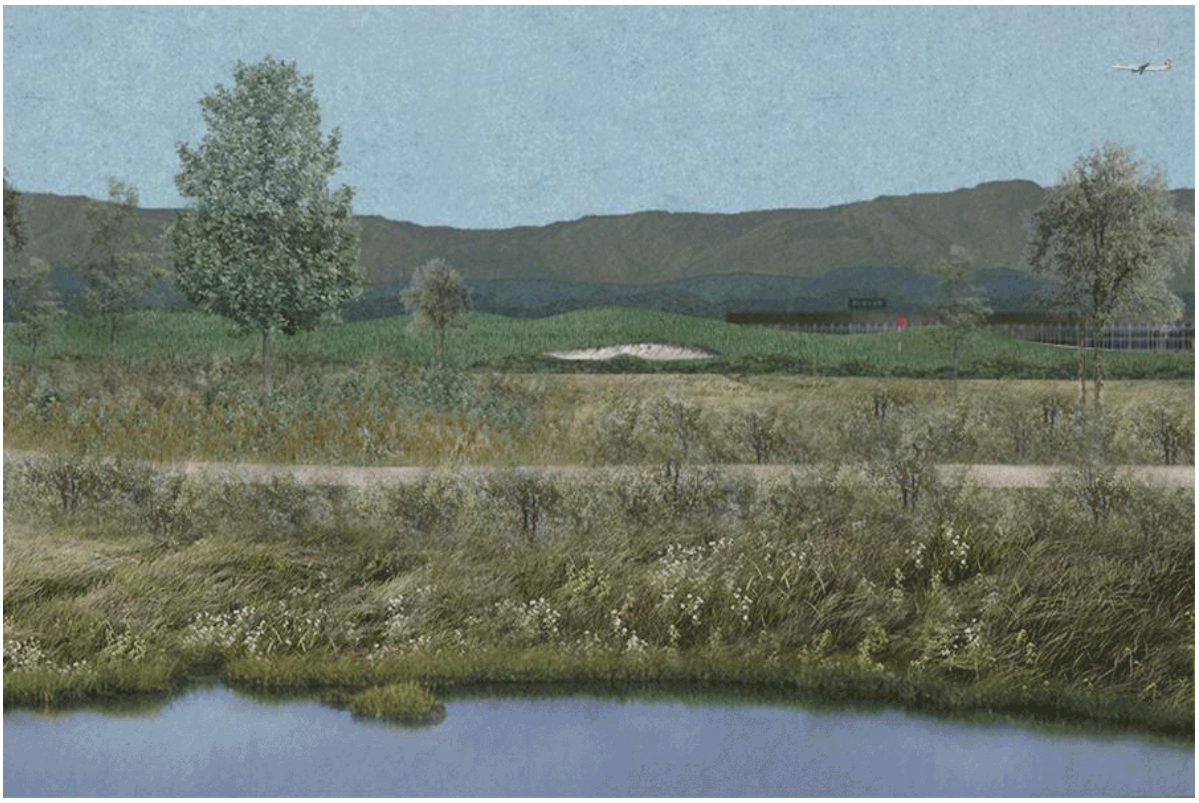
ETH Zurich Department of Architecture
ARCHITECTURE OF TERRITORY
Chair of Architecture
and Territorial Planning
Professor Milica Topalović

Soil, Water, Labour
Fall 2020

Construction of Lands

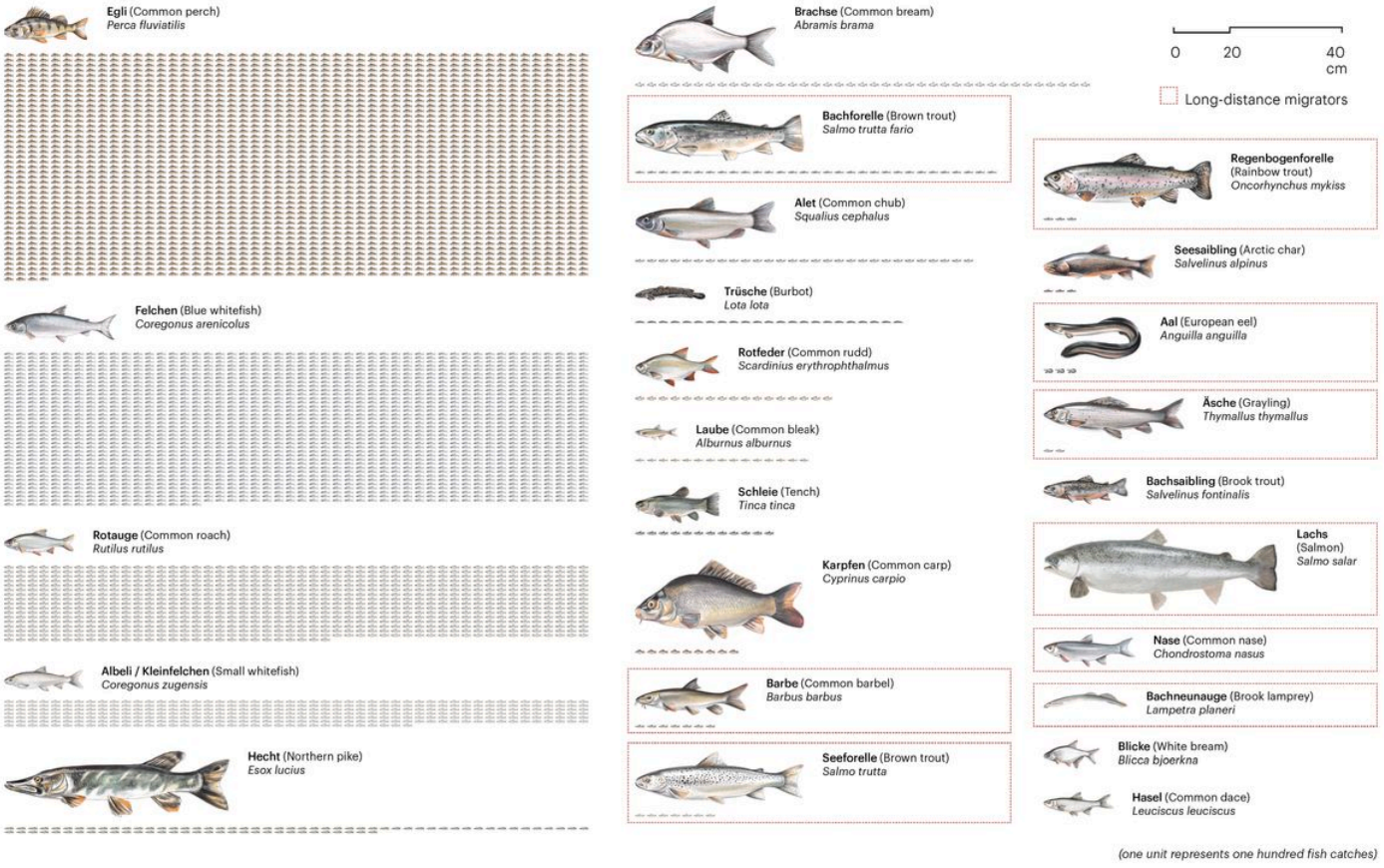
# When Draining a Swamp Is a Bad Idea: A Case for Restoring Wetlands in Zurich

Juliet Ishak, Ayça Kapicioglu, and Airas Sanchez Keller

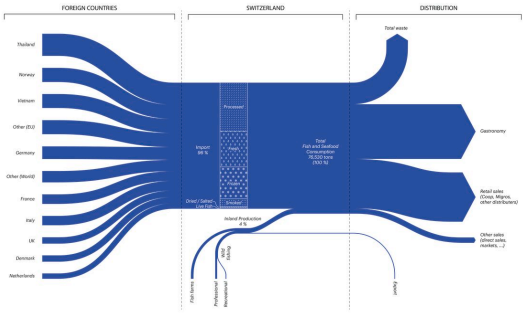


Hundreds of years of anthropogenic disturbances have caused a significant loss in wetland and river ecosystems in Switzerland. Many floodplain wetlands and tidal marshes in Zurich have been diked and ditched to create pastures and croplands, while the river basins have been radically altered by dam constructions. The future of water ecosystems depends upon the protection and restoration reversing the upheaval caused by humans.

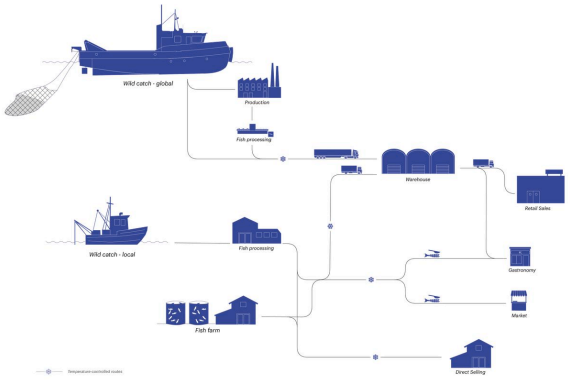
# The State of Zurich Waterscapes and Its Ecosystems



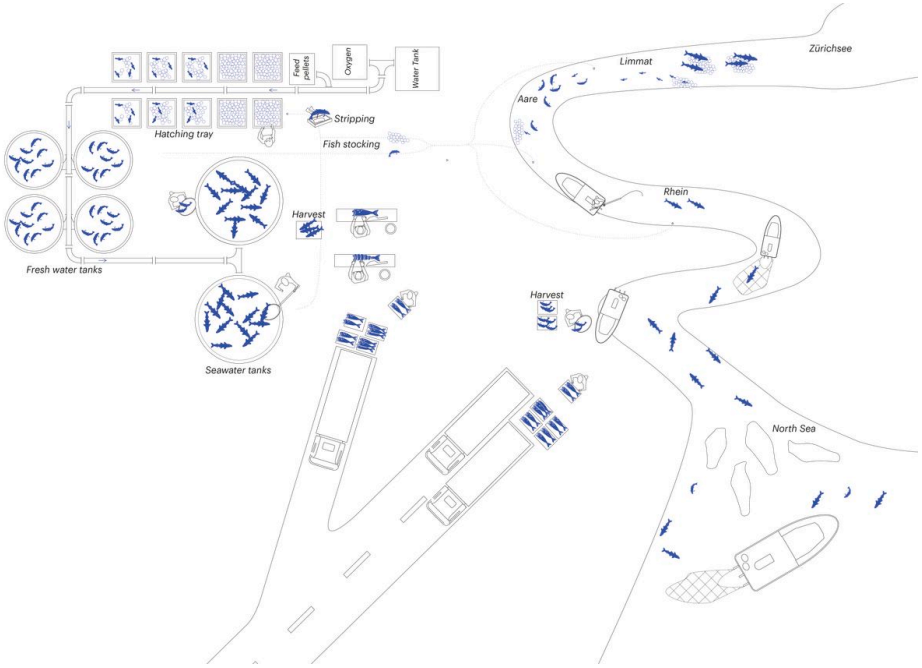

The quality of the river ecosystems in Switzerland has severely decreased since the times of industrialisation. Looking at the fauna currently inhabiting the waters of the Canton of Zurich, we can see that many fish species which used to migrate up and down the river now have, if not disappeared, then notably decreased in population size. Many fish species like the trout depend on a free trajectory along the river, on slowly flowing river parts, and wetlands to spawn, all of which have been extensively changed by the canalisation and construction of rivers in Europe.




