WATER

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Fall Semester 2011

WATER

INTRODUCTION

WATER DEFINITIONS
DISTRIBUTION OF WATER ON EARTH
GLOSSARY

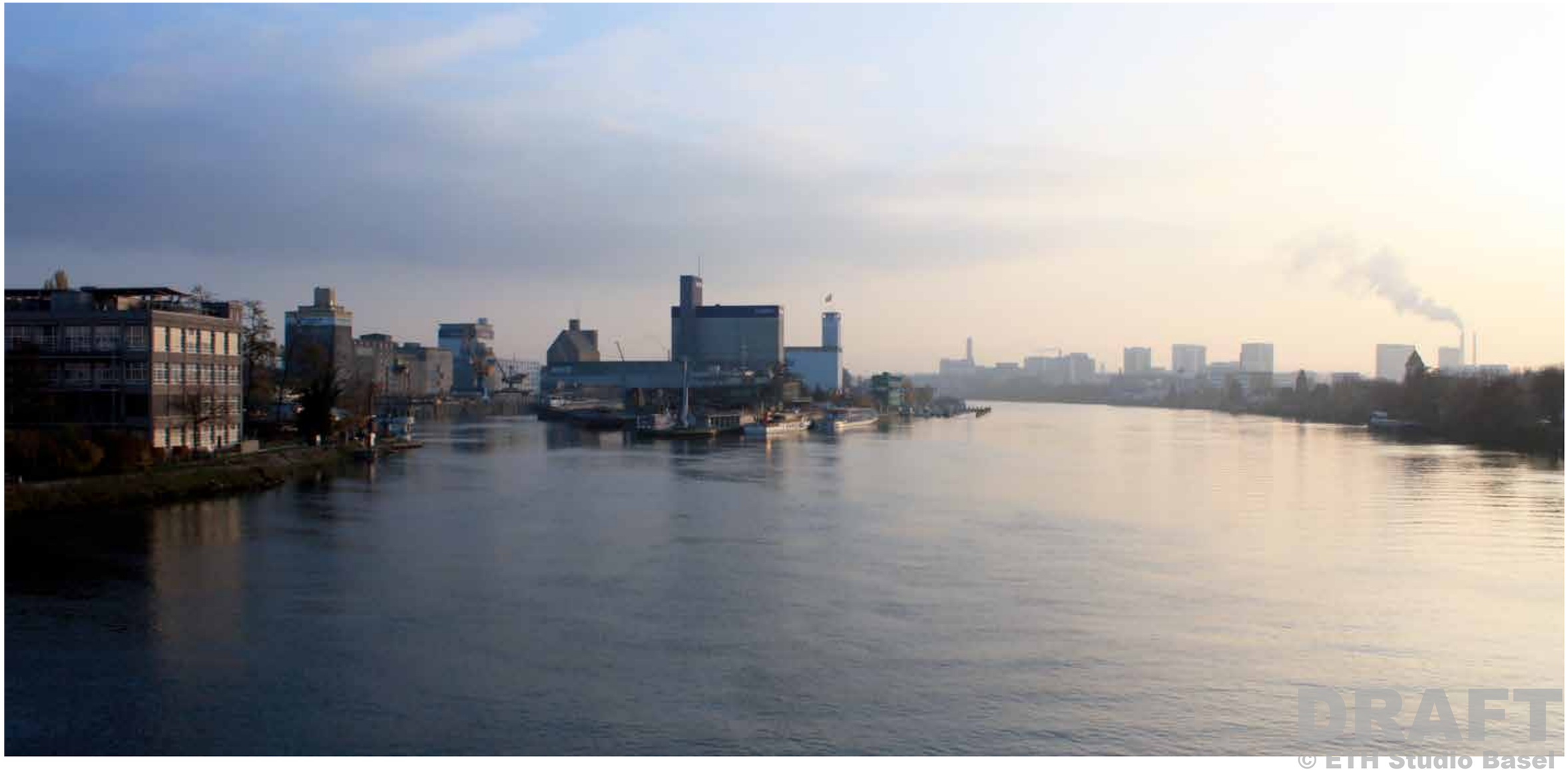
WATER IN THE METROREGION
WATER FORMATION
CURRENT PRESENCE OF WATER

URBAN WATER CYCLE
HISTORY OF WATER SUPPLY SYSTEM IN THE REGION
WATER SUPPLY
WATER USE
WASTE WATER TREATMENT
ADMINISTRATING WATER
CHALLENGES

CONCLUSION

INTRODUCTION

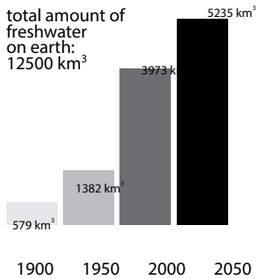
In the history of civilization water has always played a major role in defining the land we occupy. It has been an invaluable resource to appropriate to our needs and at the same time an element to domesticate and reclaim our territory from. As well as connecting people and places via transportation, it has also been an element of separation by bordering regions and lands. We try to understand water's role within the metabolism of the city by mapping its physical presence, exploring its flow,natural and artificial, within the region to serve human needs and pointing out the risks and challenges it imposes on the future development of the region.



GLOSSARY

The present glossary attempts to define the most relevant terminology related to the topic of water as a natural phenomenon as well as in its quality of an urban element. Differentiating between the categories hydrology, technology, abstract approach and water management appears to be helpful to capture the broad topic of water.

HYDROLOGICAL APPROACH



fresh water consumption 1900-2050
Source: Atlas of Water

FRESH WATER

is water containing less than 1,000 parts per million (ppm) of dissolved solids of any type, especially salts. Renewable freshwater resources are surface water and ground water.

SALINE WATER

is water containing more than 1,000 parts per million (ppm) of dissolved solids of any type, especially salts. Naturally present in salt lakes, seas, oceans.

SURFACE WATER

is found in streams, rivers and natural lakes, in wetlands, and in artificial reservoirs. Direct usage without treatment is possible for specific uses (irrigation, firefighting operations, cooling..). Surface water is important for enriching groundwater resources and affects the ground water level through infiltration into the ground.

GROUNDWATER

is part of the water used for supply pumped directly from the ground at different levels. Hydro-geological surveys and maps give an overview of groundwater availability in the region and are used to define withdrawal amounts and maximum numbers of water withdrawal permits.

SPRING WATER

is water exfiltrating naturally from water-bearing earth layers. It has high importance for emergency water supply because of the low effort required for pumping and treatment.

MINERAL WATER

is drinking water with special properties that comes from underground resources and is of original purity. Extraction and filling usually take place at the source / fountain and require official permit and certification. Treatment of natural mineral water is restricted whereas disinfection and addition of any elements is completely prohibited.


Map of European main catchment areas and watersheds (Wikipedia)

CATCHMENT AREA

is the area from which a water body collects its water in form of surface water from rain and melting snow or ice converges. The catchment area or drainage basin is either visibly separated from adjacent basins topographically through a geographical barrier (ridges, hills or mountains) or has an invisible watershed line (flat land).

WATER TABLE

is the level below the earth's surface at which the ground becomes saturated with water. Level may vary with changes in precipitation, evaporation, topography and structural geology.

TECHNOLOGICAL APPROACH

CHANNEL

the natural or artificial physical confine of a river consisting of a bed and stream banks with various geometries.

CANAL

is a man-made water channel navigable for transportation such as waterways or built for the purpose of water supply such as aqueducts.

DAM

is a structure of earth, rock, or concrete designed to form a basin and hold water back for the uses of irrigation, water supply or energy production.

WATER TOWER

is a large elevated drinking water storage container constructed to hold a water supply at a height sufficient to maintain a water distribution system based on pressure.

RESERVOIR

a pond, lake, or basin, either natural or artificial, for the storage, regulation, and control of water.

WELL

an artificial excavation for the purposes of withdrawing water from the underground aquifer.

HYDROELECTRIC PLANT

is an electric power plant in which the turbine generators are driven by energy of falling water to produce electricity.

IRRIGATION WATER

is the water used to assist crops and pastures or to maintain vegetative growth in recreational lands in areas with inadequate rainfall or during times with insufficient water availability.

TAP WATER

is water provided to the end user by a public or private provider through a network of pipes and at

TABLE WATER

consists either of drinking or mineral water or a mixture of these, specially assembled with or without additives.

BOTTLED WATER

is drinking water (e.g., well water, distilled water, or spring water) packaged and marketed in plastic or glass water bottles. The two main types of bottled water are mineral water and spring water.


The river Birsig flowing thourgh Basel-Cit and Country was channeled due to regular floodings.


Canal de Huningue, constructed 1806-1828, Huningue, France


Dam at the Kembs Powerplant, Canal d'Alsace, France


Water tower at Allschwill, Basel-Landschaft


Bottled water abundance in a local supermarket in Germany.

ABSTRACT APPROACH

Map of European main catchment areas and watersheds (Wikipedia)

Map of European main catchment areas and watersheds (Wikipedia)

White water has drinking water qualities.

Domestic waste water is considered grey water and can be treated for reuse.

Water containing human waste is considered black water that is to be treated in a waste water treatment plant.

GREEN WATER

is precipitation water stored in the soil or temporarily on the surface of vegetation that cannot be easily extracted for benefitial use. Green water partially gets appropriated for crop growth or evaporates directly from the soil.

BLUE WATER

is fresh surface and groundwater present in freshwater lakes, rivers and aquifers, and as groundwater.

WHITE WATER (POTABLE WATER)

is suitable, safe, or prepared for drinking.

GREY WATER

is waste water generated from domestic activities, which can be recycled on-site for uses such as landscape irrigation and constructed wetlands. Grey water excludes water containing human waste which is designated sewage or blackwater.

BLACK WATER (SEWAGE WATER)

is waste water produced by residential, sanitary, commercial, industrial, agricultural uses and surface runoff caused by precipitation.

IMPROVED WATER RESOURCES

is piped water to houses or yards,tube wells, public taps, protected dug wells and springs and rainwater collections. Water corresponds certain health standards, be close to home, potable and perenially reliable.

UNIMPROVED WATER RESOURCES

are unprotected wells or springs, water carts, surface water and tanker trucks.

EMBEDED WATER

is the water imbedded in food, products and services that contribute to different consumption patterns of the human population. Serves as a base to calculate the water footprint of a certain nation.

WATER FOOTPRINT

is a measure of human's appropriation of fresh water resources. The internal water footprint is the volume of water used from domestic water resources while the external water footprint is the volume of water used in other countries to produce goods and services imported and consumed by the inhabitants of the country.

VIRTUAL WATER

is the amount of freshwater used in all the steps of the production chain of a commodity, good or service, measured at the place where the product was actually produced. The term was introduced by the British scientist John Anthony Allan in the 1990s.

WATER MANAGEMENT APPROACH

PUBLIC WATER SUPPLY

is water withdrawn by public governments and agencies and by private companies to be then delivered through pipes and other constructions to users for domestic, commercial, industrial, and public water uses or for power generation.

EXTERNAL WATER SUPPLY

is extraneous water supplied from foreign supply regions in areas or at occasions when the own water supply is not sufficient for the required coverage. External water supply is of growing importance with the increasing inter-connectivity and further development of the supply network between neighbouring water supply areas.

PUBLIC WATER USE

is water supplied from a public water supply and used for the purposes of firefighting, street cleaning, municipal parks and swimming pools maintenance, etc.

NETWORK LOSSES

are shortages between the amount of water available for public water supply and the actual amount of water used, resulting from losses in the network.

WATER QUALITY

is the chemical, physical, biological, radiological, and thermal condition of water.

PH - VALUE

is a numeric value that describes the intensity of the acid or basic (alkaline) conditions of a solution. The pH scale is from 0 to 14, with the neutral point at 7.0. Lower pH levels indicate increasing acidity, while pH levels higher than 7 indicate increasingly basic solutions.

WATER POLLUTION

is the degradation of a body of water by a substance or condition that reduces the quality of the water.

WASTE WATER

is water containing waste including greywater, blackwater or water contaminated by waste contact, including process-generated and contaminated rainfall runoff.

WATER RECYCLING

is the treatment of wastewater to remove solids and pollutants and to make waste water suitable for reuse before releasing it back into the natural hydrologic system.

PUBLIC GROUNDWATER EXTRACTION

is groundwater extraction through public-sector entities.

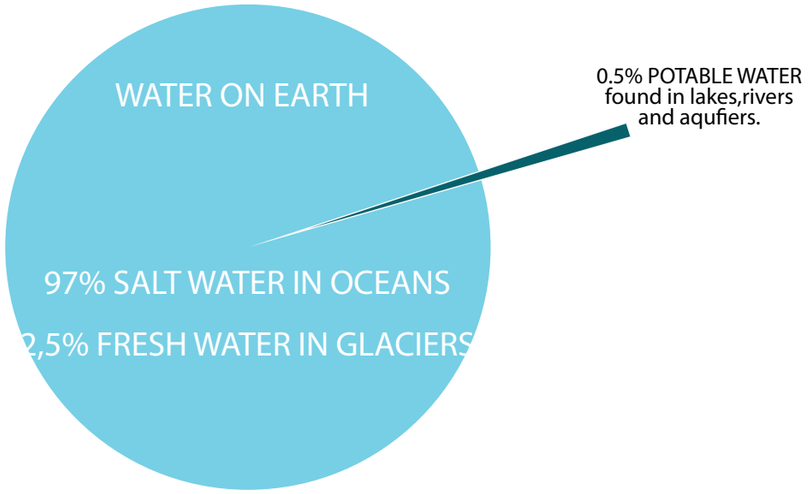
PRIVATE GROUNDWATER EXTRACTION

is groundwater extraction through private-sector entities, i.e. water supply of an industrial facility independently from the municipal water supply.

WATER PROTECTION AREA

are areas with special regulations and prohibitions applied in order to protect groundwater as well as surface water sources and banks from pollution. In Germany they are regulated by the Land governments according to the Water Management Act (WHG), Switzerland regualtes them by the Swiss Water Protection Law (GSchG). In France they are stipulated in compliance with the Water Resource Management and Protection ("Water law").

DISTRIBUTION OF WATER ON EARTH



Distribution of Water on Earth(Atlas of Food)

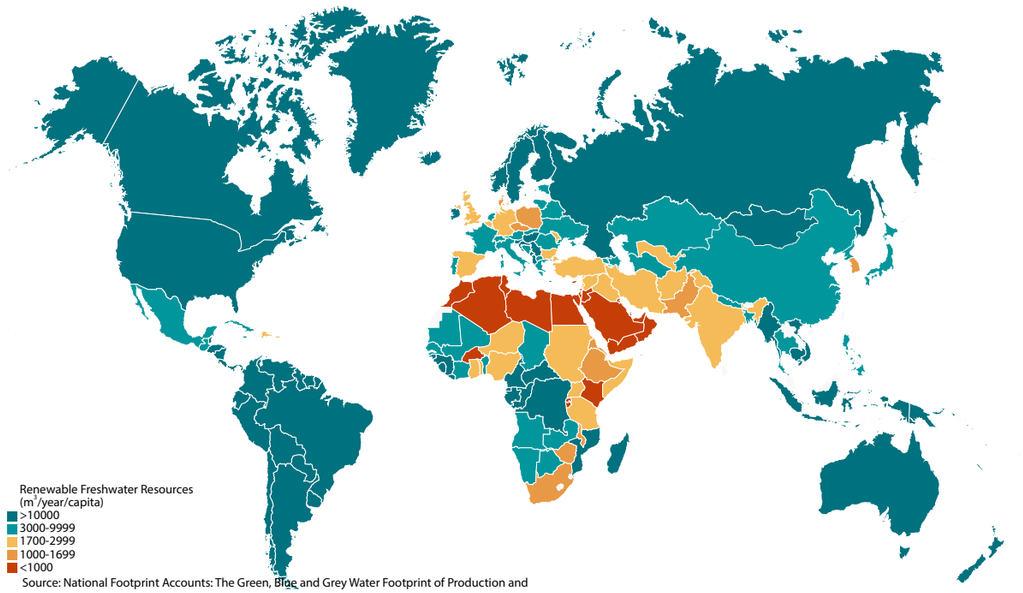
Fresh Water Resources

- Amount of fresh water on earth is constant at about 12.500 km3

- Humans use only 1/3 of available fresh water supplies and yet there is water shortage in large areas on earth.

