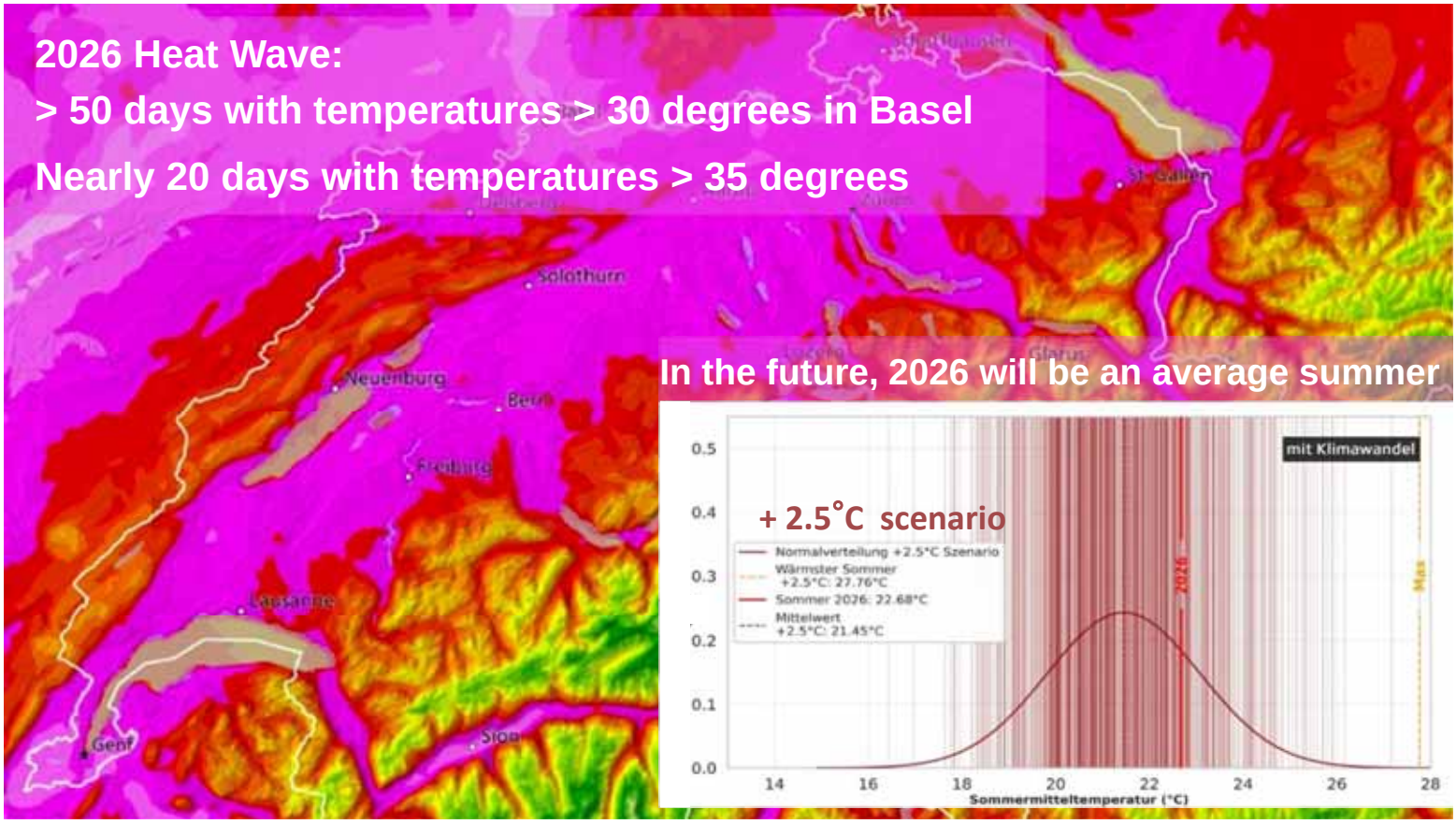
Swiss Association Wastewater and Water Protection Professionals
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Swiss Water Association

V S A



Back to the Natural Water Cycle: Sponge Cities and Landscapes

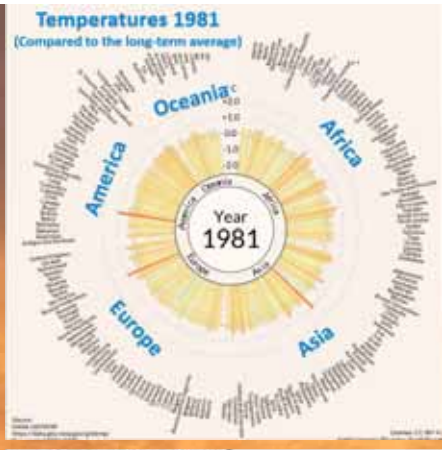
Swiss EurEau Water Summit - Our Water System under Pressure, Stefan Hasler, Director VSA

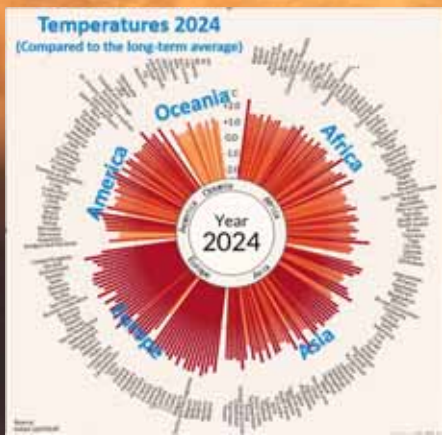


Climate change is real

Significant rise in temperature over the past 30 years

Photo: Stefan Hasler





Federal Climate Scenarios Report

Findings:

- Switzerland has warmed by about 3°C since measurements began
- Summers are getting warmer on average
- Heat waves are becoming more intense
- Increased evaporation ➡ more moisture is being drawn from the soil
- A trend toward less rain in the summer

All these factors are leading to a significant increase in summer drought

We have significantly altered the natural water cycle



Evaporation 50%

Groundwater 45%

Runoff 5%

A factor of 10!

