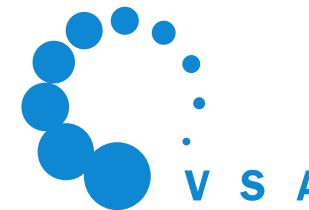


Verband Schweizer  
Abwasser- und  
Gewässerschutz-  
fachleute  
Association suisse  
des professionnels  
de la protection  
des eaux  
Associazione svizzera  
dei professionisti  
della protezione  
delle acque  
Swiss Water  
Association



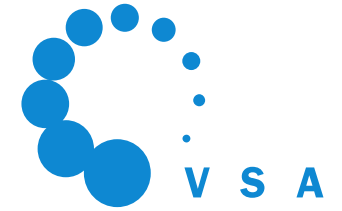
## The Swiss experience in reducing micropollutants in wastewater

Simon Bitterwolf, Swiss Water Association (VSA)

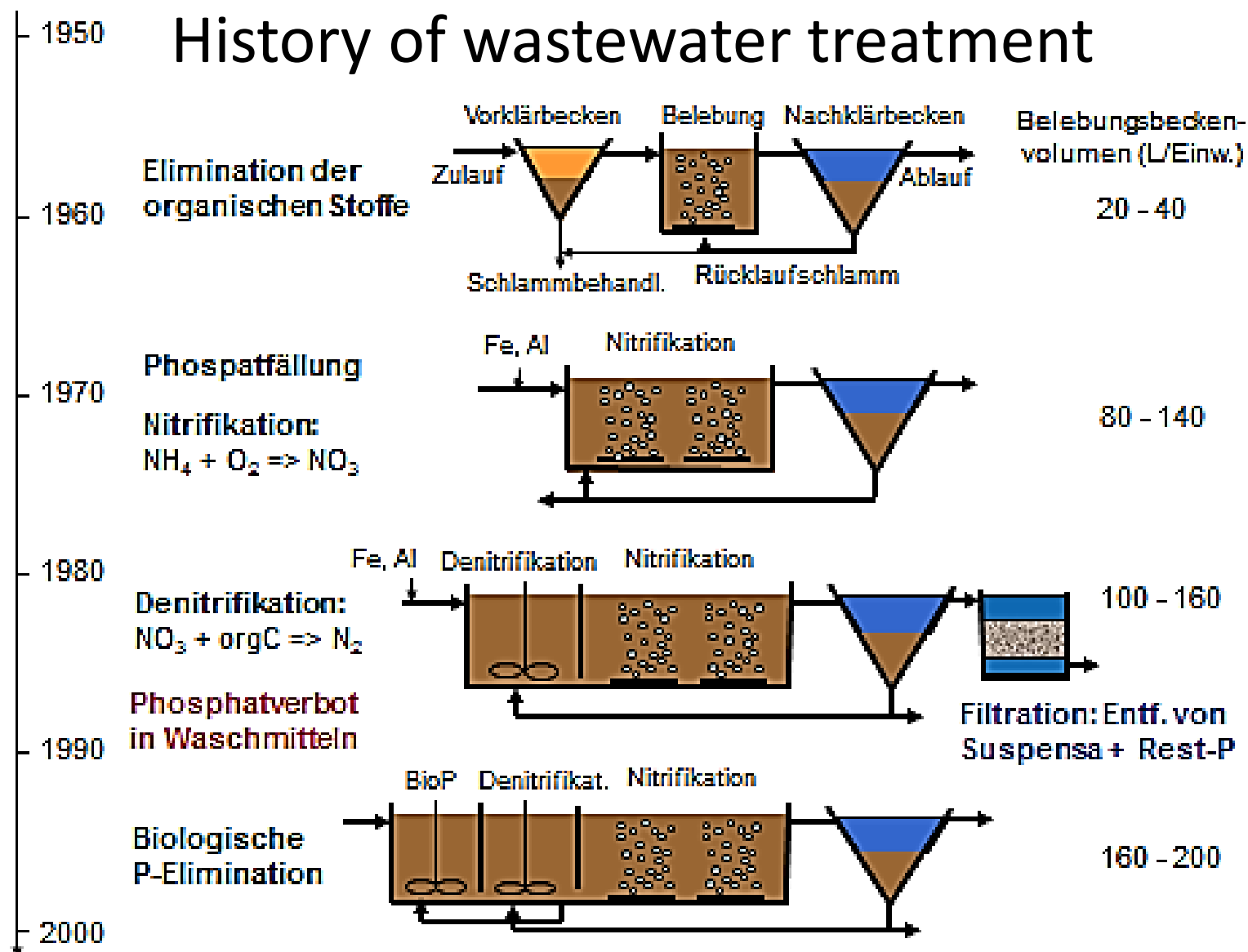
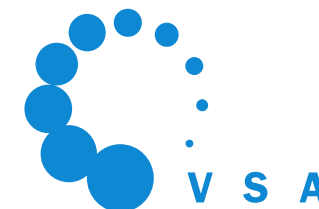
Danube Water Forum, 30 May 2024



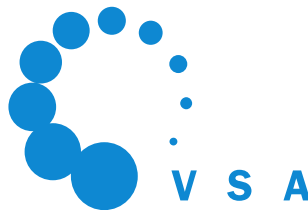
## ... looking back on wastewater treatment in Switzerland