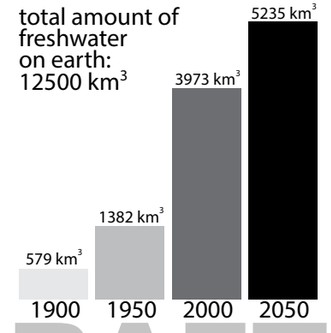
- Around 80% of agricultural water use is from rainfall stored in the soil, known as “green water”, with the rest from “blue water” which comes from rivers, lakes, aqufiers.

- Renewable freshwater ecosystems are the rivers, streams, lakes, ponds, groundwater, cave water, springs, floodplains, and wetlands (bogs, marshes, and swamps) that provide water for drinking, sanitation, agriculture, transport, electricity generation and recreation.



Fresh Water Consumption Resources on Earth(Atlas of Water)

Use of Water According to typology(Atlas of Food)



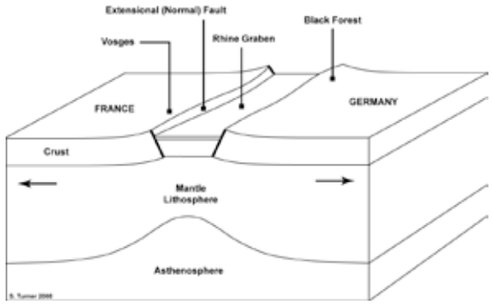
Fresh Water Consumption 1900-2050(Atlas of Food)

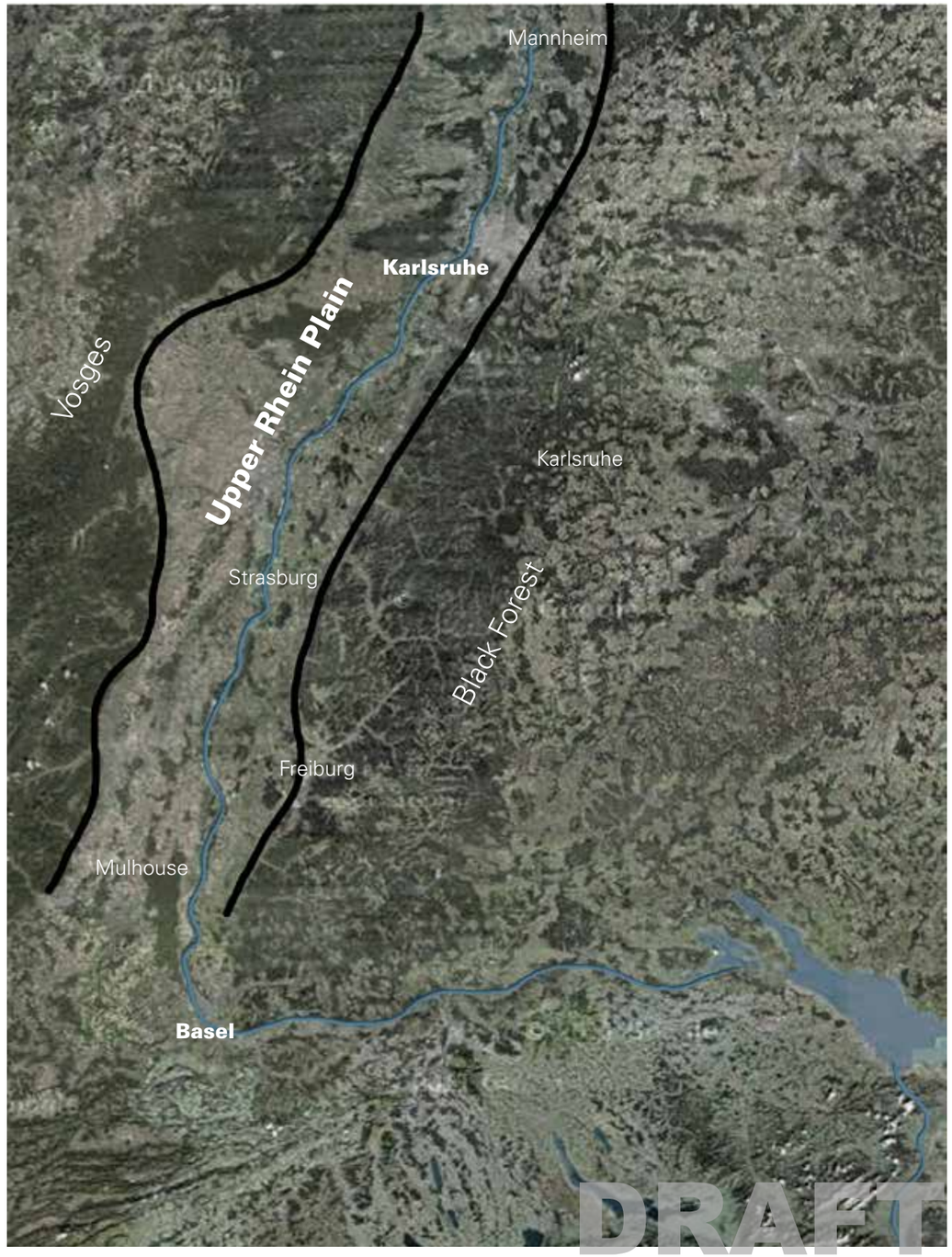
WATER IN THE METROREGION

Geological formation of the Upper Rhein Plain

The Upper Rhine Plain was formed during the Early Cenozoic era, when the continents moved to their current locations. At this time, the Alps were formed because the continents of Europe and Africa collided. It is thought that because the collision was irregular, the initial contact between the two continents resulted in the formation of dilational (extensional) structures in the foreland basin to the north of the Alps.The result was substantial crustal thinning, forming a major extensional plain and causing isolated volcanic activity.

To both the east and west of the Rhine Plain, two major hill ranges have formed that run the length of the basin. To the west, in France, these hills are known as the Vosges mountain range and in the east, in Germany, the hills comprise the Black Forest. These ranges exhume the same types of rocks in their cores, including deep crustal gneiss. The highest mountains exist immediately adjacent to the margin of the basin, and become increasingly low outwards. The boundaries between the hill ranges and the Rhine Graben are defined by major, normal fault zones.





Formation of the Upper Rhein Plain

The Rhein and Upper Rhein Aquifer

The Rhine flows from Grisons in the eastern Swiss Alps to the North Sea coast in the Netherlands and is one of the longest and most important rivers in Europe, at about 1,233 km with an average discharge of more than 2,000 m3/s.

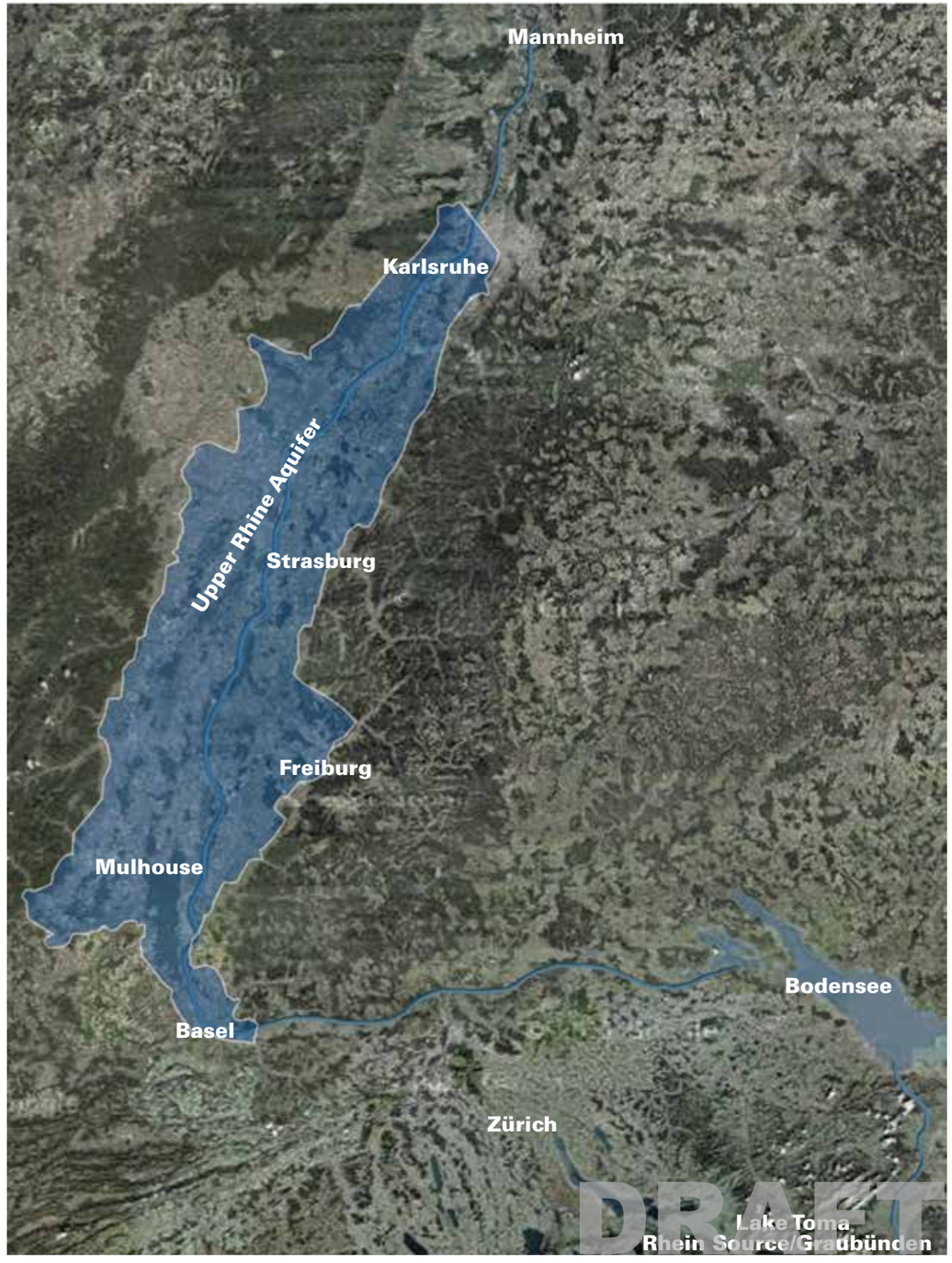
Lake Toma in the Swiss Canton of Graubünden is generally regarded as the source of the Rhine. Its outflow is called Rein da Tuma and after a few kilometers, it forms the Vorderrhein. The river begins to be called Rhine in the vicinity of Chur, more specifically, at the confluence of the Vorderrhein and Hinterrhein (river) in Reichenau.nFrom Reichenau, the Rhine flows east as the Alpenrhein or "Alpine Rhine", passes Chur turning north to form another 20 km further north the border between Liechtenstein and then Austria, on the east side and Canton of St. Gallen of Switzerland, on the west side. As an effect of human work it empties into Lake Constance on Austrian territory and not on the border that follows its old natural river bed. It emerges from Lake Constance, flows generally westward, as the Hochrhein, passes the Rhine Falls, and is joined by the river Aar. The Rhine roughly forms the boundary with Germany from Lake Constance with the exceptions of the canton of Schaffhausen and a part of the canton of Zürich, until it turns north at the so-called Rhine knee at Basel, leaving Switzerland.

The Rhine from source till outlet. (Wikipedia)

Basel stands at the beginning of the Upper Rhine Plain and also the Aquifer underneath it. Located below the plain, the Upper Rhine aquifer - one of the largest in Europe - holds an estimated 450,000 km3 of fresh water and supplies some 3 million people in France and Germany, supplying 75% of their drinking water and 50% of the water used by industry.

Since the 1970s it has suffered increasingly serious pollution from nitrates, pesticides, chloride and VOCs. 50% of the surface area is covered with agricultural lands and The Ruhr Area in Germany is an important contributer to the pollution in the aquifer. (Wikipedia)

Rhine in the Ruinaulta gorge, Graubünden/ CH



Map of the Upper Rhein Plain and Aquifer

Mineral water formation

Natural mineral water is initially rain water that seeps into the soils gradually until it eventually accumulates in an aquifer deep below ground. On its way to the deeper layers of the ground it is naturally filtered by the layers of rocks and enriched with minerals and possibly carbon dioxide according to the composition and concentration of these in the ground. The slower the seeping process, the more minerals can solve in the water in order to reach its final quality of a pure natural product. Mineral waters reflect the region and its typical rock and soil formation.

http://www.mineralwasser.com/entstehung.html

Salt deposits in the region

Baden-Württemberg

The salt deposits in the province of Baden-Württemberg are located in Heilbronn close to Stetten. Geologicall they belong to the middle Muschelkalk and are stored horizontally at a depth of around 200 m and thickness of 30-40 m in Heilbronn whereas in Stetten deposits of rock salt are to be found in the depth of 130m and form a 8-10 m thick layer.

North-West Schwitzerland

Its currently most exploited salt deposits are in the region in Schweizerhalle, Basel-Country and Riburg, Aargau. The extraction is conducted in a naturally friendly manner by means of a basic solution. The salt deposit layer is reached through drilling, then water is pumped into the ground to dissolve the salt and is finally pumped up as a salt solution to the saline, where water is evaporated.

Alsace

The main deposit of rock salt are located west of Mulhouse, between the river Rhein to the east, the Jura mountain to the south and the Vosges to the West. Wittelsheim, Cernay and Lutterbach are some of the mines reaching depths up to 700 meters. Most of these mines are not functioning nowadays but have caused a significant pollution of the groundwater in the whole Rhine basin due to the residue of salt solution discharged directly at the river as a waste product of the salt extraction.

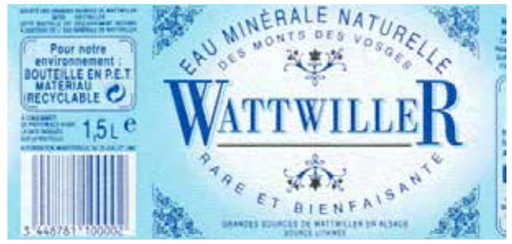
(6)Mineral spring Eptingen at Eptingen
Basel-Country, Switzerland

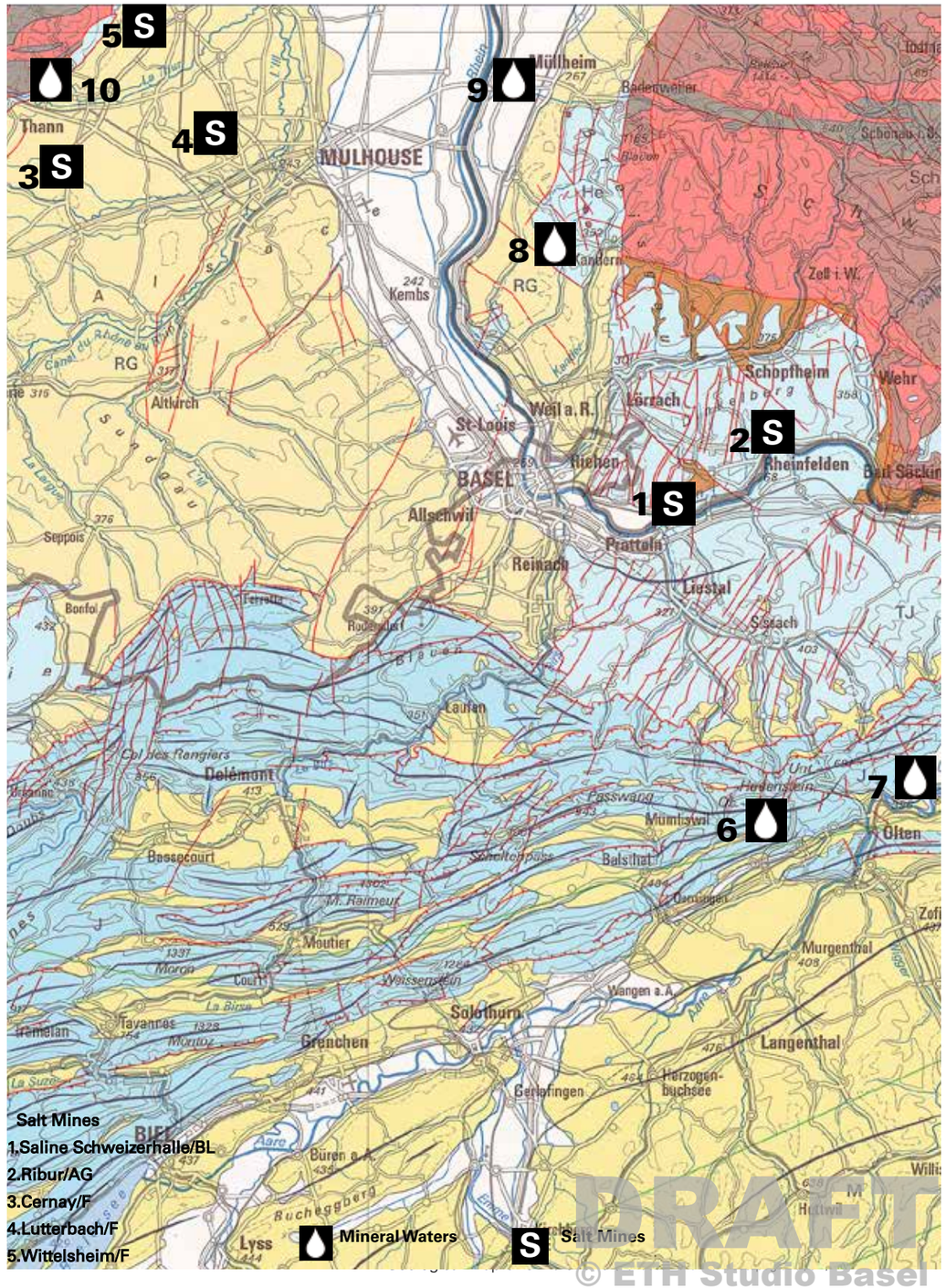
(7)Mineral spring Lostorfer at Lostorf
Solothurn, Switzerland

