Bayerisches Landesamt für Umwelt

Water management in Bavaria tasks, responsibilities, structure, legal framework and challenges ahead

Main Topics

- **Legal framework**
- Organization of water management
- Water resources
- Water supply
- Wastewater treatment
- Challenges

The European Union:
27 member states - 447 Mio. inhabitants

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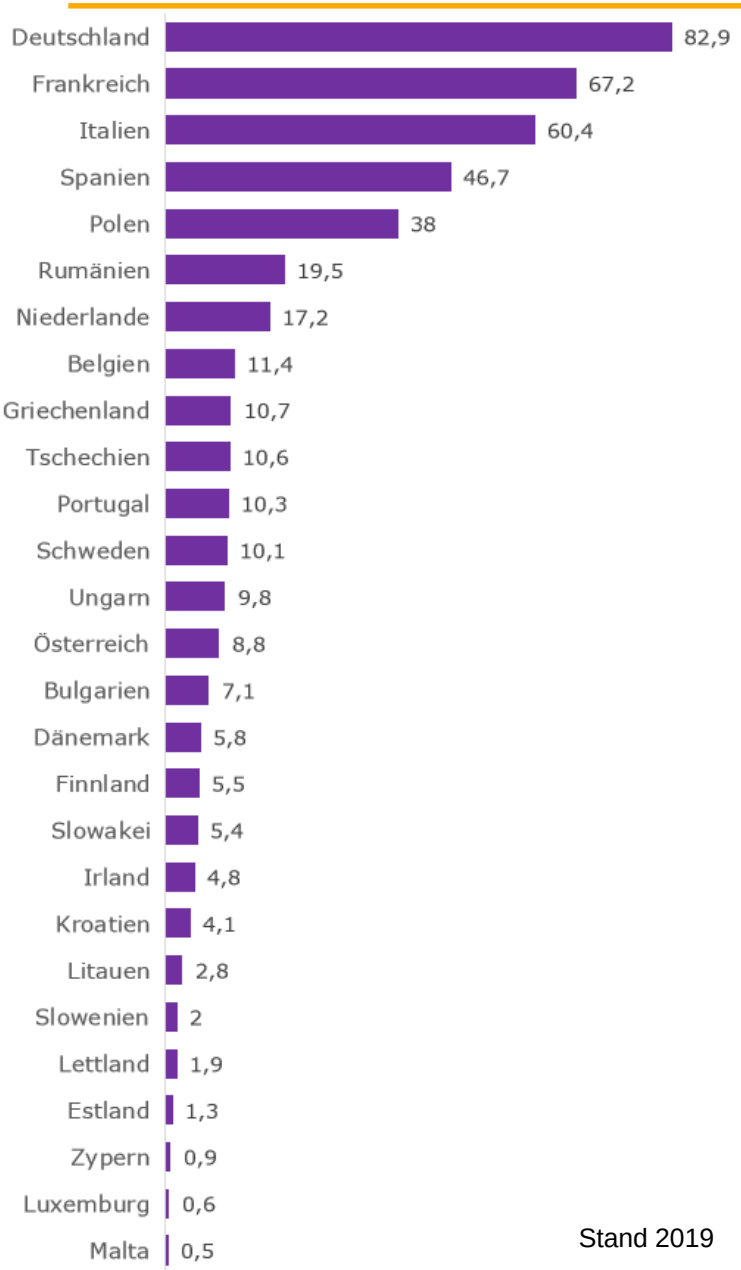
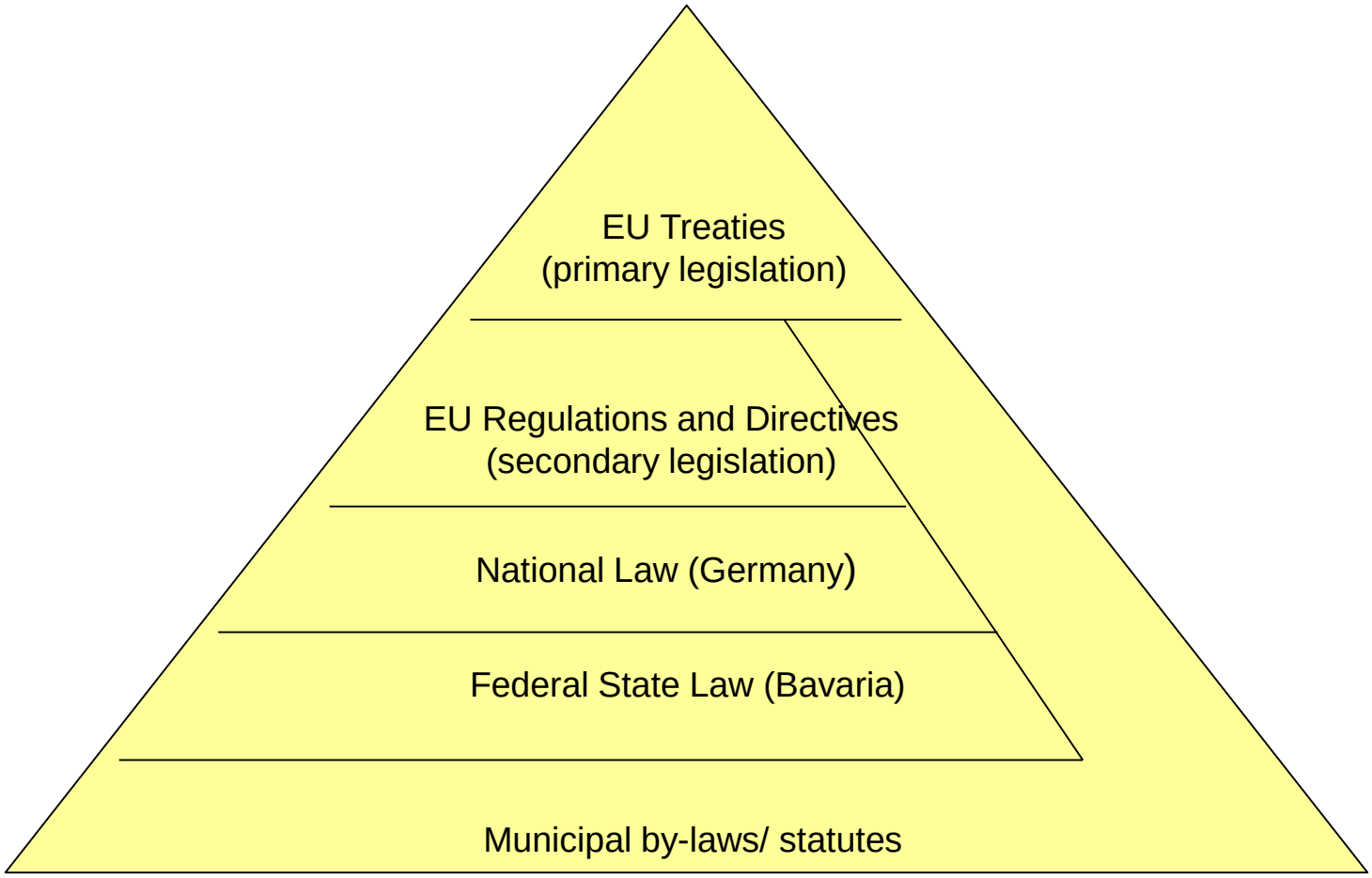


Stand 2019

Hirachy of Laws and Provisions



Legal basis of water management – European Water Framework Directive - WFD

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

„Water is not a commodity, but a heritage that needs to be protected, defended and treated as such ..... The Water Framework Directive sets a legal framework to ensure sufficient quantities of good quality water across Europe. "

Complemented by

- Directive on Environmental Quality Standards 2008/105/EG
- Marine Strategy Framework Directive 2008/56/EU
- Directive on assessment and management of flood risks 2007/60/EG
- Groundwater Directive 2006/118/EC
- Bathing Water Directive 2006/7/EC
- Drinking water directive 98/83/EC
- Directive on Urban Waste Water Treatment 91/271/EEC
- Nitrate Directive 91/676/EEC
- Directive on Industrial Emissions 2010/75/EU

and further more.

Federalistic Prinziple – delimitation of resposibility

Art. 30 Constitution of Federal Republic of Germany
execution of governmental competences and duties is in the responsibility of the federal states, as far as this constitution doesn´t make or permit another scheme

Regulation at the federal level:

- **Water supply** is the responsibility of general interest

Article 83 Bavarian Constitution

➢ Responsibility of municipalities

- **Wastewater discharge** based upon the federal state law

➢ Bavaria - basically task of the municipalities

Free State of Bavaria

7 Administrative districts,
25 urban municipalities
and 71 counties

A Erlangen Höchstadt

urban municipalities in Bavaria

1 Amberg
2 Ansbach
3 Aschaffenburg
4 Augsburg
5 Bamberg
6 Bayreuth
7 Coburg
8 Erlangen
9 Fürth
10 Hof
11 Ingolstadt
12 Kaufbeuren
13 Kempten (Allgäu)
14 Landshut
15 Memmingen
16 München
17 Nürnberg
18 Passau
19 Regensburg
20 Rosenheim
21 Schwabach
22 Schweinfurt
23 Straubing
24 Weiden in der Oberpfalz
25 Würzburg

Tasks of Bavarian municipalities by services for the public

- Commune/ town/ city:
  watersupply/ sanitation

- counties:

Waste management – collection, removal

- monopolistic position, enforcement for connection and usage
- cost recovery principle, contributions and fees must cover the incurring costs
  - no regulatory authority
  - profit´s are only possible in exceptional cases

Water Management Figures

date 2019

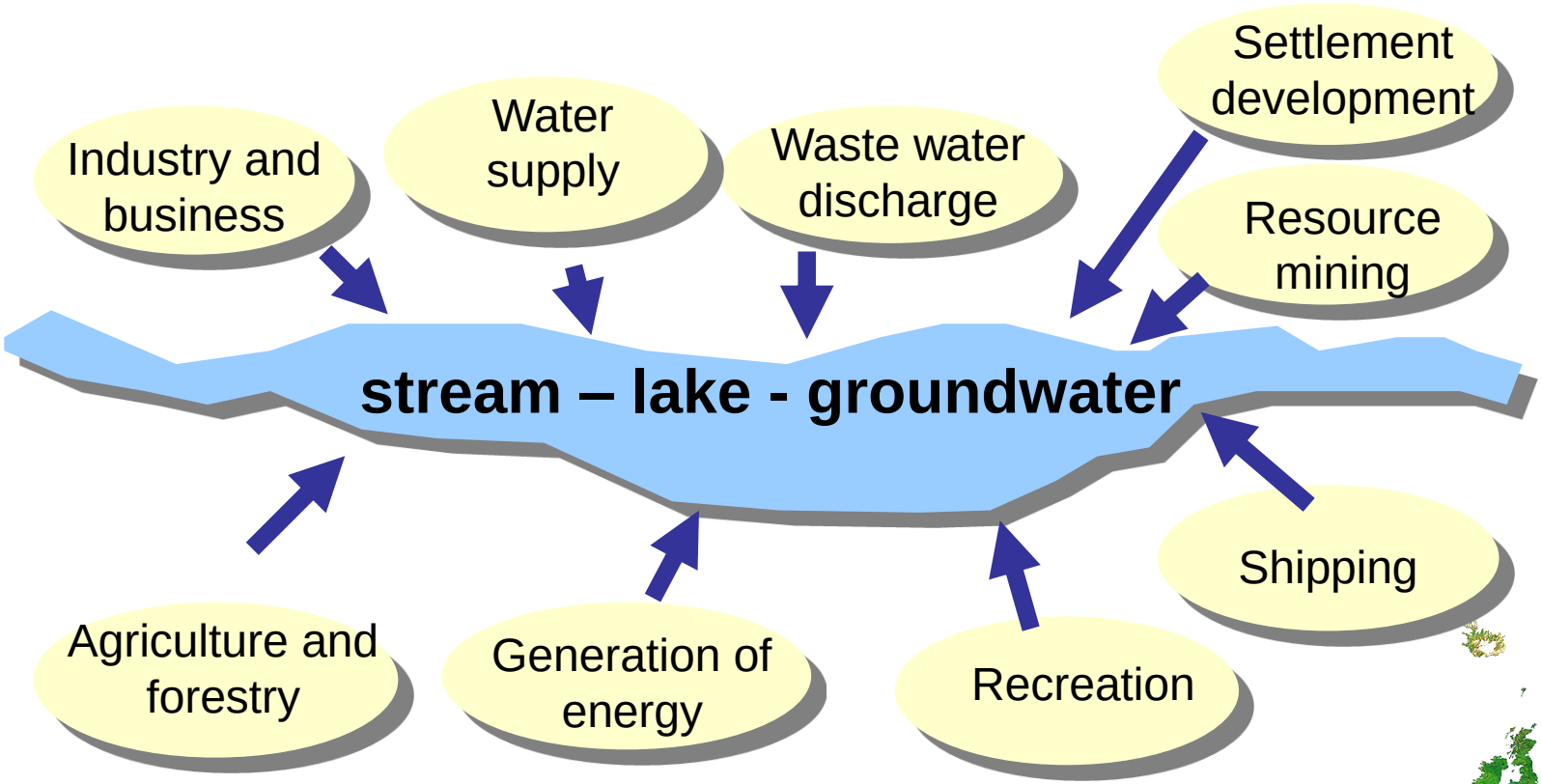
	Germany	Bavaria
area	357,000 km²	70,548 km²
inhabitants	83,1 Mio.	13,1 Mio.
municipalities	11.059	2.056
Water supply		
connection rate public drinking water	99,4 %	99,2 %
public water supply	5,355 Bio. m³/a	907 Mio. m³/a
number of public water supplier (cp. NRW: 600 PWS on 18 Mio. people)	5.684	2.189
Wastewater disposal		
connection rate public wastewater treatment plants	96,5 %	97,2 %
length public sewers	594.320 km	c. 104.300 km
number of public wastewater treatment plants	8.891	2.439
total capacity of wastewater treatment plants	152 Mio. PE	27 Mio. PE