Natural water cycle of a meadow

Photo: Stefan Hasler



Evaporation 30%
Groundwater 15%
Runoff 55%

More than half of the rainwater is never even available to the plants!

Urban water balance

Urban development

60% of the urban area is impervious



Water management

90% of floodplains and wetlands have been destroyed, rivers were channeled



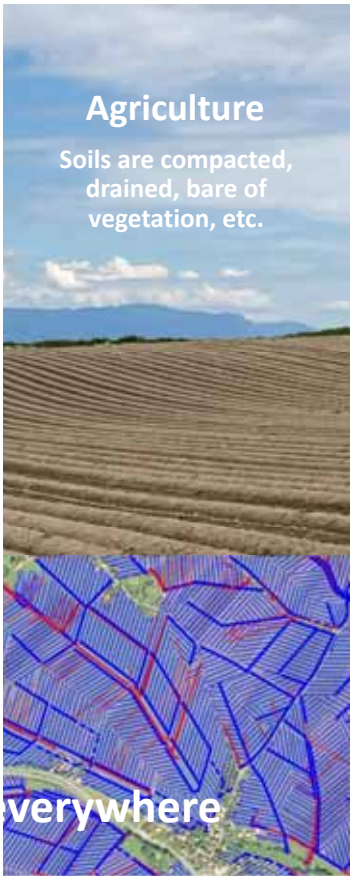
Forestry

Soils have been drained



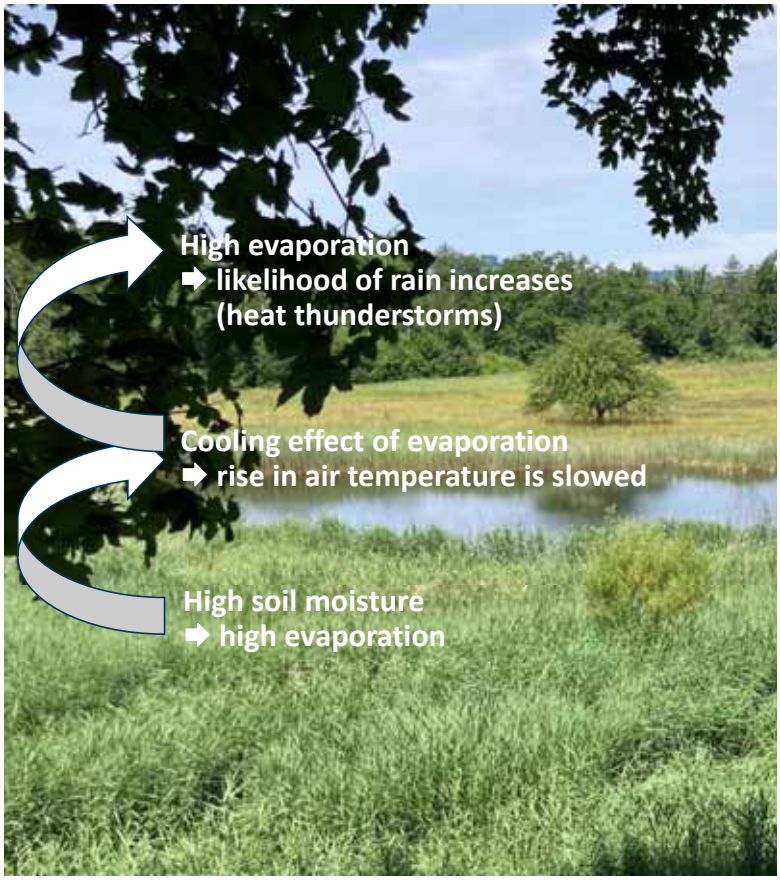
Agriculture

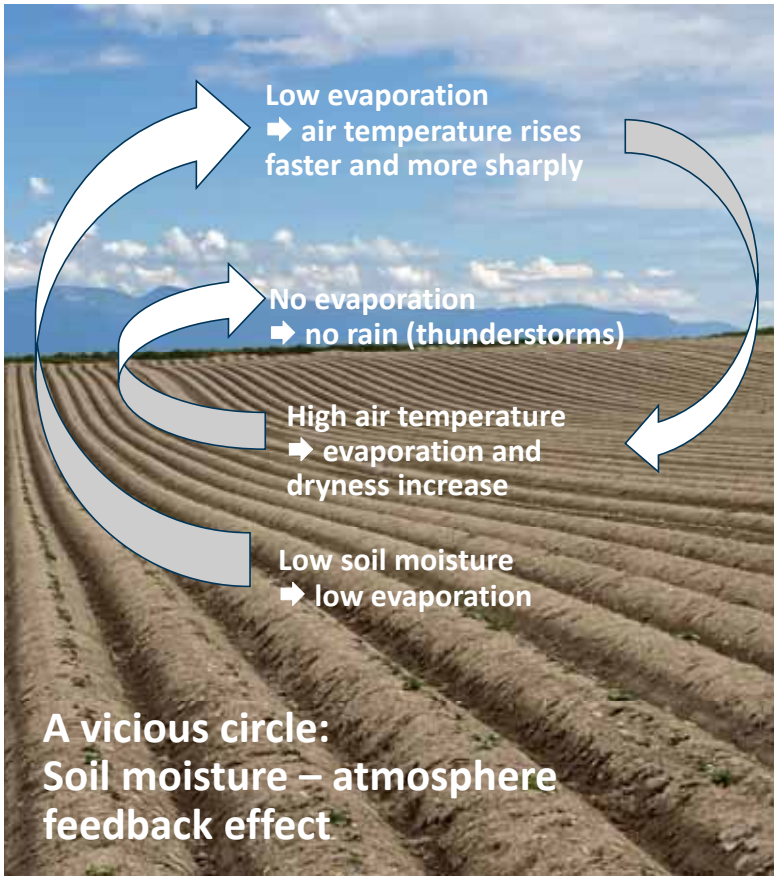
Soils are compacted, drained, bare of vegetation, etc.

