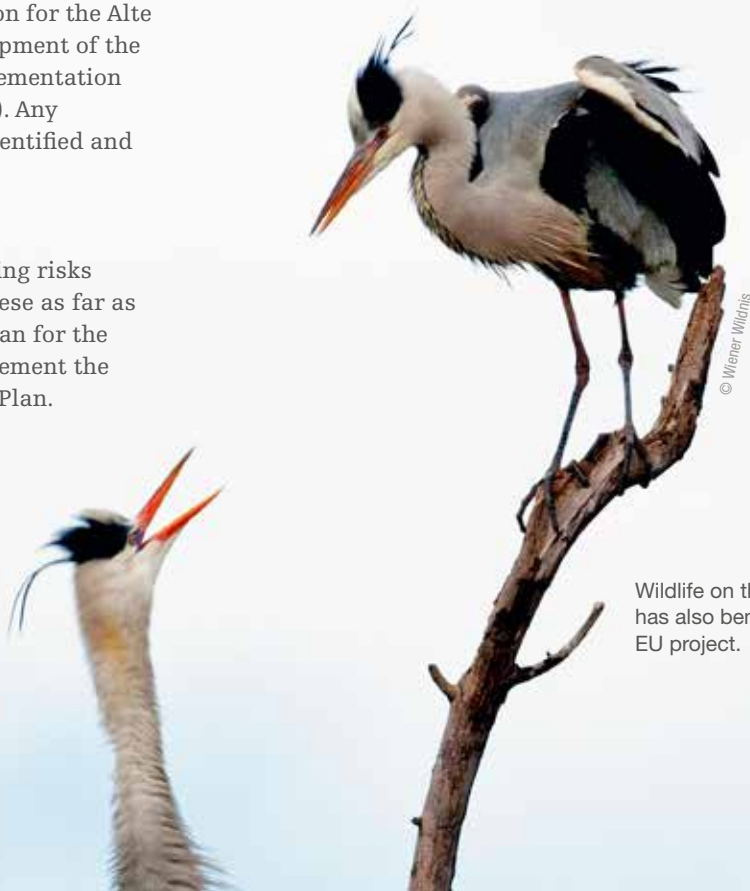
The Integrated Management Plan deals with the following segments as components of the Alte Donau system: ecological status and water balance, biocoenosis and natural habitat, climate, recreational space, and economic and social issues. Each segment is associated with a set of goals, which are to be achieved as far as possible and in a sustainable manner through implementation of the Integrated Management Plan. A goal achievement matrix is used to evaluate and measure the achievement of each set of goals, and on that basis to produce an overall evaluation for the Alte Donau as a whole. This allows the development of the Alte Donau to be evaluated over the implementation period of the LIFE+ project (2013 to 2018). Any undesirable developments can thus be identified and taken into account in future measures.

Risk Management Plan

Since management is also about identifying risks and impending threats and mitigating these as far as possible, a separate Risk Management Plan for the Alte Donau was also elaborated to complement the Integrated Water Resource Management Plan.

The Alte Donau Risk Management Plan equips us with a strategic basis for action in the event of disruptive incidents (e.g. contamination with harmful substances) or undesired developments (e.g. deterioration of water quality) and allows the municipal administration to mount a fast and efficient response. On the other hand, it also permits early identification of potential threats to the Alte Donau waterway system and allows preventative measures to be taken before an incident or development occurs.

The two management plans complement one another, and will continue to be revised and updated once the project has been completed. Together they provide the strategic basis for ongoing sustainable management of the water resource Alte Donau.



© Wiener Wildnis

Wildlife on the Alte Donau has also benefited from the EU project.

Near-natural shorelines for the Alte Donau

In heavily used bodies of water, near-natural refuge zones are especially important in maintaining ecological function. The shoreline zones, in particular, provide vital shelter for animals and plants.

In 2015, the shores of the Alte Donau were assessed according to ecological criteria. The assessment showed that some 25% of the lakeshore is near-natural in character (e.g. with reed beds), while 15 per cent is well structured. The major proportion of 60%, however, consists of walled banks and has no typical lakeshore vegetation.