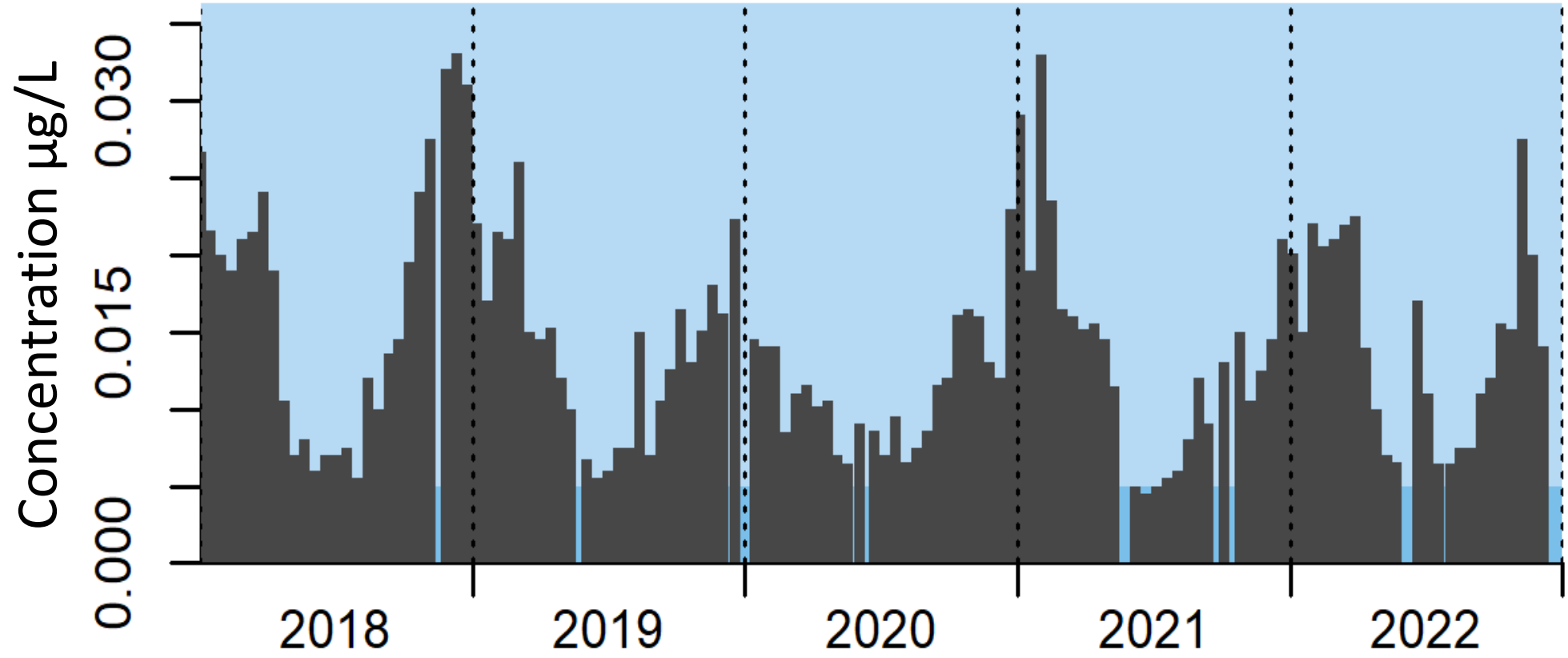
# ... looking back on wastewater treatment in Switzerland