(8)Mineral spring Lieler Schlossbrunnen at Schliengen-Liel
Lörrach, Germany

(9)Mineral spring Breisgauer at Neuenburg am Rhein
Lörrach, Germany

(10)Mineral spring Lithinée at Village de Wattwiller
Haut-Rhin, France





Groundwater Typologies

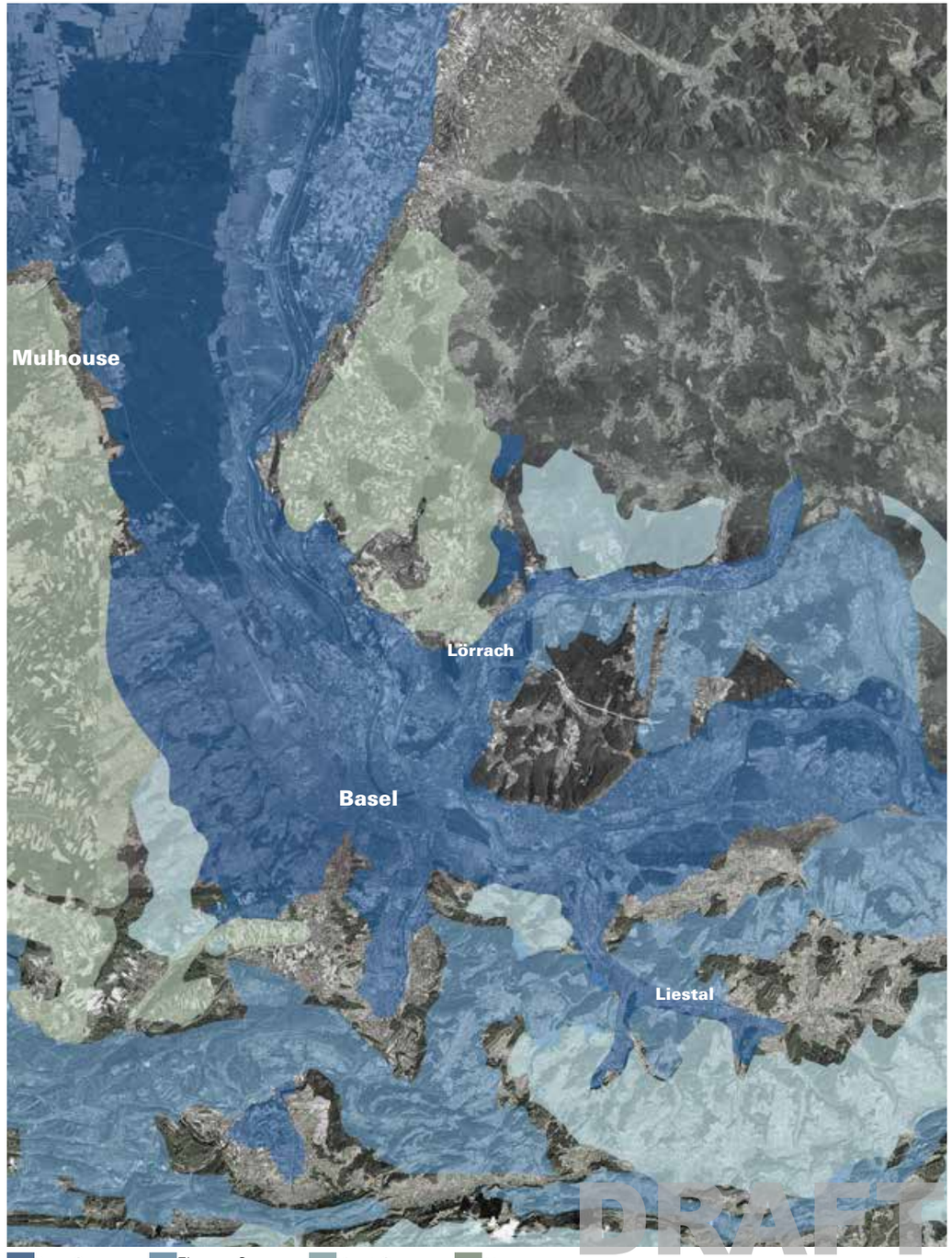
Groundwater is underground water, static or flowing, that fills in the voids in the soil and between rocks coherently. It is generated by rain water infiltration and either flows to form a surface water or emerges as spring water above ground. The water-bearing rock on which ground water is trasnmitted is called an aquifer and it varries according to the type of the rock. There are three types of aquifers: pore, fractured and karst aquifers. The different ground layers and the aquifer filter impurities in ground water. Differencies in their porosity and permeability affect the level of filtration.

Pore Groundwater
is groundwater found in unconsolidated or bedrock (pore aquifers). Their flow-effective porosity is formed by pores. Main Source of Fresh Water in metrobasel.

Fissure Groundwater
is groundwater flowing through bedrock (fractured aquifers), whose flow-effective porosity is formed by fractures and other joints.

Karst Groundwater
is groundwater found that fully saturates the cavities in a karst system and is subject only to gravity. Karst groundwater is therefore much more vulnerable to impurities than the one flowing through a porous aquifer.

(Grundwasser Helvetas
http://www.geodz.com/)



Groundwater Typology in Metrobasel(Swiss Topo)

1.Lange Erlen

The groundwater protection area Lange Erlen spans over a 180 Hectar Forest on both sides of the canalized river Wiese. The area is open to recreational use and has also a small animal park inside. The area is used by the IWB to extract almost 50%of the water distributed to Basel City and therefore has an important role on the urban water cycle. Water from the Rhein is percolated in Natural Soil into groundwater in order to keep the water table stable.(IWB,Wikipedia)

Groundwater Protection Area Lange Erlen(Airal Photo/Bing

2.Hard

The groundwater protection area “Hard” was especially important after the Second World War due to lack of resources in other areas of Basel. Almost 200.000 people in Canton Basel Stadt & Basel Landschaft are provided water through this area, although its proximity to the industrial areas in Muttenz sparks controversy about its quality, leading to questions about contamination.(Hardwasser AG,Wikipedia)

Groundwater Protection Area Hard/BL (Airal Photo/Bing Maps)

3.Grütt

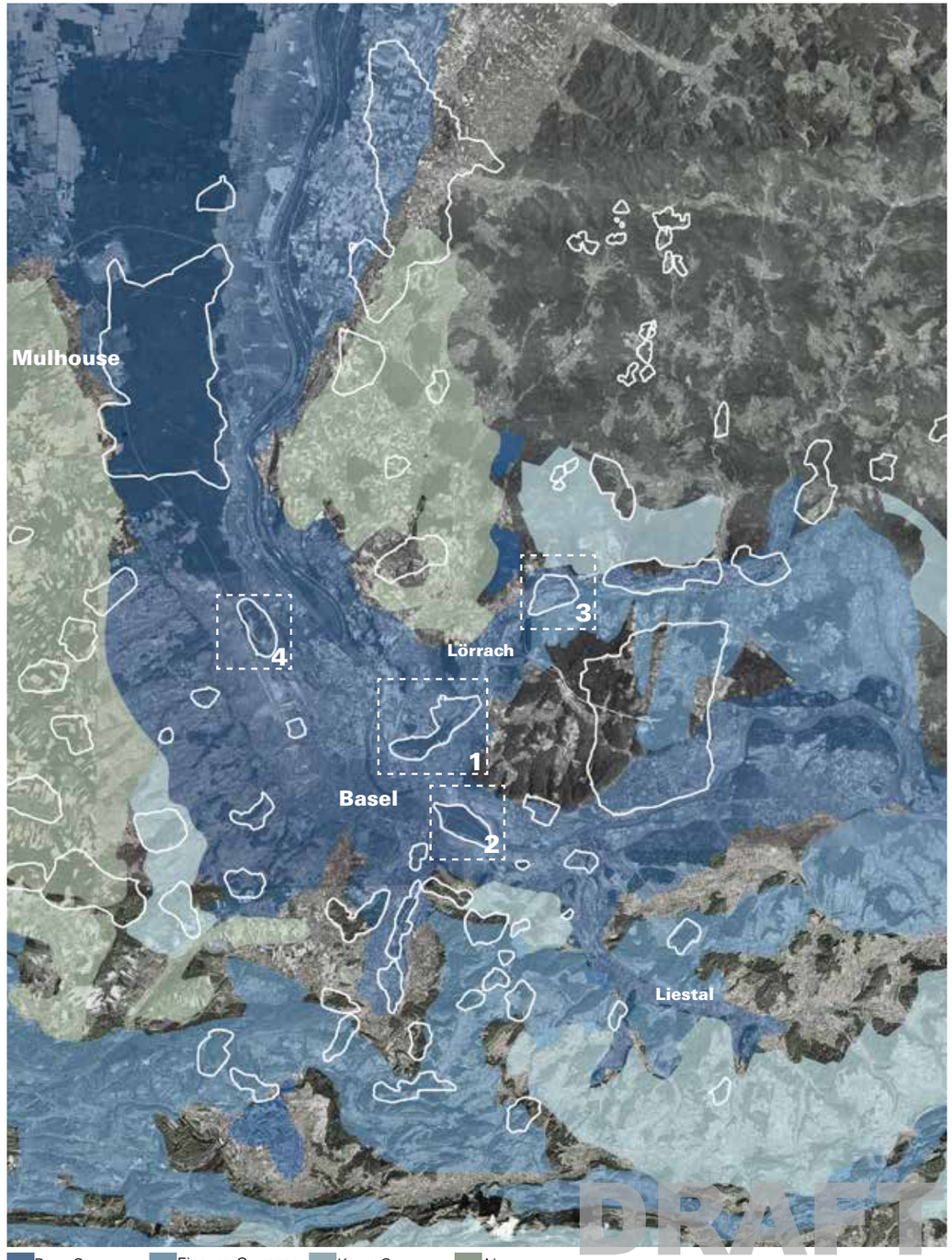
The country park Grütt serves as a recreational area to the region Lörrach as well as a groundwater extraction area for the water supply network. The Park spans a 51 hectar green space and has been used as a groundwater source since 1967 (badenova)

Groundwater Protection Area Grütt/DE (Airal Photo/Bing Maps)

4.Bartenheim/Blotzheim

Several wells within the groundwater protection area close to the Euroairport in Saint-Louis serve the population in the french side of metrobasel.

Groundwater Protection Area Bartenheim/f (Airal Photo/Bing)



Pore G.wasser Fissure G.wasser Karst G.wasser None

Groundwater Protection Areas in metrobasel(swisstopo)

1.Grand Canal d'Alsace

Origin: Basel, Switzerland
End: Breisach, Germany
Length: 50 km

2.Canal de huningue

Start: Rhine river at Huningue
Mouth: Niffer, France

3.Wiese

Origin: Feldberg auf 1200 m
Mouth: Rhine river at Kleinhüningen
Catchment area: 437 km2
Length: 54.6 km, 6.1 passing through the groundwater protected area of Lange Erlen.

4.Riehen Pond

Origin: Wiese river at Tumringer Dam,Germany
Mouth: Wiese river after Lange Erlen park

5.Rhine

Origin: 2345 m Toma lake (Rhine Source),
Height: 3402 m
Mouth: North-Sea, the Netherlands
Length: 1320 km
Catchment area: 36'000 km2

6.St. Alban Pond

Origin: Birs river at St. Jakob Steg
Mouth: Rhine river at Schifflände, Basel
Length: 21 km

7.Birsig

Origin: Burg, Leimental
Mouth: Rhine river at Schifflände, Basel
Catchment area: 82 km2
Length: 21 km

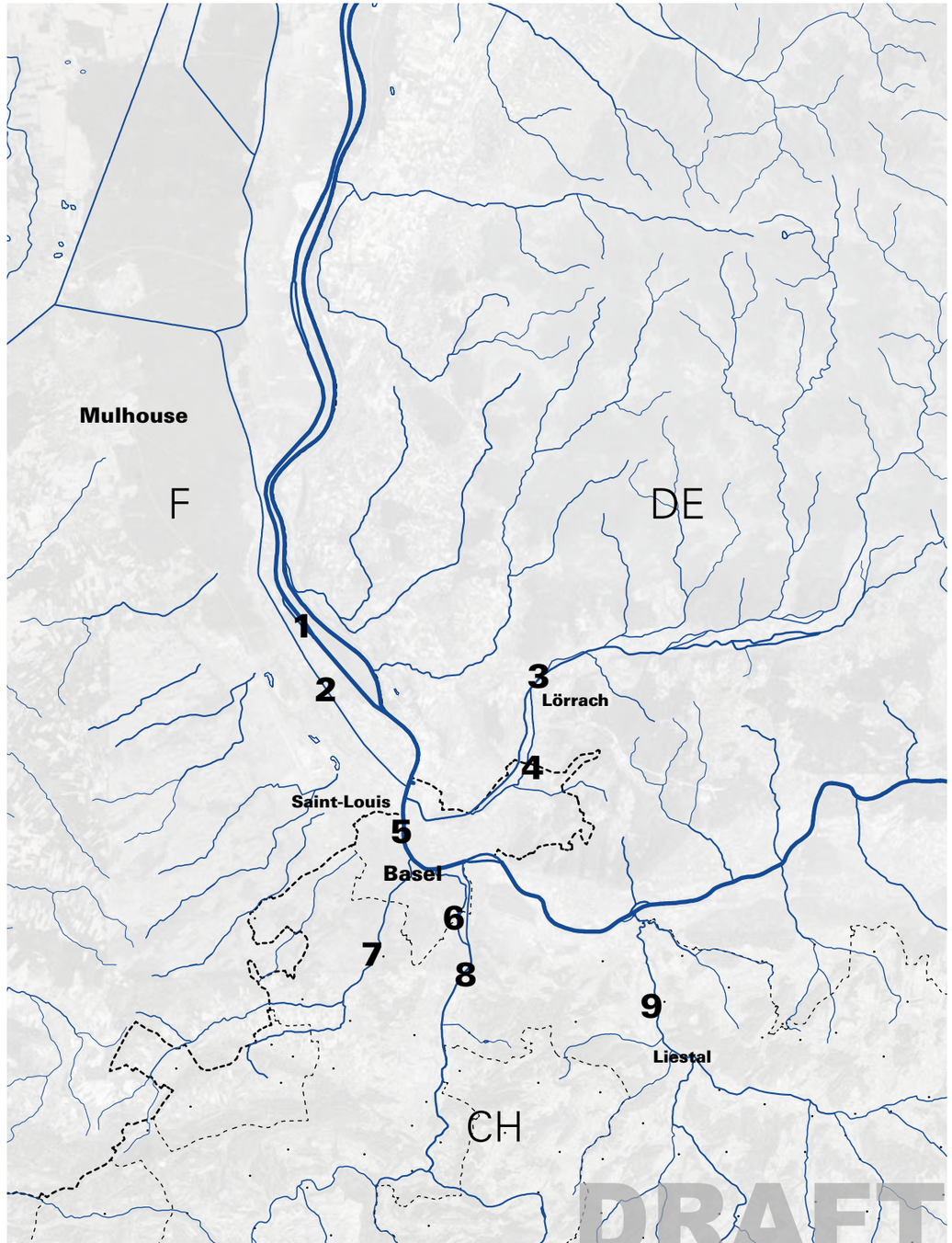
8.Birs

Origin: Jura am Pierre Pertuis bei Tavannes, 800 m
Mouth: Rhine river at Birsfelden
Catchment area: 922 km2,
Length: 80 km

9.Ergolz

Origin: Faltenjura, Schafmatt, 930 m
End: Rhine near Augst
Catchment area: 82 km2,
flowing through France and Switzerland
Length: 21 km

Rivers in Metrobasel



Surface Water in Metrobasel

Transition from open river to and underground canal, the River Birsig in Basel City

Birsig

- 11th century shore reinforcement against flooding
- waste water and stool disposal at the Birsig causes Cholera and Typhus onset
- the river is covered in the 14th century inside the city wall
- 1850-1900 - correction of the river bed and coverage over Fischmarkt up to its Rhine mouth
- 1950 Birsig Parking Lot
- 1962-1964 coverage at the Zolli area. Birsig flows today above ground only shortly before and after the area of the Zoo.