Objective: one-third near-natural lakeshore

The long-term goal of the City of Vienna is to increase the proportion of near-natural stretches of lakeshore to at least one-third of the perimeter of the Alte Donau. Within the framework of the LIFE+ project, two stretches of lakeshore on the upper section of the Alte Donau were chosen as pilot zones for re-naturalisation. In addition, a large number of individual measures were also implemented to safeguard the ecological function of the Alte Donau and improve biodiversity on land

and in the water. Reed beds in danger of drying out have been rejuvenated, for example, and deadwood has been introduced at various points around the lake to provide shelter for fish. Planting of wildflower strips in several less frequented areas close to the lakeshore has improved biodiversity on land, supplying nectar for a large number of honey bee and wild bee species as well as bumblebees and butterflies. In addition, the number of near-natural stretches of lakeshore has also been substantially increased by means of natural succession, i.e. as a result of deliberate less intensive management of the shoreline vegetation. Encouragingly, a review of overall progress shows that the share of near-natural stands of reeds has risen by approx. 30% as a result of measures implemented under the LIFE+ project.

Pilot projects

On the 450m stretch of lakeshore between Drygalskiweg and Mühlshüttelgasse, stones and pebbles have been piled up on the lakebed and then planted with various types of reeds. The second stretch of lakeshore to be re-naturalised in this way is in the northern section of the Alte Donau at Broßmannplatz. Here, bundles of branches have been fixed to the lakebed and planted with reeds, and a waterlily zone has been planted in the water.



The Alte Donau provides a habitat for 72 different species of water plants.



The reed beds have expanded by approx. 30% as a result of the LIFE+ measures.

New sunbathing lawns: ecology and recreation go hand in hand

Opportunities to instal new near-natural zones are limited on account of the existing man-made structures und recreational facilities. However, it does not necessarily follow that ecologically valuable stretches of lakeshore cannot be used for anything else. The near-natural lakeshore zones of the two new sunbathing lawns ArbeiterInnenstrand and Strombucht, for instance, have been preserved and indeed expanded, despite having been opened for public use.

Measures to prevent drying out of reed beds

Reed beds are important habitats for young fish, amphibians and dragonflies as well as a breeding ground for large numbers of reed-dwelling birds. Over time, however, many of the stands of reeds in the Alte Donau have largely dried out and been lost as a habitat for aquatic organisms. To counteract this process, some patches of reeds have therefore been removed to create small pools and ponds for amphibians and young fish. These can be found on the western shore of the Kaiserwasser arm, alongside Wagramer Straße and around the southernmost tip of the Alte Donau.

New refuge zones in the water

In little-used zones of water close to the lakeshore, a number of permanent refuge zones have been created in which the submerged aquatic vegetation is left unmown. These zones serve as undisturbed spawning grounds and areas of shelter, chiefly for fish.

Deadwood as a habitat

Deadwood is a valuable structural element and habitat in bodies of water, being colonised by countless invertebrates and providing shelter for fish. Away from bathing areas, e.g. in the right arm of the lower section of the Alte Donau, deadwood in the form of tree trunks has therefore been placed in the lake, and trees which have been felled by beavers or fallen into the water for other reasons are left where they are.

Planting of young trees around the Alte Donau

Mighty old black poplars and willows characterise the typical landscape around the Alte Donau. Close to 1,200 trees line the grassy areas around the lakeshore. Many of these huge and impressive old trees have now reached their natural age limit. In order to ensure the long-term preservation of the typical tree species around the Alte Donau, a total of 245 new young trees of habitat-appropriate species have been planted or left in place under the auspices of the LIFE+ project, and invasive,



Pools for young fish have been created in dried-out reed beds.



A near-natural stretch of lakeshore (through-cut to the Kaiserwasser arm).

non-native species (neophytes) such as ailanthus and robinia have been removed.

Living with beavers

The last beaver to be killed in the Vienna region was back in 1863, i.e. well before the regulation of the Danube. For the next 100 years or more, beavers were extinct in Austria. It was not until the 1970s that beavers were re-introduced in the wild in the Danube Wetlands National Park, subsequently spreading out from there to colonise waterways throughout Vienna. There are currently three resident beaver families on the Alte Donau, which is the maximum number the potential available habitat can support.

Co-existing with beavers in urban areas does require measures to be taken to protect trees, however, because in autumn and winter these purely vegetarian animals fell trees for food. Wire tree guards have therefore been installed on many trees around the Alte Donau. To safeguard the beavers' food supply, willow and poplar saplings have been planted behind protective fencing under the auspices of the LIFE+ project. After a number of years, the young trees will be given over to the beavers as winter food.



The Alte Donau provides a habitat for over **20** fish species, **3** beaver families, large numbers of waterfowl and **27** species of dragonfly

Management of aquatic vegetation

Submerged plants, so-called aquatic macrophytes, are vitally important in maintaining the excellent water quality of the Alte Donau. For many years now, the City of Vienna has been mowing the underwater plants in the peak summer season to allow the lake to be used for swimming.