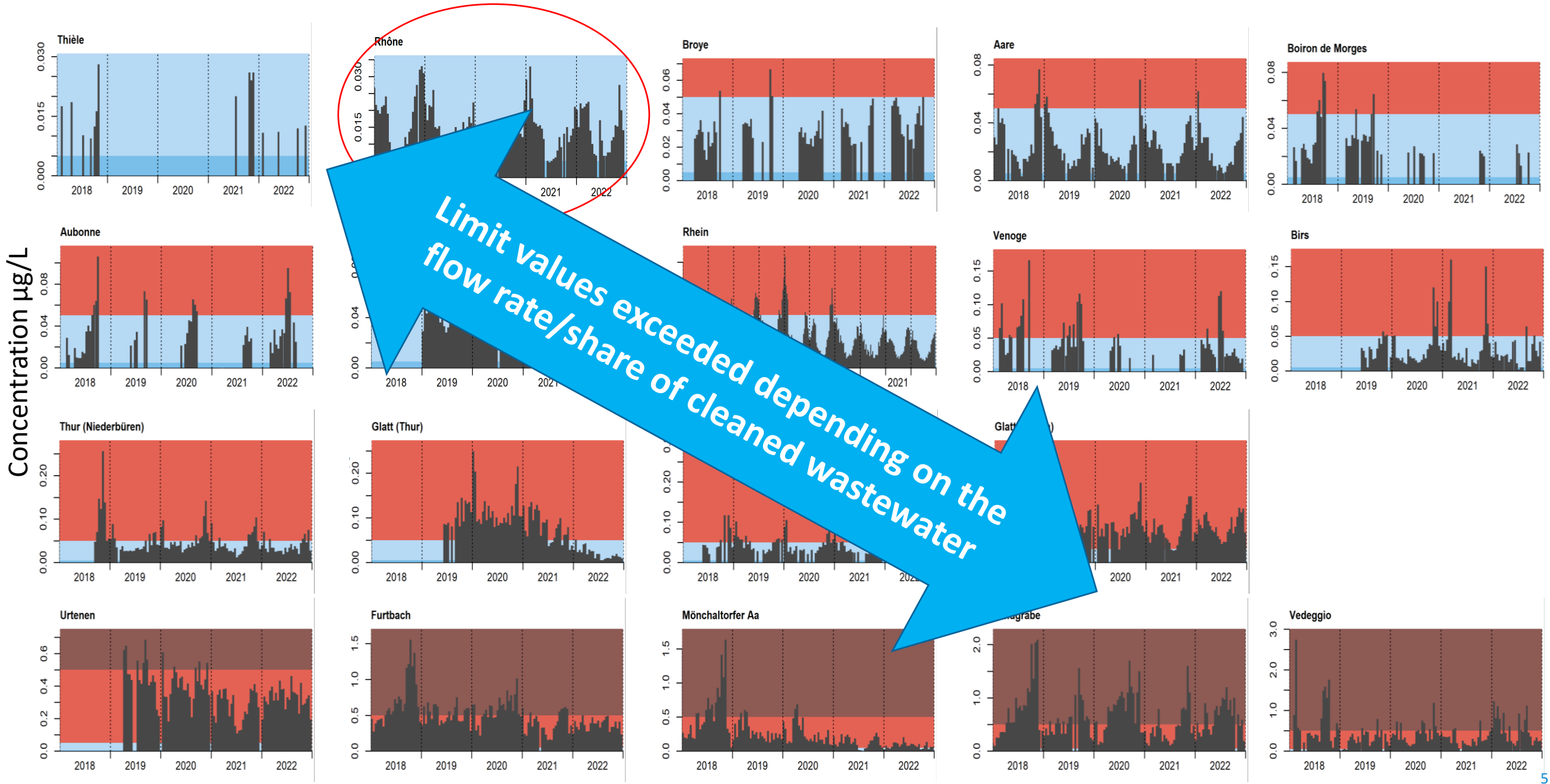
# Situation today: Diclofenac in rivers



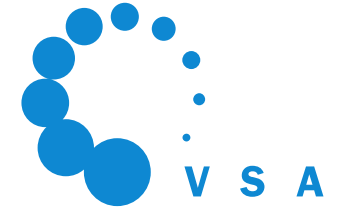
## Rhône



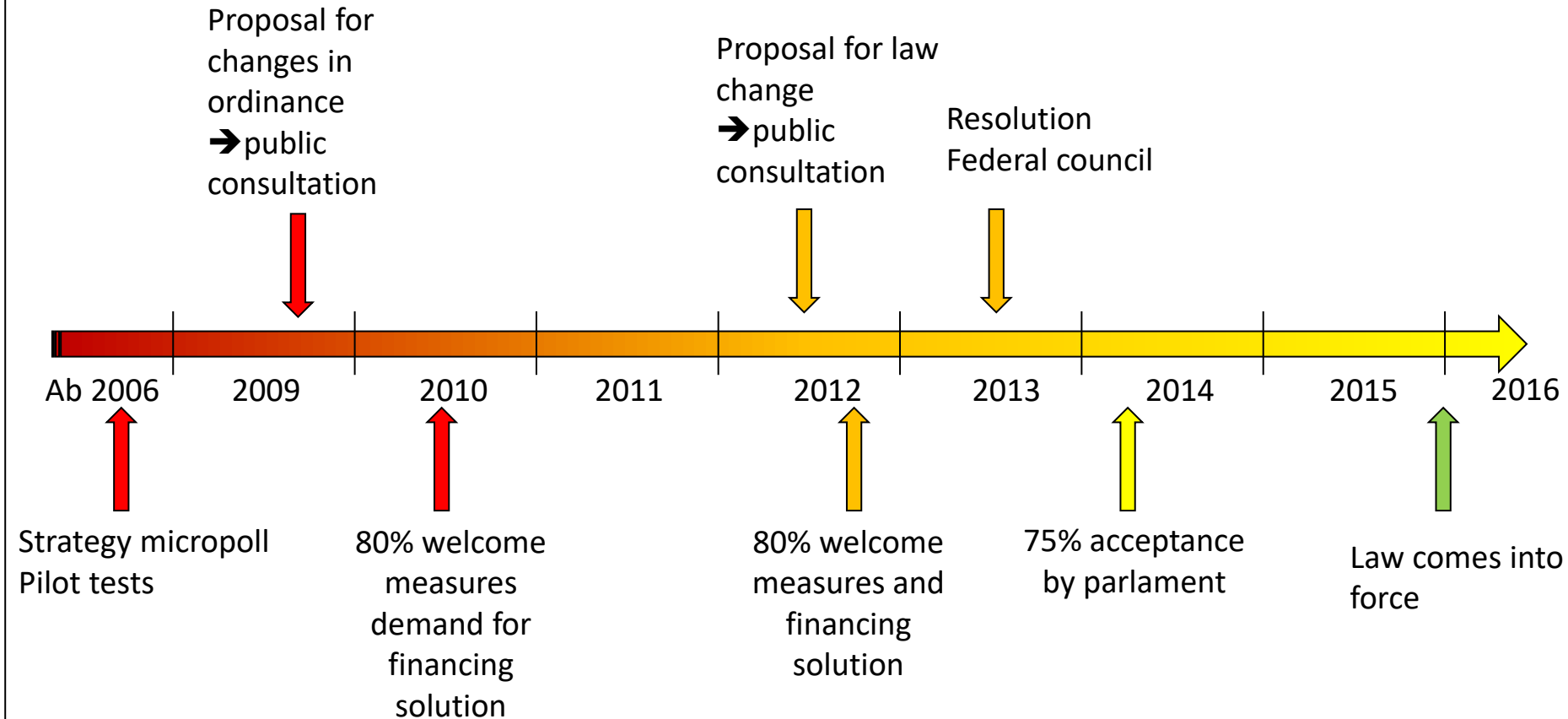
# Diclofenac concentration in 19 rivers



# Looking back at the legislation



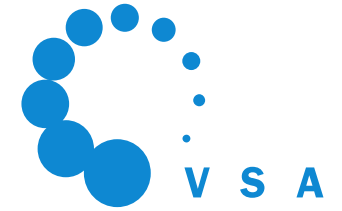
- 10 year process
- Pilot tests => basis for decision finding
- Collaboration with authorities and all relevant stakeholders
- Two public consultations
- «willingness to pay»
- Pragmatic approach for evaluation:  
Abatement of 12 indicator substances



**Cost-Benefit Analysis of the Swiss National Policy on Reducing Micropollutants in Treated Wastewater**

*Logar et al. ES&T (2014) 48, 12500–12508*

# Legislation from 2016



**Goal:** Abatement of micropollutants by 80 % with advanced treatment until 2040

## Load-reduction + «up-stream» responsibility

Large WWTP > 80'000 inhabitants