Fishing production and import in Switzerland. Sources: fischereistatistik.ch, agrarforschungschweiz.ch, bfs.admin.ch.

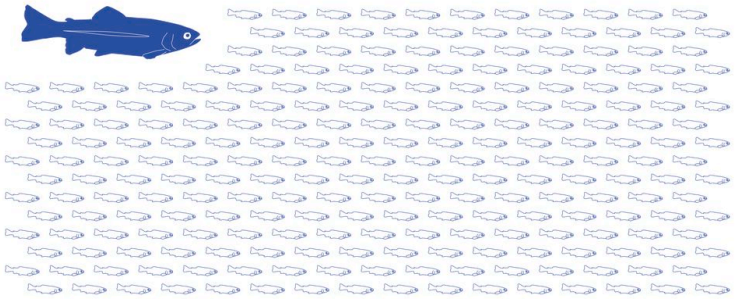



Infrastructure of the fishing industry. Imported goods often rely on large-scale suppliers.




The life cycles of fish in farms and in the wild are highly commodified.

Wild fishing is the source of only a small part of the production of fish in Switzerland. Most of the locally produced fish is grown on fish farms, where the environment the fish live in is controlled to a high degree, the fish grow quickly and can be harvested easily. The production of fish on fish farms is trending and more and more farms are being built.
In Switzerland, the processes behind the monitoring and regulation of wild fish stocks are highly intertwined with the fishing industry. Since fisheries depend on these populations to survive, it is mostly them who sustain the populations by releasing spawn and juvenile fish into the waters. These are bred in fish farms, and only a small percentage of this released stock survives in the wild. Even less are fished again after growing older.



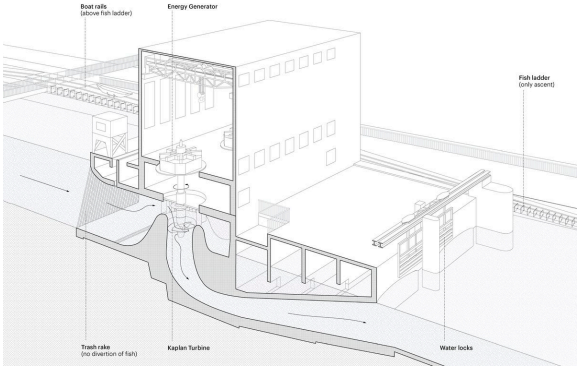

For every one trout fished in the rivers and lakes of the Canton of Zurich, 238 juvenile trouts are released by fishermen into the water as a stock. This is done in order to sustain the trout population. Without stocking, fish would disappear from our waters in a short period of time. Source: fischereistatistik.ch




Barriers along the Limmat river. Most of them hinder the free migration of fish. Source: The Odyssey of Eels, Julien Graf and Priscilla Bader, 2019




Impacts on the Limmat river at Letten. The riverscape in Zurich is a highly constructed space.



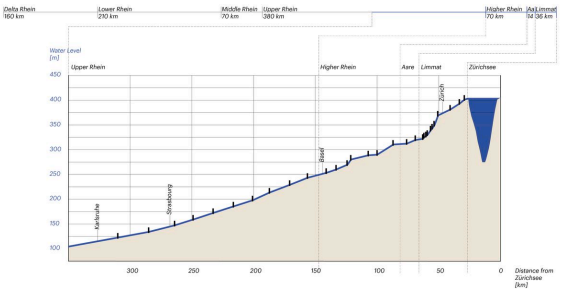

Section through the Letten powerplant in Zürich. The fish ladder only lets fish swimming upstream pass. Source: Ökostrom aus Wasserkraft, ewz, 2012.

The waterscape of present-day Zurich is a highly constructed space. Analogous to other cities in Europe, humans have altered the river, lake, and its wetlands during the development of the city. This was first done in order to maximise agricultural and built land and control the flow of the river and its naturally occurring seasonal floodings. Later, the force of the moving water was used to power mills, and with the industrial revolution, powerplants.

The Letten hydroelectric powerplant can be regarded as an exemplary case of a barriers which was built along the trajectory of the Limmat. It was the first powerplant to be built in Zurich—first to pump water up the Höngg hill, then to mechanically power factories in the area, and lastly, to generate electricity for the city. Nowadays, several hydropower plants, public baths, and weirs for water level regulation are placed along the river in Zurich, making it into a highly used part of the city's infrastructure. A similar use of the river can be seen along its trajectory towards the sea. Especially in the higher regions of the Rhine river, the Aare and the Limmat, the natural flow of the river has been interrupted by powerplants and weirs.



Barriers along the Limmat river's trajectory towards the North Sea. Source: The Odyssey of Eels, Julien Graf und Priscilla Bader, 2019




Barriers along the migration route of a trout. Source: BfG, Koblenz and Eidgenössisches Amt für Wasserwirtschaft

# Why We Should Protect and Restore Wetlands

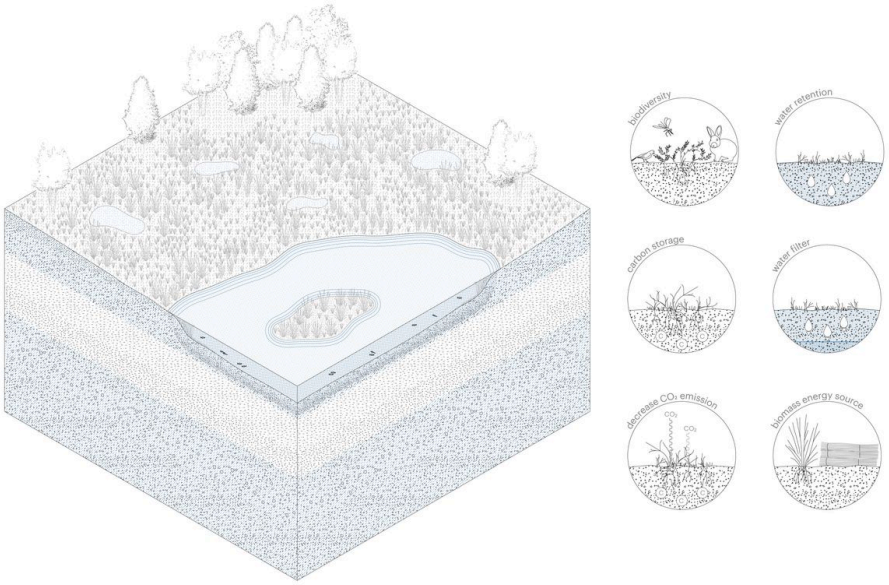


Continuing with our investigation, we would like to take a step away from looking at entire river ecosystems, and focus on a different kind of ecosystem connected to the waterscape: wetlands. These ecosystem are more contained and can be seen as a case study of how we humans have inflicted upon and totally changed natural waterscape systems.

Wetlands are a type of ecosystem where the ground contains and retains a lot of water. They are also called mires, bogs, marshes, peatlands, fens, or swaps, depending on their exact qualities and the region. In German, we often refer to them as Moore, or, in some cases, Moorlandschaften.

Moorlandschaft is an interesting term, in the sense that it refers to a wetland/mire in relation to, and defining, the landscape it is located in. It is important to think about them in this way, since, as we will show next, wetlands play a number of essential functions for their respective landscapes.

In this chapter, we would like to make clear why wetlands are important for our planet and what the benefits of preserving, maintaining, and possibly restoring them would be. For us humans, and for the lands we live on.




Soil profile: 1) Sedge peat; 2) Reed peat; 3) Peat clay; 4) Humus; 5) Gravel, sand; 6) Silty clay; 7) Clay; 8) Gravel, sand; 9) Gravel, stones; 10) Denser gravel, sand

## What Are the Properties and Benefits of Wetlands?

To begin with, wetlands are considered to be some of the most diverse ecosystems, offering a habitat for many plant and animal species. Plants that live in very wet or aquatic conditions, such as reeds (Schilf), mosses, or alguae, find an optimal habitat in wetlands. At the same time, wetlands are essential for many fish, bird, amphibian, insect, and invertebrate animal species. As an example, there are many fish species like the pike (Hecht) that depend on conditions as the ones in wetlands, where water flows slowly and there are a lot of calm, protected hideaways, where the fish lay their eggs.

This diversity also plays a role in the sense that wetlands are incredibly productive ecosystems, producing biomass at a higher rate than any other ecosystem. This production of biomass is relevant for one very important reason: To produce biomass, that means, to grow, wetland plants filter a lot of carbon dioxide from the atmosphere. When the plants die, this biomass is stored in the ground and converted to fertile peat (Torf). Wetlands thus act as a very effective CO2 storage option, which, with the current climate crisis situation, is more relevant than ever. To reduce the amount of CO2 in the atmosphere, preserving and restoring wetlands is an important action to take.



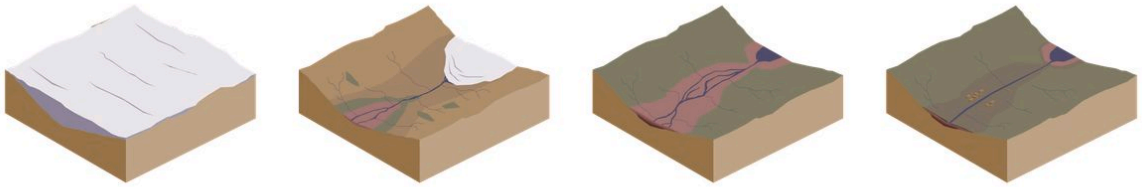




Some impressions of the wetlands af Katzensee, one of the last of these ecosystems in the Canton of Zurich.