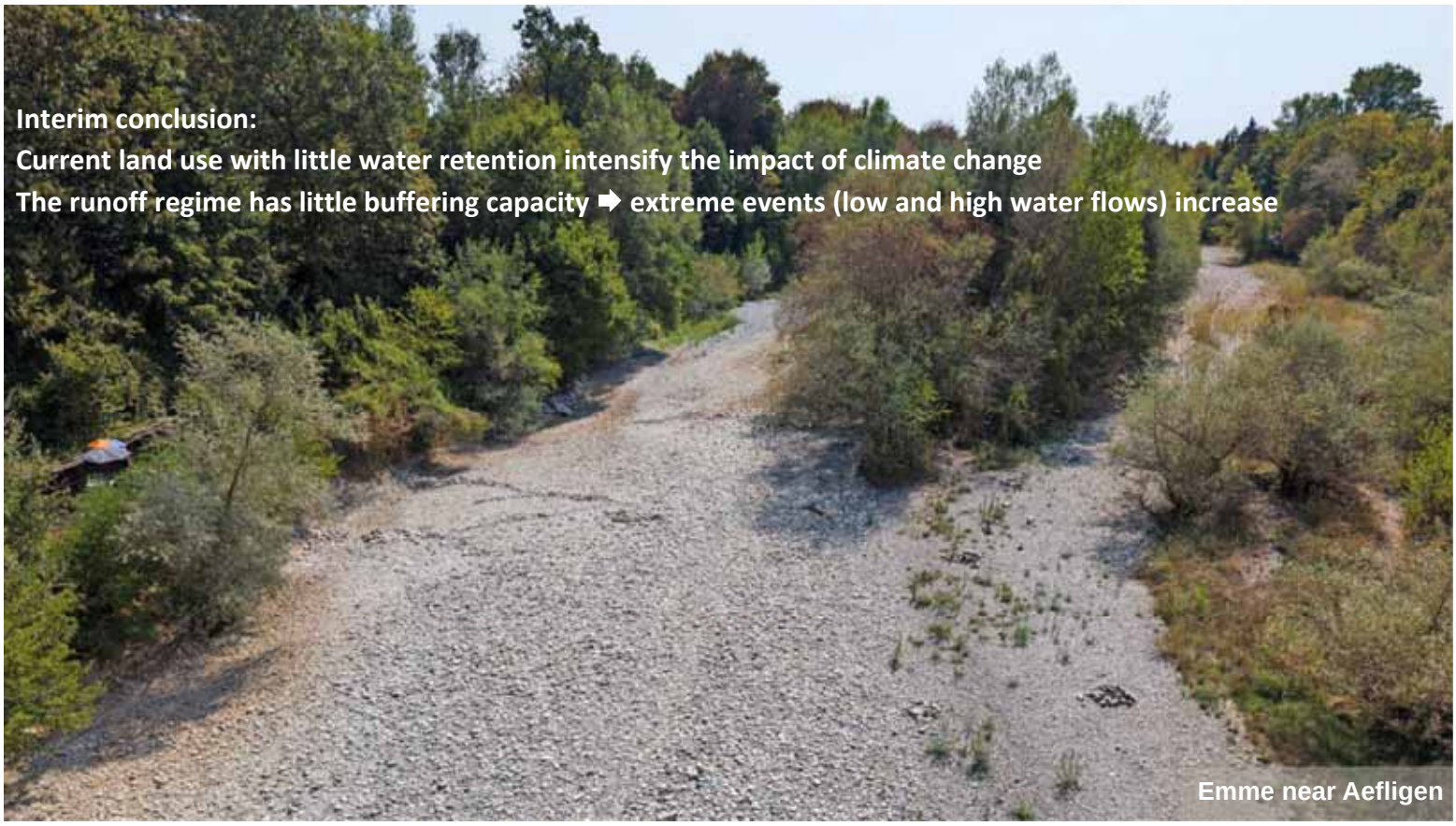


Water retention capacity has decreased dramatically everywhere


Given the reality of climate change, these measures taken in the past now have a negative impact
Common view: «there ist too much water» ➡ we have to get rid of it
For centuries, water/wetlands were considered as a nuisance for land reclamation


High evaporation
➡ likelihood of rain increases (heat thunderstorms)
Cooling effect of evaporation
➡ rise in air temperature is slowed
High soil moisture
➡ high evaporation


Low evaporation
➡ air temperature rises faster and more sharply
No evaporation
➡ no rain (thunderstorms)
High air temperature
➡ evaporation and dryness increase
Low soil moisture
➡ low evaporation
A vicious circle:
Soil moisture – atmosphere feedback effect