## Quality control of drinking water resources

WWTP > 24'000 inhabitants discharging into lakes

WWTP > 8'000 inhabitants in special hydrogeological situations

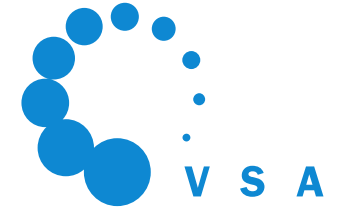
## Protection of sensitive water bodies

WWTP > 8'000 inhabitants discharging into stretches with inadequate dilution (>10% share of wastewater)

~130 WWTPs  
upgraded

70% of  
inhabitants

# How is the elimination checked?



## Average 80% elimination of 12 leading substances

substance
Amisulpride
Carbamazepine
Citalopram
Clarithromycin
Diclofenac
Hydrochlorothiazide
Metoprolol
Venlafaxine
Benzotriazole
4/5-Methylbenzotriazole
Candesartan
Irbesartan

Selection of at least 4 substances

Selection of at least 2 substances

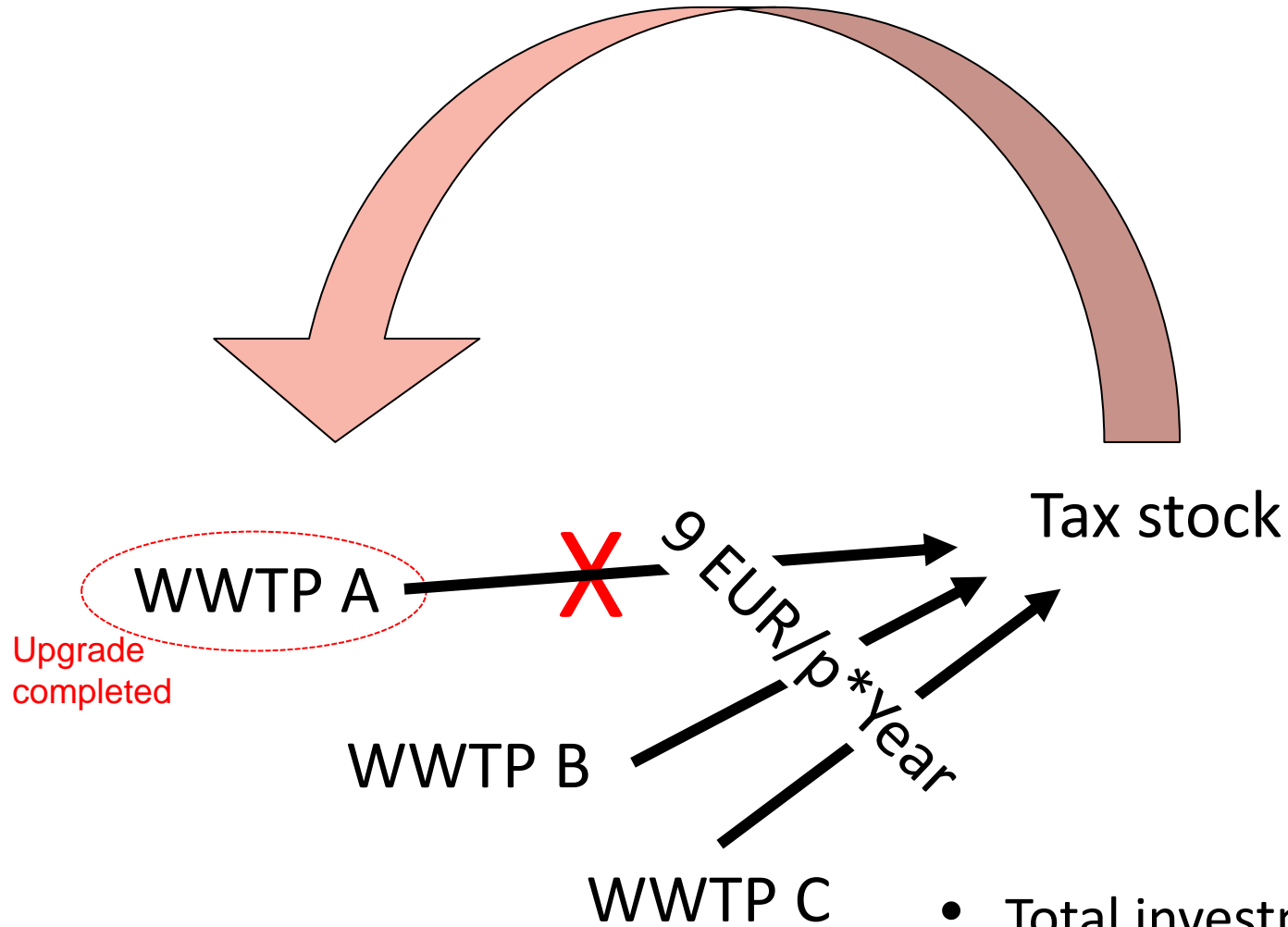
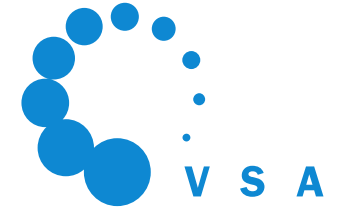
12 substances are **representative** for organic micropollutants  
**Not** based on high risk chemicals (but, e.g. hormones are also abated)