Wetlands also act as a water filter for our landscape. The soil can absorb large amounts of water, up to 90 percent of its mass. When the water runs though the wetland, it is purified of pollutants like fertilisers and other residues, which harm the wetland ecosystem much less than in waterbodies. A wetland thus acts as a save filter for the rivers and lakes further downstream. Also, in case of heavy rainfall, a wetland can be flooded and absorb a lot of water, thus preventing the lower regions from sudden flooding.

At the same time, the large amounts of water stored in wetlands can be used in case of water scarcity, for example in a drought, which is only more likely to occur in the future. As wetlands regularly fluctuate between more dry and flooded states, carefully using the water in case of an emergency would not severely impact the ecosystem and provide a save backup for settlements and agriculture in surrounding regions.



During the last Ice Age, snow and ice covered the Swiss landscape. Glaciers formed for thousands of years, retaining incredible amounts of water.

After the glacier started melting down, the first peat layers began to form on the wet valley bottom.

Layer after layer, the wetlands continued to build up until large areas of Switzerland were covered with them.

In the last 150 years, humans have drained more than 90 % of the wetlands in Switzerland in order to eradicate diseases, control the flow of water, and use the ground for agriculture.

The development of wetlands started thousands of years ago. Since the last Ice Age, they have slowly built up on the bottom of valleys, on wet, lowered pieces of land, and on the shores of waterbodies like rivers, lakes, and seas. Through time, one layer of plants after the other grew on the fertile soil, building up more and more peat. Even though wetlands produce biomass at a very high rate, it still takes up to a millennium for one meter of peat to form. It was a slow process that occurred until 5 percent of European land was covered in wetlands. These wetlands provided rich ecosystems where a wide variety of plants and animals evolved. Long before our lifetimes, animals like aurochs roamed though Switzerland’s wetlands and thousands of bird, fish, amphibian, and insect species inhabited these landscapes. Even the first settlers of Switzerland lived in buildings on stilts above wetlands and lakes, where they could use the resources the waterbodies provided and where they were save from predators.

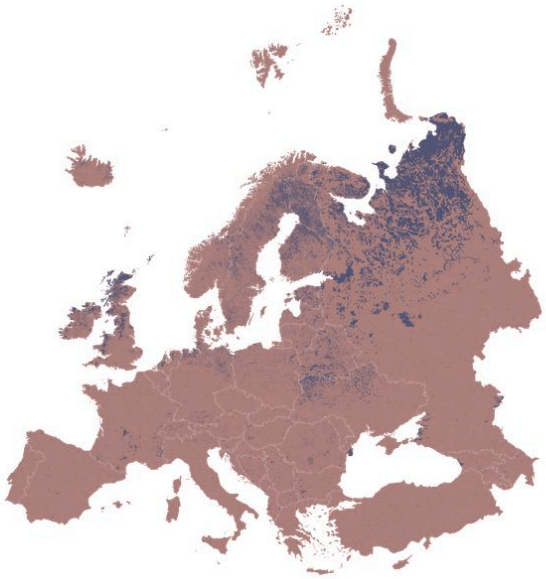
It has not taken such a long time to reverse these developments. In the last 150 years, humans have changed almost all waterscapes of Switzerland to make them more stable and predictable, more profitable. Waterbodies and wetlands have been altered, canalised, drained, and constructed on.

After being drained, the soil of wetlands changes quickly. Firstly, it begins to sink, since the water which makes up most of the soil mass is missing. Secondly, the peat, which in the beginning is very fertile, changes over time, since the dried soil now contains enough air for bacteria and fungi to grow and decompose the biomass into minerals. In former wetlands that were drained 150 years ago, the soil is now less fertile than other lands which have been farmed on for longer time. At the same time, when wetlands are drained, their function as a storage of carbon dioxide is reversed. Over time, the dried peat releases the bound CO2 into the atmosphere, making drained wetlands heavy greenhouse gas polluters.

# 150 Years of Wetland Drainage

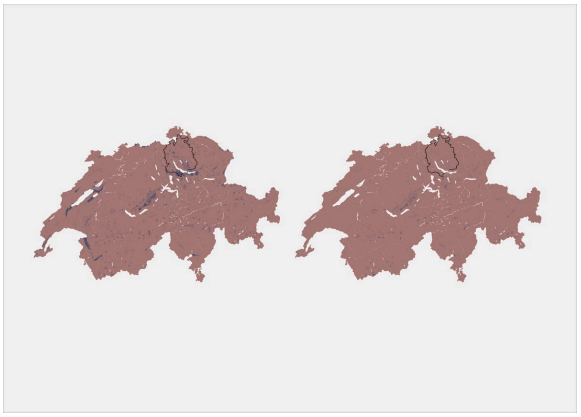


5 percent of Europe’s ground was once covered in wetlands. Nowadays, it is merely 1.5 percent. Most of the wetlands close to settlements have been drained in the last two centuries. Looking at Switzerland, the situation is even worse. According to BAFU, since 1800, more than 90 percent of all wetland coverage has been drained and destroyed. Luckily, in 1987, nature protection organisations were able to convince the state to put all remaining wetlands of importance under protection, in order to preserve what is left. Looking at the maps above, we can see that the development in the last 150 years has been drastic.

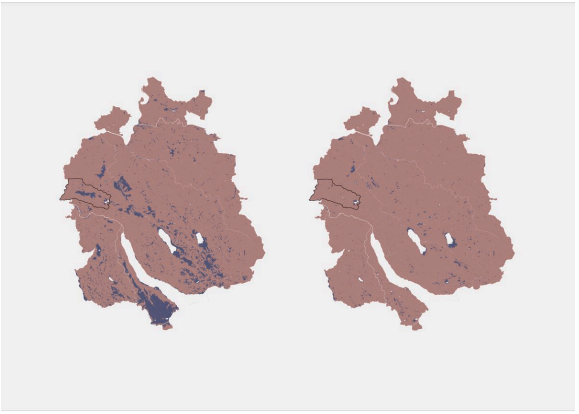


European wetlands, 2020.
Only 1.5 % of the surface are wetlands, compared to the former 5 %.

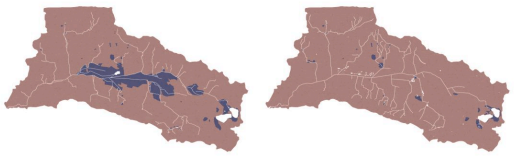
Source: The Peatland Map of Europe, Institute of Botany and Landscape Ecology, Greifswald University.