Main Topics

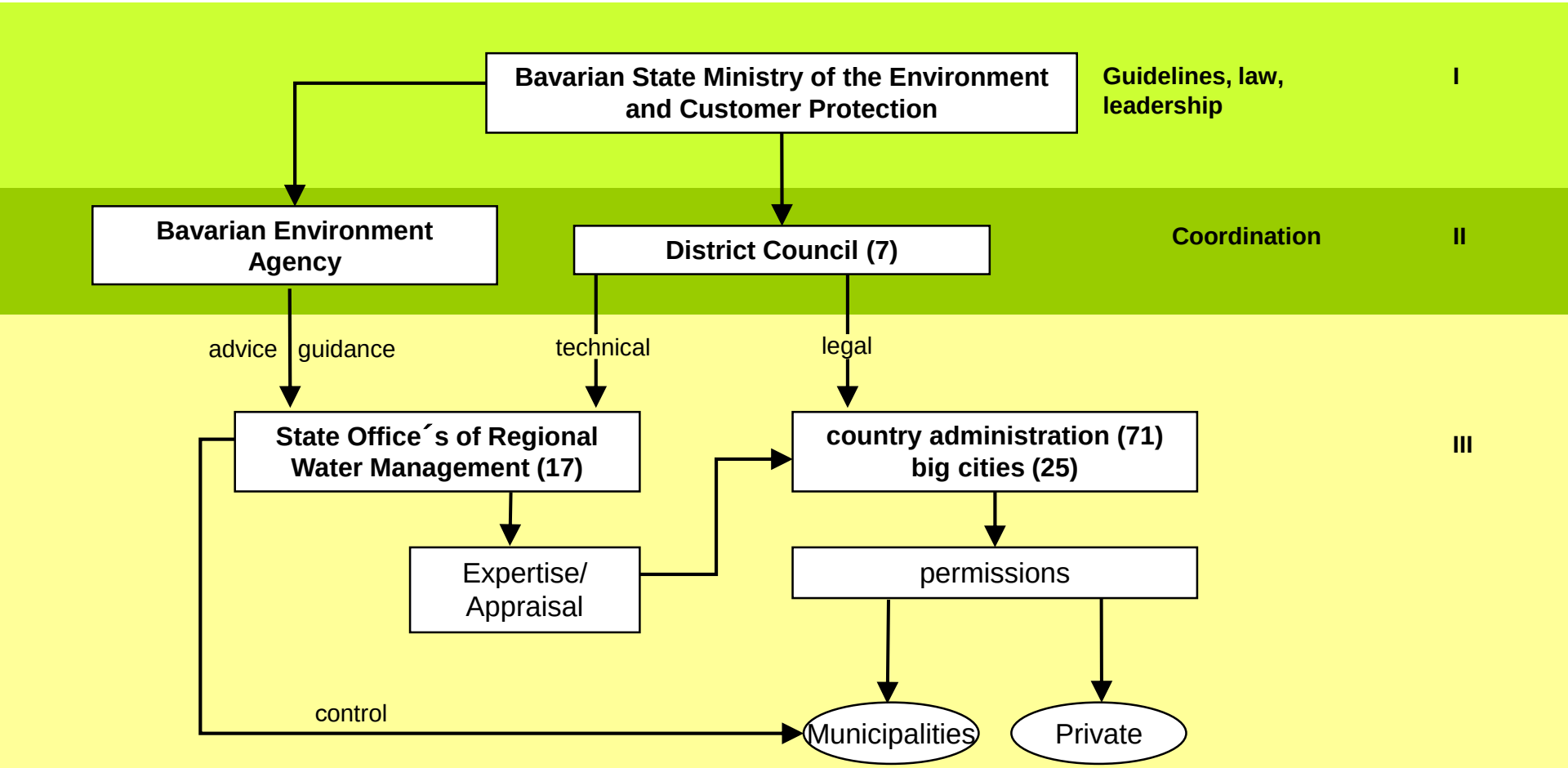
- Legal framework
- **Organisation of water management**
- Water resources
- Water supply
- Wastewater treatment
- Challenges

Core task sustainable water management

Manage water = balance of conflicts of interest
= protect water = secure of long term use



Water Management Organization on federal state level
Example Bavaria



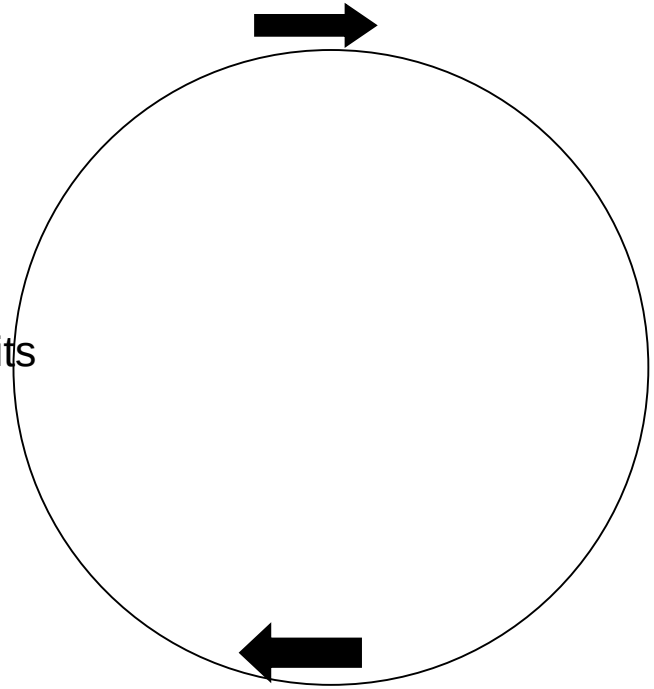
Water Management Organization on federal state level
Example Bavaria

Location of the 17 State Offices on Regional Water Management

Maintasks of the Water Management Admistration

Investigation of the hydrologic cycle/ Hydrology

➢ base on expert appraisal of new utilizations



Assessment of use applications, official appraiser

➢ environmental examination

➢ construction examination, gov. funding

Maintenance and construction of streams, lakes and reservoirs under state responsibility (water body renaturation, flood protection, maintenance, etc.)

Certification of utilization plants (meanwhile privatised)

Monitoring of utilizations

➢ Compliance with permit limits

➢ Data collection for waste water fee

Main Topics

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Precepitation in Germany, long term mean 1961 - 1990

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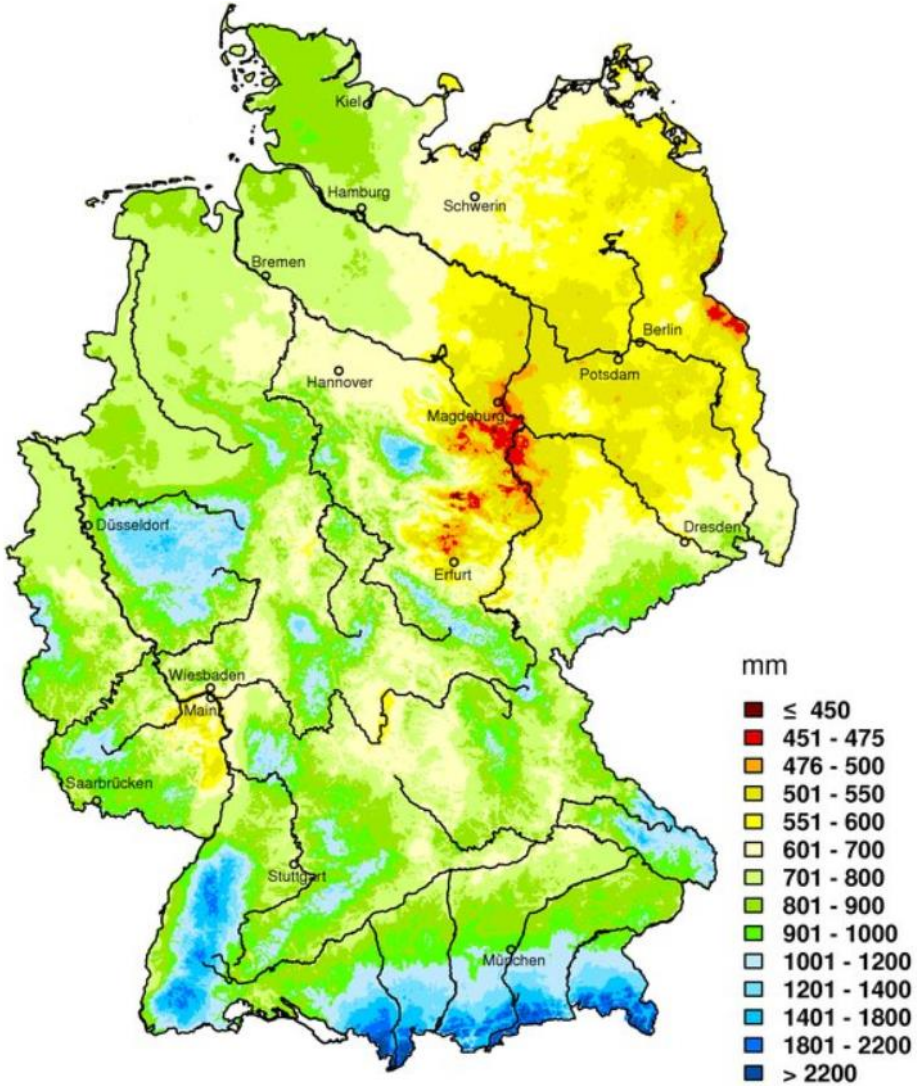
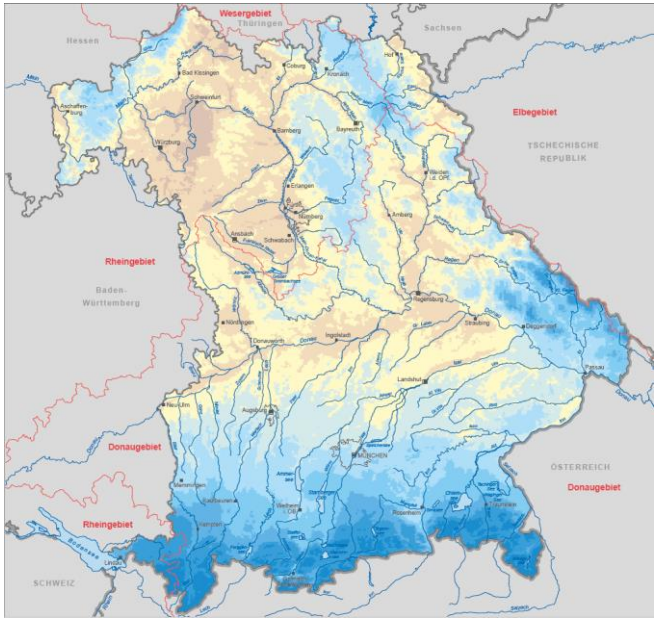




Niederschlagshöhe in mm/a

500 - 650
> 650 - 750
> 750 - 850
> 850 - 950
> 950 - 1100
> 1100 - 1300
> 1300 - 1500
> 1500 - 2000
> 2000