- Only parents compounds (no transformation products)
  - Can be easily and routinely measured in one analytical method (at cantonal or private labs)
  - Occurring in bigger WWTPs at measureable concentration (influent concentration 10x LOQ in effluent)
  - Degraded to less than 50% in biological treatment
  - Similar abatement in advanced treatment (not favoring ozone or AC)
  - Continuous discharge into WWTP
- **Mainly pharmaceuticals fulfill these criteria**



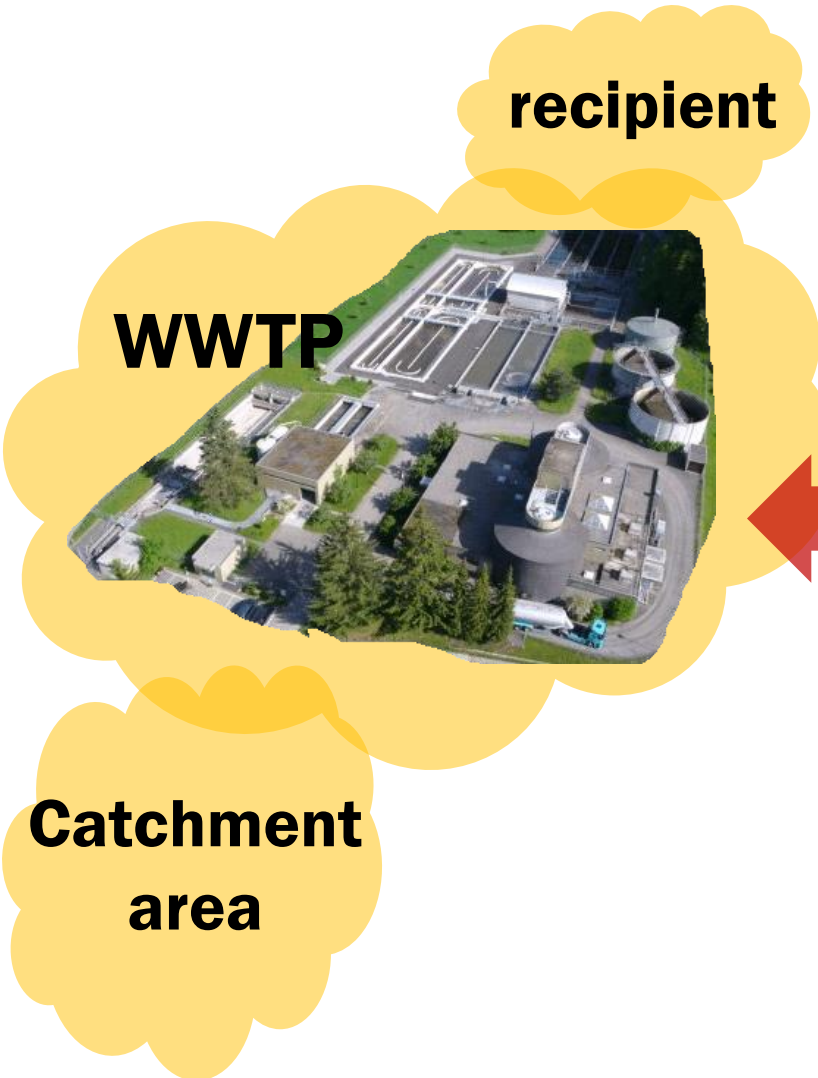
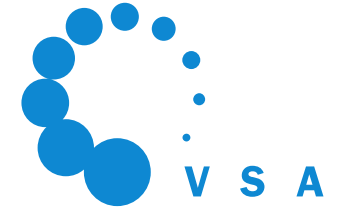
# Funding