1850 -2020, Switzerland’s wetlands

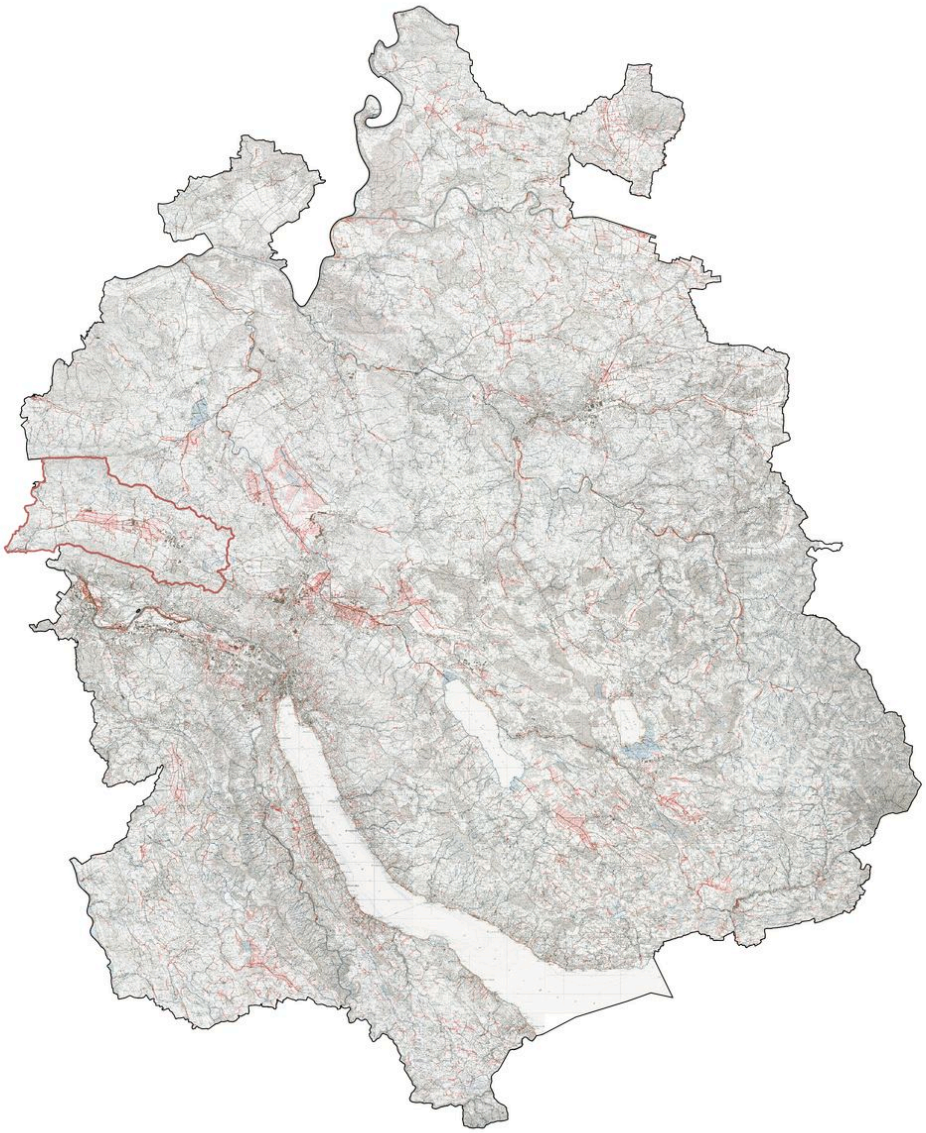


1850-2020, Canton Zurich wetlands



1850-2020, Furttal wetlands

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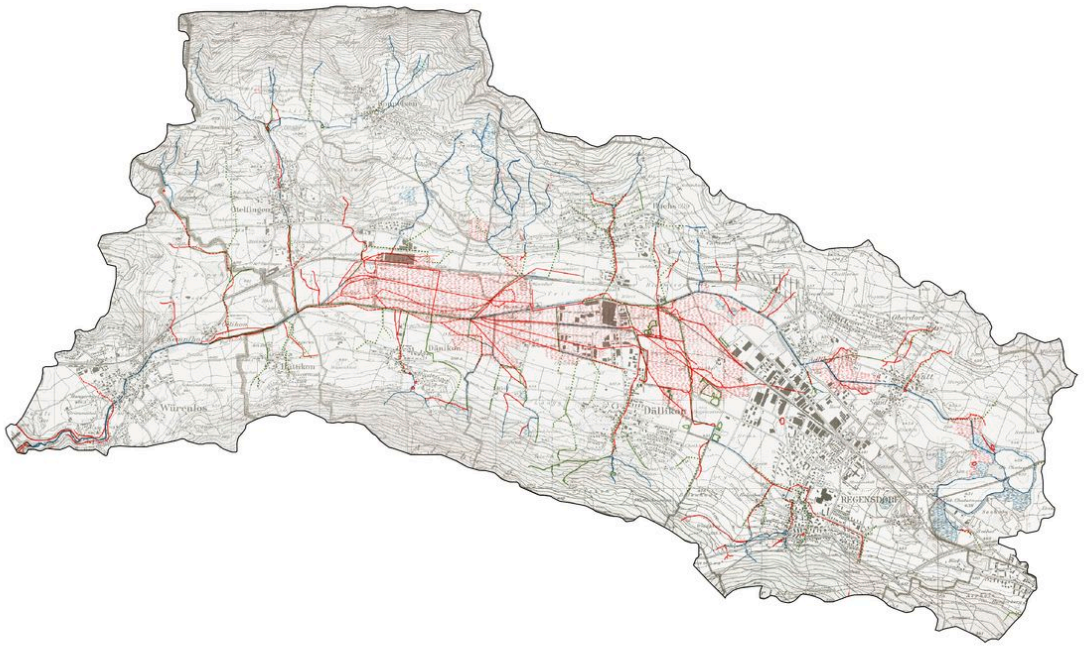


Historical water map of the Canton of Zurich. Missing waterbodies are marked red. Source: Historische Gewässerkarte des Kantons Zürich, 1991.

The Canton of Zurich is one of the worst affected cantons by wetland drainage. Being on the lower lands in quite wet conditions, once a large part of the ground was covered in wetlands. The development of settlements and the need for agricultural land lead people to drain almost all wetlands in order to use them for other purposes.

Large infrastructure projects, such as the construction of the Kloten airport, as well as peat mined for heat and energy, contributed to the loss of wetland areas.

The loss of wetlands results in environmental and ecological problems, like the increase in greenhouse gas emissions, the decrease of ground water level, the deterioration of soil and water quality, the loss of biodiversity, but also social problems like the loss of cultural values and the loss of natural heritage. A study undertaken by the University of Zurich in 2014 estimated that the carbon footprint of the Canton of Zurich's damaged wetlands at nearly 20,000 tonnes per year, roughly equivalent to the annual emissions of 4,100 passenger cars. Wetland restoration could be used as a powerful and cost-effective technique with the Canton's climate mitigation planning while also providing a range of other invaluable benefits to society and the environment as a whole.



Historical Water Map of Furttal. Missing waterbodies are marked red. Source: Historische Gewässerkarte des Kantons Zürich, 1991.

In this study, we will take a closer look at one specific valley in Zürich —the Furttal (Furt valley), in order to define problems and interests on former wetlands and investigate future possibilities for wetland restoration. The Furttal is situated to the north-west of the city of Zürich. It meets the Limmat valley at Würenlos (close to Baden), where the main river of the Furttal, the Furtbach, flows into the Limmat river. On the other end of the valley, the Katzensee are located, two lakes which are connected by a small channel.




Section, Furttal, 2020

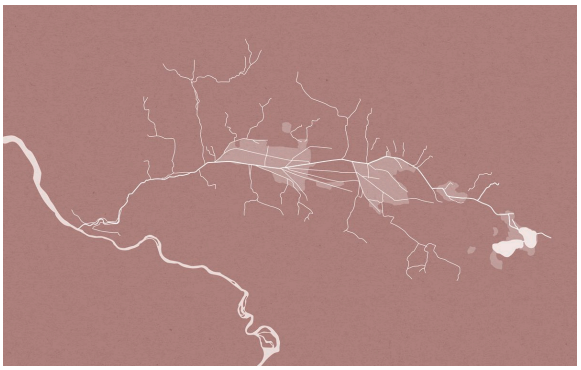
The Furttal is a very shallow, wide valley, which is situated between the hills Lägern and Altberg. The valley formed after the last Ice Age and has the typical U-shape with a wide base seen in valleys formerly covered by glaciers. A notable characteristic of this valley is that a large part of the valley base was once covered by wetlands, which can be seen in the historical water map above. Nowadays, only the regions next to Katzensee are left as a natural wetland—all the other parts have been drained in the last 150 years.

The Furttal is a good case study to showcase what processes led to the drainage of wetlands. In this chapter, we will make clear what led to the current precarious state of these ecosystems, and, with the example of Furttal, show how the drained wetlands are currently being used.

## The Furttal - A Drained Valley



2020



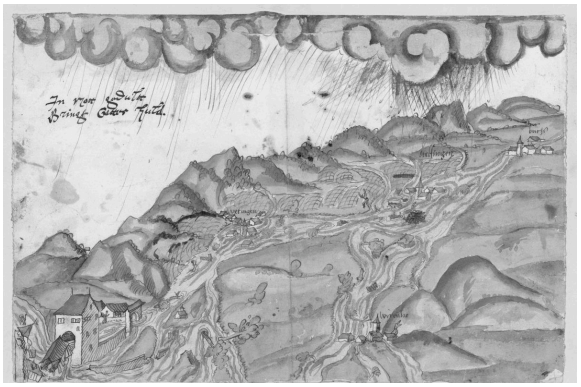
1880



1930



1850



before 1850



1880



1930



2020



2020



2020

As can be seen on the waterbody maps above, the wetlands in Furttal were drained in several steps since 1850.



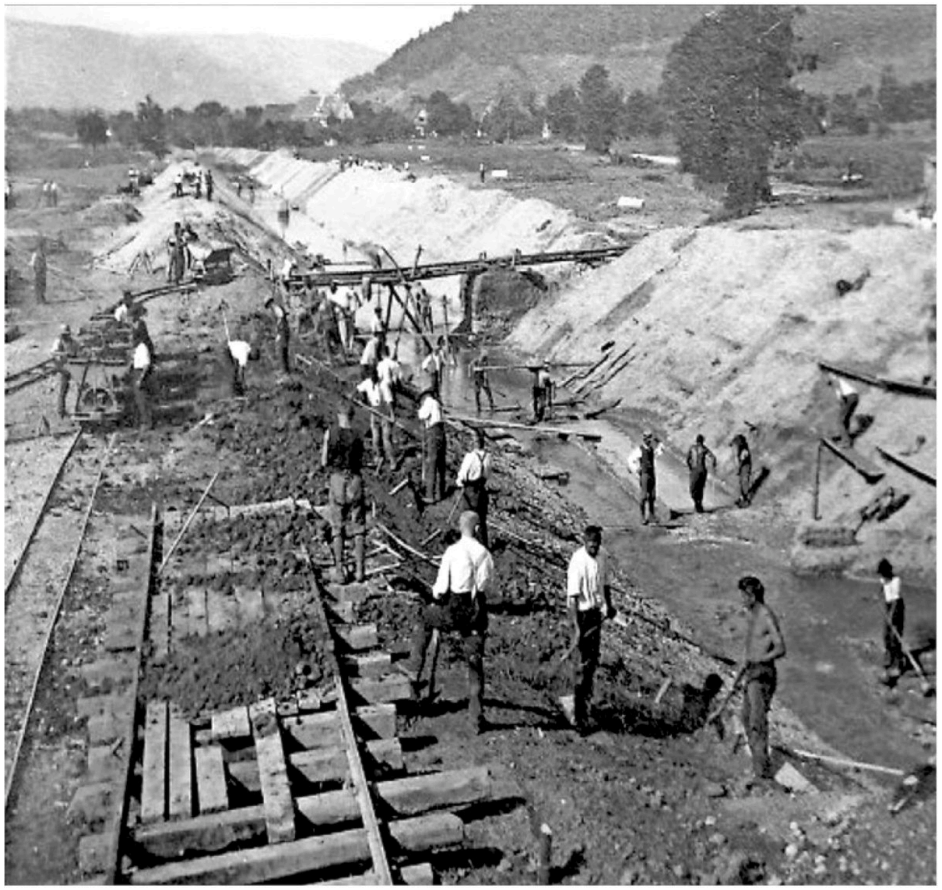
Celtic Pile Dwellings in Switzerland, Ferdinand Keller. Source: hls-dhs-dss.ch.

Before that, humans had not made a strong impact on the local waters. Up until the 19th century, waterbodies were regarded as a strong natural force which was at the same time useful, but also dangerous. The first settlements in Switzerland were even built on top of wetlands, on pile dwellings. Later, rivers in Zurich were used to power mills for the production of flour, or to irrigate fields, and they were one of the most important resources for early settlements.



Floods in Furttal in the Middle Ages. Source: ba.e-pics.ethz.ch.

However, in case of heavy rainfall, flooding occasionally occurred along the shores, destroying agricultural fields and settlements without warning. At the same time, where there was water, and where there were wetlands, mosquitoes could rapidly reproduce. These insects could carry diseases like malaria from one person to another, causing major outbreaks. This made living close to waterbodies unpredictably dangerous for some settlements—until humans decided to change this.



Lowering and canalization of the Furtbach at the end of the 19th century. Source: ba.e-pics.ethz.ch

It was these goals—the taming of rivers to protect settlements from flooding, and to prevent disease outbreaks—that motivated humans in the 19th century to begin the drainage of the Furttal wetlands. The first stage of the drainage took place at the end of the 19th century. At that time, the work was still done without the help of machines. With picks, shovels, wheelbarrows, and intensive human labour, the flow of the Furtbach was changed, canalised, and lowered. The first drainage pipes were put into the ground, carrying water away from the wet soil of wetlands.