Submerged plants (aquatic macrophytes) bind nutrients, thus minimising the growth of plankton algae and reducing turbidity. The oxygen they produce through photosynthesis maintains the lake's self-cleaning capacity. The dense stands of underwater vegetation are also a valuable habitat for fish, dragonfly larvae, small crustaceans and numerous other aquatic invertebrates.

The predominant aquatic plant in the Alte Donau is spiked water-milfoil (*Myriophyllum spicatum*), the dense stands of which can be a hindrance to boating and swimming. For some two decades now, the City of Vienna has been employing contractors to mow the submerged aquatic vegetation and prevent it from interfering with people's recreational enjoyment of the lake. Municipal Department MA 45 – Water Management is responsible for the strategic management of the mowing schedule.

Huge proliferation of underwater plants

Although a sharp decline in the submerged vegetation cover was observed in the years 2009 to 2013, there has been a huge proliferation of underwater plants since 2014. The weight of mowed material in 2013 was around 72 tonnes, a quantity that had already increased 30-fold by 2016 (2,100 tonnes). In 2017, some 2,700 tonnes of material were mowed. Aquatic vegetation growth is influenced by nutrient availability, temperature and light conditions, though the exact cause of the fluctuations has not yet been conclusively explained. This drastic increase in underwater plant growth poses a major challenge for the City of Vienna's mowing management scheme. New optimization measures have been developed and implemented within the framework of the LIFE+ project.

New: DGPS-based management of aquatic vegetation

Once a fortnight from around March to October, the submerged aquatic vegetation cover of the entire Alte Donau is surveyed using echo sounders and mapped. As part of the LIFE+ project, special hard- and software has been developed to allow precise steering of the mowing boats vis DGPS. The results of the echo sounder surveys are used to produce digital maps that allow the mowing boat operators to precisely target their activities.

Both the digital vegetation map and the current position of the mowing boat, established using DGPS, are visible to the mowing boat operator on a screen. The movements of the mowing boat are also recorded, so it is possible to see which areas have already been mown. A bathymetric chart integrated in the software allows the cutter bar to be adjusted to the exact depth required. This new system ensures pinpoint planning, implementation and recording of the mowing operations.



"Berky" the mowing boat in action

New underwater plants

The predominant aquatic macrophyte species in the Alte Donau is the high-growing spiked water-milfoil. Low-growing aquatic plants would require less mowing and hence be easier to manage.

The Alte Donau originally contained a range of different submerged aquatic plant species, with low-growing species predominating. As a result of the severe deterioration of the water quality in the 1990s, the underwater plant population was almost completely obliterated. Spiked water-milfoil colonised the entire lake once the ecological balance had been restored, and currently accounts for 90% of the biomass in the Alte Donau. With an average water depth of just 2.3 metres, the tall-growing plants reach the surface in many places.

The predominance of spiked water-milfoil is not only problematic with regard to the mowing required. Monocultures are also less resilient to disturbances. If this species were to be lost for any reason, the majority of the Alte Donau would suddenly have no aquatic macrophytes.

Low-growing macrophytes for the Alte Donau

It is hoped that the targeted introduction of new species will improve plant biodiversity in the Alte Donau while simultaneously reducing the amount of mowing required in the long term. Experimental planting of low-growing aquatic macrophytes has been carried out within the framework of the LIFE+ project. Various stoneworts, common mare's tail and several species of pondweed have been successfully tested and

introduced to the lake. The experiments have shown that stoneworts in particular grow very well in the Alte Donau, but tend to be eaten by fish, especially rudd. In order for stoneworts to permanently recolonise the Alte Donau, they will require large stable areas where they can grow out of reach of fish.

Large-scale experimental planting of seven stonewort species

In spring 2017, seven low-growing stonewort species were planted out for the first time over a large area on the bed of the Alte Donau. The area covers approx. 2.5ha and is situated on the right side-arm of the lower section of the Alte Donau close to the new Strombucht sunbathing lawn, one of the two created as part of the LIFE+ project. A number of preparatory steps were required prior to planting, including deep mowing followed by clearance of the high-growing plants. To protect the young plants from grazing by fish, as many herbivorous fish as possible were shut out of the area; predatory fish were then released and the area surrounded by a fine mesh net.

The growth of the plants is subject to constant monitoring, and the experts are very satisfied with the development of the young stoneworts. Plans provide for the successive expansion of the planted area over the coming years.