Hauptwasserscheide

Sitz Bezirksregierung

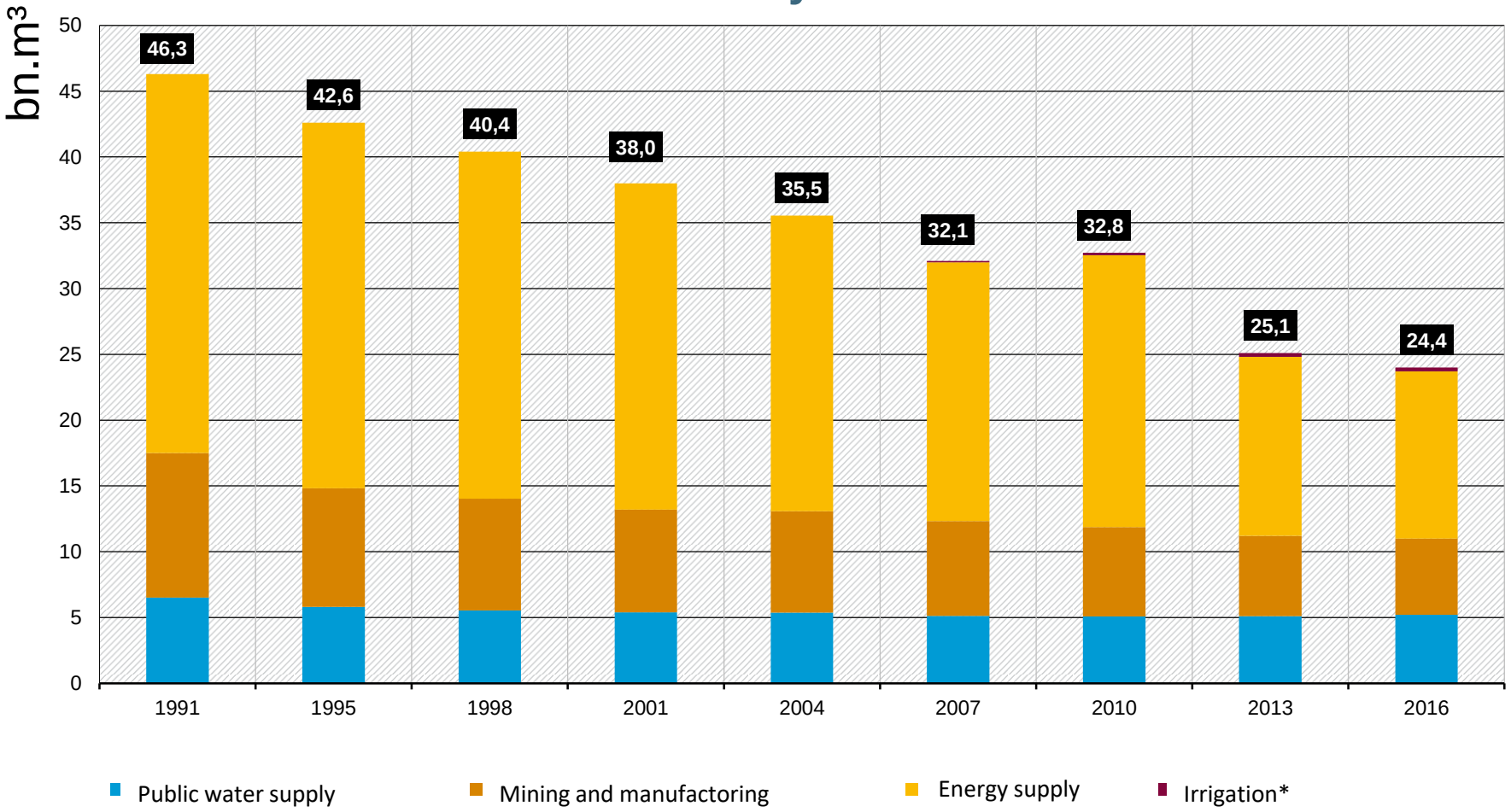
Stadt

Siedlungsfläche

Withdrawal of water in Germany

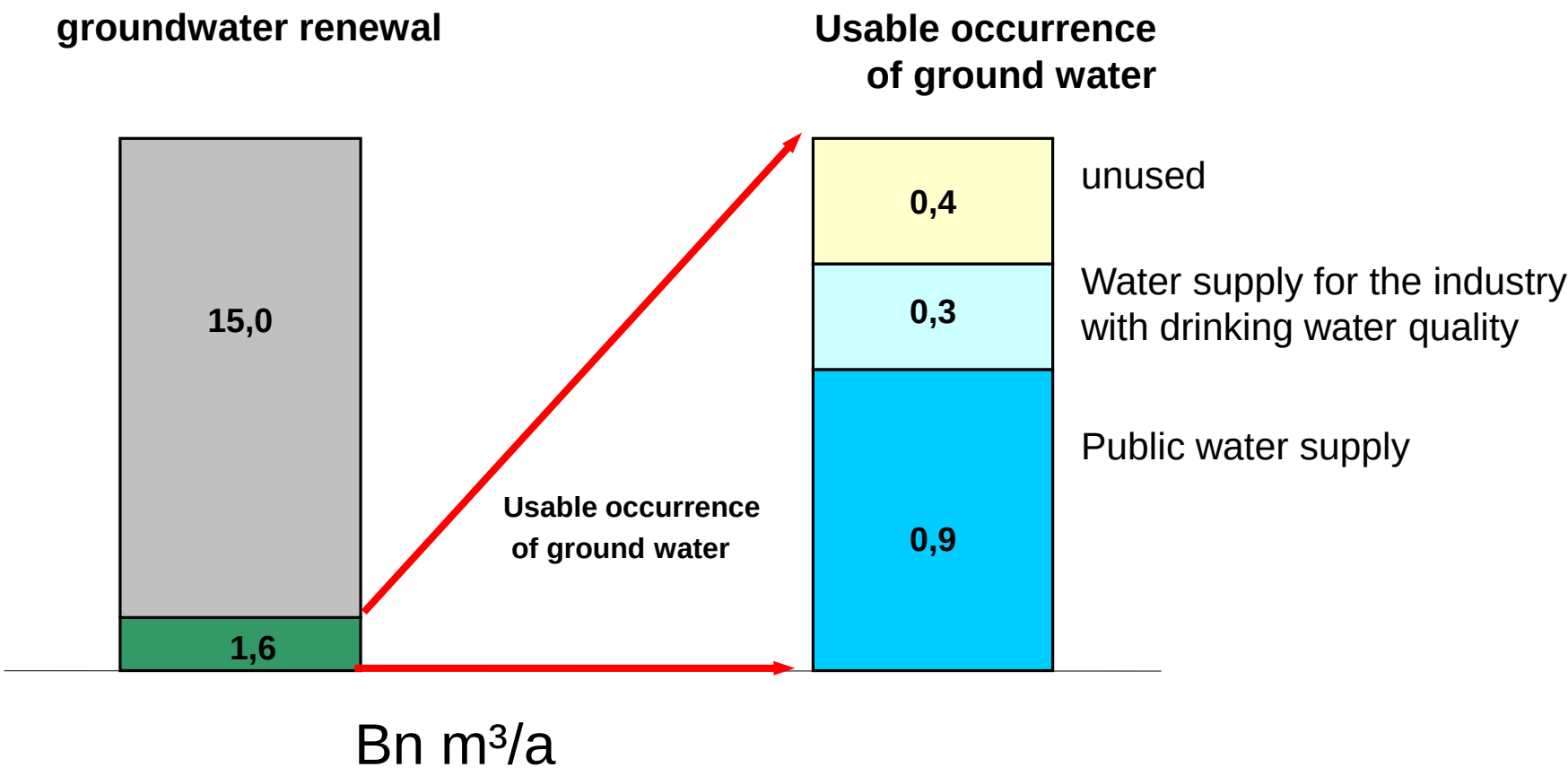
Bayerisches Landesamt für Umwelt

Potential availability of water 188 bn. m³

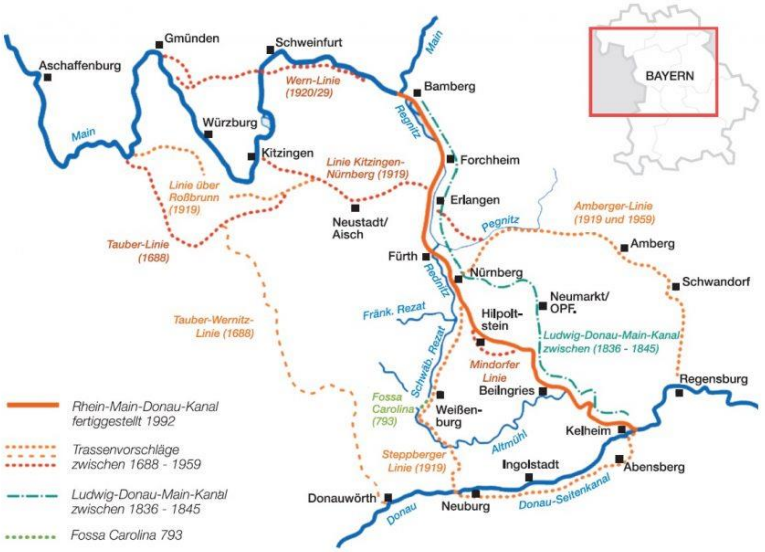


*data first from 2007 available

Public water supply in Bavaria – occurrence of ground water and its utilisation



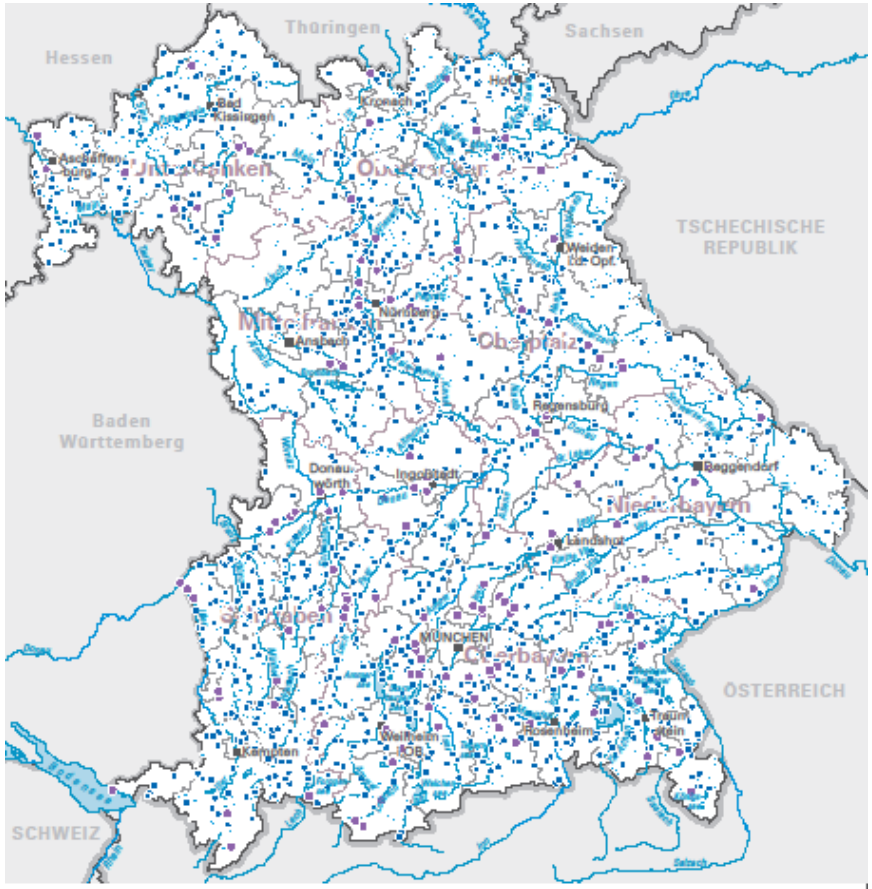

Nordsee
Amsterdam
IJssel
Ems
Waal
Lippe
Ruhr
Rhein
Maas
Brüssel
BELGIEN
Maas
LUXEM-
BURG
Luxemburg
Mosel
Saar
Nahe
Sieg
Köln
Bonn
Lahn
Frankfurt
Main
Rhein
Marne
Nancy
Straßburg
Stuttgart
Neckar
Seine
Saône
Doubs
Aare
Zürich
Bern
Reuss
Rhein
SCHWEIZ
LIECHTEN-
STEIN
Rhône
Genf
Lyon
FRANKREICH
Mailand
Etsch
Venedig
Bozen
ITALIEN
Innsbruck
Inn
Donau
Lech
Iller
Isar
München
Bayern
Passau
Salzburg
Enns
REPUBLIK
ÖSTERREICH
Linz
Wien
Mur
Graz
Drau
SLOWENIEN
Ljubljana
Zagreb
Raab
Naab
Regnitz
Altmühl
Nürnberg
Würzburg
Eger
Beraun
Moldau
Prag
Elbe
Leipzig
Dresden
Erfurt
Kassel
Weser
Leine
Aller
Hannover
Berlin
BUNDESREPUBLIK
DEUTSCHLAND
Ems
NIEDER-
LANDE


Aschaffenburg
Gmünden
Schweinfurt
Main
Wern-Linie
(1920/29)
Bamberg
Würzburg
Regnitz
Kitzingen
Linie Kitzingen-
Nürnberg (1919)
Forchheim
Linie über
Roßbrunn
(1919)
Erlangen
Neustadt/
Aisch
Amberger-Linie
(1919 und 1959)
Pegnitz
Tauber-Linie
(1688)
Amberg
Fürth
Nürnberg
Schwandorf
Neumarkt/
OPF.
Tauber-Wernitz-
Linie (1688)
Fränk. Rezat
Hilpolt-
stein
Ludwig-Donau-Main-Kanal
zwischen (1836 - 1845)
Mindorfer
Linie
Regensburg
Schwabach
Fossa
Carolina
(793)
Beilngries
Weißen-
burg
Kelheim
Altmühl
Steppberger
Linie (1919)
Ingolstadt
Abensberg
Donauwörth
Donau
Neuburg
Donau-Seitenkanal
Rhein-Main-Donau-Kanal
fertiggestellt 1992
Trassenvorschläge
zwischen 1688 - 1959
Ludwig-Donau-Main-Kanal
zwischen 1836 - 1845
Fossa Carolina 793
BAYERN