Investment subsidy: 75 %

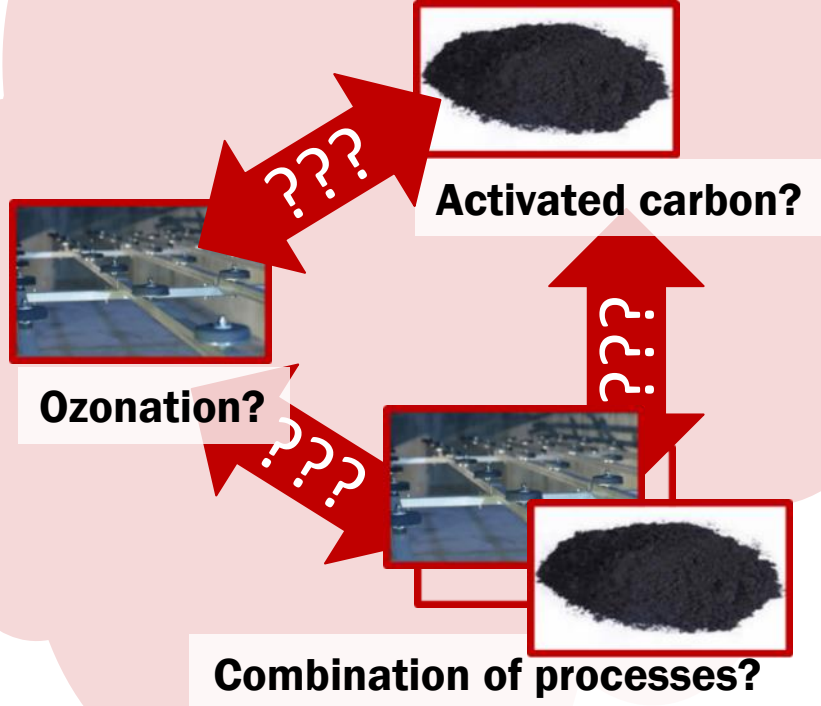


- Total investment costs: about 1'200 million Euro
- Increase of costs for wastewater treatment: 10-15%

# Choice of procedure

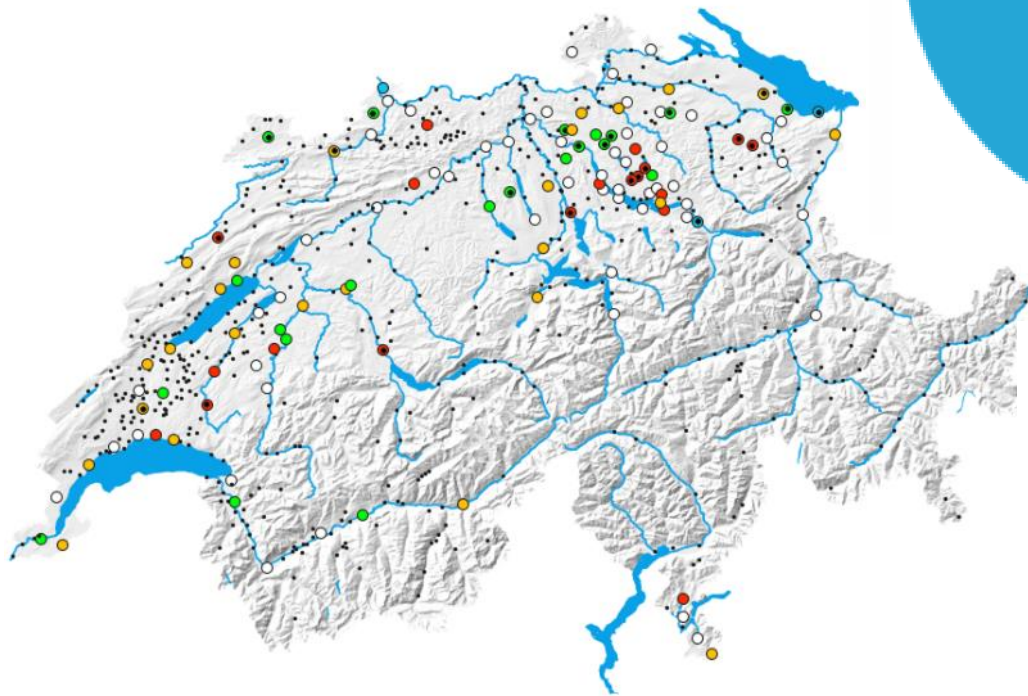
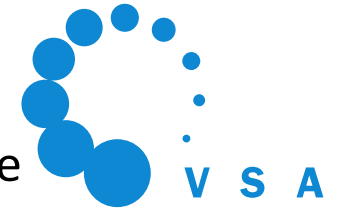