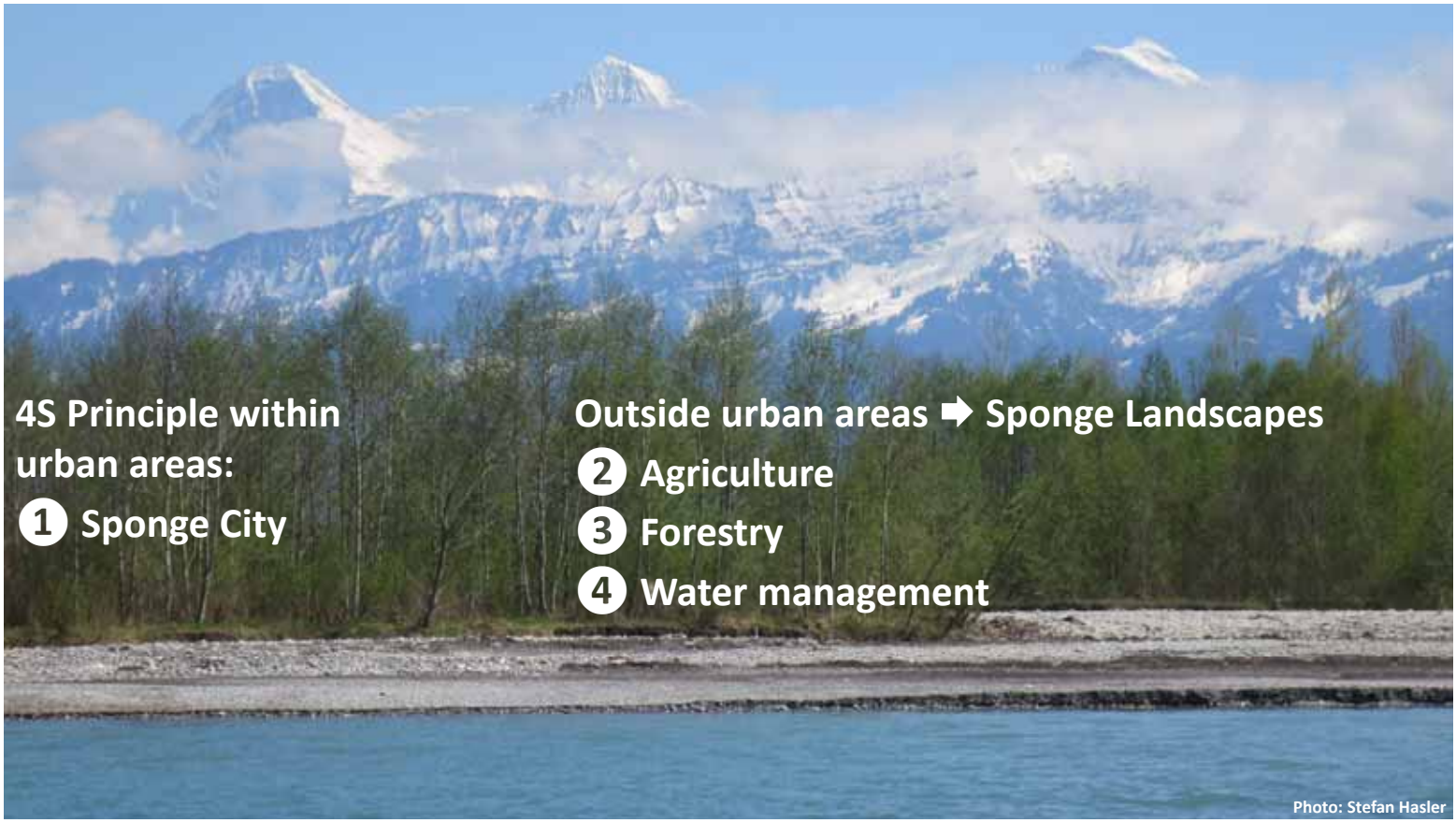

Interim conclusion:
Current land use with little water retention intensify the impact of climate change
The runoff regime has little buffering capacity ➡ extreme events (low and high water flows) increase
Emme near Aefligen


Good news:
❖ Annual rainfall has hardly changed
❖ A matter of storage ➡ Retain water for dry periods!
❖ Measures are well known! (e.g., reactivating natural storage areas such as floodplains)



Basics of Sponge Landscapes and Sponge Cities: 4S Principle:

- ❖ Slow: slow down the velocity of surface runoff
- ❖ Spread distribute water over a wide area instead of channeling it
- ❖ Soak cultivate / manage the soil so that the distributed water can infiltrate optimally
- ❖ Store store water to bridge dry periods



4S Principle within urban areas:

1. Sponge City

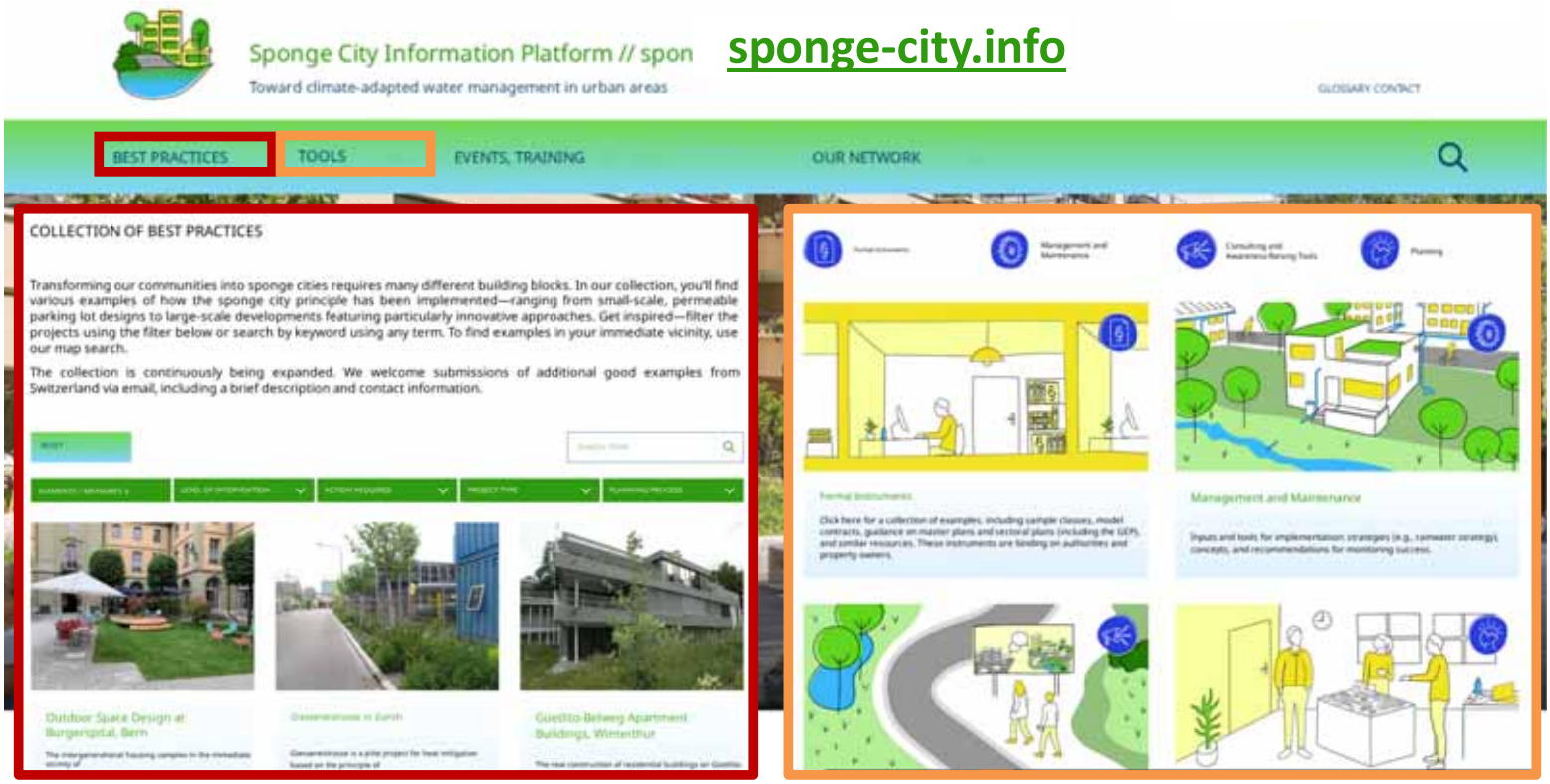
Outside urban areas ➡ Sponge Landscapes

2. Agriculture
3. Forestry
4. Water management

Photo: Stefan Hasler

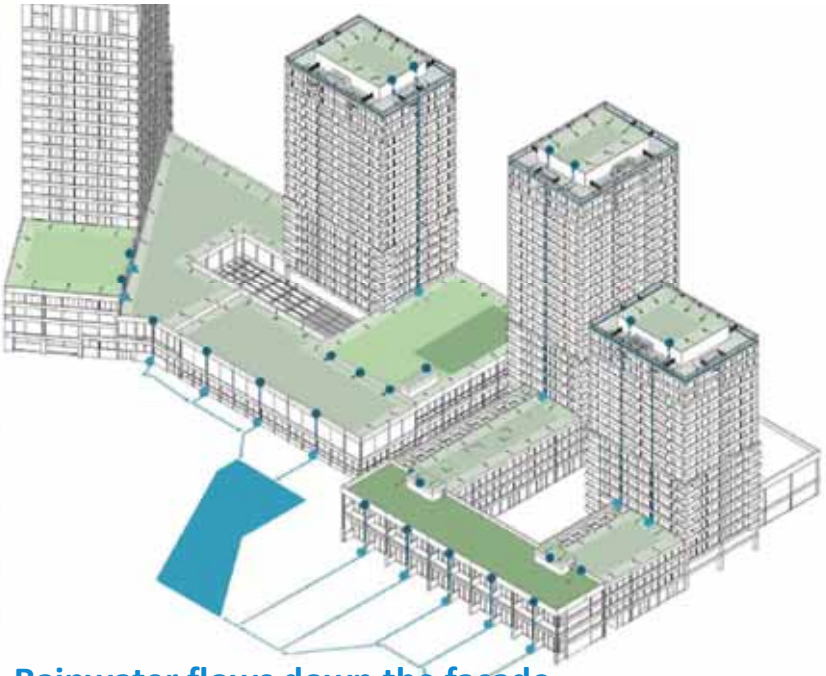

Synergies:
▪ Reduction of the heat island effect
▪ Promotion of biodiversity
▪ Improved quality of life
▪ Reduction of surface runoff
▪ Improved water protection
Retention!
After rain: delayed evaporation/infiltration
1 Sponge City:
Retain (rain)water;
manage it with decentralized BGI
Goal: A water cycle close to nature!
Parco Casarico, Sorengo (TI)
Photo: Stefan Hasler