© Wiener Wildnis (2x)

The new aquatic macrophytes are individually planted in the bed of the Alte Donau by divers.



Measures implemented under the LIFE+ Alte Donau project

CIRCULAR ROUTE

-  Promenade
-  Footpath



DID YOU KNOW that ...

... **ice used to be cut out** of the frozen Alte Donau in the winter and stored for use in the summer? Today, Eiswerkstraße ("Iceworks Road") in the Kaisermühlen district recalls this earlier use of the ice.

... **Laberlweg ("Loaf Way")** got its name from the loaves of bread ("Laberln") which were carried along this route from the bakeries to the inns of the Franz Josef's Land entertainment district?

... in 1908 there were plans to build a **large port facility** on the Alte Donau?



Planting of low-growing aquatic macrophytes



Biological filter bed in the Water Park



Recreational facilities



New hydrological measurement station



Re-naturalised stretches of lakeshore



Barrier-free paths



Unowned stretches of water (refuge zones)




New planting of young trees



LIFE+ Alte Donau information boards



Biological filter bed



In order to safeguard the water quality of the Alte Donau for the long term, sustainable hydrological management measures are required to refresh the lake water. A biological filter bed installed in summer 2016 ensures a permanent inflow of water from the Neue Donau.

The regulation of the Danube and the construction of the Freudenau hydroelectric plant greatly diminished the natural fluctuations in the groundwater table that had been largely dependent upon the varying level of the river. The exchange of water in the Alte Donau was severely limited by the reduced inflow of groundwater, which in turn also depleted the lake's self-cleaning capacity.

For many years now, Municipal Department MA 45 – Water Management has regularly carried out two important water management measures, namely reducing the water level in the Alte Donau every spring, and whenever necessary replenishing the lake water by temporarily feeding in water from the Neue Donau. These procedures are complicated, however, and can only be implemented for a limited period of time. A new biological filter bed installed in summer 2016, the centrepiece of the LIFE+ project from the hydraulic engineering point of view, now allows a continuous inflow of water from the Neue Donau.

How the filter bed works

The inflow of water from the Neue Donau compensates for the water deficit in the Alte Donau. The main function of the new biological filter bed is to remove nutrients, primarily phosphates, from the water before it is fed into the Alte Donau.

The water is fed in via an intake on the surface of the filter bed and then passes through the body of the filter from top to bottom. As it flows through, microorganisms are eliminated, suspended solids filtered out and nutrients broken down and absorbed by the biofilm coating on the surface of the granulate.

The filtered water collects in a chamber underneath the filter bed (housing a RIGOL system) and is then discharged via drainage pipes and a sluice structure that regulates the flow. A major advantage of this filter system is its operational flexibility, with a total of five different modes of operation available. These include

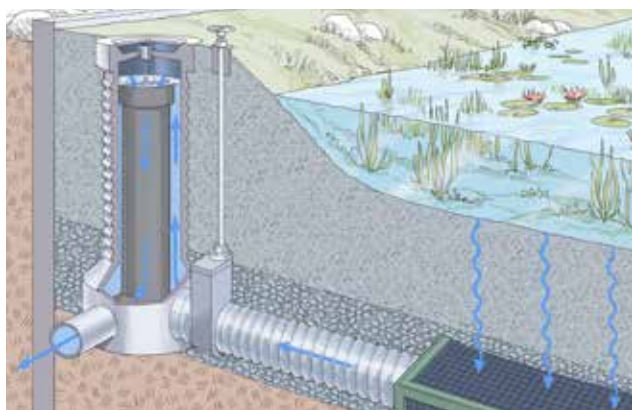


© MA 45



© Wiener Wildnis

The filter bed went into operation in August 2016 after a five-month construction period.



© Polyplan GmbH

Route of water through the filter bed

the option of channelling water from the Water Park through the filter bed via a pump system to specifically reduce waterborne nutrients in the Water Park area.

Stabilization of pH values

When required, the water can also be enriched with calcium in the body of the filter before being fed into the Alte Donau. This enhances the buffering capability of the lake water to help counteract fluctuations in pH value during the summer months.

Landscaping to create a new local recreation area

The embankment enclosing the filter bed is topped by a promenade furnished with three contemporary seating elements and waste bins, creating a landscape design feature that serves as a new local recreation area for visitors to the Water Park. The surface of the filter bed has been landscaped with water plants to enhance the visual attractiveness of the installation.