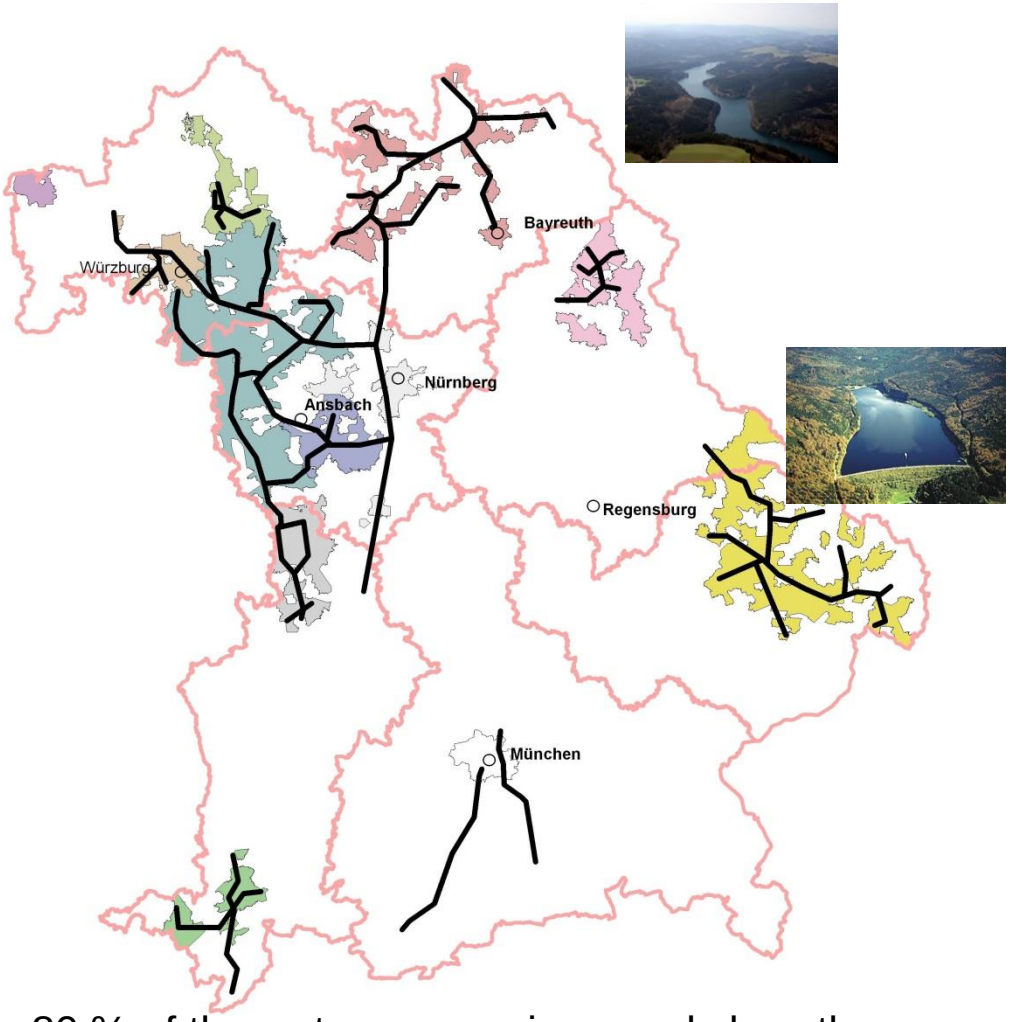
Main Topics

- Legal framework
- Organisation of water management
- Water resources
- **Water supply**
- Wastewater treatment
- Challenges

principle of regionality!



2.930 water catchment plants (date 2016)
app. 25.000 private wells



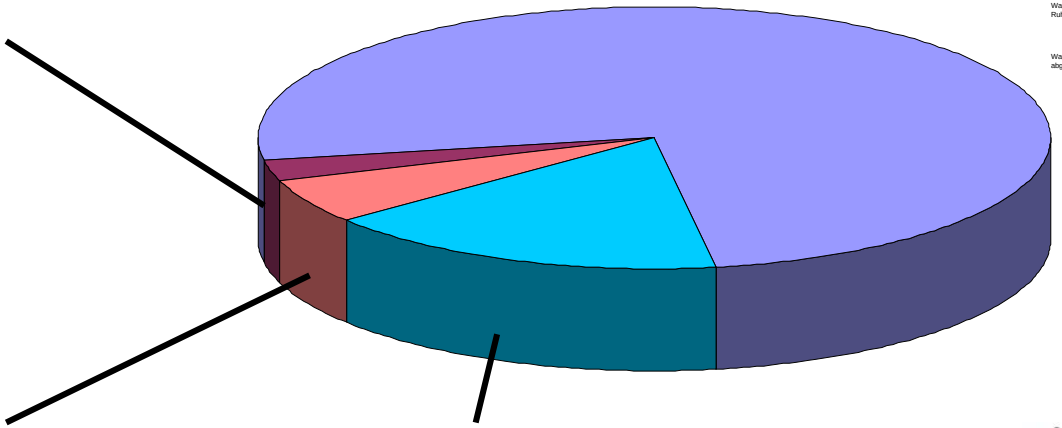
80 % of the water companies supply less than 4500 inhabitants but there are as well big linked systems of associations

Statistisches Bundesamt, Fachserie 19, Reihe 2.1., 2016, veröffentlicht 10/2018

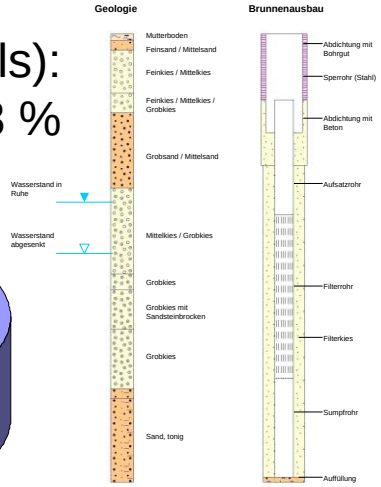
Public water supply

Raw Water Sources in Germany (D) and Bavaria (BY)

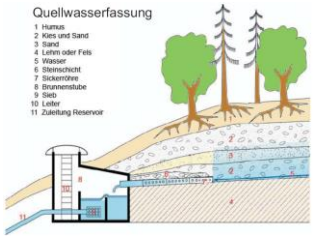
surface water, reservoirs:
D 13,8 % - BY 2,9 %



groundwater (wells):
D 62,4 % - BY 68,3 %

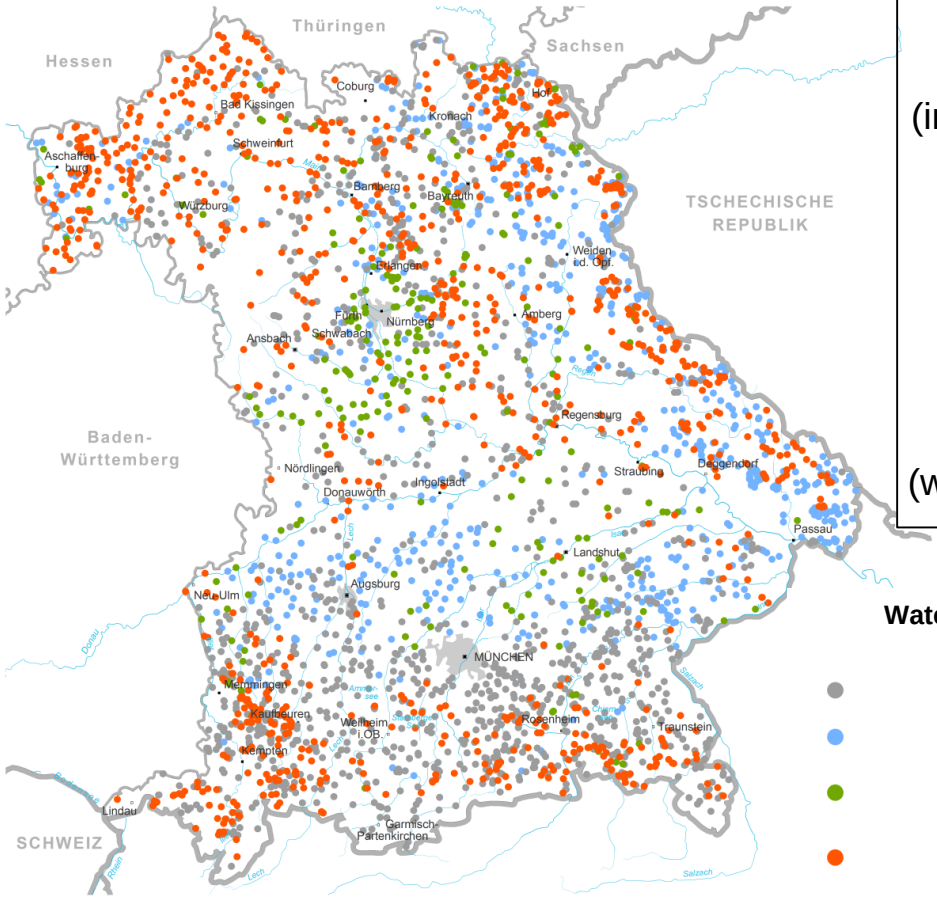


groundwater (springs):
D 8,1 % - BY 20,7 %



surface water, bank filtration:
D 15,7 % - BY 8,2 %

Potable water purification - Status Quo Bavaria

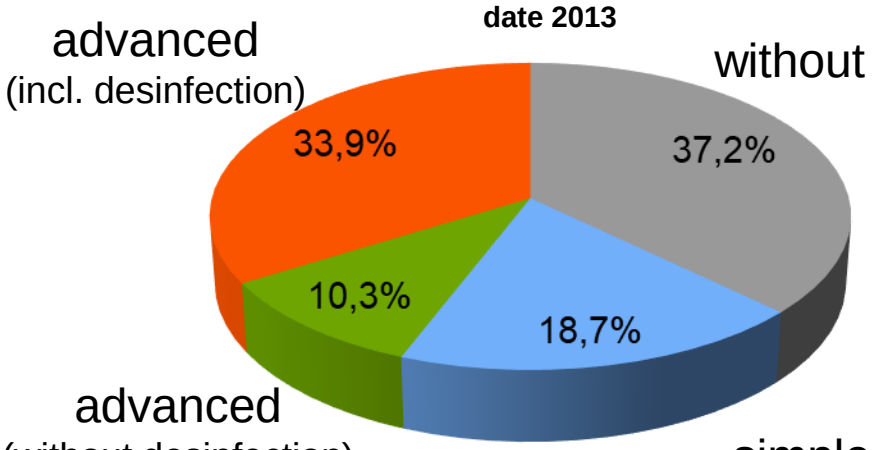


Water abstraction sites on public supply

- without treatment
- simple treatment
- advanced treatment (without desinfection)
- advanced treatment (with desinfection)

Share taken wateramount

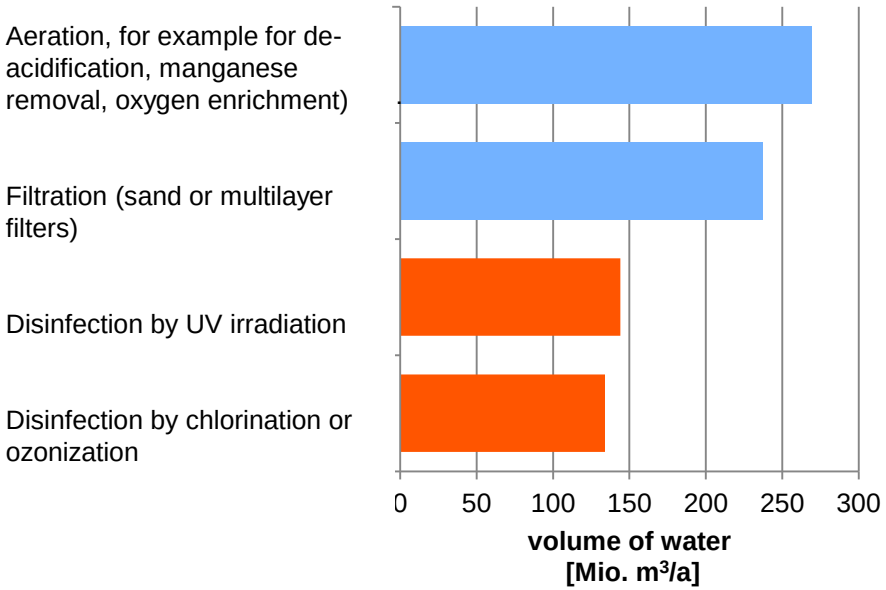
date 2013



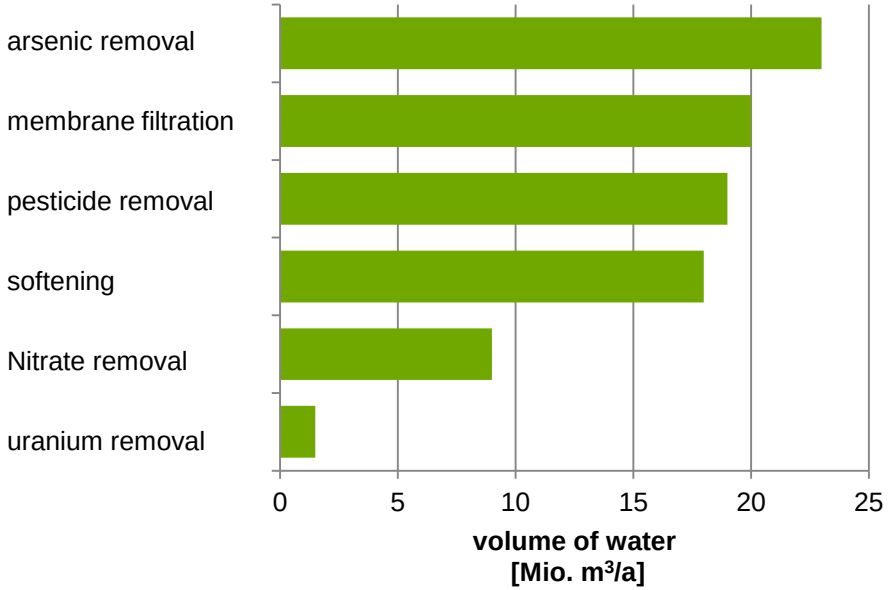
(Source: survey and evaluation of public water supply in Bavaria - water supply balance sheets)