St. Alban Pond

- Channeled as a branch of the Birs to supply the mills of the St.Alban cloister
- 1623-1626 errection of dam “Neue Welt”
- Water supply for the mill of the Paper Museum and the Brüglingen Ponds until present days
- 1860 - correction of the river bed and coverage of the two mouthings in the Rhine.

The renaturalized Birs in Basel City.

Birs

- 11th century deflected for commercial usages
- 1625 first dam “Neue Welt” errected, 1811 corrections of the river bed
- 1890 Haefely-dam built to secure the railway bridge
- 1936/37 Birskopf developed as an urban element
- 1957/58 expansion of the Basel-country shore to gather gravel and stones before entering into the Rhine.

Ergolz

- Drinking water supply for Augusta Raurica in Roman times until 1318
- Aqueduct with origin above Liestal
- 14th century water supply for mills and saw mills
-1960 Water Treatment plants.

Canal de Huningue/F

Grand Canal d'Alsace

- Constructed between 1932-1959 to improve navigation of the Rhine (shallow and with a rapid current) and to increase traffic upstream from Strassbourg
- Hydroelectric power plans erected at Kembs, Ottmarsheim, Fessenheim and Vogelgrun, supplying electricity to one of the most heavily industrialized regions in France and Germany
- All yeas around water supply for the nuclear power plant at Fessenheim, eliminating the need for cooling towers.

Canal de Huningue

- Constructed 1806-1828, navigable from Niffer until Kembs
- Enlarged in 1961 between Grand Canal d'Alsace and Mulhouse
- 1992-1993 creation of the wild life parc Parc des Eaux Vives at the site of the former harbour.

The renaturalized River Wiese in Lörrach/DE

Wiese

- Channeled in the 13th century for irrigation and mill supply; bank reinforcement with wood, pastures, alders
- 1834 straightening and channeling of the river
- 2001 creation of Landscape park Wiese, various revitalising projects.

Riehen Pond

- Channeled in the 13th century for industrial and irrigation purposes
- 1823 supplies 26 facilities in Kleinbasel
- 1923 Riehenteich power plant errection
- Riehenteich is led below the Lange Erlen Park until its mouthing in the river Wiese.

Rhine Panorama from Dreilaendereck

Industrial Rhine Bank

Tinguely Brunnen at Basel Theather

UV-Filtration Facility at IWB Plant Lange Erlen/BS

Water Discharge Canal at River Wiese/ Lörrach

URBAN WATER CYCLE

"Water" as a substance which can be found in nature is a different phenomenon than "Water" which runs from our taps in our homes, which we define as "tap water", in the metrobasel region also "drinking water", although in many parts of the world these two terms have different meanings.
Water in the metrobasel region goes through certain processes which qualify it as safe drinking water. Although we consume this product in great quantities, thanks to the natural cycle of water, it finds its way back into nature. This cycle within the urbanized metrobasel region has become gradually further regulated in order to sustain the qualitative properties of this resource and prevent ourselves from its destructive negative effects.

Plan of Grossbasel City Water Supply Network in 1865. (Vernetzt, Versorgt, Verbunden, IWB)

Regulating Water in Metrobasel

Drinking water within the Metrobasel region is extracted from sources that belong to the same hydrological system; groundwater from the Upper Rhine Aquifer and surface waters, mainly rivers, which feed this aquifer.

Although water itself does not recognize any artificial boundaries , the urban water cycle(s) which regulate the use of water in the region are generally defined by administrative and economic boundaries

Each political body in the Metrobasel region define their own terretorial water supply network. These networks are connected at certain points which give a certain amount of flexibility to the system. Water either stays embedded within products and gets transported to other destinations or ends up in the Rhine after being purified in waste water treatment plants.

1.WATER SUPPLY

Extraction

Treatment

Distribution

Percolation Process at IWB Lange Erlen

Pumping Station in IWB Lange Erlen

2.WATER USE

Industry

Agriculture

Energy Production

Botanic on Hirtenweg, Basel

Feldschlösschen Bottling P., Rheinfelden

Domestic

Transportation

Recreation

Kraftwerk Birsfelden

Fountain in Basel Landschaft

3.WATER TREATMENT

Canalisation

Purification

Discharge

ARA Pro Rheno Basel

The River Wiese in Lörrach, Discharge

HISTORY OF URBAN WATER CYCLE IN THE

The present timeline aims at a general overview of historical events relevant to the urban water cycle in the metropolitan region of Basel. Natural disasters, technological advance, industrial development and social events that had impact on the the development of the urban water supply and sanitation are introduced to the left in relation to the chronologically corresponding reactions in the urban water cycle to the right.

NATURAL DISASTERS, SOCIAL EVENTS, TECHNOLOGICAL ADVANCE AND INDUSTRIAL DEVELOPMENT

1250

1500

1501

The historical canton of Basel joins the Old Swiss Confederation as its eleventh canton.

1800

1812

Launch of local production of various acids primarily for the textile industry.

1833

The historical canton of Basel splits into Basel-Stadt and Basel-Landschaft.

1836

Beginnings of the salt extraction industry in the region.
A 6 meter thick rock salt layer is dicovered at the depth of 135m near Rothaus, Muttenz.

1837

The first saline is established in Schweizerhalle near Pratteln follwed by three further facilities in Kaiseraugst 1834. Rheinfelden 1844 and Riburg 1848.

1850

1855

Cholera epidemic spreads in Basel due to extreme pollution of the river Birsig with domestic and human waste.

1859

Beginning of the modern chemistry industry of artificial and synthesized natural dyeing pigments in Basel region. Alexander Clavel starts producing tar dyes for silk dyeing.

1865

Abdominal typhus epidemic in Basel caused by impure water and food.

1880s

Beginnings of the pharmaceutical industry in the region of Basel.
1895 the chemical plant of Sandoz produces their first pharmaceutical product.

1882

The Swiss Society of the Chemical Industries (SSCI) established in Zürich to defend the economical and political interests of the chemical industries.

1883

Robert Koch discovers that the Cholera causative agent is transmitted over drinking water.

HISTORY OF URBAN WATER SYSTEM

1250

Public water supply system starts operating with wells at the Holee and Bruderholz springs in Basel-Stadt. Basel is the first city in Switzerland to operate a public water system.

1530

Erection of the first basilisk fountai`n in the Augustinerstrasse.

1850

Opening of the first brine bath facility at Schweizerhalle. It functioned until 1910.

1853

Imperial decree by Napoleon III that allows private companies to operate the urban water systems. The Compagnie Générale des Eaux is founded in France.

1864

A private company is launched to provide the water supply for the city of Basel. In 1875 the city of Basel acquires the rights and the facilities to operate the public water supply system.

1864

A supply network of roughly forty springs in Jura mountain is constructed and operates until 2003 supplying the canton of Basel-Stadt.

1866

Boosted water supply is introduced in Basel-Stadt.

1880

Introduction of iron and casted pipes for the water supply system in the canton of Basel.

1882

The pumping station at Lange Erlen, Basel-City starts operating with two ground water wells.

1886/7

The first wells are sinked at the Tumringer street in Lörrach. Beginning of the centralized and regulated water supply in Lörrach.

NATURAL DISASTERS, SOCIAL EVENTS, TECHNOLOGICAL ADVANCE AND INDUSTRIAL DEVELOPMENT

1900

1914-1918

First World War.

1915s

Peak of the dyeing industry with tar dyes in Basel.

1932

Erection of the Kemb hydroelectric power plant in France.

1939

Beginning of the industry for agricultural products with Sandoz' launch of their first pesticide Copper Sandoz.

1939-1945

Second World War.

1950

1960s

Consequent summer droughts in the south-west regions of Baden-Württemberg cause chronical shortages in water supply. Rain water is quickly absorbed by the calcareous soil.

1973

World Oil Price Crisis.

1974

Diversification of the chemical industry into the seeds market.

1986

Chernobyl Nuclear Power Plant disaster in Ukraine

1986

Sandoz warehouse in Schweizerhalle near Basel catches fire with catastrophic consequences for the waters of the region due to the outlet of contaminated extinguishing water directly into the Rhine river.

1993-1995

Massive flooding in the Rhine delta regions in Holland.

2002

100-year flood in Germany

2005

Alpenhochwasser and 2005 European Flood

HISTORY OF URBAN WATER SYSTEM

1911

Artificial recharge of ground water with water form the river Wiese is introduced in the city of Basel.

1918

The Société Auxiliaire des Distributions d'Eau (Sade) is set up on the initiative of Compagnie Générale des Eaux to assist in the operating of water services as a company specializing in water and wastewater systems.

1930s

Alterations of the Rhine natural flow to facilitate hydraulic power plant establishment and inland river transportation.

1947

Water supply shortages due to enduring heat and drought. Water saving measures are introduced in the canton of Basel-Stadt.

1955

Establishment of Hardwasser AG, as a cantonal partnership for water supply between the cantons of Basel-Stadt and Basel-Landschaft.

1958

First waste water treatment plant establishment in Basel-Landschaft in Therwil.

1962

A fluoridation facility starts operating adding fluorid into water supplied assisting dental prophylaxis in the canton of Basel-Stadt until 2003.

1964

Artificial recharge of ground water with water form the river Rhine is introduced in the city of Basel.

1975

A waste water treatment plant for the chemical industry starts operating in Schweizerhalle-Pratteln. As per 1972 contract chemical companies pay according polluter pay principle.

1983

A waste water treatment plant starts operating in the city of Basel. Waste water from both Swiss cantons is now fully purified before flowing back into the Rhine.

1983

The central water works "Im Grütt" starts operating to guarantee an adequate water supply for the city of Lörrach and its surroundings and secure contemporarz water standards.

2001

Rhine 2020-programme for Sustainable Development of the Rhine released by the International Commission for the protection of the Rhein (ICPR).

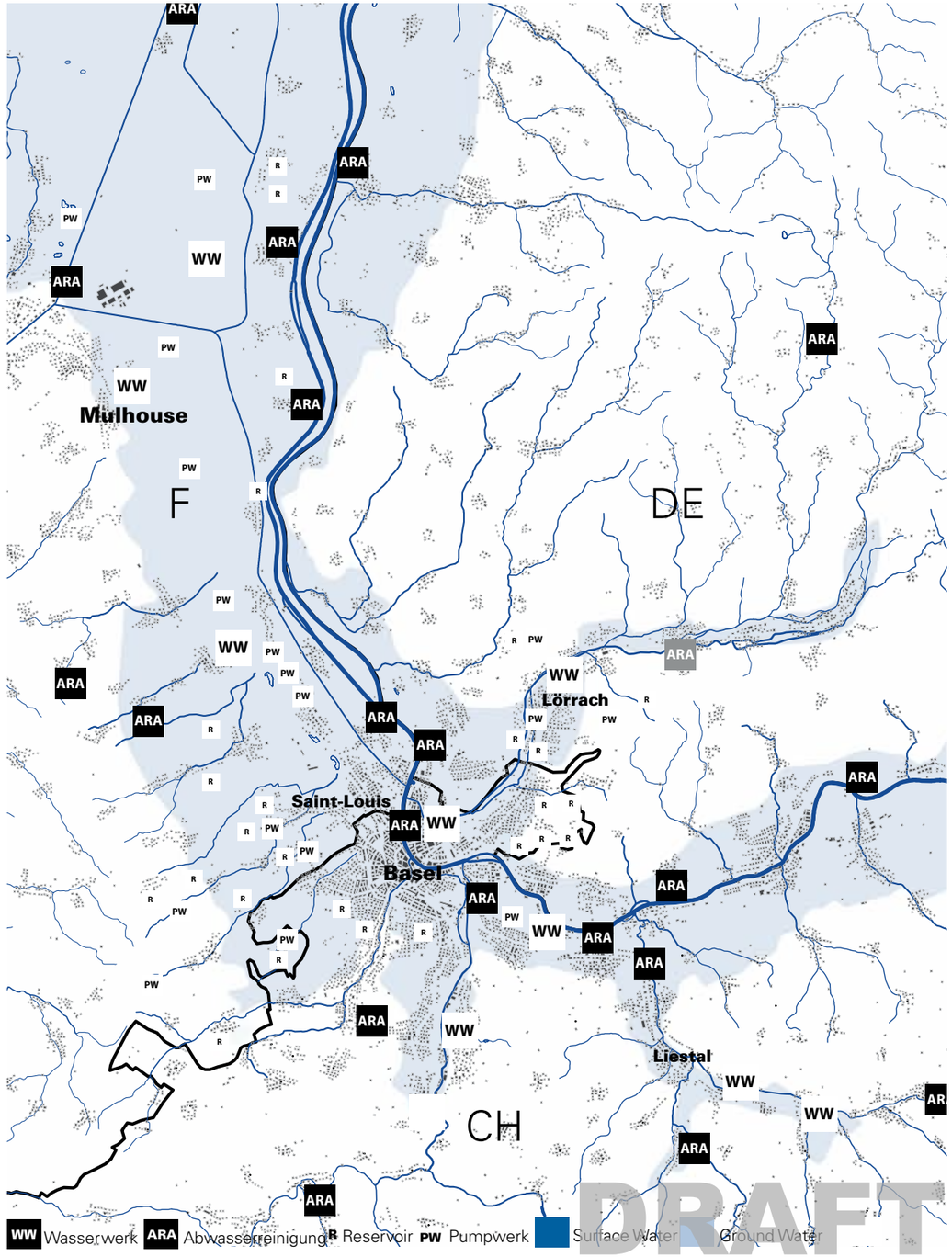
2010

Introduction of ultraviolet light for disinfection that should replace the chlorine dioxide treatment of water in the canton of Basl-Stadt.

Regional Networks

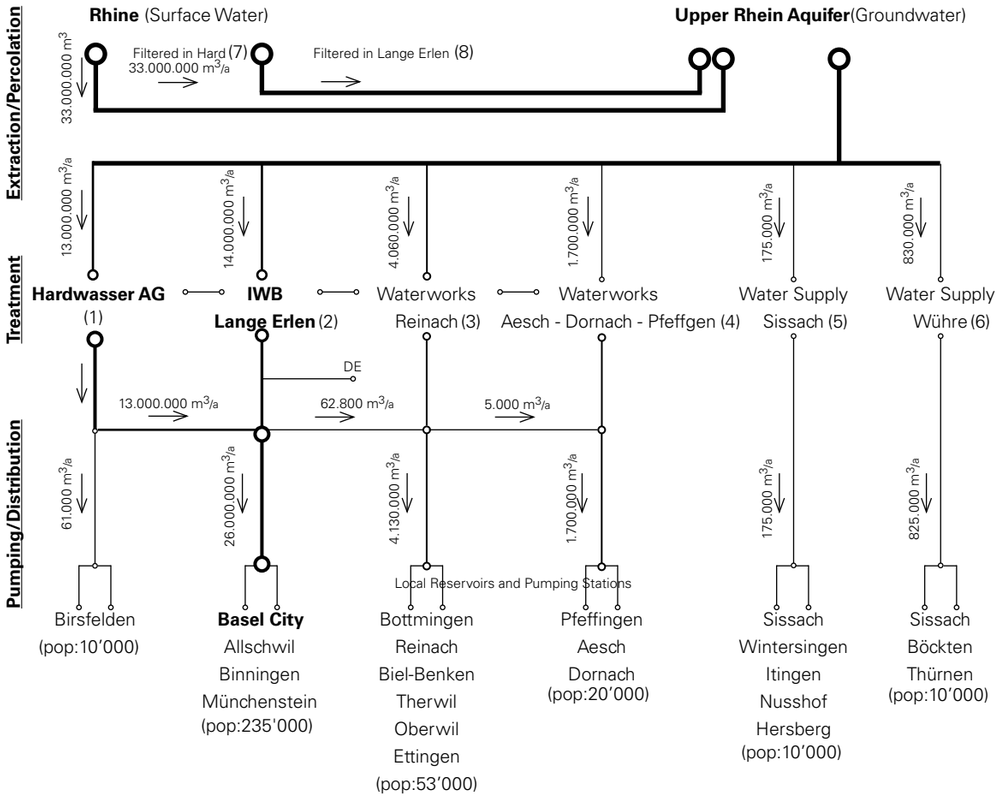
Taking a closer look at the urban water cycle in metrobasel, the rather well connected road network does not match with the water supply network. Due to regulations, political decisions and lack of integration on infrastructural matters, each area in the three national region has its own closed network, only to be connected with their own national networks.