Recreation on the Alte Donau – new public facilities

Numerous measures implemented under the LIFE+ project have brought about improvements for recreational users of the lake. Two new, near-natural grassy areas have expanded free public access to the water. A new signage system and an app help visitors find their way around and provide useful, on-the-spot info.

The Alte Donau is a magnet for city-dwellers in search of relaxation, offering a wide range of leisure facilities. Sailing and windsurfing schools, boat-hire companies, rowing clubs, an angling association and numerous restaurants, cafés and bars make the Alte Donau a recreation hotspot. Bathers can choose from four public lidos, a number of lidos run by clubs and associations, five grassy sunbathing lawns and eleven spacious bathing jetties run by the City of Vienna for free public use. And last but not least, the promenade encircling the lake is perfect for cycling, jogging and strolling, even in the cooler months.

In line with sustainable urban development principles, the Alte Donau is to be preserved and improved as a valuable local recreation area for city-dwellers. The objective here is not so much about adding to the leisure facilities as about reconciling the interests of the various users in a manner compatible with the Alte Donau ecosystem.

The new ArbeiterInnenstrand sunbathing lawn

Whereas free public access to the shoreline of other Austrian lakes is becoming increasingly rare, Vienna has opted to pursue a different policy. Under the auspices of the LIFE+ project the City of Vienna took over the spacious lakeshore grounds of the former Arbeiterstrandbad lido on the upper section of the Alte Donau, carefully regenerated the site and opened it to the public. With an area of 23,000 square metres, this is the largest green space the City of Vienna has restored to public access for decades.

The dilapidated old bathing huts and a jetty were demolished, while the stands of old trees and the reed beds along the lakeshore have been largely preserved. Over 60 new trees of habitat-appropriate species such as poplars, willows and limes have been planted. Permanent public toilets and wooden benches and tables have been installed for use by visitors, and the rest has been left in its natural state.

Commercial use of the lakeshore

Commercial use of the Alte Donau lakeshore has intensified substantially in recent years. At present there are eleven boat-related businesses, i.e. boat-hire companies and sailing schools, plus rowing, sailing and other water sports clubs. In total, some 1,500 boats are registered on the Alte Donau.





Up to **1,200,000** bathers visit the Alte Donau every year

© Wiener-Witchnis



The new Strombucht sunbathing lawn

A further attractive free bathing spot was made accessible to the public in July 2016 with the opening of the Strombucht sunbathing lawn on the lower section of the Alte Donau. Formerly occupied by the lido of a private organisation, the site covers approx. 6,000 square metres and is owned by the City of Vienna. As part of the LIFE+ project it was regenerated as a near-natural bathing area with an adjacent sunbathing lawn. The original reed beds were left untouched, as were most of the old trees.

The new Donaufeld relaxation bays

Being the former eroding bank of the River Danube, the stretch of lakeshore between Drygalskiweg and Mühlenschüttelgasse on the upper section of the Alte Donau features steep embankments and is therefore not very well suited for bathing. In summer 2016, 20 new grassy terraces with wooden backrests were installed to create level relaxation bays for visitors. Six flights of steps down to the water were refurbished and additional benches installed.

New barrier-free sections of footpath

To improve access to the Alte Donau for people with limited mobility, the barrier-free sections of footpath have been extended. The approx. 400-metre footpath along the Kaiserwasser arm is now barrier-free, for example, and steps on the lakeshore promenade have been replaced by ramps.

The Kaiserwasser arm
 In 1889 this became the centre of an entertainment district known as "Franz Josef's Land" featuring pleasure boats, inns and fairground amusements – a popular leisure and bathing spot of its time.



© MA 45



© Shutterstock

A signage system and an app help visitors find their way around and supply useful and interesting info about the Alte Donau.

New signage system for the Alte Donau

In summer 2015, a new signage system was installed on the roads and paths around the lake to help visitors find their way around. Each of the 20 wayside information pillars indicates the current location and has a map showing the way to the nearest restaurant, dog zone, public toilets and other facilities.

The Wiener Wasserweg walking trail app

With its walking trail app, Municipal Department MA 45 – Water Management has developed a complementary digital service for visitors to the Alte Donau. Featuring 21 virtual stopping points around the lake, the app provides useful info and fascinating facts about each location. The 13-kilometre trail takes in near-natural stretches of lakeshore as well as historic allotment garden plots and public lidos. It also provides easy navigation to public lidos and bathing spots, cafés and restaurants, boat-hire facilities and public toilets.

► www.wiener-wasserweg.at

Getting people on board



Over 7,000 visitors flocked to the opening party of the ArbeiterInnenstrand sunbathing lawn.