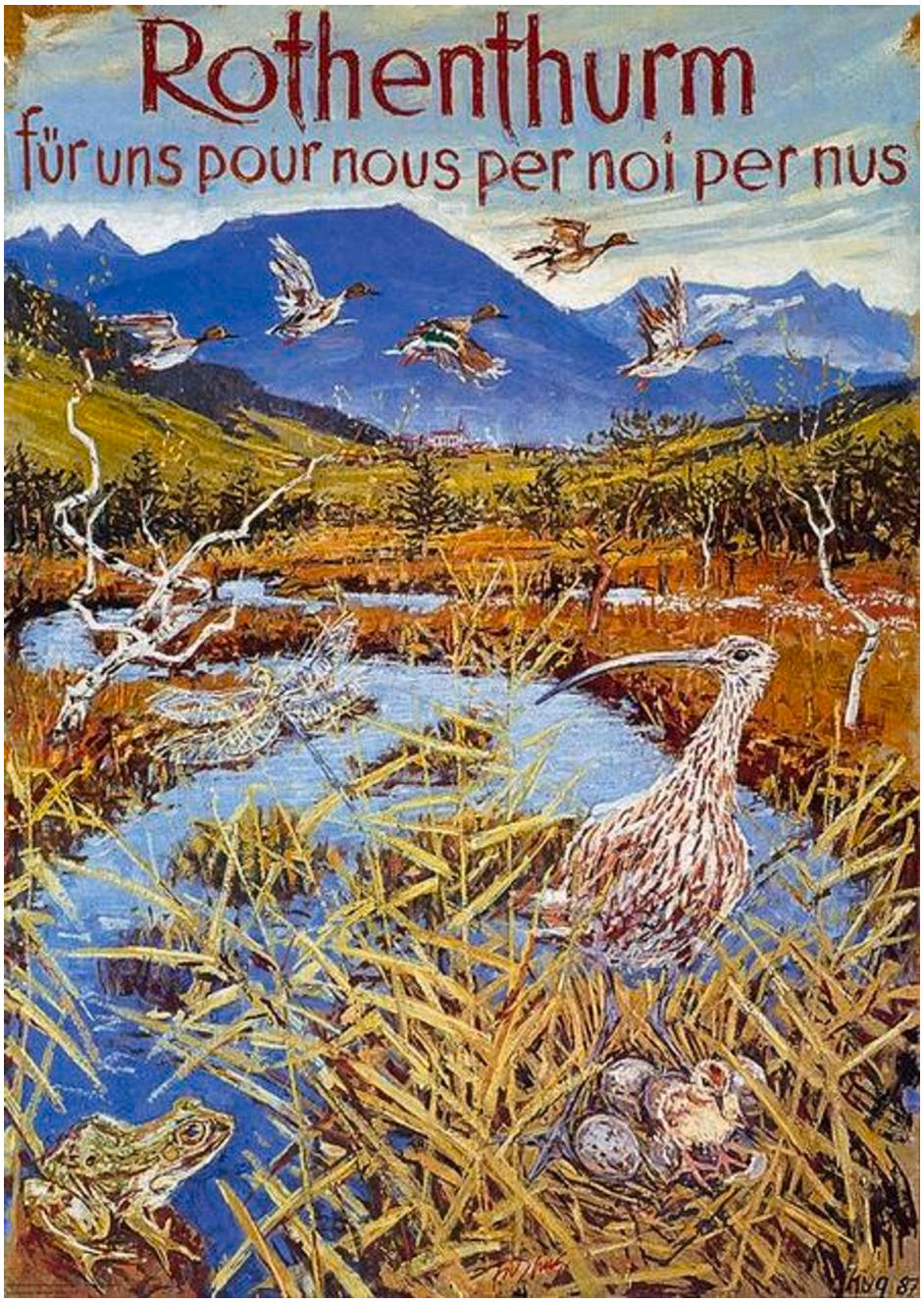
Use of machines for the drainage of wetlands,
around 1930. Source: ba.e-pics.ethz.ch

Over time, with the introduction of the first excavation machines in the beginning of the 20th century, this became easier to do. Also, the increase in need for fuels made the cutting of peat out of wetland soils a profitable endeavor. Dried peat could be used as an alternative fuel for heating, and, because of its richness in undecomposed biomass, peat was used as a fertilizer which could increase the production of food on agricultural land.




Overview of drained Furttal, around 1930. Source: ba.e-pics.ethz.ch

The increase of population and the scarcity of food during and after the two world wars also increased the need for agricultural land in Switzerland. In Furttal, analogous to similar places in Switzerland, the drainage of wetlands in order to convert them to very fertile agricultural land became a profitable business. Large enterprises and organisations formed that would buy the wetlands for cheap, drain them, and resell them to farmers for a multiple of the former price. In Furttal, the local Entsumpfungskomission (drainage commission) regulated the wetland drainage and pushed it forward until all wetlands in the lower valley were converted to agricultural land.

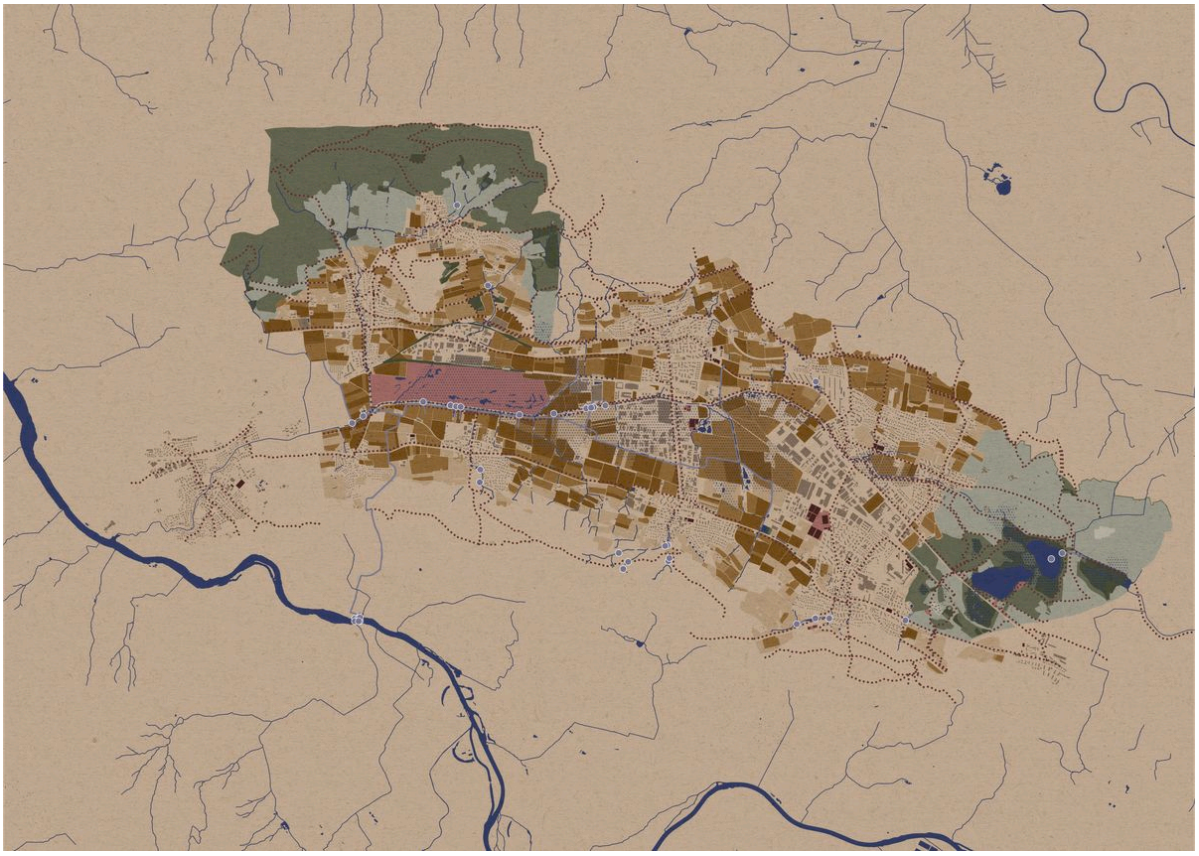



Poster for the Rothenthurm Mire Protection Initiative, 1987. Source: hls-dhs-dss.ch

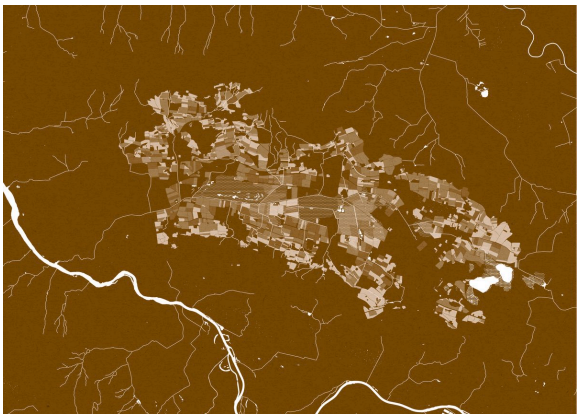
In 1987, the Rothenthurm Initiative, an initiative to protect all natural wetlands of national importance, was passed in Switzerland. This prevented the further drainage of wetlands, but, in the case of Furttal (as in most other places), it was only a small percentage of the former wetlands which was left.
Today, it is only at the Katzensee natural reserve that we can find natural wetlands in Furttal. In the lower valley, only the dark colour of the peaty soil on agricultural land reveals the past of the region.

# Use of Former Wetlands in Furttal

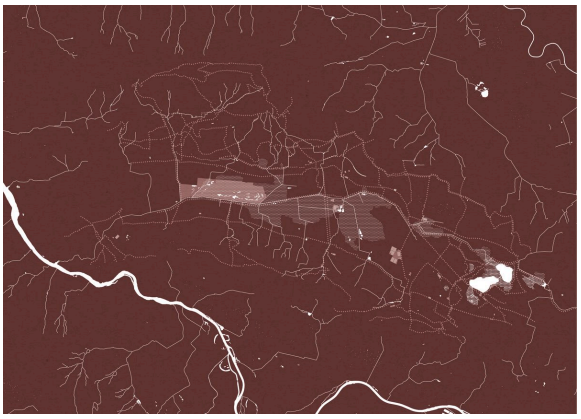
If we look at the map of present-day Furttal shown below, we can see how the former wetland area (marked by the dotted pattern) is being currently used. Some of it is still agricultural land, but there are also the sprawling settlements whose development has advanced into the wetland area. And with them, other spaces, for example, recreational areas like the big golf park at Otelfingen (pink area to the left). After visiting the site, we decided to divide the main actors who define the present-day situation of the former wetlands into four main categories, shown in the four single-colored maps below: agriculture, leisure, water control, and nature protection.