Use water as a design element instead of discharging it!
Video: Stefan Hasler

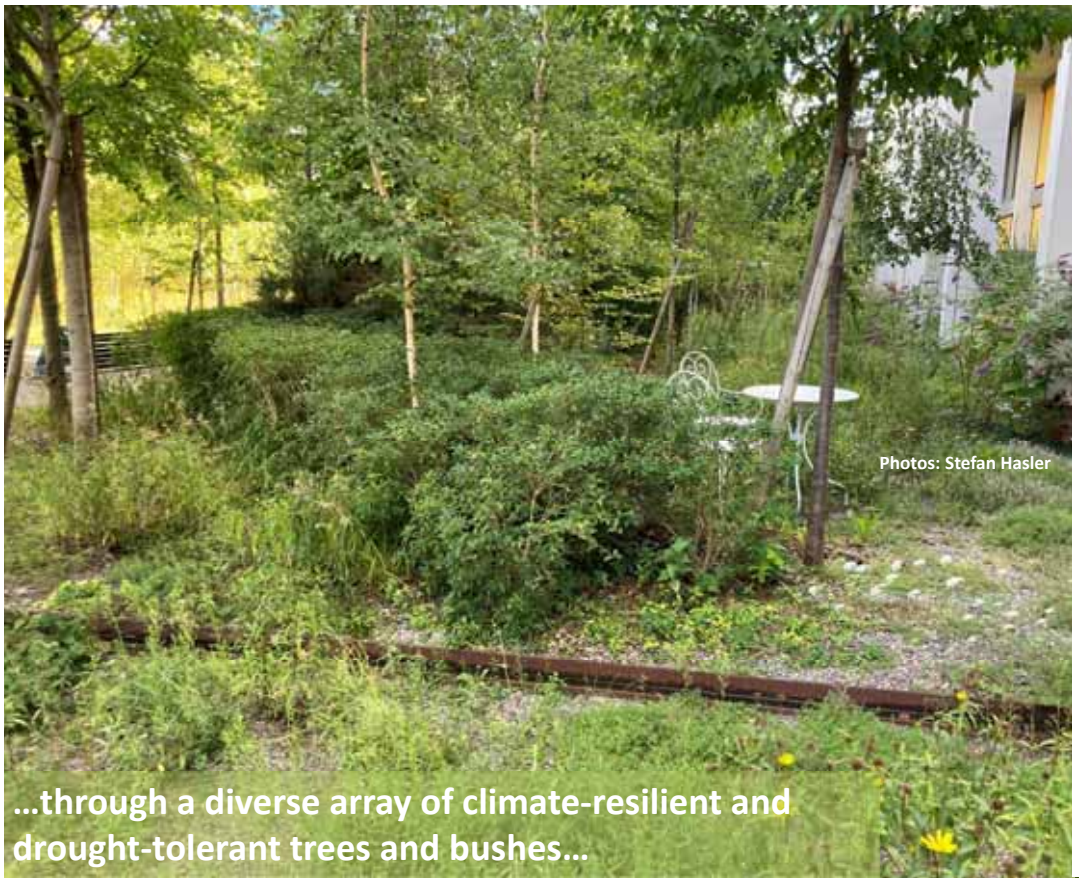




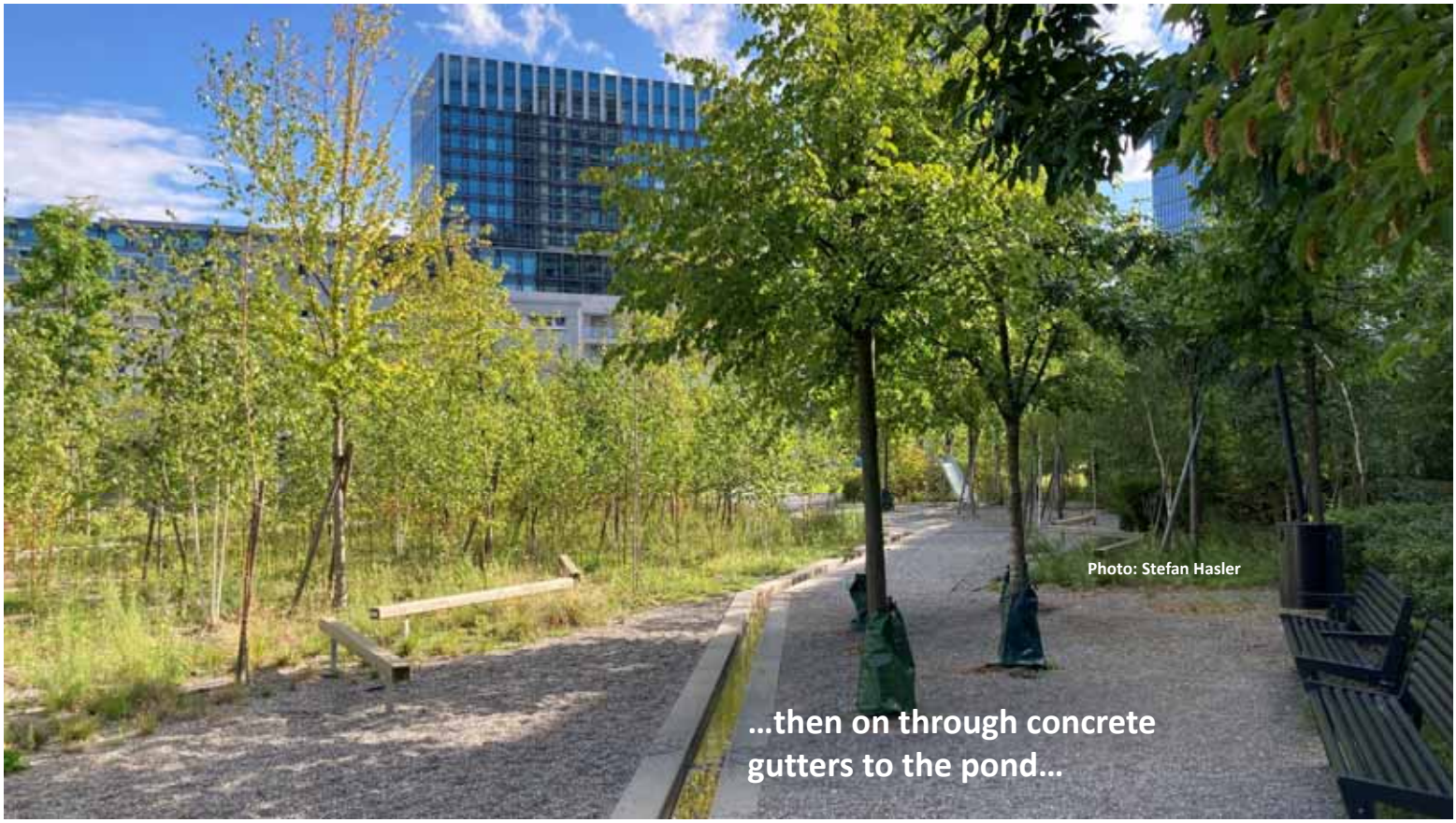
The rooftops are covered with greenery
➡ several cascades leading down to the pond