Potable water purification - Status Quo Bavaria

Selected treatment processes with huge importance (multiple mention)



Selected treatment processes with small dissemination (multiple mention)



(Datenquelle: *Projekt „Erhebung und Bewertung der öffentlichen Wasserversorgung in Bayern“*)

- app. $^1/_3$ rd of Bavarian water get´s desinfected (1995: app. $^1/_4$)
- app. $^3/_5$ of Bavarian water is treated (1995: ca. $^2/_5$)

Causes: in particular, new rules for exemptions (TrinkwV 2001), higher safety awareness; basically no deterioration of GW Quality

Main Topics

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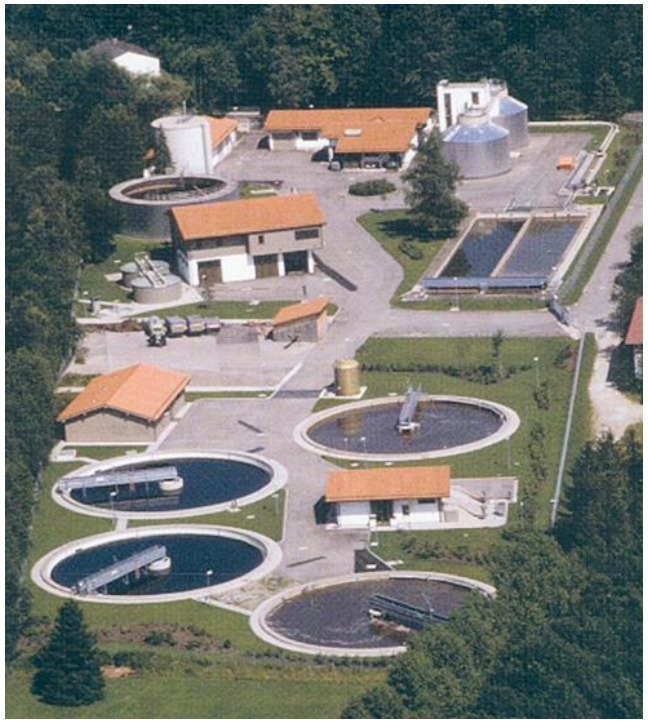
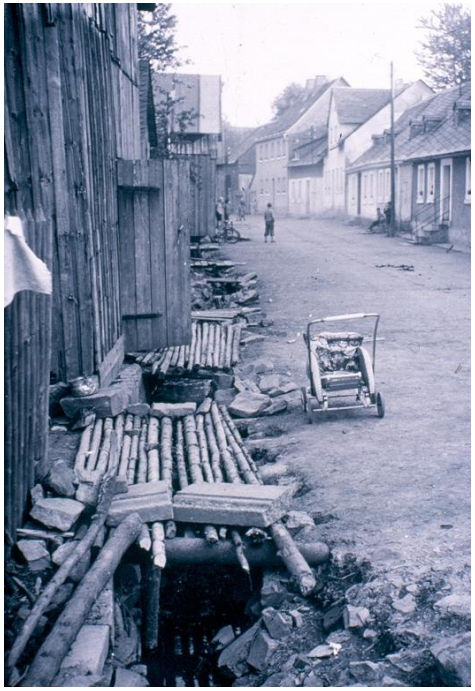
- Organisation of water management
- Water resources
- Water supply
- **Wastewater treatment**
- Challenges



Development of the waste water discharge



1945
20 mechanische Kläranlagen
20% der Bevölkerung an Kanal angeschlossen

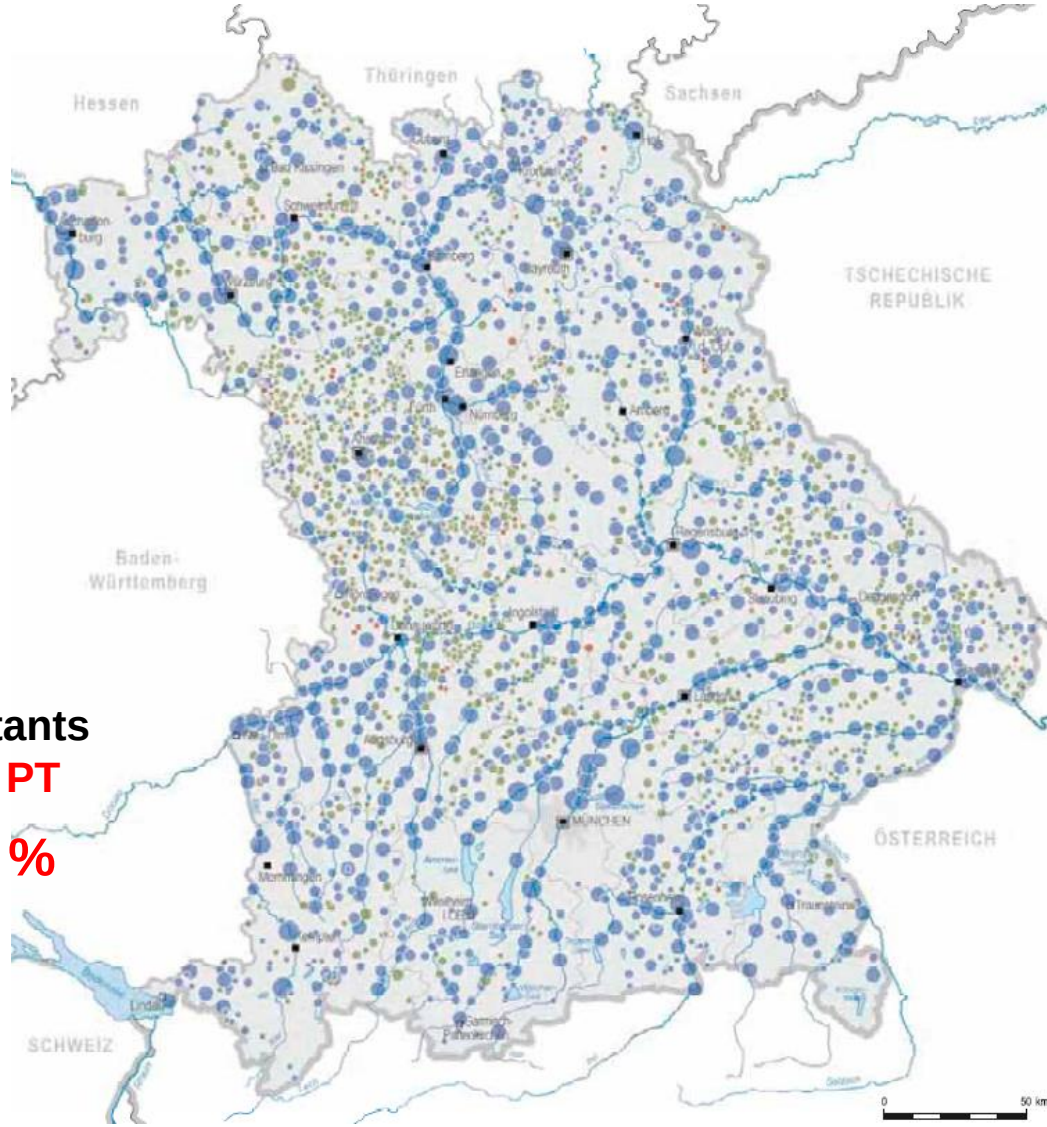
2020
2.439 Kläranlagen
97,2% Anschlussgrad an zentralen Anwasserbehandlungsanlagen
KKA nach dem Stand der Technik

Public wastewater treatment plants in Bavaria (2020)

Total Population Equivalent	Number
less than 1.000 PT	1.101
1.000 PT bis 5.000 PT	734
5.001 PT bis 10.000 PT	223
10.001 PT bis 100.000 PT	345
more than 100.000 PT	36
Total	**2.439**

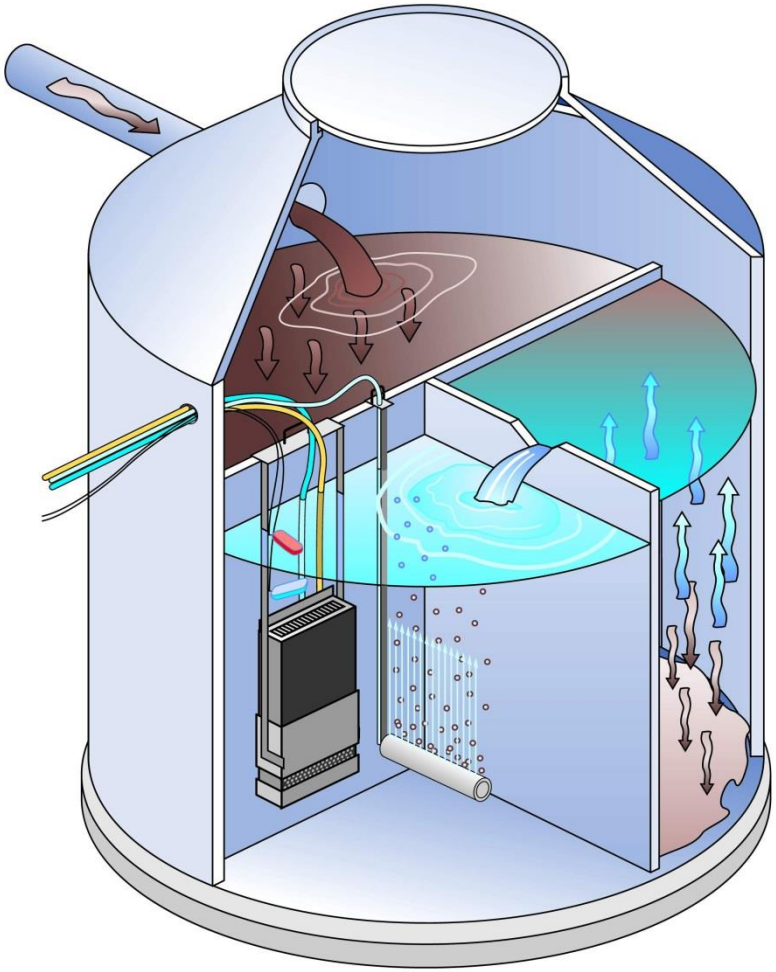
Design capacity (total number of inhabitants and population equivalent PT): **27 Mio. PT**

Connection rate to public systems: **97,2 %**



- natural wastewater treatment plant
- technical wastewater treatment plant

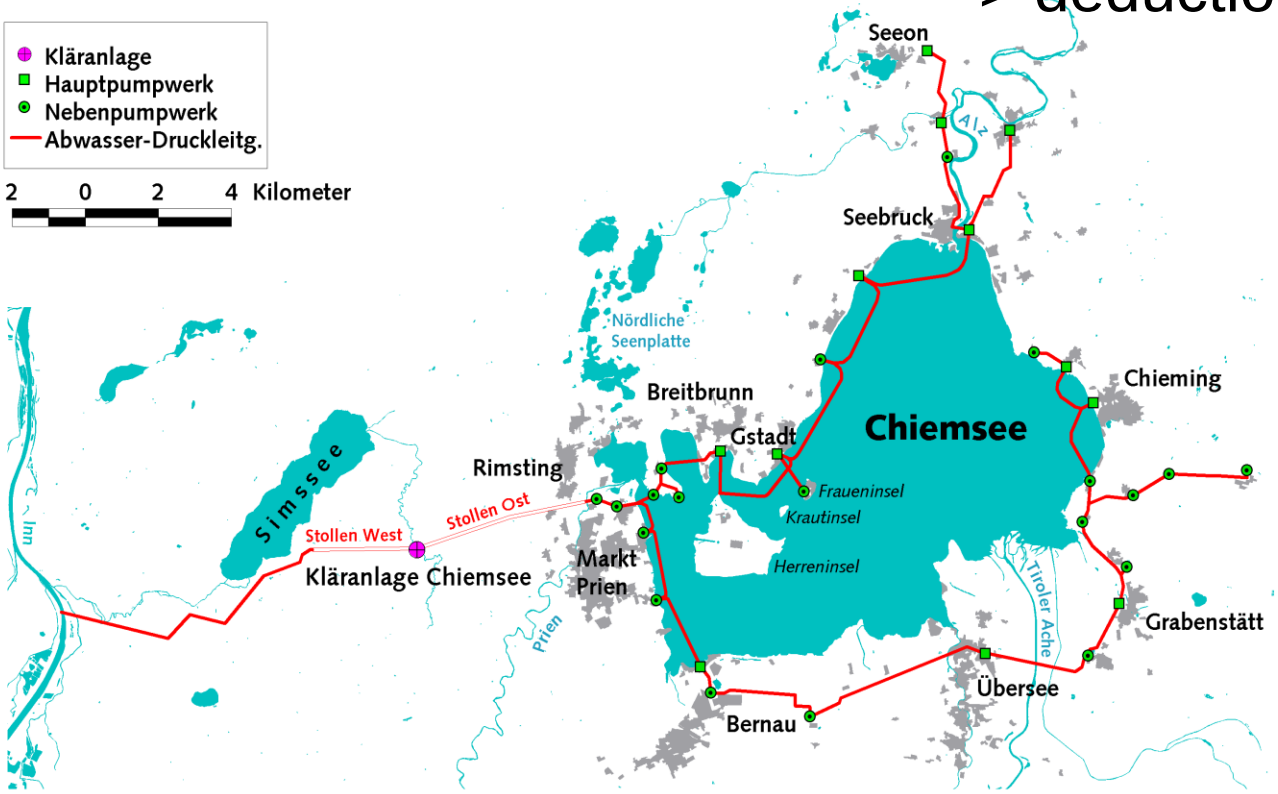
100.000 small waste water treatment plants long term