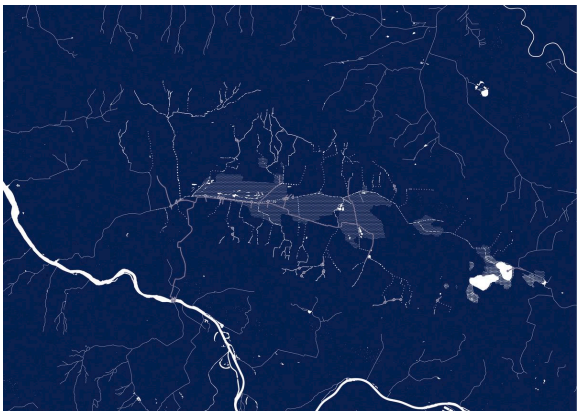
The landscape of Furttal in 2020, divided into four main topics: agriculture, leisure, water control, and nature protection (see maps below). The former wetlands are marked as a dotted surface.



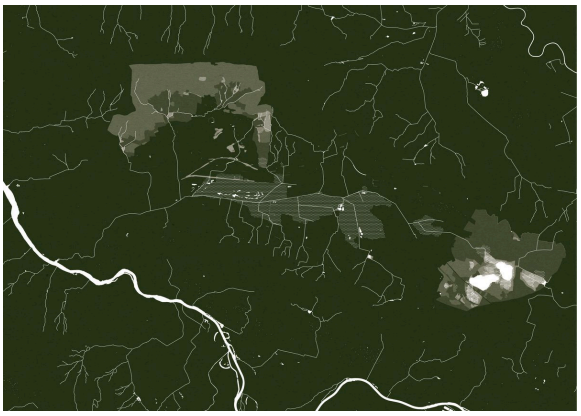
Agriculture—Agricultural fields and their use. The darker coloured, the more fertile the soil, and thus, the more intensively used.



Leisure—Recreational areas with hiking and biking trails. Notable: the biggest leisure surface is the Golf Park Otelfingen.



Water control—Conditions of the rivers (the more dashed, the worse) and locations where water is being tapped and pumped from the river.



Nature protection—Protected areas of Lägern forest (north-west) and Katzensee wetlands (east). The lighter coloured, the more protected.

In order to understand the interests and the attitude of the different actors, we contacted four different people whose work represents these four topics. We asked them about their experiences, their work, and their opinions. The following case studies can be seen as exemplary for the current situation in Furttal.

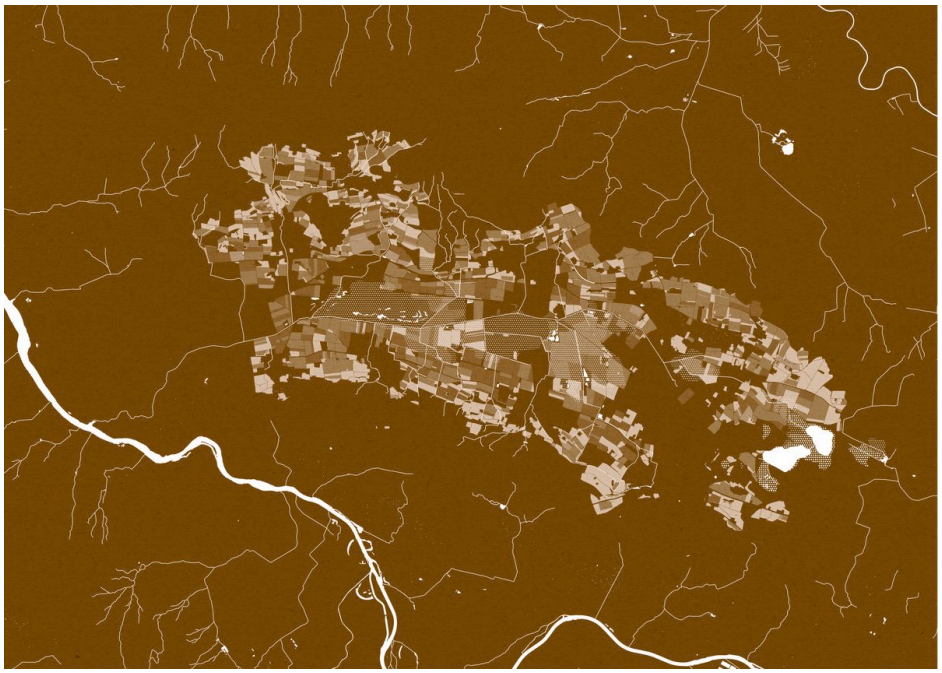
# The Furthof: Farming on Former Wetland Soil



Kurt Würmli, a farmer who owns agricultural land on the drained wetland area.

“The quality of the soil has decreased over time and continues to change.”

“Today, us farmers use the water from the Furtbach to water our fields when it’s too dry in summer.”



Agriculture—Agricultural fields and their use. The darker coloured, the more fertile the soil, and thus, the more intensively used.

“Our farm operates since 1923. My father bought the land just after it was drained, it was a big oppurtunity for young farmers at the time. It was costly, but very fertile land. At the time, a whole economy was made from draining wetlands for farmers.

Today, us farmers use the water from the Furtbach to water our fields when it’s too dry in summer. The water quality in the Furtbach is not very good, but it was much worse in the past. Forty years ago, the water was muddy and toxic. Once, my father fell into the river and swallowed some of the water. Because of that, he fell ill and had to go to the hospital. That the water was so toxic was not always the case. When I was young, there used to be even some people fishing in Furtbach. Today, we don’t see a lot of them.

We use artificial fertilisers on our fields and have always used them. Some farmers in the valley opt for organic fertilisers, I think this is changing. Since 1970, we lease ten hectares of our land to the biggest farmers in Furttal, Gebrüder Meier AG. They do much more intensive agriculture, but under organic regulations.

The quality of the peaty soil has decreased over time and continues to change. The level of the ground also continues to sink, over the years, I have seen how it dropped by around a meter.”









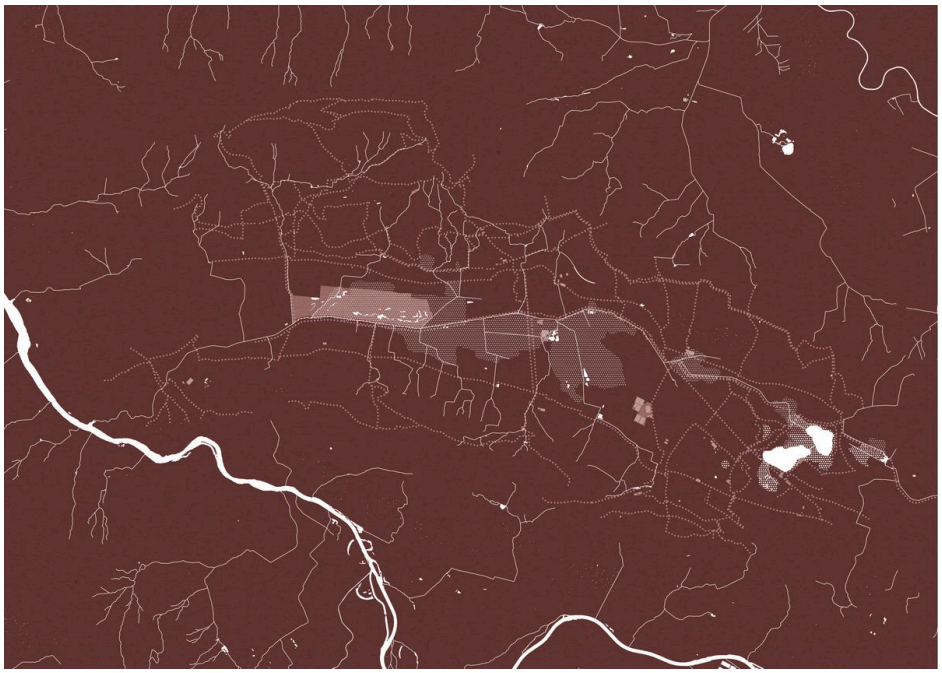
# Golf Park Otelfingen:
# A Leisure Landscape



Patrick Montagne, head green keeper at Golf Park Otelfingen

“We try to combine the two uses of golfing and the providing of natural habitats in the best possible way.”

“Migros bought the 92 ha of land and transformed it into a recreational zone.”



Leisure—Recreational areas with hiking and biking trails.
Notable: the biggest leisure surface is the Golf Park Otelfingen.

“The Golf Park Otelfingen was built in the year 2000 on former agricultural land, which belonged to Coop. Migros bought the ninety-two hectares of land and transformed it into a recreational zone, the biggest of its kind in Furttal. The Furtbach and its tributaries were revitalised, and the excavated dirt was used for the modelling of the golfing landscape.

We now have five different water ponds, two of which are fed with water from the Furtbach and used to water the golfing courses. The golf park has a range of nature compensation areas which are maintained as a habitat for native plant and animal species, like, for example, wet meadows and a reptile biotope. Some of these are maintained by our neighbor farmers. Our biotopes are not declared as nature protection areas, since the whole golf park is categorised by the Canton as recreational zone. However, they are some of the last pieces of land offering a natural habitat in the lower valley.

It may seem odd that such an artificial landscape as a golf course can contribute to nature protection, but we try to combine the two uses in the best possible way.”









# Awel (Amt Für Abfall, Wasser, Enegie Und Luft): The State of Our Waters



Dr. Pius Niederhauser, AWEL, responsible for the surface water control and protection in Furttal

“Furtbach is one of the most polluted rivers in the Canton of Zurich.”

“The future of our waters depends on how well agriculture adapts to and implements the established water protection guidelines.”



# Wasser aus der Limmat für Lebensmittel aus dem Furttal

**Ein grosser Teil der Flächen im Furttal dient nach wie vor der Produktion von Nahrung für die Bevölkerung. Dazu braucht es genügend Wasser. Dieses soll bald aus der Limmat kommen.**

SIBYLLE RATZ

**FURTTAL.** Die Talflächen in den Furttaler Gemeinden sind von Landwirtschaft und Gemüseanbau geprägt. Das ist auch im regionalen Richtplan so festgelegt, damit die Zürcher Bevölkerung mit Frischprodukten und qualitativ hochstehenden Lebensmitteln versorgt wird. Bisher wurde Wasser aus Grundwasser, Oberflächengewässern und aus dem Trinkwassernetz der Gemeinden bezogen, um Gemüsekulturen und landwirtschaftliche Produkte zu bewässern.