National borders become much more present at the underground level than on the surface level in the case of water networks. In order to understand this phenomenon, we take a closer look on each network.



Water Supply & Treatment Plants in Metropolitan Region of Basel

IWB Lange Erlen Treatment and Pumping Plant, Basel Stadt



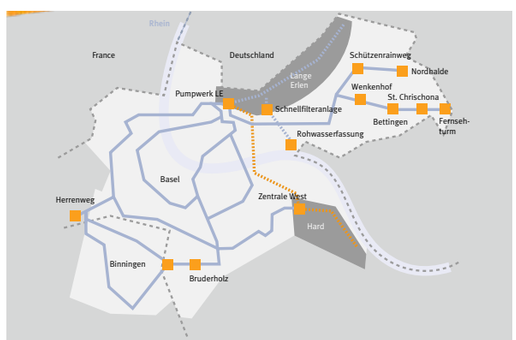
Public Water Supply Network Basel Stadt & Basel Landschaft

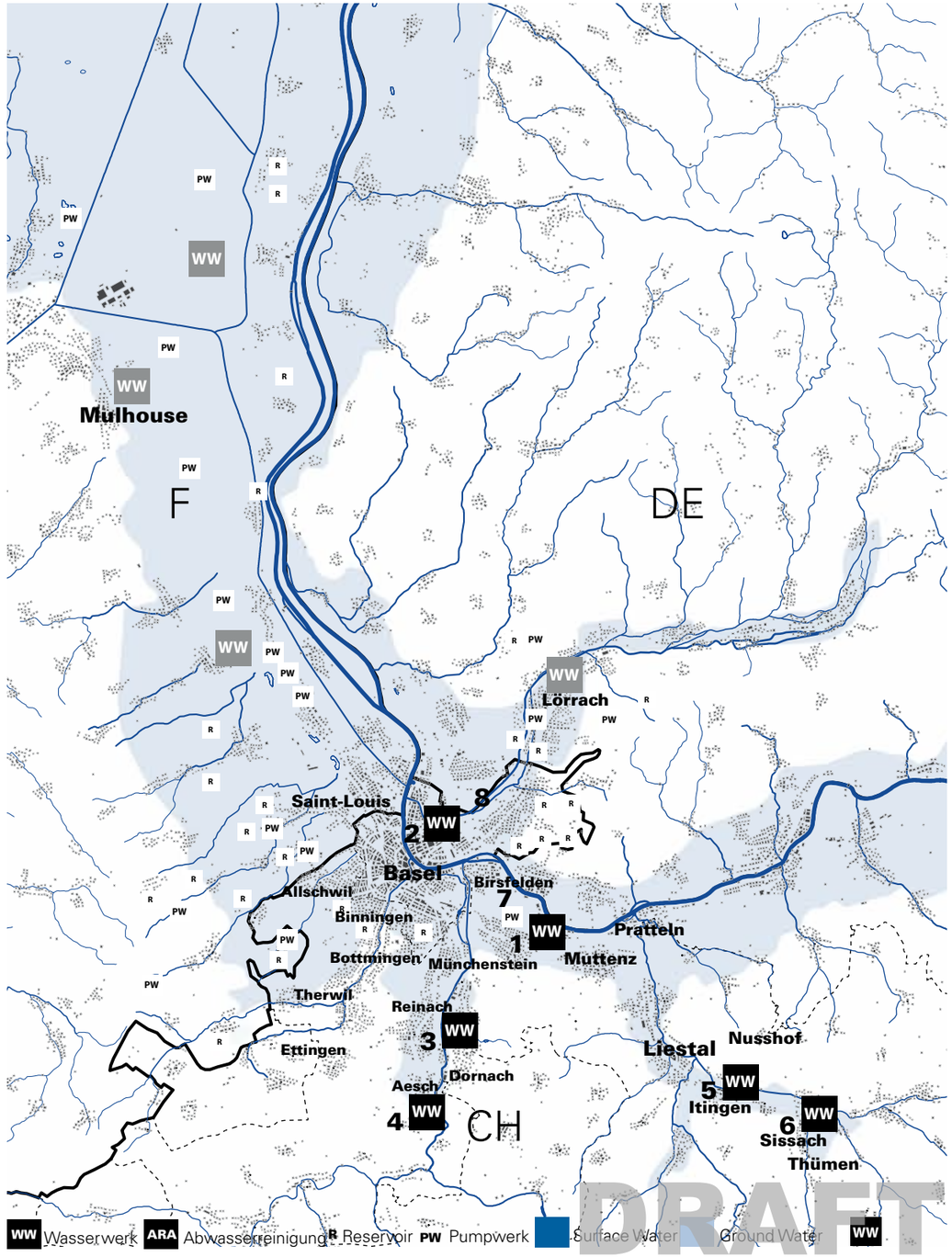
Basel depends on two main sources for its drinking water supply; The River Rhine as the surface water and the Upper Rhine Aquifer as groundwater.

Basel City is the largest consumer of water due to population and industries based in the city. Waters extracted from the water protection area in Hard are diverted into the Basel City Network in order to keep up with the high demand in this area.

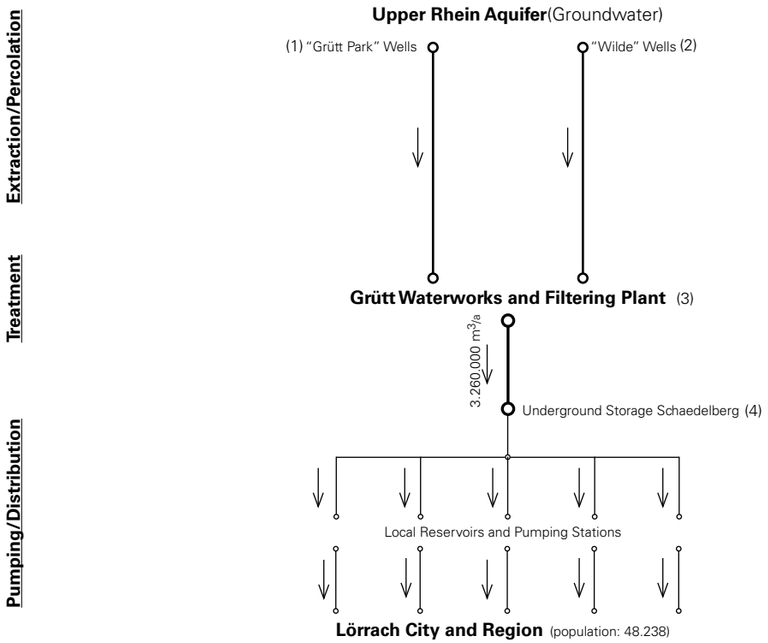
The water supply network in this region is run by different companies or associations. IWB(Industielle Werke Basel) runs the network in Basel City. Hardwasser AG provides water for both Basel City and Basel Countryside.

Kanton Basel Landschaft has also a high number of private wells. Almost 50% of water in the countryside comes from these wells, direct from groundwater resources.





Urban Water Cycle/Basel Stadt & Basel Landschaft(wasserstatistik.bl.ch/iwb.ch)



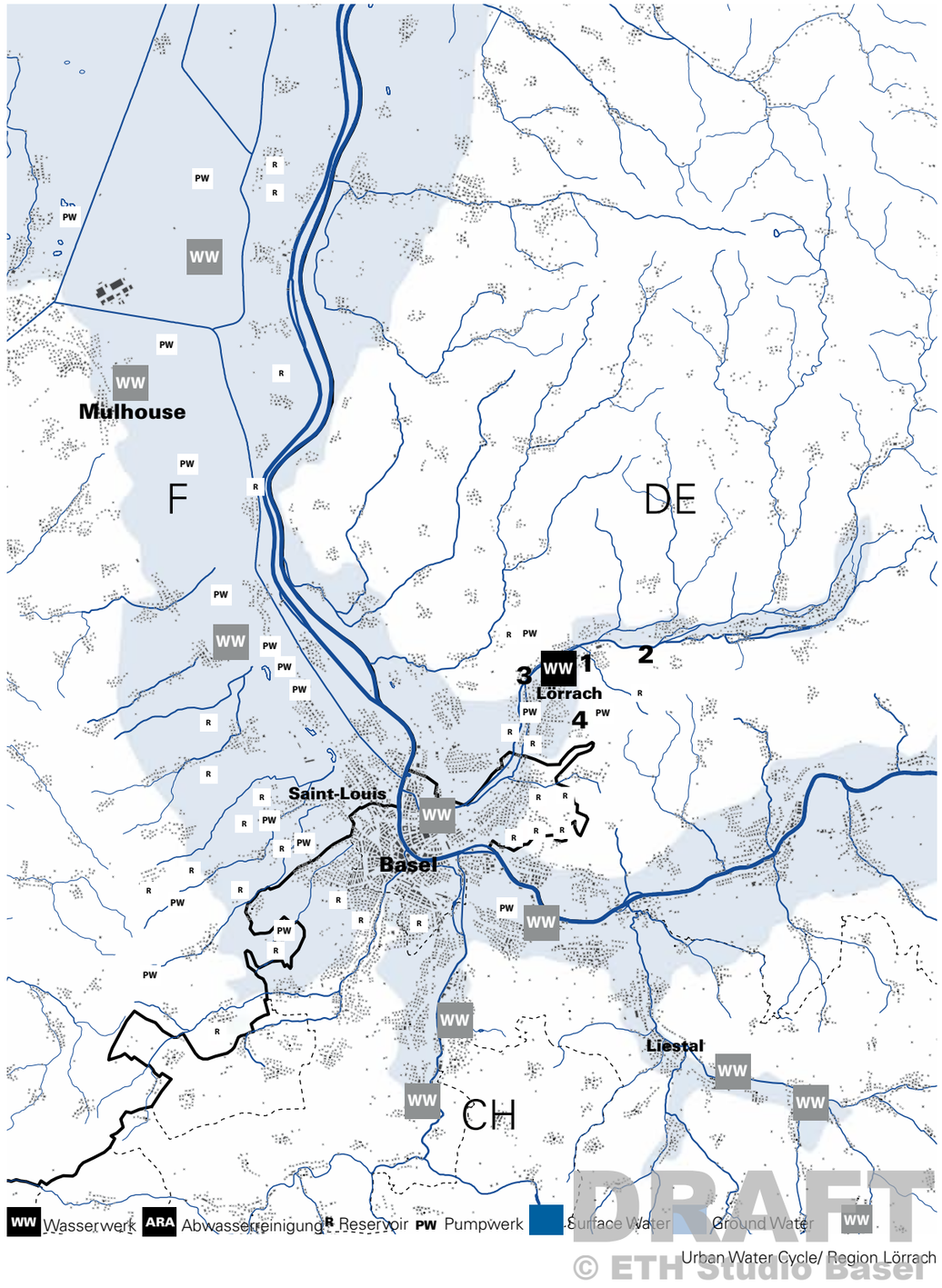
Public Water Supply Network Lörrach Region

In Lörrach drinking water is extracted from wells around Grütt Park and Wilde ,which are connected to the upper Rhein Aquifer.
The source of the groundwater in the area is the river Wiese, which is connected to the river Rhein further south. The River bed acts as a natural filter .

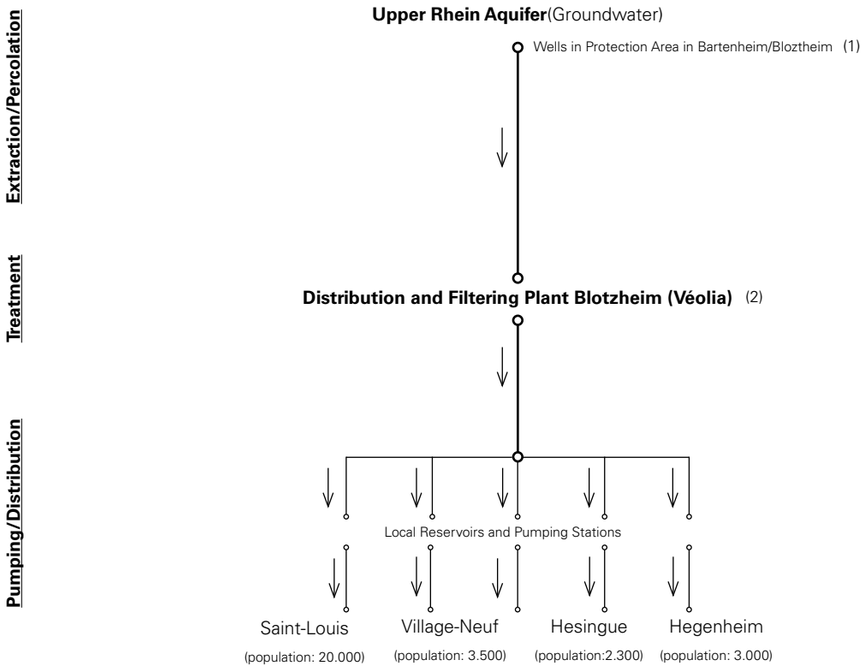
The Grütt Park with its filtering and pumping Facilities is the place where fresh water is treated and filtered into safe drinking water with a specific quality. From there on, water is pumped into local water towers and pumping stations around the city to be pumped into individual units.