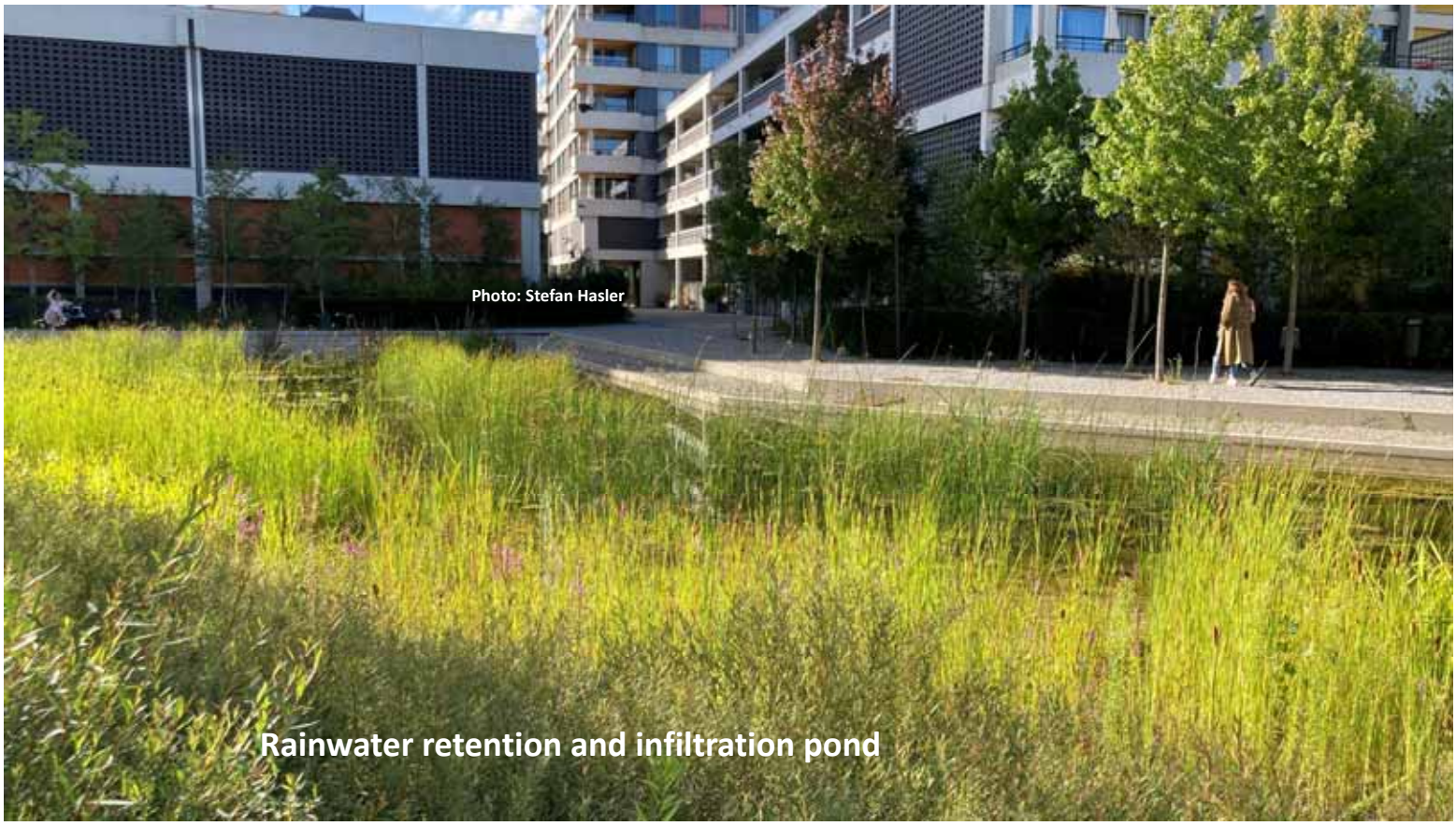


Rainwater flows down the facade…


Photos: Stefan Hasler
…through a diverse array of climate-resilient and drought-tolerant trees and bushes…