**Neue Lösung für Wasser**

Verschärfte Anforderungen an die Nutzung dieses Wassers und der nur beschränkt möglichen Nutzung des Furtbachs, was Qualität und Quantität anbelangt, führten dazu, dass die Konzessionen für die Bewässerung vom kantonalen Amt für Abfall, Wasser, Energie und Luft (AWEL) auf den 31. Dezember 2022 begrenzt sind. Die landwirtschaftlichen Betriebe haben sich deshalb 2014 zu einer privatrechtlichen Bewässerungsgenossenschaft Furttal (BGF) zusammengeschlossen. Die Genossenschaft wurde auch notwendig, da der Kanton grundsätzlich die Haltung vertritt, ab 2022 keine individuellen Konzessionen für Wasserbezüge im Furttal mehr zu erteilen. Die BGF soll demnach künftig ihre Mitglieder mit Wasser aus der Limmat versorgen.

Dafür sind eine Wasserfassung, ein Pumpwerk, ein Druckausgleichsspeicher auf dem Hüttikerberg sowie ein Verteilnetz von Otelfingen bis Regensdorf geplant. Nach der Planauflage im Jahr 2018 wurden die Konzession zur Wasserentnahme sowie die notwendigen Baubewilligungen im März 2019 erteilt. Seither war es ruhig um die Bewässerungspläne.



**Das neue Wasserreservoir wird auf dem Hüttikerberg (im Hintergrund zu sehen) gebaut.** Foto: Sibylle Ratz

**Detailplanung brauchte Zeit**

Diese Zeit wurde genutzt, um die Planung zu verfeinern, wie Susanne Preiswerk von der Baudirektion des Kantons Zürich auf Anfrage erklärt: «Wir haben mittlerweile den Verteilschlüssel für die Kosten geklärt sowie ein Generalunternehmen mit der Detailplanung beauftragt. Daraus ergaben sich Änderungen bei der Leitungsführung.» Der geplante Hochspeicher liegt zudem in einem überkantonalen Naturschutzgebiet. Auch hier mussten noch diverse Detailfragen geklärt werden. «Bei diesem Projekt hat es viele Beteiligte, so beispielsweise auch die SBB, welche ebenfalls Bewilligungen erteilen musste.» Die Bewilligungsverfahren hätten entsprechend viel Zeit in Anspruch genommen. Ueli Forster, Präsident der BGF, sagt dazu: «Es war sinnvoll, dass wir uns für die Detailplanung genügend Zeit genommen haben. Zusammen mit dem Generalunternehmer konnten wir das Projekt in diesem Stadium optimieren. Die Leitungsführung wurde aufgrund fachlicher Fragen angepasst. Jetzt haben wir alles geklärt. Das ist insgesamt einfacher für die Projektrealisierung.» Die Änderungen seien in gutem Einvernehmen mit den Gemeinden und Umweltverbänden vorgenommen worden. Trotzdem habe man sich entschlossen, die angepassten Pläne nochmals aufzulegen, damit es keine Diskussionen beim Bau gebe.

**Finanzierung ohne Banken**

Finanziert wird das 8,25 Millionen Franken teure Projekt zu 61 Prozent von Bund und Kanton. Die restlichen 39 Prozent werden von der BGF und ihren 20 Genossenschaftern übernommen durch Beiträge und Darlehen von Mitgliedern sowie befreundeten Genossenschaften, insbesondere der Zürcher Landwirtschaftlichen Kreditkasse. Die grösste Herausforderung war laut Forster, dass ein Projekt ausgearbeitet wurde, das bezahlbar ist, und bei dem der Wasserpreis unter einen Franken zu stehen kommt. Nur so sei es realistisch, auch ein wirtschaftlich rentables Wassermanagement zu realisieren. Das habe man erreicht. Im Januar ist der Baustart des Hochspeichers auf dem Hüttikerberg geplant. Wann genau, ist vom Wetter abhängig. Der Wasserspeicher kommt teilweise auf Waldareal zu liegen. Dazu müssen rund 75 Quadratmeter definitiv und 90 Quadratmeter temporär gerodet werden. Aufgrund der Topografie und aus Gründen des Naturschutzes kann der Speicher nicht vollständig ausserhalb des Waldes platziert werden. Es ist eine Ersatzaufforstung geplant. Auch die Archäologie ist zu berücksichtigen. Es wird vermutet, dass auf einzelnen Grundstücken allenfalls Fundstücke entdeckt werden können. Bei der Planung habe man darauf, so weit möglich, schon Rücksicht genommen, sagt Forster.

Mit der Wasserfassung in der Limmat ist eine Lösung für die künftige Bewässerung für das Furttal gesichert. Aber hier ist die Kapazität begrenzt. Deshalb braucht es ein ausgeklügeltes Wassermanagementsystem und es müssen Wasseruhren installiert werden. Diese Wasseruhren wiederum brauchen Strom. Es stellt sich auch die Frage, wie das Wasser gerecht auf die verschiedenen Nutzer verteilt wird. Eine grosse Aufgabe für die Trägerschaft. Wenn beispielsweise ein Rollomat auf einem Feld langsamer unterwegs ist als geplant, dann geht es unter Umständen mit der geplanten Zeitschaltuhr nicht auf. Solche und andere Anforderungen will die BGF mit digitaler Unterstützung klären.

**Die angepassten Pläne** liegen vom 20. November bis zum 19. Dezember im Gemeindehaus Dällikon auf.




**Die aktuell geplante Leitungsführung zur Bewässerung des Furttals mit Limmatwasser. Bei Oetwil (links unten) ist die Fassung in der Limmat vorgesehen.** Darstellung: zvg

Article on the new pipeline form the Limit river to Furrtal. Source: Furttaler, 27.11.2020

“Some years ago, the water quality of the Furtbach (the river running though Furttal) used to be much worse. Nowadays, our sewage treatment plants are better and we continue to upgrade them. This has caused a visible improvement in recent years. However, the measurements of pollutants still continue to exceed the limit values. Furtbach is one of the most polluted rivers in the Canton of Zurich. Most pollution comes in form of micro-pollution like pesticides, medication, or industrial residues.

In recent years, farmers have become more professional and they have acknowledged the pollution caused by the use of chemical substances. Since 2017, there is an action plan to reduce the quantities of pestizides and fertilisers. There have also been some major projects of revitalisation of the Furtbach, like the one along the golf park. These have improved the habitats for both plants and animals—although for the former, it could be much better. The future of our waters depends on how well agriculture adapts to it and implements the established water protection guidelines.

At the moment, there is a major project being set up to supply the agricultural fields, as well as the golf park, with water from the Limmat river. Since the lands are drained, in summer, the area gets quite dry and the farmers would like to have more water than is being carried by the Furtbach. The new projected pipeline will pump water through several stations from the Limmat river, over the mountain, to the Furttal. It is costly, but for them, worth the investion."









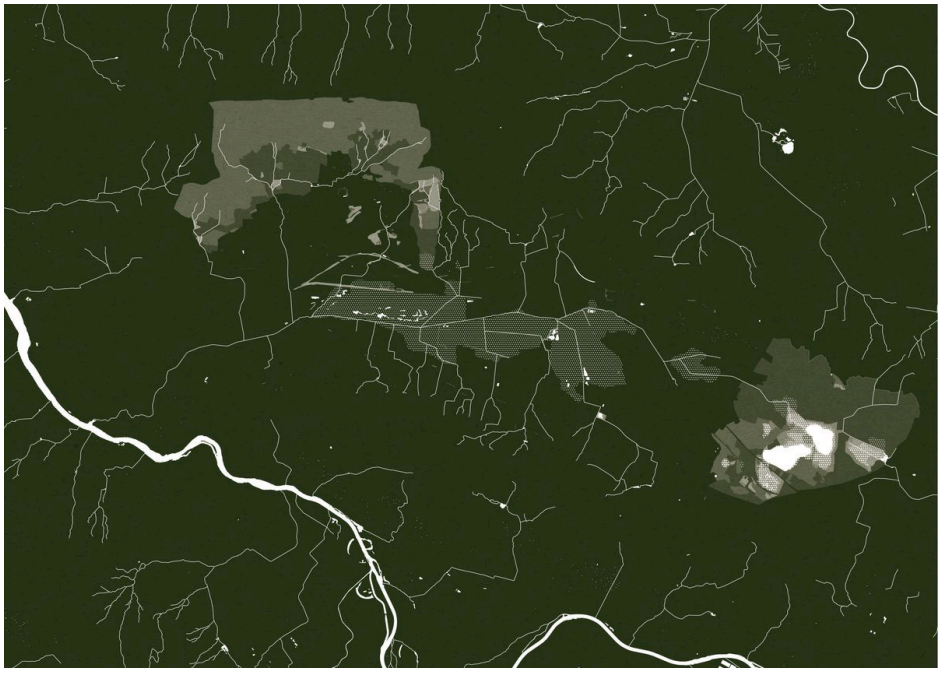
# Nvr (Naturschutzverein Regensdorf): Protecting What We Have Left



Franziska Blum, president of the NVR and ranger at Katzensee nature preserve

“The importance of the Katzensee as a recreational area has increased with the development of Zurich.”

“A strong deterioration of biodiversity has taken place during my life.”



Nature protection—Protected areas of Lägern forest (north-west) and Katzensee wetlands (east). The lighter coloured, the more protected.

“Our Nature Protection Association (Naturschutzverein) was created in 1977 to protect the natural areas in Regensdorf. The most notable of them is the Katzensee, one of the biggest nature reserves near Zurich. When it was first put under protection, the land around Katzensee was in poor condition—there were a lot of illegal buildings, and trash from former inhabitants. The surface layer of the soil had to be removed because it was so polluted.

The Canton of Zurich puts a lot of effort in maintaining the nature protection areas. They fight against invasive species, promote native species, and protect the reserve areas. We [the NVR] are responsible for the protection of amphibians and the upkeeping of smaller nature protection areas close to Regensdorf. As a ranger at Katzensee, I am responsable for looking out and point out to people when they don’t pay attention to the nature protection regulations, and inform people on the importance of the reserves.

The importance of the Katzensee as a recreational area has increased with the development of Zurich. It acts like a magnet, attracting people from all around as a beautiful natural retreat.