Public information and awareness-raising measures have played a key role in the LIFE+ Alte Donau project. Events and workshops gave the public an insight into the great ecological, economic and social importance of the Alte Donau.

Beach party at ArbeiterInnenstrand, 9-10 May 2015

On 9 and 10 May 2015, the newly refurbished sunbathing lawn on the upper section of the Alte Donau was officially opened with a grand beach party attended by Executive City Councillor for the Environment Ulli Sima. Picnicking facilities, sport and games, a DJ lounge, music and fun activities for children attracted over 7,000 visitors.

Vienna Biodiversity Day, 5-6 June 2015

In 2015 the Alte Donau hosted Vienna's Biodiversity Day, an initiative launched by GEO magazine that takes place annually throughout Central Europe. Participants in the event attempt to find as many wildlife species as possible in a defined area within a 24-hour period. The event was co-organised under the auspices of the LIFE+ project by Municipal Department MA 45 – Water Management and Municipal Department

Ownership of the Alte Donau

The Alte Donau is owned by the Donauhochwasserschutz-Konkurrenz (DHK*) (Danube Flood Protection Association), except for some small areas around Gänsehüfel island and the Dampfschiffhaufen peninsula which are under the sole ownership of the City of Vienna.

*The DHK is jointly owned by the Provinces of Vienna and Lower Austria and the Republic of Austria. via donau - Österreichische Wasserstraßen-Gesellschaft mbH manages the land on behalf of the DHK. Maintenance works are carried out by Municipal Department MA 45 – Water Management and via donau on behalf of the DHK.

MA 22 – Environmental Protection. A wide variety of day and night-time wildlife spotting trips, including snorkelling tours, were on the activity programme, which took place in and around the Kaiserwasser arm of the Alte Donau.

Free workshops with the "Umweltspürnasen"

The environmental education organisation Umweltspürnasen-Club is run by young biologists and ecologists and offers wildlife discovery tours in Vienna for children and young adults. As part of LIFE+ the organisation designed workshops and guided walking tours on the Alte Donau for families, schools and kindergarten groups. The resulting series of 15 two- to three-hour workshops and walks took place from March to December 2014. All of the events were fully booked, with a total of 350 children, young people and adults taking part in the programme.

Alte Donau – urban walks with expert guides

Six expert-led, free-of-charge "urban walks" organised during the LIFE+ project period were aimed at anyone interested in finding out more about the formation, history and ecology of the lake and the hydraulic engineering measures carried out. The tours were designed, organised and led by external experts and took place on foot or by boat.

Cargo bike/mobile info stand

In 2014, 2015 and 2016 a LIFE-branded cargo bike doubling as an info stand saw intensive use as a mobile public information point at hotspots around the Alte Donau.

Alte Donau Round Table

The "Alte Donau Round Table" was set up within the framework of LIFE+ Alte Donau to improve the exchange of information between the City of Vienna and the businesses, clubs and associations on the lake. The discussions focus on the management of the aquatic vegetation, which is of prime interest to the local leisure businesses. The Round Table discussions have been held at least twice a year since 2015, and Municipal Department MA 45 – Water Management plans to continue them in the coming years.



© MA 45



© C.Fürthner/PD



© MA 45

Events and mobile info stands gave the public an opportunity to find out more about the LIFE+ project.

Public perspectives on the Alte Donau

In 2014 the LIFE+ Alte Donau project launched a socio-economic study to gather data about user behaviour and assess the satisfaction of various demographic groups with the facilities on the Alte Donau.

A socio-economic study carried out as part of LIFE+ Alte Donau gathered data about user behaviour, social space and public space around the lake, and a wide range of user groups were surveyed.

Data from the public lidos were analysed, among others, and user surveys and visitor counts were carried out at various hotspots around the Alte Donau. At the same time, an online survey aimed at the general public was published on the website of the LIFE+ project and questionnaires were also sent out to clubs and associations, schools and businesses. In addition, interviews with visitors to the Alte Donau were conducted at mobile LIFE+ info stands during the summer season. The aim of the questionnaires and interviews was to gain an insight into how satisfied people are with the Alte Donau, so that their input and ideas can be taken into account in future measures relating to the lake. The respondents were also asked about the visibility of the LIFE+ project and how effective they thought it had been. A total of 1023 respondents took part in the surveys.