## Available technologies

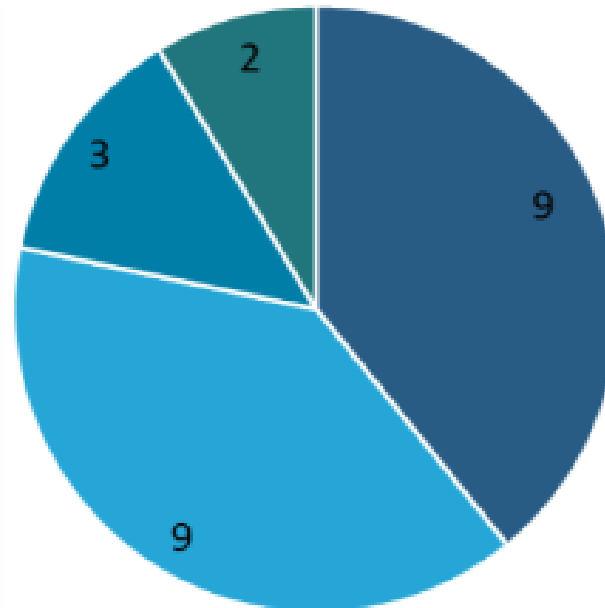


- Collaborative decision: Authorities, WWTP operators, Engineers, suppliers, scientific experts (Eawag, other research institutes)
- Often pilot scale experiments (reports and publication)
- VSA ensures knowledge transfer ([www.micropoll.ch](http://www.micropoll.ch))