Basic Priziple of usement of biolog. secondary treatment capacity of waters

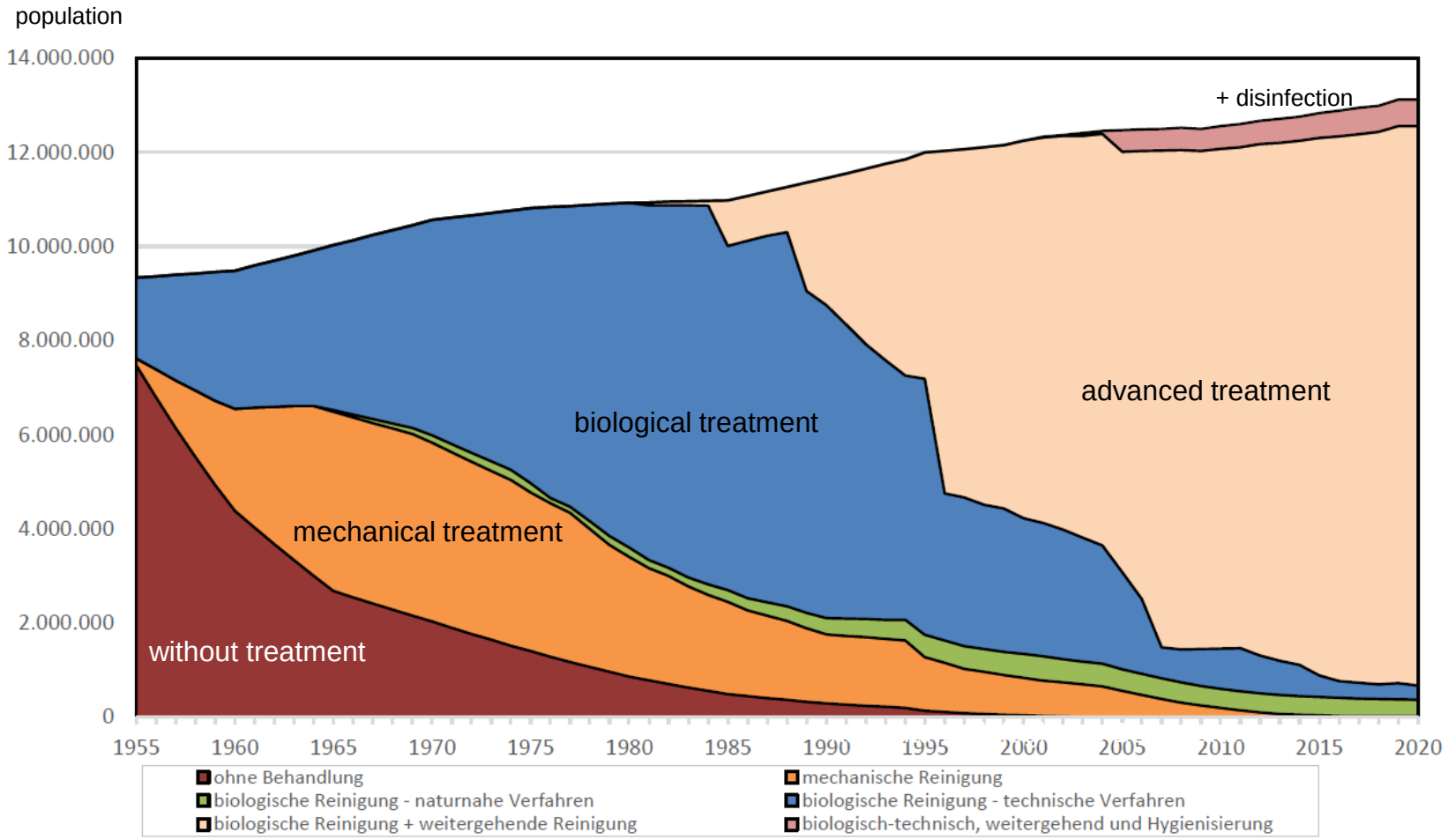
no discharge in dammed gestaute waters sections or lakes

-> deduction/ ringsewer



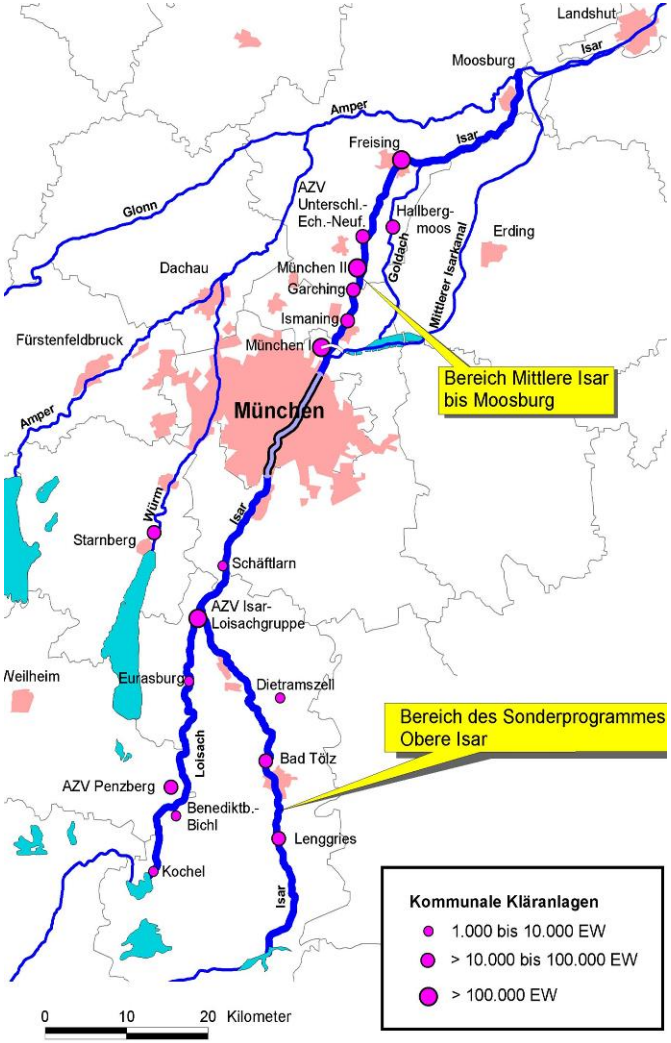
(LFU, 2006)

Development of the treatment level of municipal wwtp´s



Quelle: Lagebericht 2020 zur Umsetzung der EG Richtlinie 91/271 EWG "Kommunales Abwasser"

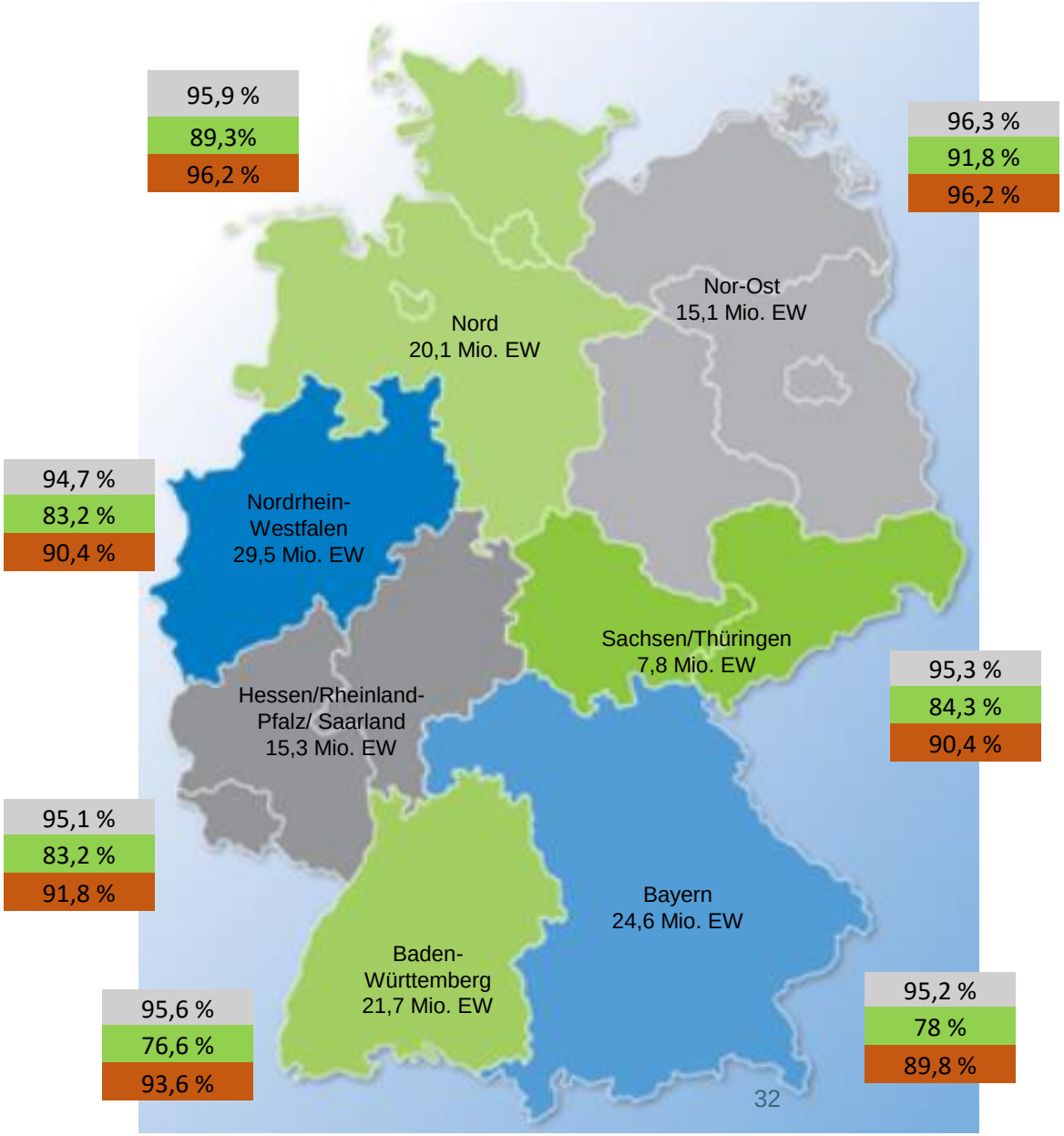
Wastewater disinfection at Isar river



swimming waters quality

WWTP Bad Tölz: UV-radiation

Carbon, Nitrogen and Phosphorus elemination



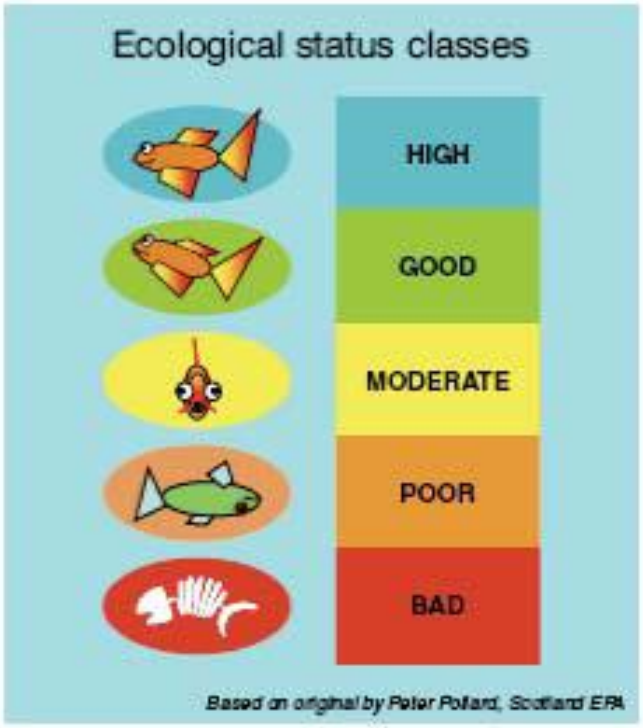
CSB	**95,4 %**
N_{ges}	**83,6 %**
P_{ges}	**93,0 %**