…into metal gutters…


Photo: Stefan Hasler
…then on through concrete gutters to the pond…


Photo: Stefan Hasler
Rainwater retention and infiltration pond







Photos: Stefan Hasler / Silvia Oppliger



Photos: Stefan Hasler / Ramboll Studio Dreiseitl



2 Agriculture



Keylines

Irrigation ditches along contour lines

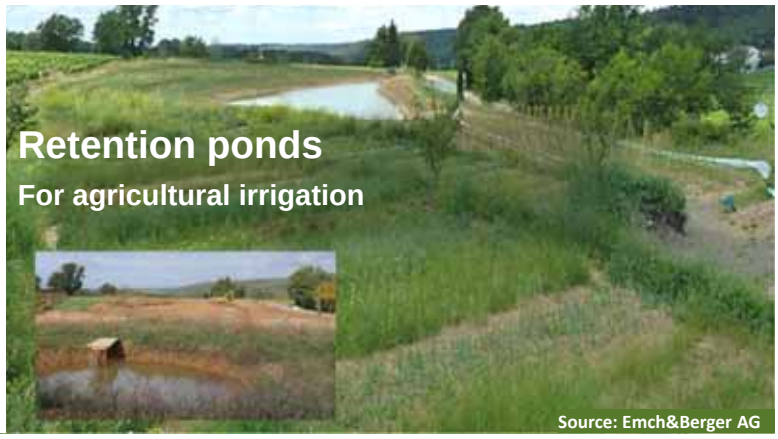


Agroforestry



Smart Drainage

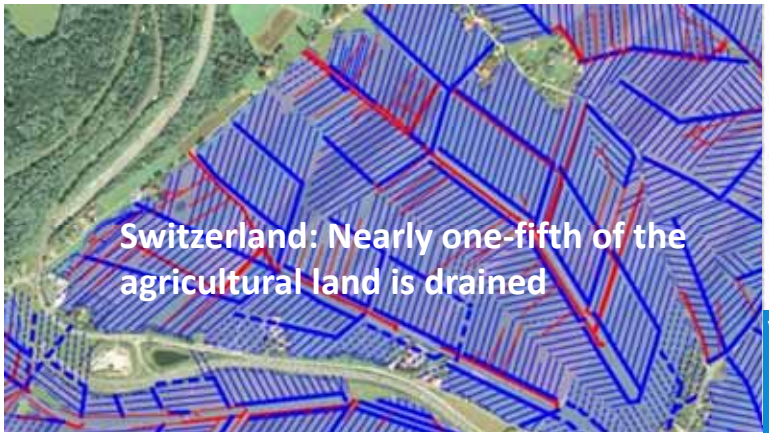
Regulated drainage networks



Retention ponds

For agricultural irrigation

Source: Emch&Berger AG

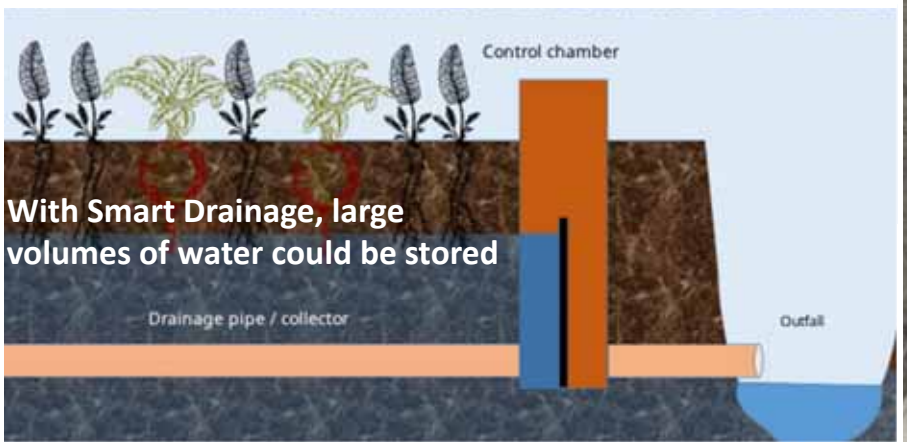


Switzerland: Nearly one-fifth of the agricultural land is drained



VSA demands:

- Low-productivity soils: Abandon drainage and rewet the area
- Best soils: Replace drainage systems with regulateable systems



With Smart Drainage, large volumes of water could be stored

Urtenen was lowered by approx. 4 meters
➡ soils on both sides were drained



❸ Forestry

Removal of Forest Drainage Systems



➡ Re-wetting

Source: Emch&Berger AG

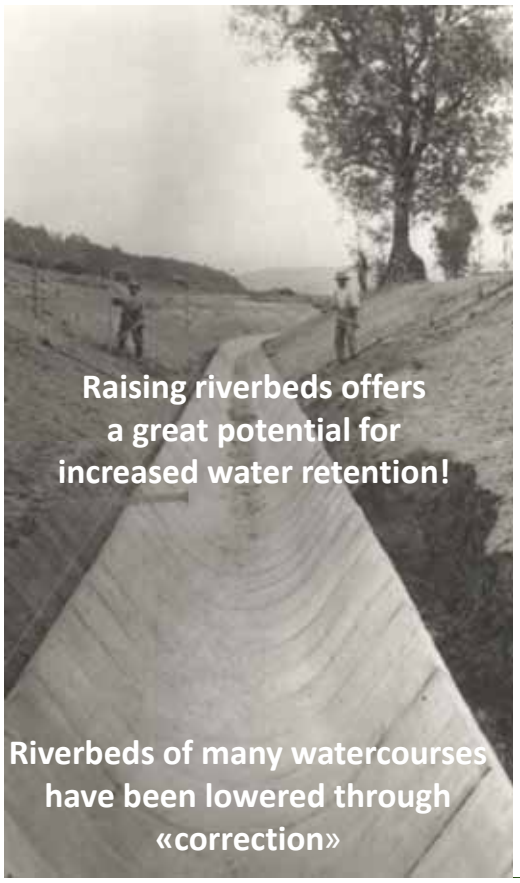


Ponds in the forest…

Photo: Stefan Hasler


...or at the edge of the forest
Photo: Stefan Hasler


4 Water management
Revitalize water bodies and restore floodplains!
Water and groundwater protection, biodiversity, hydraulic engineering, drinking water supply, etc.
Photo: Stefan Hasler



Raising riverbeds offers a great potential for increased water retention!

Riverbeds of many watercourses have been lowered through «correction»

Magdenerbach:
Riverbed raised over length 1 km ➡ Groundwater level rose
(creak can flood again ➡ dynamic floodplain!)



A new standard for river restoration?
Where possible, riverbed should be raised!
Measures should be subsidized with additional funding




SRF
Lobsigensee: Beavers raised the lake level
DOK documentary on the beavers of Marthalen
6 times more species and 36 times more individuals than in rivers without beavers!!!


Climate protection and adaptation
to climate change are urgent!
Conclusions:
Treat rainwater as a precious resource ➡ retain it for dry periods
Goal = near-natural water balance ➡ reduce runoff!
Solutions are known ➡ nature-based solutions, low-tech
All sectors are called upon to act ➡ interdisciplinary collaboration is required
Together we can do it! ➡ Benefits for everyone (win-win-win)
Photo: Stefan Hasler