There are no free wetland areas in the lower valley anymore. The valley is dominated by intensive agriculture and the development of the communes. The collaboration between nature protection and agriculture could be much better. At the same time, a strong deterioration of biodiversity has taken place during my life. There are bird species which were common in the valley when I was a kid that now have completely disappeared and only are found at Katzensee.”

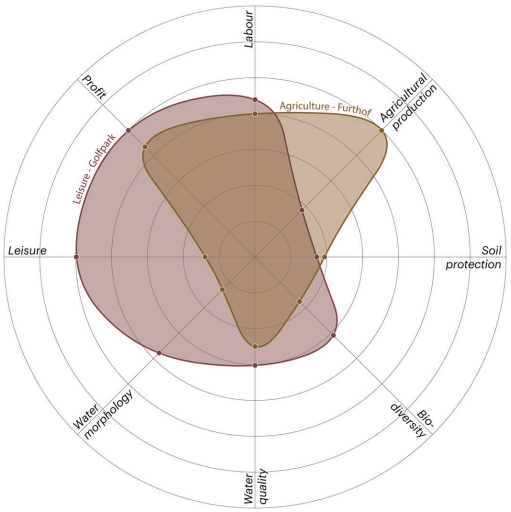




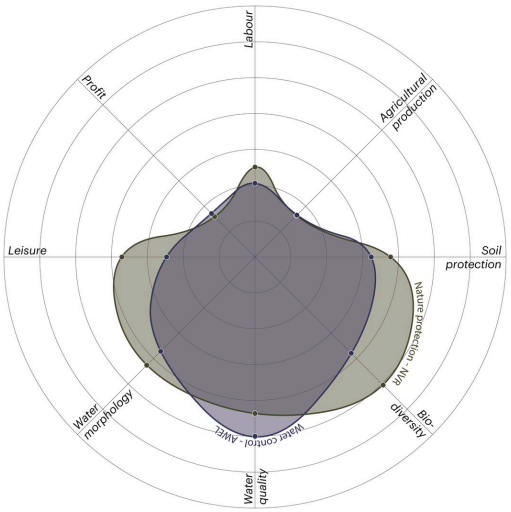




The interests of the people acting on the former wetlands of Furttal can be mapped to compare where they differ and where they overlap:

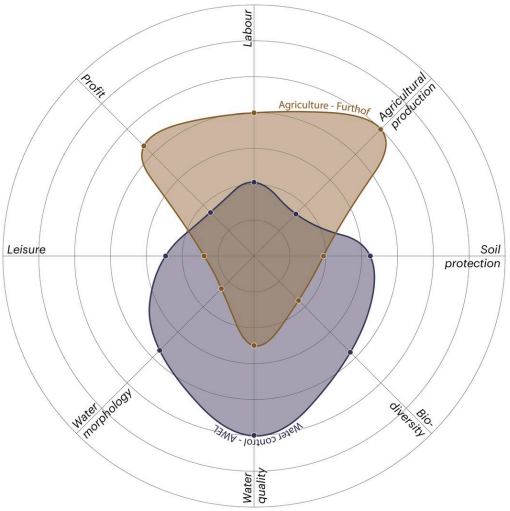



Agriculture and leisure: Both of them are focussed on making profits form the drained wetlands.

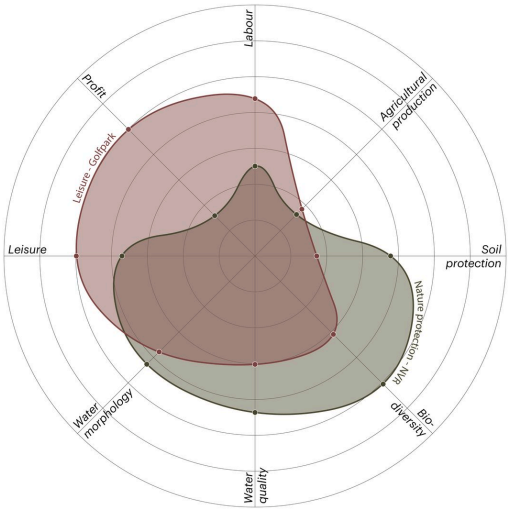



Water control and nature protection: Controlling and regulating the activity on wetlands to protect nature.

There are two competing forces acting on the former wetlands. First, we find that actors like the golf park or the Furthof are interested in using the former wetlands for making profit, be it from the people using the area for leisure activities like golfing, or for producing goods. For them, the draining of wetlands meant an opportunity to use the gained cultural territory for new activities which are profitable. On the other hand, water control and nature protection regulate these activities and try to improve the quality of the ecosystems existing on the area of Furttal. This oppositeness of the users and the regulators is all-present when dealing with matters of preservation and improvement of ecosystems.




Agricultural and water control interests overlap. Farmers need rivers to irrigate their fields, so they are interested in improving the quality of the water.




The interests of leisure areas and nature protection overlap. Nature serves as a retreat for people, and thus, leisure actors (like the golf park) are interested in providing natural habitats.

However, from our case studies, we also learnt that these two main forces are not completely opposed, but, in contrary, dependant on each other.

Vegetable farmers like the Furthof depend heavily on the quality of the water flowing through the river, since they irrigate their fields with it in summer. Since summers are getting drier and drier with the ongoing climate change, this dependance is only increasing. In order to sustain local agriculture, it is only logical that we have to control the pollution leaking into waterbodies. Otherwise, agriculture will be more and more dependant on “emergency solutions” like the connecting of Furttal agricultural fields through a pipeline to the Limmat river, which are not sustainable solutions.

Leisure zones like the golf park serve as a retreat for people seeking a different environment to the hectic, urban one. Nature provides a calm place for people to retreat, and this becomes more important in an area like Furttal, where the city of Zürich is growing closer. Leisure areas like the golf park, as well as nature protection zones like the Katzensee, provide this atmosphere. Their interests overlap in providing such an environment.

The study above shows that the interests of the four actors of agriculture, leisure, water control, and nature protection, are not completely opposite, but, in contrary, tend to be equal in some aspects.

Coming from this realization, we would like to invite you to imagine a future where all people cooperate in order to improve the quality of wetland ecosystems in Furttal. This, while still providing area for farmers and people seeking retreat, be this in a different way than we can find today.

# Bringing the Wetlands Bach to Furttal




The current trends in Furttal show that there are overlaps in interests of different stakeholders in the valley. With our proposal we would like to expand these overlaps and create an interrelated network which would be beneficiary for all. The focus will be placed on establishing a connectivity of the region through partial restoration of the previous wetlands and the revitalization of Furtbach and its tributaries. Since the restoration of wetlands is a long-term process, the project is planned to be developed in different stages.

The first stage focuses on revitalizing the largely canalized stream of Furtbach by giving the riverbed more space and generating a natural watercourse. The next stage would be to remove or fill the drainage pipes, which were installed in the 19th century. This would allow water to be held on the surface; slowly infiltrate and naturally recharge the upper aquifer. When the aquifer is saturated, the excess water will remain and restore the previous wetlands over time. The last stage is the preservation and maintenance of the newly generated landscape.

Through the revitalized watershed corridor, different parts of the valley will be connected to each other, forming a new continuous recreational zone with various benefits. The new landscape reflects the cultural values and historical features of the site which used to be a swamp area. The restored hydrological character of the valley will enhance the wildlife habitat for native flora and fauna species. Since the water quality will be improved, and the riverbed rehabilitated, many aquatic species will reinhabit the national waters of Furttal. The reintegration of wetlands will function as ecological infrastructures for climate change mitigation by reducing green house emissions through carbon-storage. This will compensate the negative consequences of todays conditions and heads for a balance in ecosystem. With the consideration of all these aims different qualities will be embedded in the daily landscape of Furttal.

The intervention focuses on three main zones which show potentials for the restoration of former wetlands. These zones show currently trends in prevention of further degradation by having revitalized course of riverbed or nature protection areas. These will be further developed by the expanding of the existing components and qualities.



Nature in Regensdorf: Remaining wetlands are preserved and extended around Katzensee creating continous recreational zones.

# Katzensee

The current remaining wetlands in the Furttal are situated around Katzenseen – Oberer and Unterer Katzensee. They are under nature protection and provide habitat for indigenous flora and fauna species. These areas serve as recreational zones together with the hiking routes and swimming facility on the coast of Unterer Katzensee. The intervention aims to preserve and prevent further degradation of the remaining wetlands which will help achieve overall improvements in a greater percentage for the further restoration of extinct wetlands in the surrounding. Through that the native wildlife habitat and the recreational area will be enhanced. The cultural values will be reflected with the generated landscape which will be socioeconomically beneficiary for the actors on site. Interests of nature and leisure will be combined by making the wetlands as part of daily landscapes.



Production in Buchs: Former wetlands are restored in between urban infrastructures and combined with agriculture to establish productive land use.

# Buchs

The site is surrounded by relative massive industrial areas (factories, logistic centers), infrastructural facilities (sewage treatment plant, electrical substation) and housing zones. The nature is tightened in between these urban infrastructures where Furtbach crosses with its two tributaries. The catchment area around these are currently under nature protection, but controlled by the flood retention basin. The intervention integrates the urban infrastructures into natural landscape and makes space for a planned restoration of previous wetlands. The current trends of production and profit in the surrounding will be expanded on the wetlands so that they become productive landscapes. Reed and water buffalo cultivation generating paludiculture are possible production methods on the site. Paludiculture refers to the productive use of wet peatlands which is a current praxis experimented in several sites in Zürich such as buffalo farming in Riedenholzhof (Regensdorf) and rice cultivation in Reckenholz. Interests of nature and agriculture will interact with each other through this productive landscape.



Leisure in Otelfingen: Former wetlands are restored between revitalized Furtbach and present golf park allowing diverse recreational activities in the valley.

# Otelfingen

The Otelfingen Golf Park is located along a course of two kilometers of the revitalized Furtbach. It is settled on 92 hectare land from which 1/3 is predefined from the canton as a nature compensation area. The land is constructed on one of the biggest former wetland in the valley which will be partially restored with the intervention. The present rather monofunctional landscape of the golf park will be ecologically upgraded and harmoniously embedded in the terrain of the Furttal. These two aspects of natural and urban infrastructure are combined in a symbiotic landscape. The recreational zone will be expanded with integration of further paths. Various activities will be provided among the revitalized riverbed: swimming, relaxing zones, hiking paths, etc. Through the improvement of water quality and morphology fishing will also be reintegrated. This creates an interplay between current trends of leisure, nature and water control in the region.

ACKNOWLEDGEMENTS

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