© dwa.de, 34. Performance comparison of municipal waste water treatment plants, DWA 2022

Main Topics

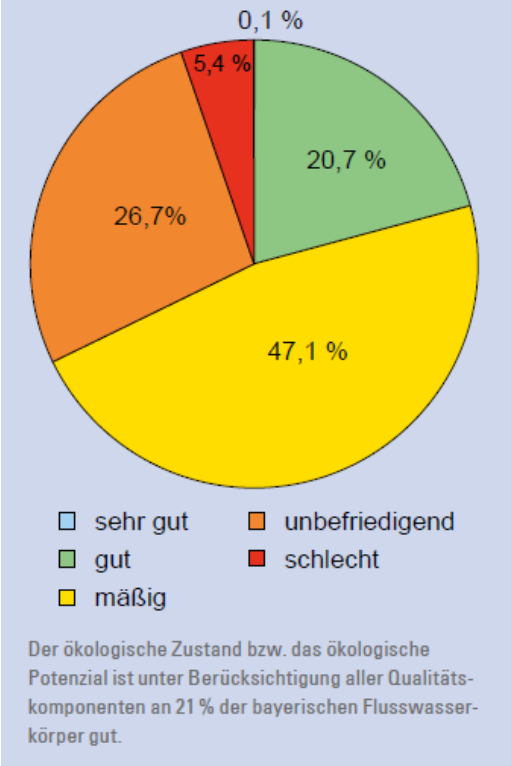
- Organization of water management
- Water resources
- Water supply
- Wastewater treatment
- **Challenges**

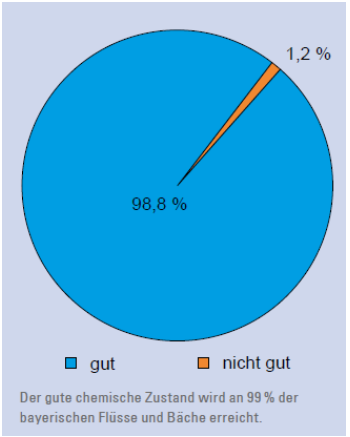
Classification of the Ecological Status



Five classes
with colour codes

Objective of the WFD

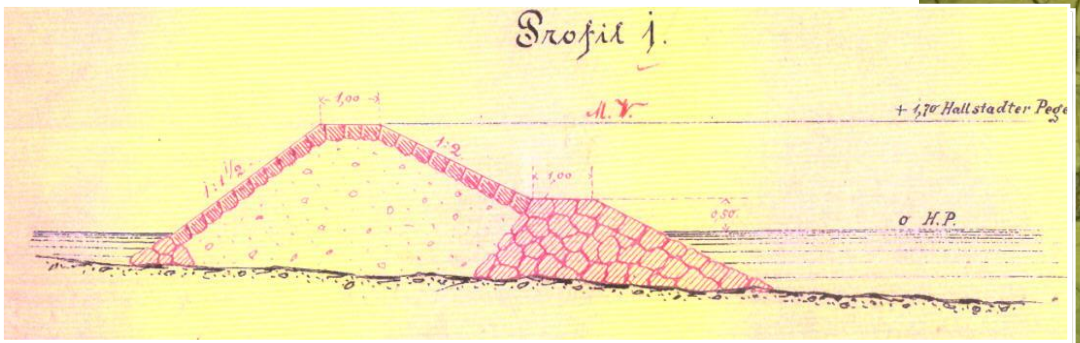




A look into the past

Historic Main - meandering river

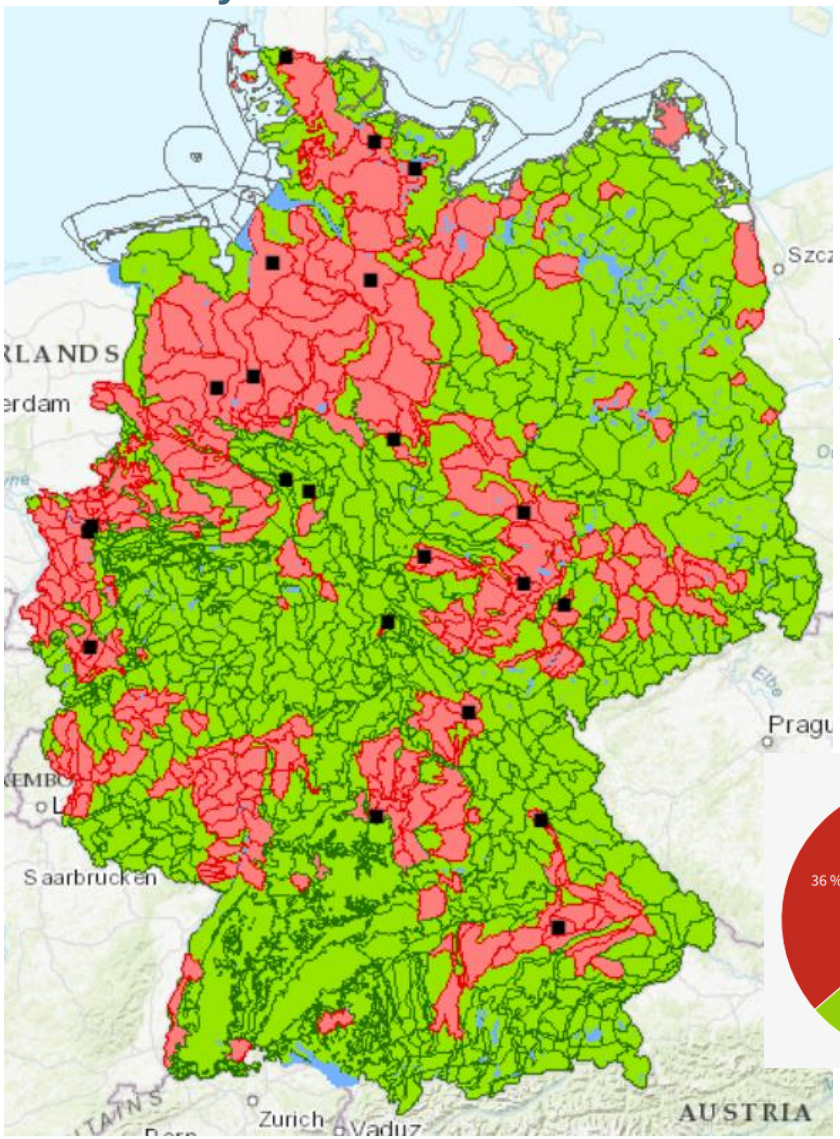
Technical design plan from 1885



bank reinforcement prevents lateral erosion

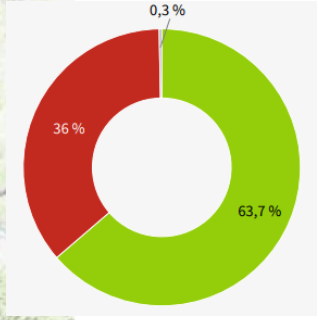
Achievment of WFD goals

Chemical status of groundwater bodies in Germany



Bad status mainly due to nitrates and pesticides

https://geoportal.bafg.de/wfdmaps2017



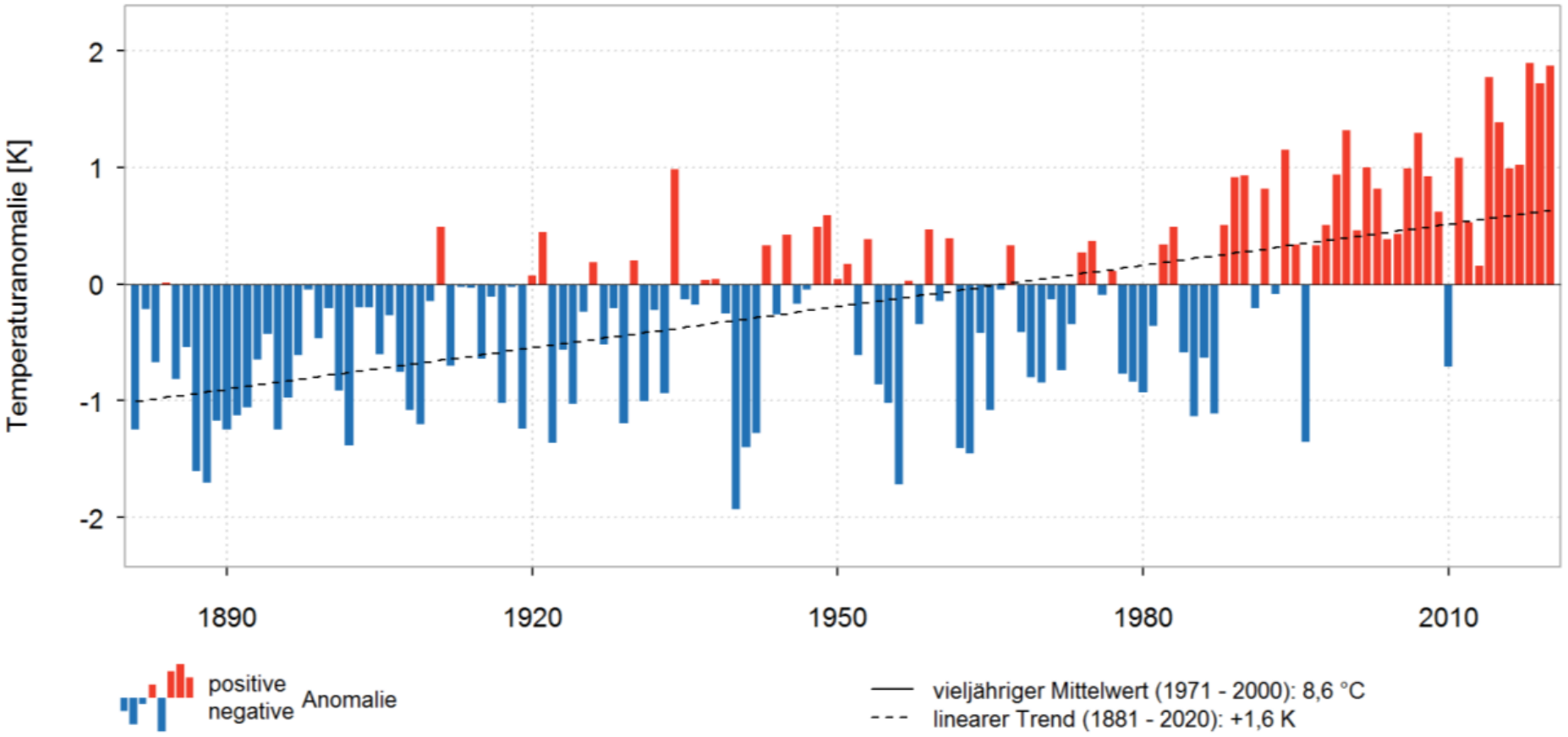
Challenge: Raw water impacts of diffuse pressures

Effected potable water supply

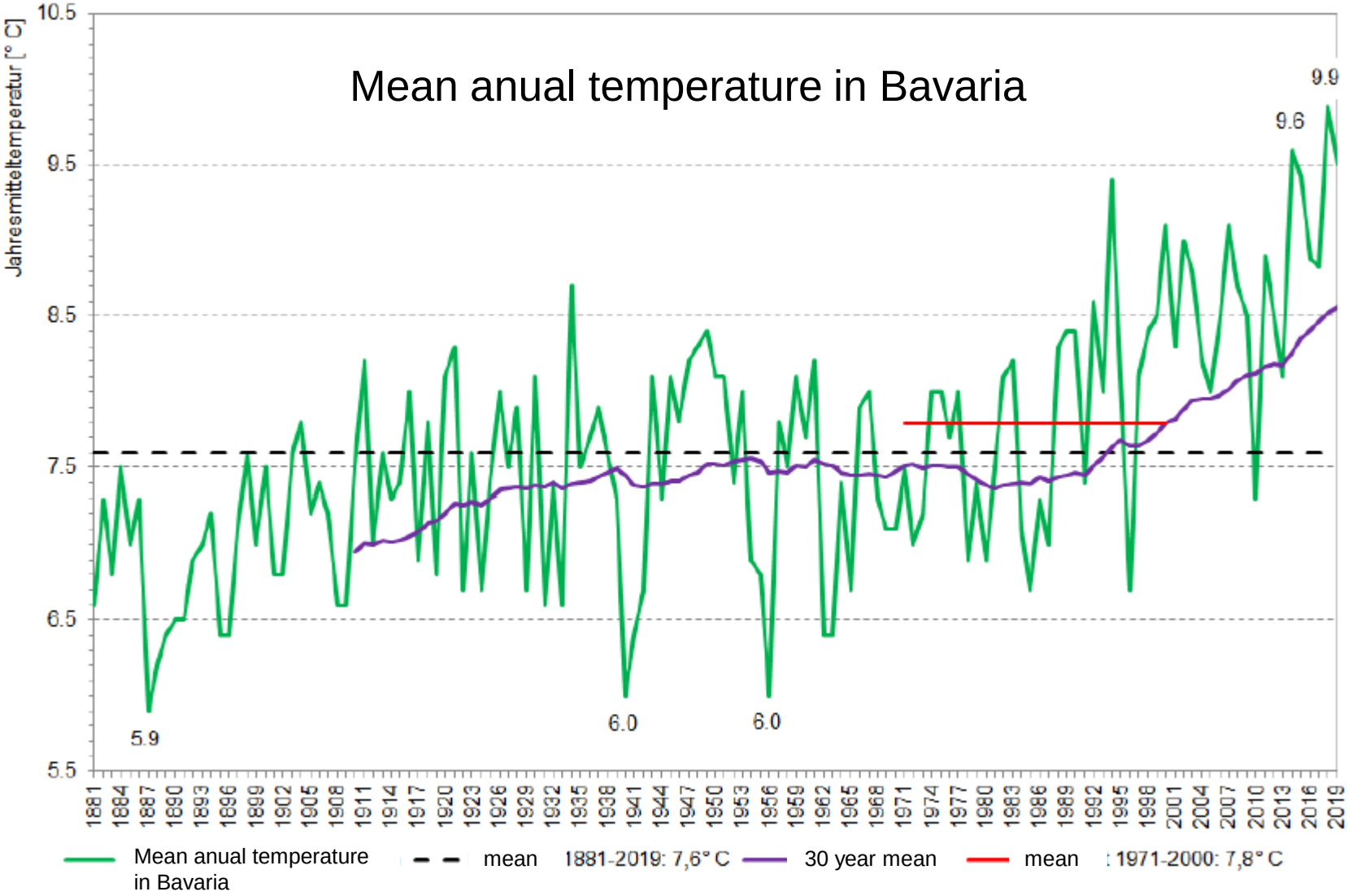
- Nitrates NO_3 > 50 mg/l
  in 3.7 % of water catchment
  (due to intensive farming)
- Pesticides over 0.1 µg/l
  in 1.8 % of water catchment
  (mainly due to Atrazine)