The German company "Badenova" runs the water supply network in Lörrach as well as other cities in the region surrounding Lörrach.

badenova



Urban Water Cycle/ Region Lörrach

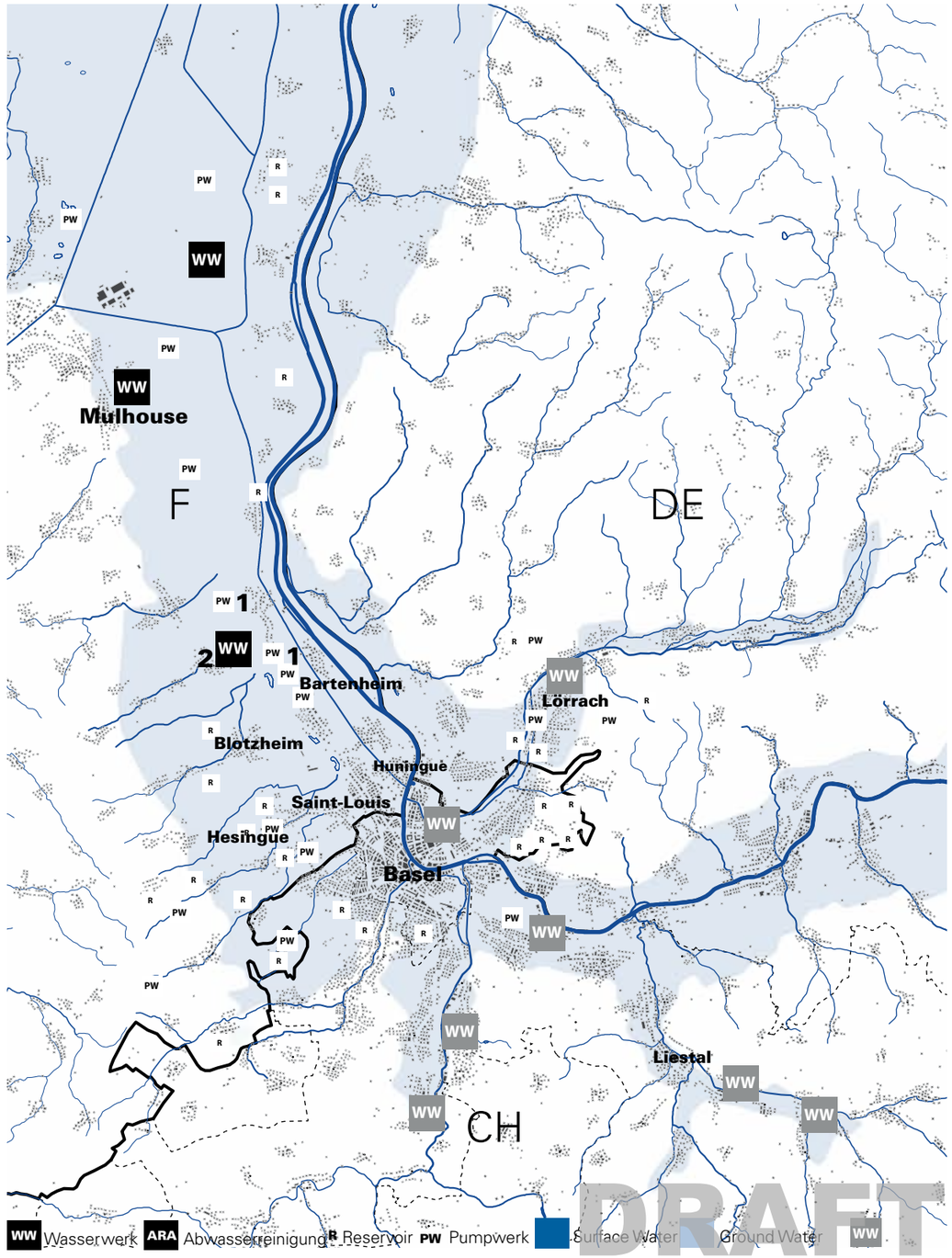


Public Water Supply Network in Region Saint-Louis

In the region around Saint-Louis, water is extracted from wells at the grounwater protection area in Bartenheim/Blotzheim. Several wells provide water for the filtering plant which pump the water to the city of Saint-Louis and neighbouring towns.

In France, unlike Germany and Switzerland, the water supply system is run by major companies and therefore it is rather more difficult to find data on the system compared to other regions in Metrobasel. Veolia, a company that works not only in France but in many countries run the water supply and waster water treatment plants in the region.

VEOLIA
EAU



Urban Water Cycle/ Region Saint-Louis

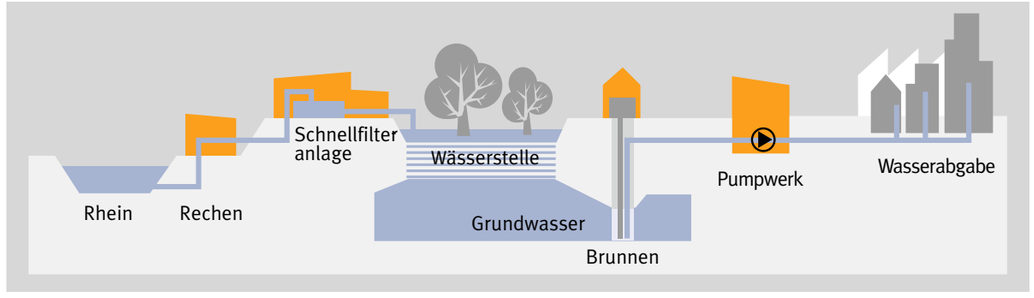
IWB Treatment and Distribution Process

IWB provides drinking water to Basel City (95%) and Binningen (5%). Rhein water is extracted only to be filtered back into the Groundwater, where it is mixed with the water of the aquifer. Since the groundwater is very close (5-20m.) in the region, this filtering process(3) is a completely natural one,where trees and soil act as the filter layer.
After the mixture, the mixed water is treated with an UV Filter(4) and pumped into the network.

The Water Distribution Network of IWB seperated into 5 different height zones, in order to maintain a even pressure within the delivery network. The height zones establish within themselves enclosed supply networks with seperate pumping stations and its own reservoirs.

IWB Lange Erlen/1.Water Collection

IWB Lange Erlen/2.Fast Filtration



Schematic Section of the Water Supply Process (IWB)

IWB Lange Erlen/3.Natural Filtration

IWB Lange Erlen/4.UV Filtration

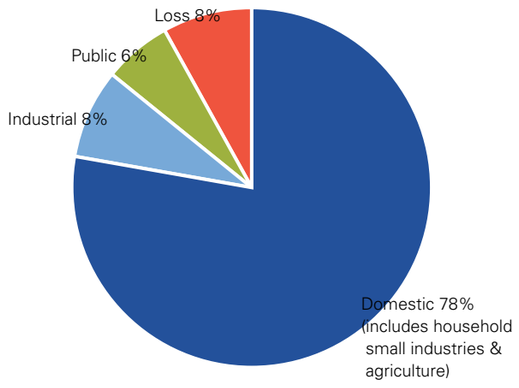
IWB Lange Erlen/5.Fountain 1/Test Fountain

Water Supply Network IWB in Basel City according to height difference. (IWB)

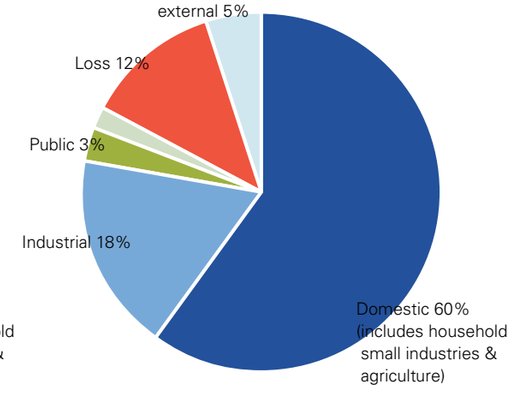
Fountain in Basel City/BS

Water Use

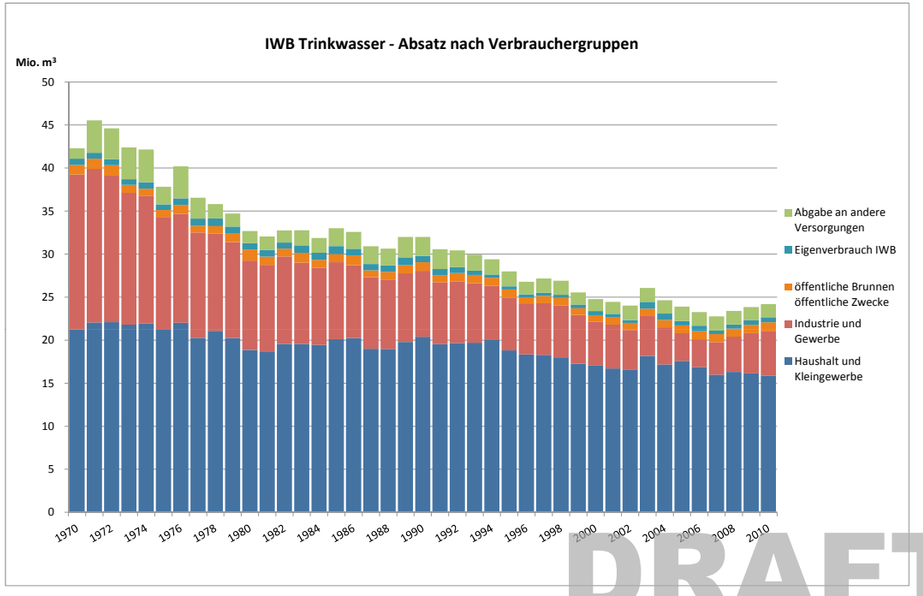
Water is not a finite resource. On the contrary, it is an renewable resource which is in the metrobasel region found in abundence. When we take look at the world average, we see that 70% of fresh water resources are used for agricultural activities. This figure does not reflect the situation in western Europe. High amount of precipation and green water sustain the need for agricultural activities for long periods of the year (October-May) without external irrigation, although these figures are also due to change since global climate is becoming less stable every year.
In Switzerland, water is utilized for Industrial activities, energy production(Nuclear and Hydroplants) and domestic purposes as well as agricultural production. Figures differ from city to countryside and they reflect the user typology of the region quite clearly.
Water is not only utilized for productive purposes. Recreative qualities of water are guarateed only thorugh a solid water supply and purification system. Although water can be found free in nature, its value changes through how we use and perceive it.



Water Use Diagramme Reinach/BL(AIB)



Water Use Diagramme Basel City/BS(IWB)



Water Use According to User Groups 1970-2010 in Basel City/BS (IWB)

The Novartis Campus from Dreilaenderbrücke

Use of Water for Industry & Transportation

Topographically well situated on the cross roads of the Rhine valley and favored by its connection to the sea due to the navigable Rhine, the trinational region around Basel was able to develop a strong economy. Textile, chemical and pharmaceutical industries as well as salt extraction thrived in the region since the early years of the industrial revolution. Not only was this possible due to the available local natural recourses but it was also for the Rhine and the other artificially constructed canals or channeled navigable water bodies that facilitated industrial production and economical transportation of goods.

Usage of water for industrial and transportation purposes was though not beneficiary in all aspects. Water contamination through chemical waste water discharge, low water level in the original Old Rhine bed due to water deviation as well as ground water salination as result of salt extraction activities have been problematic for the region in the past centuries.

The waste water treatment plant to collect chemically polluted waste water from the companies active in the region only started operating in 1975 in the canton of Basel-Landschaft followed by the ARA Chemie plant in Basel-Stadt in 1982. The later plant had a total intake of 1.5 Mio m3 waste water in 2010 from the four major chemical factories of Basel-Stadt and secured a water purity of 99%.

The Salt Storage Saldome in Riburg/AG (www.badischerzeitung.de)

The locks at Canal de'Huningue/F are no longer operational

The Rhein Harbor from Dreilaenderecke

Historical photo of the river Birsig before rehabilitation

Domestic Use of Water

Water has played an essential role in the history of human kind. Yet it has not always been an inseparable part of our everyday life - a commodity so self-explanatory and familiar that we would not even question where it comes from, what effort it takes to achieve its quality, where it is disposed of after we no more need it. Hot water, private bathroom facilities, properly working sanitation were not given or at least not well spread in the trinational region until the late 19th century.

Urban citizens would get their water from wells or directly from the rivers just as they would dispose of their domestic and human waste in the same water bodies. Cholera and typhus epidemics from 1855 and 1865 caused by the pollution of the river Birsig in Basel-Stadt testify to these conditions before an urban water supply and a sanitation system were introduced.

Used to the luxury of pure water of high quality at practically inexhaustible amount, contemporary citizens have to realize that the relatively low price of provided services of water in a region rich in water resources do not represent the actual value of water as the main source of life.

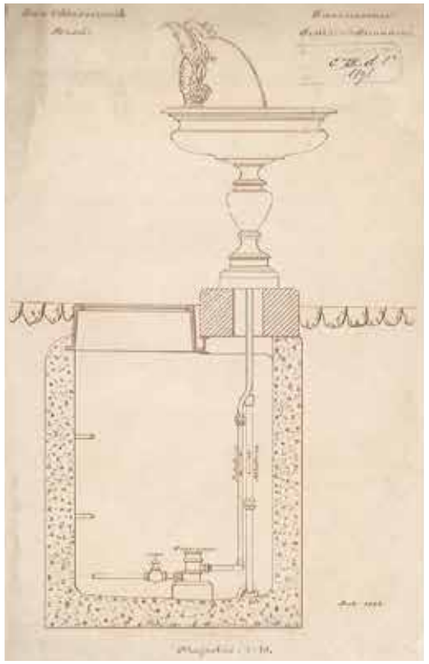
Running hot water was not common in households in 1915 in Basel. (IWB)

Vreneli Brunnen at Claraplatz during Basel Autumn Fair 2011 /Kleinbasel/BS

Public Use of Water

According to definition water is used for public purposes when it is utilized for fire fighting, street cleaning and municipal parks and swimming pools maintenance.

Nonetheless public water use should be understood as something more than the sum of the before listed purposes. Water used for the common property of the inhabitants of a city can be optically challenging and inspiring. Fountains, water basins and attractively designed river banks and promenades are forms of water presence in the urban environment that create various urban situations, make recreation activities possible and establish a commonly shared sense of identity.



Drawing of the first Basilisk Fountain by Wilhelm Bubeck,1884 (IWB)

Pisoni Fountain at the Münsterplatz by Paolo Antonio Pisoni,1785 (IWB)

Traditional Watering Tools at Gartaeneri am Hirtenweg

Use of Water for Agriculture

Even though on a world scale 70% of fresh water resources are used for the purposes of agriculture, in Switzerland this amount is much lower due to the so called “green water” or the water embedded in the soil as precipitation water. Nonetheless, climate changes resulting in prolonged periods of drought such as these observed in the dry spring and autumn of 2011 pose challenges for agriculture in the region of metropolitan region of Basel despite the spread notion of water as an inexhaustible resource of the region.
Other problematic aspects of agricultural use of water have to deal with the usage fertilizers and pesticide. These affect ground water quantity and quality considerably and are therefore specially regulated by the cantonal legislative framework.
Both cantons of Basel-Stadt and Basel-Landschaft do not differentiate in tariffs constitution between small businesses and agricultural farms. Though prices for irrigation water are not felt as high in comparison to the neighboring states of France and Germany, more farmers adopt the strategy to sink their own wells or collect rain water in tanks. For the year 2010 52.4% of ground water on the territory of canton Basel-Landschaft equeal to 42.1 Mio m3 have been withdrawn privately.

Ground Irrigation at Birsmattehof/Therwil BL

Greenhouse watering system at Birsmattehof/Therwil BL

Mechanical Irrigation Vehicle at Birsmattehof/Therwil BL

Hydroelectricity Plant Birsfelden/BL

Using Water for Energy Production

Hydroelectric power plants are considered to be a relatively harmless way to harvest energy though the erection of a number of plants on the rivers of the trinational region has played a major role in shaping the water bodies of the region.

The construction of dams and channels has also affected fish and beaver populations and has considerably increased the risk of flooding in the regions of the Middle and Lower Rhine, since large amounts of water can be released easily to ease the situation in the Upper Rhine in the case of high water.

Erected in 1945 the river hydroelectric plant of Birsfelden is situated on the river Rhine above the city of Basel. It is the twelfth hyroelectric plant between Lake Constance and the Swiss border at Basel and at the same time the largest in Switzerland producing average 560000.00 MWh/annually. Compared to the Birsfelden plant, the Münchenstein hydroelectric plant on the river Birs produces modest 4000.00 MWh/annually due to the inconstant water flow of the river Birs.

Airal View Kraftwerk Augst /BL

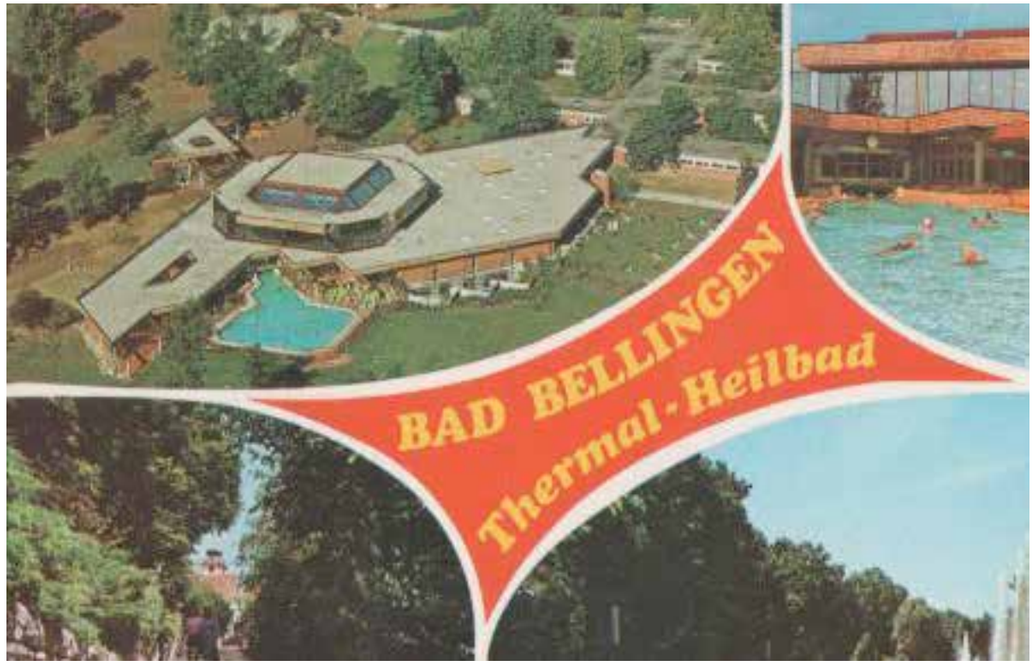
Rhybadhysli Santihans, Basel/BS(www.badi-info.ch)

Recreational Use of Water

Swimming in the Rhein was not allowed in thr 18th.century. Later on, the quality of the water was not good enough to swim in it. Today, swimming in the Rhein is an enjoyable activity. It is important since it changes the habit of the people into spending more time on the promenade and become aware of the water within the city, value it more than just a resource to use without care.
(www.badi-info.ch)

Swimming is not the only possible activity in the region. The Salt Baths around Rheinfelden or thermal baths at Bad Bellingen in Germany attract tourists and enrich the social life of the people in the region. These different types of outcome shows how soil and water typology varies in the region.