Here is an overview of some of the results:

To summarise, it can generally be said that the special atmosphere of the Alte Donau with its mix

The cradle of sailing

The Alte Donau is known as the cradle of Austrian sailing. The first rowing and sailing clubs soon opened premises here, while boat-hire companies offered affordable equipment hire and training facilities. Sailing quickly grew in popularity, with the first regattas being held in 1880.

of nature and wildlife, free (sun) bathing areas and places to eat and drink is rated very highly by the respondents. People appreciate the Alte Donau as a tranquil, laid-back place, and do not want to see it further "eventified".

- Around half of the respondents think that the lakeshore is a pleasanter place to spend time than it was before.
- People are also very satisfied with the water quality, which respondents think has improved over the past few years.
- The proliferation of submerged aquatic vegetation over the past two years has been noticed, and many respondents say it poses a problem for bathers and boaters. The measures taken under the LIFE+ project to improve management of the underwater plants are therefore welcomed.
- The majority of the respondents say that the grassy areas with their large shady trees are their favourite feature of the Alte Donau.
- Accordingly, some 70% of respondents say that preserving and extending the stretches of near-natural lakeshore with free public access is very important.

© Wiener Wildnis





length of lakeshore **17km**

deepest point around **7m**

average depth **2.3m**

surface area approx. **1.6km²**
(equivalent to 200 football pitches)

- According to the survey results, there is potential for conflict between sport sailors/rowers and pleasure boaters, and also between cyclists and pedestrians. People bringing dogs to bathing areas and sunbathing lawns despite the ban on dogs are another frequently mentioned source of conflict.

The LIFE+ project is visible to the public

- People's awareness of the LIFE+ Alte Donau project has increased. In the online survey carried out in 2015, 37% of respondents said that they had heard of the LIFE+ Alte Donau project. In the 2017 survey, the figure had risen to 52%.
- The opening to the public of the two free, near-natural sunbathing lawns, ArbeiterInnenstrand and Strombucht, and the bathing jetties installed by the City of Vienna have left an especially positive impression on respondents.
- Regular visitors also noticed that embankments had been upgraded, trees planted and stretches of lakeshore restored to their natural state.

The most popular spots

With over 40,000 bathers visiting, the most heavily used stretch of lakeshore is the Dragonerhäufel sunbathing lawn on the right bank of the upper

section of the Alte Donau, followed by the Rehlacke sunbathing lawn on the lower section of the lake. The ArbeiterInnenstrand sunbathing lawn, which was newly opened to the public as part of the LIFE+ project, is also very frequently visited, being especially popular among families with children.

Dragonerhäufel sunbathing lawn



© Brigitte Hozang

Monitoring: quantifiable success of the LIFE+ measures



© Ch. Houdak

The experts commissioned to monitor the project's success looked at so-called indicator organisms such as fish, invertebrates, reed species and submerged aquatic plants. Further monitoring criteria included water quality, management of underwater plants and the visual landscape quality of the Alte Donau. Progress made with regard to biodiversity was also documented, with a special focus on protected and endangered fauna and flora.

Expansion of near-natural zones

Thanks to the setting aside of unmown refuge zones in the lake, the partial re-naturalisation of reinforced banks, rejuvenation of reed beds, and above all by allowing the lakeshore to develop naturally without interference, the share of near-natural stretches of lakeshore rose substantially during the project period. This means that the negative impact of growing user numbers on the flora and fauna in these zones has been significantly reduced.

Approx. 1,500 metres of lakeshore saw a significant structural improvement. As a consequence of the project measures, the extent of intact reed beds rose from around 6,000 metres to some 8,000 metres. Young willows were planted and neophytes removed on around 300m² of land close to the lakeshore.

Visual landscape and recreational value

To evaluate the visual landscape, the experts used criteria such as spatial structure, variety, naturalness and originality. The lake's recreational value was assessed by means of user surveys. The assessment shows that there has been a noticeable improvement in the visual landscape, especially through tree planting, shoreline restructuring and enhanced spatial structure, but also thanks to attractive urban furniture (e.g. picnic tables, benches and jetties).

Measures benefit fish

With over 20 different species, the Alte Donau is highly diverse in terms of fish. Restructured shorelines and unmown refuge zones in the water foster the development of young fish. In quantitative terms, there is always a time lag before positive impacts on the fish population are felt; however, initial results indicate that both the restructured stretches of lakeshore and the refuge zones are well accepted by fish.

New dragonfly species

Richly structured habitats also promote invertebrate biodiversity. The longer-term development of the dragonfly fauna on the Alte Donau is very pleasing, with a survey during the project period documenting 27 dragonfly species. A third of the species occurring on the Alte Donau

An accompanying monitoring process was carried out to review the success of the LIFE+ project on the basis of specific indicators and parameters.