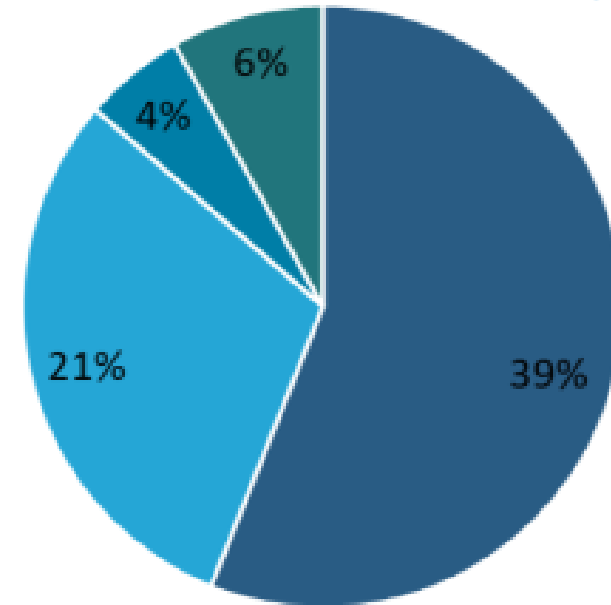
# Situation May 2024



Number of WWTP



Connected people

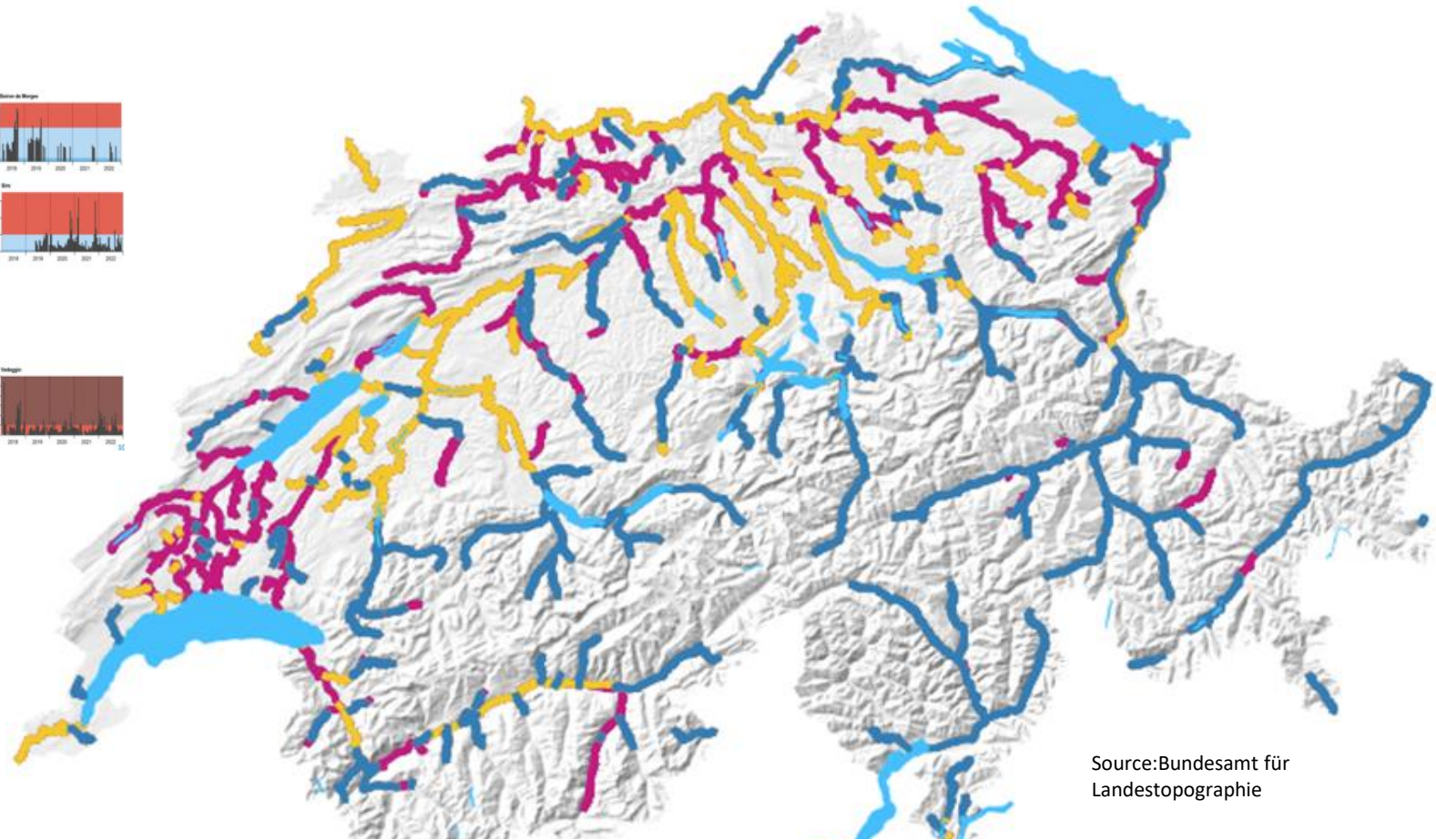
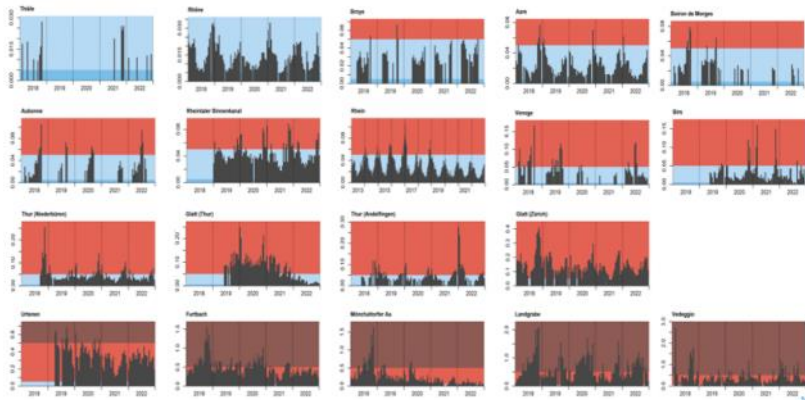


- Ozon / Ozone / Ozono
- PAK / CAP / PAC
- GAK / CAG / GAC
- Kombi / Combinaison / Combination

# How many kilometres of streams are affected in Switzerland?



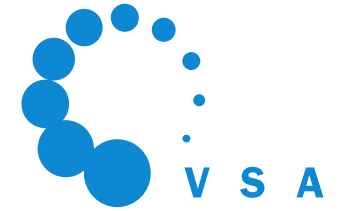
S A



Source: Bundesamt für Landestopographie

- ➔ 5,000 kilometres of streams with treated wastewater
- ➔ 3,000 km of streams with exceedances without any WWTP upgrade (>2% wastewater proportion)
  - 1,300 km covered by the WWTP upgrade (2016)
  - 1,700 km remain, exceedances are expected

# Claim for adaption of the water protection act («Motion 20.4262»)



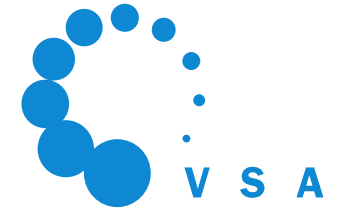
“All WWTPs whose discharges result in limit values being exceeded must implement measures to eliminate micropollutants”

Work in progress since 2020

Law will probably be implemented in 2028



## Keys for success



- Strong collaboration among researchers, regulators and practitioners
- Accepted financial plan (financial risk not at water managers)
- Simple measures to evaluate treatment
- Willingness to proactively invest towards a clean and sustainable environment
- VSA Platform supports all stakeholders involved ([www.micropoll.ch](http://www.micropoll.ch))

### Barriers:

- Knowledge gaps, remaining uncertainties (research is still ongoing)
- Other priority issues
  - bad water quality (well performing WWTP with nitrification is prerequisite)
  - Rather use money for something else?



Swimming in the Rhine in Basel

# <https://micropoll.ch>

- Information on processes
- Publications
- Datasheets

(mostly in German)

Get in touch:

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Der Herr der Übersicht.

**Rebekka Gulde**



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industrielles Abwasser**  
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[rebekka.gulde@vsa.ch](mailto:rebekka.gulde@vsa.ch)

Fährt am liebsten mit dem E-Bike zur Arbeit.

**Fabienne Eugster**



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Abwasser**  
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[fabienne.eugster@vsa.ch](mailto:fabienne.eugster@vsa.ch)

Gerne im, am und auf dem (festen) Wasser!

**Simon Bitterwolf**



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[simon.bitterwolf@vsa.ch](mailto:simon.bitterwolf@vsa.ch)

Ansonsten eher wasserscheu.