Rhine Promenade at Kleinbasel/BS



Bad Bellingen in Germany/Postcard

Bad Bellingen in Germany/Postcard

ADMINISTRATIVE REGULATION

F

Water Supply	Sanitation (Sewerage+Treatment)
Regulatory Body	**Regulatory Body**
State Government	State Government
Water Management	
Six Water Agencies (Agences d'eau) operate on national and regional level. They correspond to the six river basins river basins Adour-Garonne, Artois-Picardie, Rhin-Meuse, Loire-Bretagne,Rhône-Méditerranée and Corse, and Seine-Normandie	
Control and charge fees for water withdrawal, discharge of waste water and investments in the network infrastructure.	
Responsibility	**Responsibility**
Municipalities (commune)	Municipalities (commune)
Municipalities often consolidate on inter-communal basis (Syndicat d'Eau).	
Service Provider	**Service Provider**
Syndicates or communes may provide the service directly or contract it to a private company.	
Veolia Environment (Compagnie Generale des Eaux), found 1853, operating in 67 countries	
Revenue	€12.128 billion (2010)
People provided with drinking water	100 million people worldwide
People provided with waste water services	71 million people worldwide
Tariff Constitution	
3.56 € HT/m3 flat rate abonnement	
National Legal Framework	
1992 Loi sur l'eau (Water Law) 2006 Loi sur l'eau et les milieux aquatiques (Water and Aquatic Environment Law)	

DE

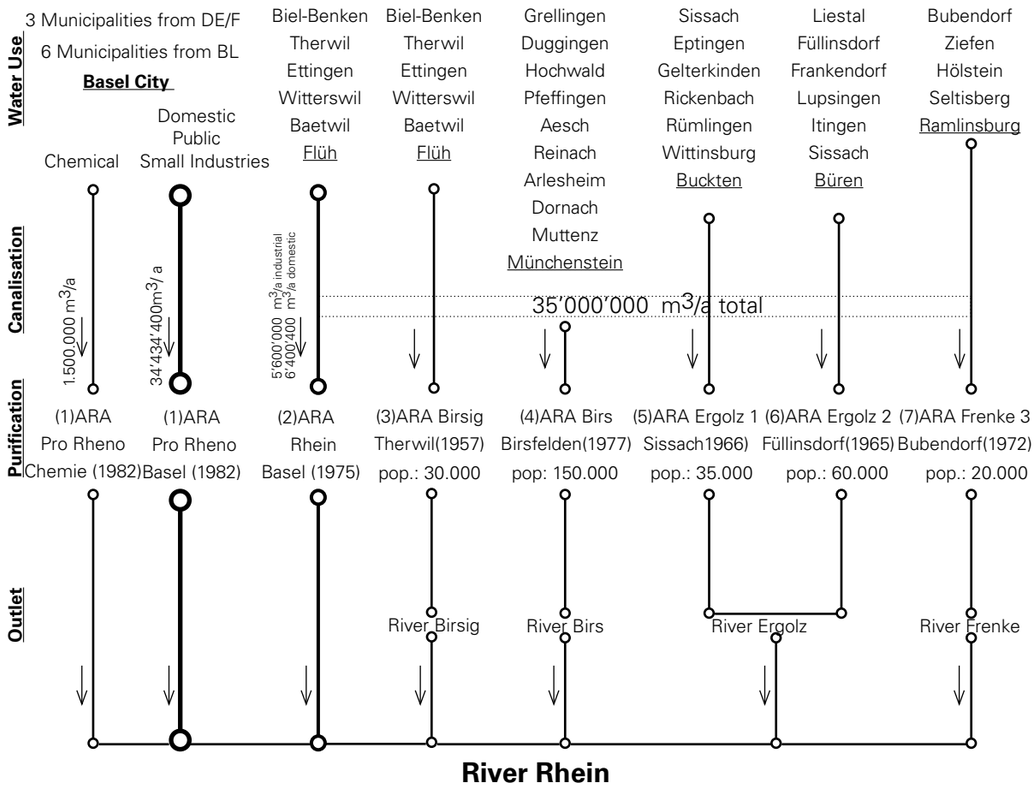
Water Supply	Sanitation (Sewerage+Treatment)
Regulatory Body	**Regulatory Body**
Federal/State Government	Federal/State Government
Water Management	
State Governments (Bundesländer) regulate and monitor water supply and sanitation	
Responsibility	**Responsibility**
Municipality (Gemeinde)	Municipalities (Gemeinde)
Service Provider	**Service Provider**
Badenova	Abwasserverband Mittleres Wiesental
Water provided for 2010: 17,4 Mio. m³	
Tariff Constitution	**Tariff Constitution**
1.82 EUR / m3	2.70 EUR /m3
National Legal Framework	
1979 Ground Water Directive 2001 Drinking Water Directive 2009 Wasserhaushaltsgesetz (WHO)	

CH

Water Supply	Sanitation (Sewerage+Treatment)
Regulatory Body	**Regulatory Body**
Cantons	Cantons
Water Management	
Cantonal Governments delegate the water supply to communes.	
Responsibility	**Responsibility**
Cantonal, delegated to municipalities	Cantonal, delegated to municipalities
Some cantons encourage public water systems operating on a regional level due to economic and technical reasons. Public association and regional water associations are established for this purpose.	
Service Provider	**Service Provider**
Privately operated companies give way to communally operated water supply and sanitation models.	
IWB, Hardwasser AG	ProRheno AG, ARA Rhein, AIB
Originally founded as a private company in 1864, IWB was overtaken by the city if Basel in 1875.	
Tariff Constitution	**Tariff Constitution**
1.82 CHF / m3 Basel-Country Average	2.42 CHF /m3 Basel-Country Average
1.46 CHF / m3 Basel-City Flat rate	
National Legal Framework	**Cantonal Legal Framework**
2005 Swiss Water Protection Law (GSchG) 2005 Swiss Federal Chemical Risk Reduction Act 2004 Waste Water Ordinance	2000 Cantonal Water Protection Act for Basel-City 2005 Cantonal Water Protection Act for Basel-Country (kGSchV).

International Legal Framework
1992 Urban Waste Water Treatment Directive 2010 EU Water Framework Directive (2000/60/EG-WRRL), establishing a framework for Community action in the field of water policy

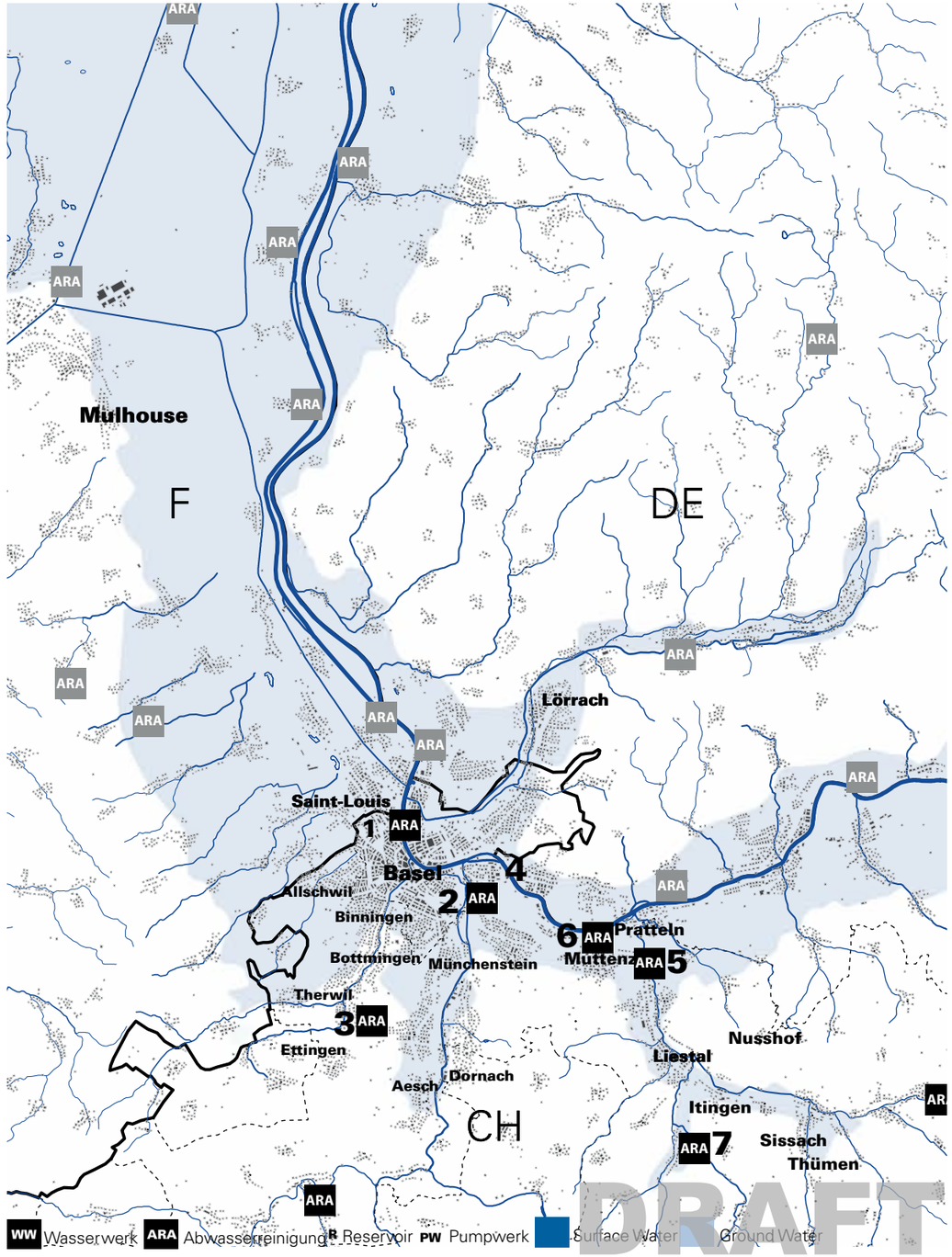
full page image with caption (sources if not private picture/



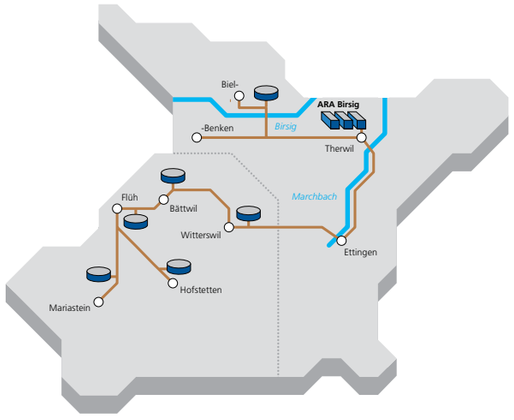
Waste Water Network in Basel Stadt & Basel Landschaft

Waste water treatment network in the swiss part of metrobasel is today well established. Plants around Basel City treat water from households as well as from Chemical and Pharmaceutical Plants. Major companies such as Novartis, Syngenta, Roche and BASF are shareholders in the establishments Pro Rheno and ARA Rhein. This movement is also an act of responsibility which has increasingly arised after the Sandoz chemical catastrophy in 1986, which caused great damage on the river Rhein and water network in the upper Rhine.

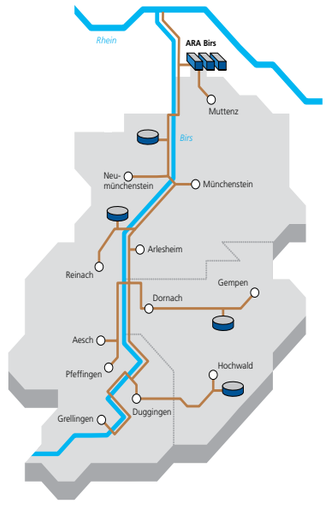
In Canton Basel Landschaft, several waste water treatment plants run by the AIB are connected to the rivers Birs, Birsig, Ergolz and Franke. Mixed water containers based locally are connected to these plants which purify the waste water and exhaust the clean water into these rivers. All these rivers feed the Rhein and therefore bring the treated water into the Rhein, closing the urban water cycle.



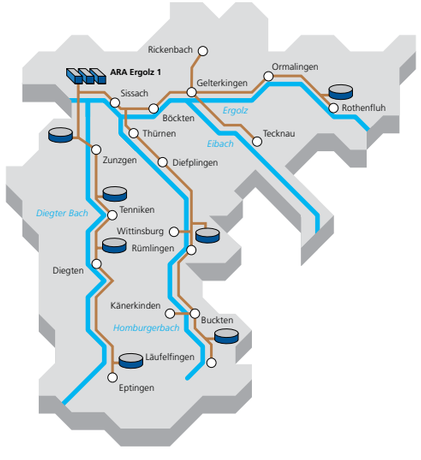
Waste Water Treatment Plants in Metrobasel/Kanton Basel Stadt & Basel Landschaft



Canalisation Network ARA Birsig/BL (AIB)



Canalisation Network ARA Birs/BL (AIB)



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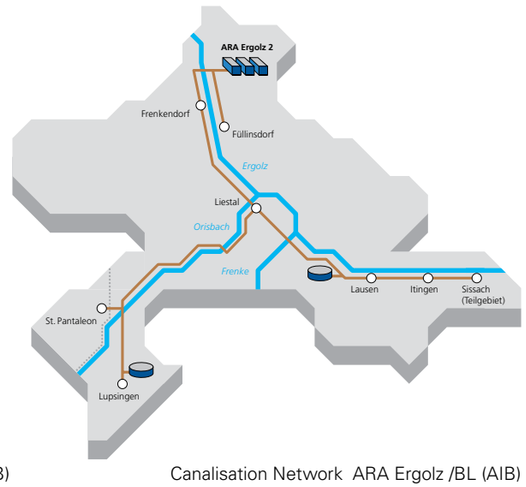

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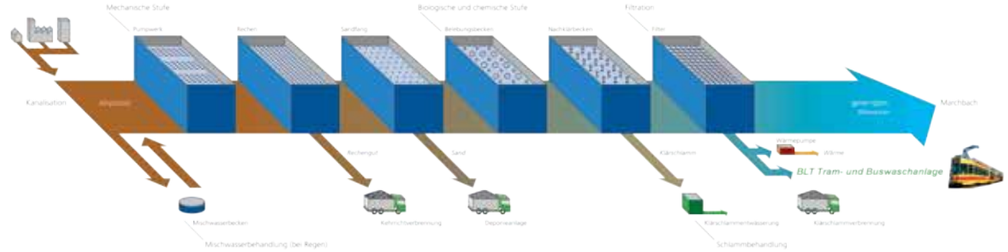
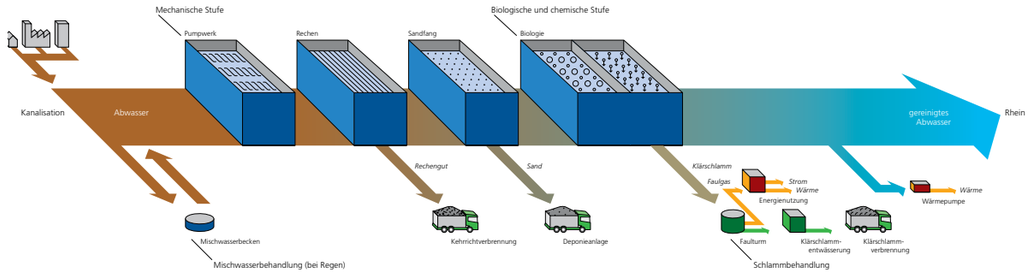
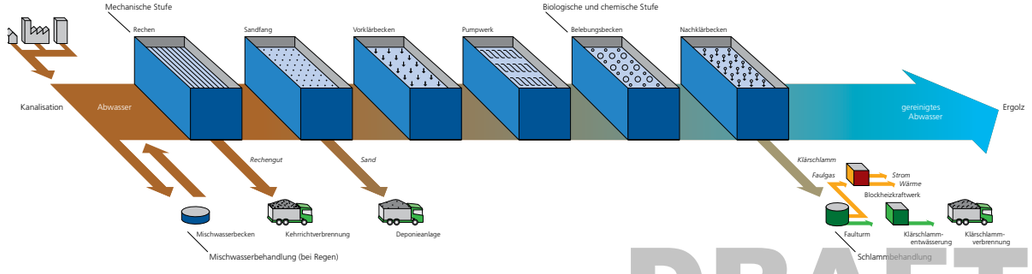