Habitat for over 20 species of fish

The fish population of the Alte Donau is dominated by whitefish species such as rudd, bleak, silver bream, common bream and carp. The lake is also home to predatory fish species like pike, zander and wels catfish. These fish species are adapted to the living conditions in clear oxbow lakes with dense vegetation and warm summer temperatures. In order to thrive they need reed beds and underwater plants to use as cover for hunting and for spawning.

today are actually categorised as endangered on the Red List of Austrian Dragonflies. Likewise especially gratifying is the fact that a species identified in the EU Habitats Directive as being of European importance – the lilypad whiteface – has been recorded on the Alte Donau for the first time.



© Iris Fischer

The lilypad whiteface dragonfly

Living space for three beaver families

The measures implemented under the LIFE+ project are designed to maintain a stable beaver population on the Alte Donau and ensure the peaceful coexistence of humans and beavers. The monitoring results show that it has been possible to maintain a constant population of three beaver families, numbering a total of eleven to

fourteen animals. The Alte Donau is a habitat of high quality for these herbivorous rodents. Despite the wide-ranging tree protection measures installed by the City of Vienna, the beavers have an adequate food supply, even in winter.

Evaluation and management of underwater vegetation

The experts also documented the ongoing development of the submerged aquatic vegetation with a special focus on biodiversity and the progress of the low-growing macrophytes, the share of which was increased again for the first time in the course of the LIFE+ project.

Mowing of the submerged aquatic vegetation poses a major challenge in the management of the Alte Donau. Due to the proliferation of the underwater plants in the past few years, innovative and more efficient measures are required to prevent them from interfering with people's recreational enjoyment of the Alte Donau. Within the framework of the LIFE+ project, experts addressed the challenge of optimising the City of Vienna's mowing schedule to deal with the proliferating vegetation. Numerous improvements and adjustments were implemented as part of the project. The development and testing of GPS systems and digital vegetation maps aboard the mowing boats, for instance, have made the mowing operations much more efficient. The project also yielded valuable findings with regard to optimum mowing depth, mowing priority and time sequence.

Filter bed: impact on water quality and water balance

The impact of the new biological filter bed in the Water Park on the water quality and water balance of the Alte Donau was also evaluated. The filter bed allows fresh, filtered water from the Neue Donau to be fed into the Alte Donau. Tests performed in the inflow and outflow zones of the filter bed showed that the passage through the biological filter reduces the phosphate content of the infed water by an average of 25%. The chlorophyll content of the water is reduced by a hefty 75%, and the suspended solid content by 50%.

In its first one-and-a-half years of operation, the filter bed fed in a volume of fresh water roughly equivalent to the entire volume of water in the upper section of the Alte Donau. The new filter bed is thus an effective water management tool that is able to ensure a continual inflow of impeccable quality water to refresh the water in the Alte Donau.



MUNICIPAL DEPARTMENT MA 45 – WATER MANAGEMENT. We're at your service

FEEDBACK, SUGGESTIONS, COMPLAINTS?

Your contact for all matters relating to Vienna's waterways:
Municipal Department MA 45 – Water Management
Am Brigittenauer Sporn 7, 1200 Vienna
Tel.: 01/4000-96530
E-Mail: post@ma45.wien.gv.at
www.gewaesser.wien.at

KEEP INFORMED WITH OUR ONLINE NEWS

The latest news on Danube Island,
Alte Donau & Co:
www.facebook.com/donauinsel



Printed in compliance with the Austrian Ecolabel's "Printed Material" guideline. gugler® print, Melk, Ecolabel no. 609, www.gugler.at



Highest standard of eco-effectivity. Cradle to Cradle™ certified printed products innovated by gugler®.



This paper is from sustainably managed forests and certified sources. www.pefc.at



CREDITS: Publisher: Municipal Department MA 45 – Water Management, 1200 Vienna, Am Brigittenauer Sporn 7 **E-mail:** post@ma45.wien.gv.at **Text & editorial content:** Thomas Ofenböck, Mathilde Urban/MA 45 **Design & graphics:** message Marketing & Communications GmbH, www.message.at **English translation:** Angela Parker plain.english@chello.at **Cover photos:** Wiener Wildnis **Printed by:** gugler GmbH on environment-friendly paper from the "ÖkoKauf Wien" sample folder. Vienna, March 2018

www.life-altedonau.wien.at