Challange climate change

Annual average temperatures in Germany in the period 1881 to 2020 as anomalies from the reference period 1971 to 2000

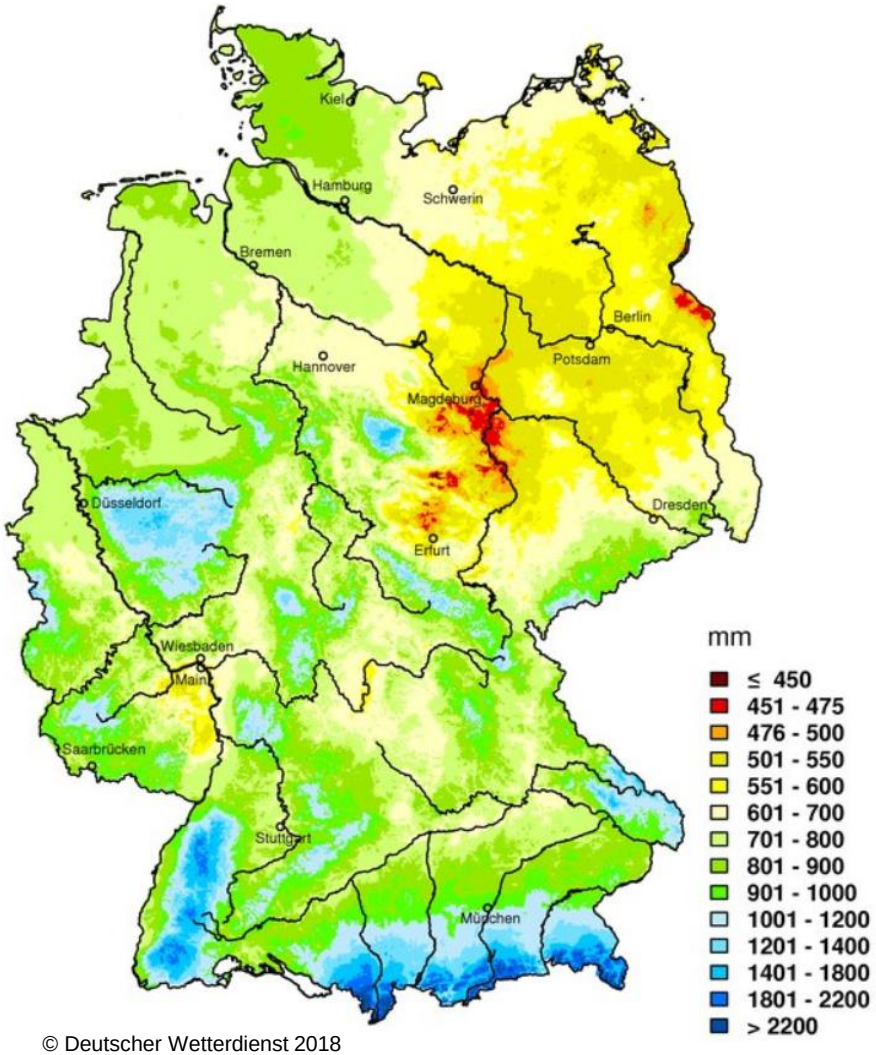


Challange climate change

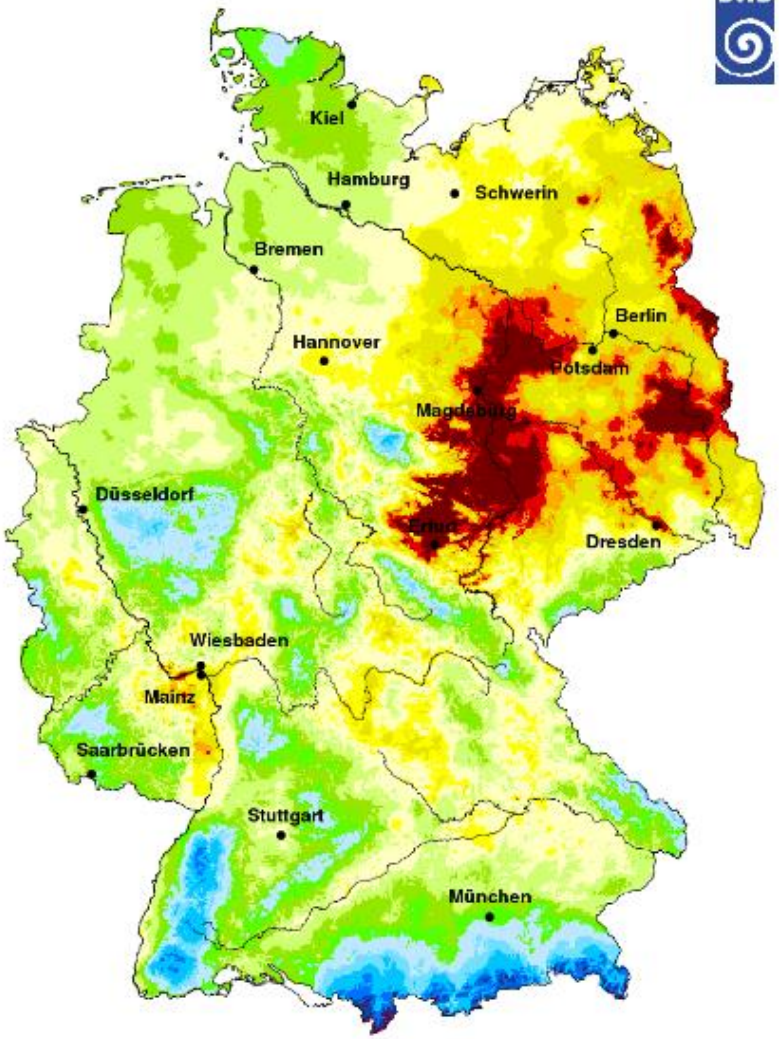


Challange climate change

Precepitation in Germany, long term mean 1961 - 1990



precipitation height 2019



Change in seasonal precipitation

Bayerisches Landesamt für Umwelt

Precipitation Trend 1951-2019

in %

-25 -15 -5 +5 +15 +25

Klimaregionsgrenze

+10 Trendwert

Signifikanzniveau

+19 nicht signifikant

+19 signifikant

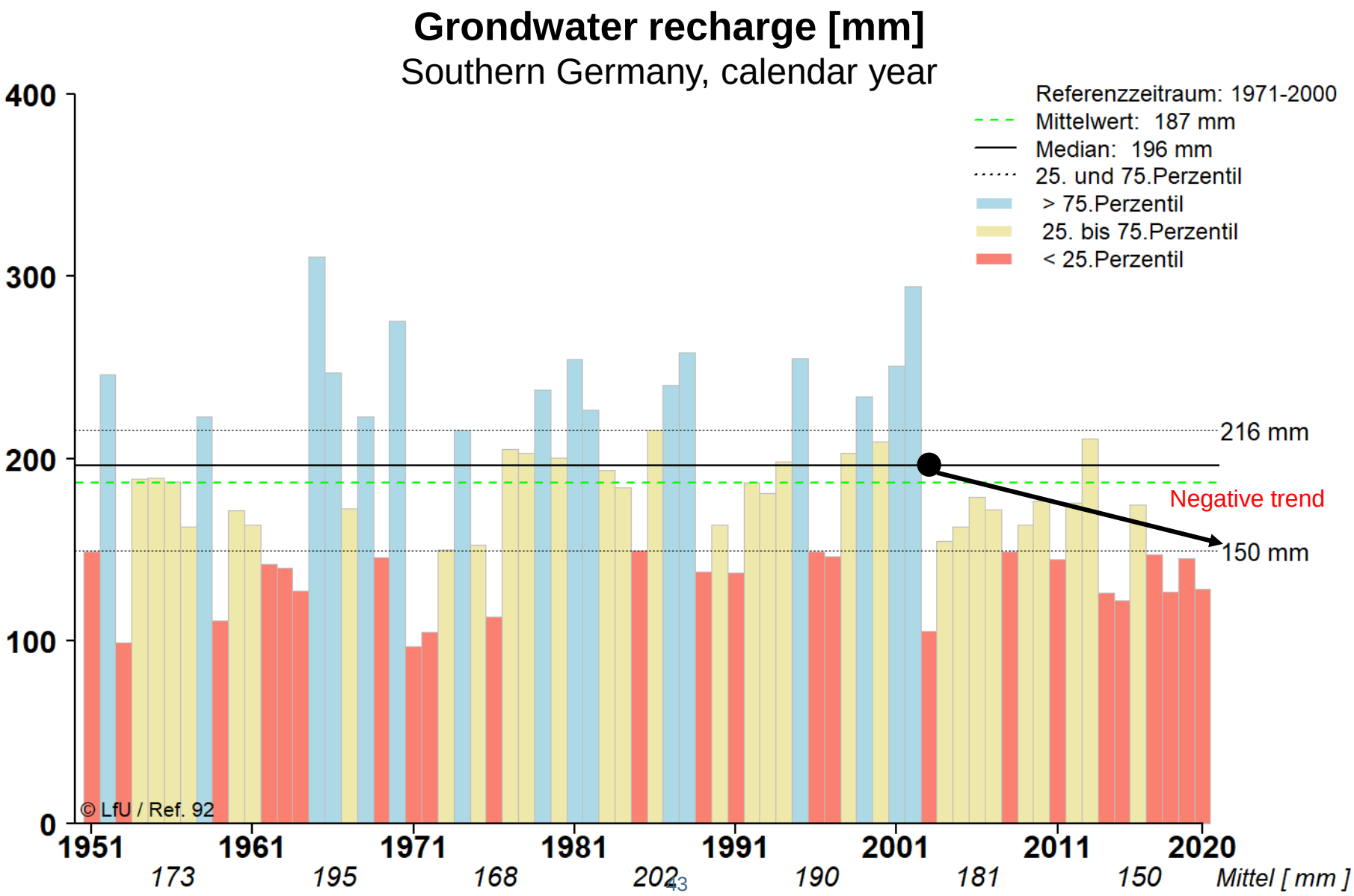
0 50 km

Fachdaten:
LfU, basierend auf Daten des Deutschen Wetterdienstes

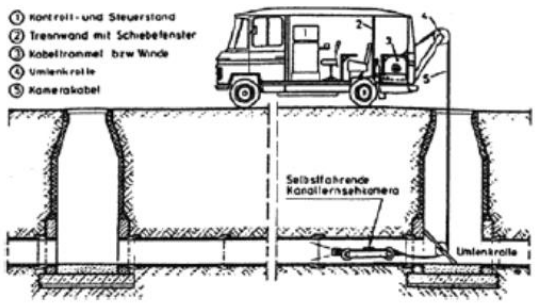
https://www.stmuv.bayern.de/themen/klimaschutz/klimareport/index.htm

Outcomes of climate change

Challange climate change



Challenge: maintenance and re-investment of public water supply and sewage network



Challange Micro-pollutants

Active substances from pharmaceutical hormonal products,
human- and verterinary drugs,
additives for animal feed,
cleaning agents,
industrial chemicals (dissolver, anti-corrosion agents, PFC)
agricultural pesticides,
combustion products (PAK, PCDD/PSDF)**.....**

Thank you very much for your attention!

Contact

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