Waste Water Treatment Scheme ARA Birsig/BL (AIB)

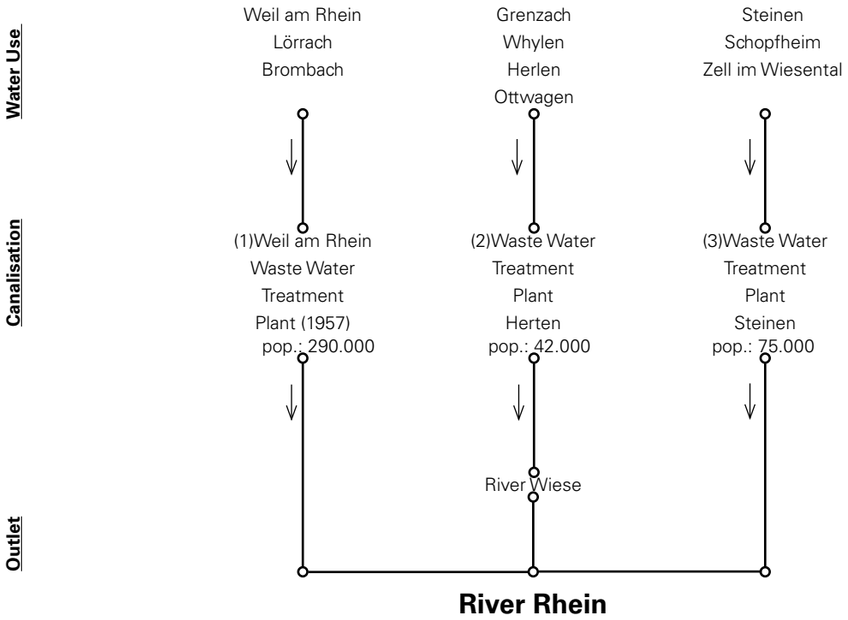


Waste Water Treatment Scheme ARA Birs/BL (AIB)

Waste Water Treatment Scheme ARA Ergolz 1/BL (AIB)

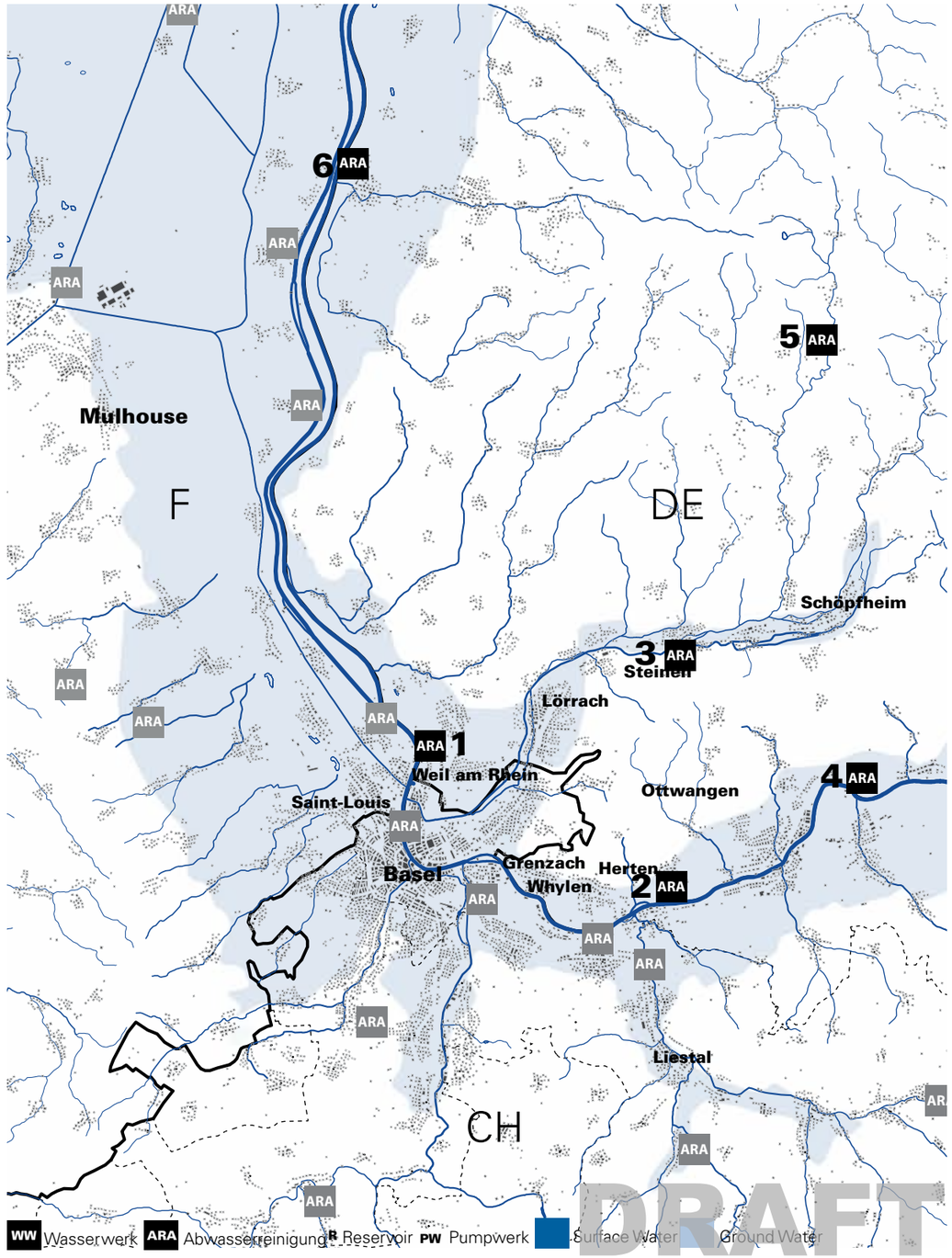


Waste Water Treatment Scheme ARA Ergolz 2/BL (AIB)



Waste Water Network in Region Lörrach

Waste water network in State Lörrach is run by different associations such as the “Wieseverband” or “Abwasserverband Mittleres Wiesental”. These bodies serve a certain range of municipalities around themselves. The largest ones in the region are the Water treatment plant in Weil am Rhein and Steinen, which serve the rather denser population close to Basel



Waste Water Treatment Plants in Metrobasel/Network Region Lörrach

ARA Pro Rheno Basel & Chemical

ARA Pro Rheno Basel and ARA Pro Rheno Chemical are two of the major waste water treatment plants in metrobasel. In the 19th century, canalising sewage water out from the city was much harder than pumping it into homes and industries. Waste water has always been an urban issue and treatment plants in Europe are generally much younger than pumping stations.
The two waster water treatment plants are the result of a joint operation between Basel City(42%), Basel Landschaft(9%), Roche(9%), Hunstman(23%), BASF(3%) and Syngenta(2%).
The ARA Chemical collects only waste water with chemicals from certain industrial plants and purifies the water with different techniques. The awareness that surface and groundwaters in the region are sensitive to pollution has increased the necessaty for these major firms to work with these associations in order to guarantee a sustainable water cycle.

ProRheno

ARA Pro Rheno Basel/1.Pumping Process

ARA Pro Rheno Basel/2.Raking Process

Übersicht 2010

		ARA Basel	
		2010	**Grenzwert**
Zulauf in die Anlagen			
- Abwassermenge	Mio. m^3	34,4	-
- CSB-Fracht [1]	t	16'500	-
- BSB_5-Fracht [1]	t	-	-
- TOC-Fracht	t	4239	-
Reinigungsleistung			
- CSB-Elimination [2]	%	92,2	85,0
- BSB_5-Elimination	%	-	-
- TOC/DOC-Elimination	%	91,9	85,0
- Schwermetall-Elimination	%	66,9	-
Ablauf in den Rhein			
- CSB-Elimination [2]	mg/l	36	45
- BSB_5-Konzentration	mg/l	-	-
- DOC-Konzentration	mg/l	10	10
- Gesamte ungelöste Stoffe (GUS)	mg/l	12	20
- FOCl-Konzentration	mg/l	0,001	0,1
- Gesamtphosphor-Konzentration	mg/l	0,59	0,8
- Schwermetalle	t	4,4	-
- Nitrit	mg/l	0,62	0,3 [3]

ARA Pro Rheno Basel/3.Sand Filtering Process

ARA Pro Rheno Basel/5.Sludge Basin

ARA Pro Rheno Basel/4.Biological Treatment

ARA Pro Rheno Basel/6.Final Clarifier

Water Treatment Plant ProRheno/Kleinhüningen BS (Airal Photo/Bing Maps)

CHALLENGES

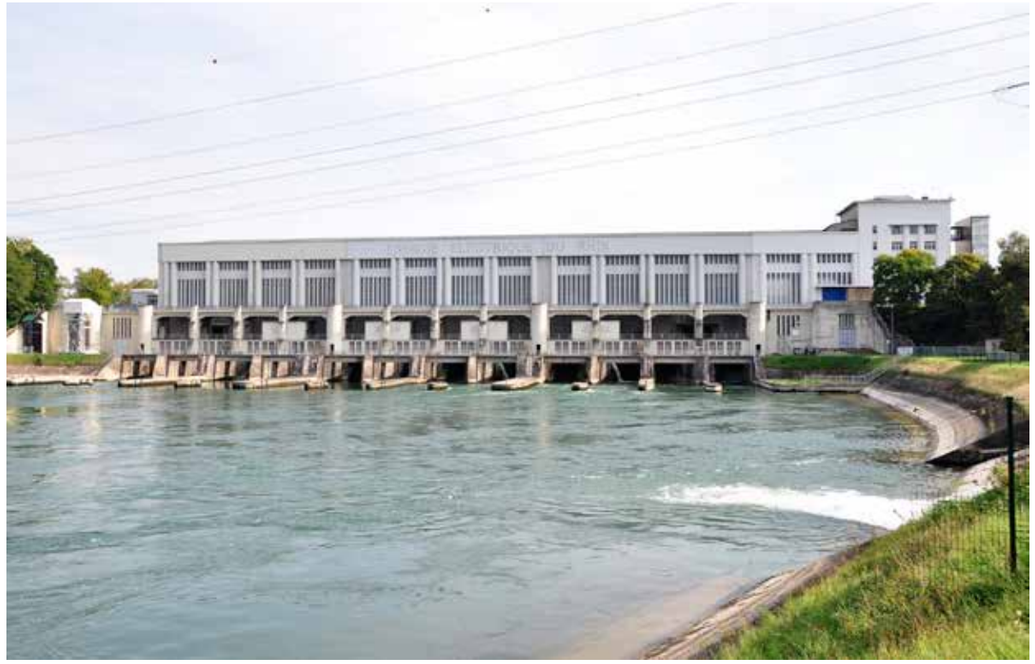
Salt piles landscape at Mulhouse (Regionalverband Südlicher Oberrhein)

Ground Water Salination in the Upper Rhine

The abraum salt hills in the mines of south Alsace resemble dessert landscapes though these so called "Kalimandscharos" of waste material consist up to 90% of salt that easily got washed away into the Rhine river by rain water. The caused salination of large areas of groundwater led to its inappropiration as drinking water.

Salt solutions assisting the process of salt extraction in a depth of roughly 100m below ground level contain up to 50 gramm of dissolved salt per 1 L ground water (sea water contains 35 gramm) are also being transported in layers lower than those of groundwater. The fatal mixture of these layers with the above located surface water depends only on the ground quality and can cause major environmental issues not only for the drinking water supply but also for the natural balance in the region.

Potash salt well in Mulhouse (Regionalverband Südlicher Oberrhein)



Power Plant Kembs, France (http://www.panoramio.com/photo/41190246)

The High Price of Energy

The construction of the hydroelectric power station in Kembs in 1932, 15 km downriver from Basel, was an expected outcome of the 1919 Treaty of Versailles which gave exclusive right to France to use the Rhine waters for ship navigation and energy production.

The dam erected at Märkt deviated most of the water of the Old Rhine bed to the Grand Canal d'Alsace to provide for the power stations of Kembs, Ottmarsheim, Fessenheim and Vogelgrun. The Rhine was made navigable for ships throughout the year though the low ground water level made agricultural usage of the wetlands in France and Germany impossible and endangered fish population in the initial bed of the Old Rhine due to low water amount.

The backflow of residual water released by the Kembs power station back into the natural Rhine bed had severe consequences also for the run-off of the river Wiese, which flows into the Rhine in Basel and increased the risk of floods for the Middle and Lower Rhine regions, due to the fast high water discharge by the dams in order to prevent floods in the Upper Rhine and the altered natural meandering flow of the river.

Currently the station is ran by the state owned Electricité de France (EDF) with 20% participation by a Swiss firm. renewal of the consession in 2007 was preceeded by environmental studies on the impact of the dam on natural fish and beavers populations. The revitalisation of the river Wiese is co-funded with 2.1 million Swiss francs by French authorities. The canton of Basel-City is compensated with 20% of the produced electricity.

Landscape Park Wiese

Firefighting in the night of 1. November 1986 at Sandoz warehouse, Schweizerhalle, BL (http://www.nzz.ch/nachrichten/panorama/chemie-

The Red Rhine - Sandoz Catastrophy

Twenty-five years after the disastrous fire at a warehouse of the Basel chemical company Sandoz in the industrial area of Schweizerhalle, BL the river Rhine still has not fully recovered from the interference.

The contaminated extinguishing water was let out direclty into the Rhine and destroyed the fish population and the shores of the river to the north up to the city of Mannheim colouring them red.

The environmental catastrophy found a great response in society and urged for political action.

Aktionsprogramm Rhein was launched in 2002 to assist cross-border cooperation in preserving the river Rhine and reducing the amount of industrial waste water back into the river as well as in the errection of further water treatment plants.

Strickter regulations in disposal of chemically contaminated waters as well as water for firefighting purposes were introduced. Concepts were worked on for an early alarm in the case of accident. Numerous projects for the revitalisation of the river shores have been introduced.

Firefighting operations the day after the fire (http://www.nzz.ch/nachrichten/panorama/chemie-brandkatastrophe_in_schweizerh-

Dead eels near Iffezheim in Baden-Baden (http://www.nzz.ch/nachrichten/panorama/chemie-brandkatastrophe_in_schweizerh-

CONCLUSION

The observations that were made on the formation of the Upper Rhine valley and the strong presence of topographic and hydrologic conditions in the trinational region leave one with the notion that the region is defined only by the constitutive watershed of the river Rhine.
Yet abstract borders are consequently imposed on the given conditions of water. Various regulations, distribution of responsibilities and service providers, incomparability in the constitution of tariffs and the complexity of land usage designation reveal a rather different setting.
Urban water cycles in the region, although they depend on common water resources, differ from each other in the way the network is run and regulated. Political, economical, social and geographical borders, considering the extensive channeling for transportation and power generation, are artificially created or redefined even though water represents an invaluable resource for the human being and for the metabolism of the city and should be equally available to all.
At a time where water is being traded as a virtual resource via international food trade, these borders become all the more intriguing and meaningless, thus a phenomenon which should be further traced and studied upon in order to understand its causes and effects on the contemporary urban environment within the metropolitan region of Basel.