Bavarian Environment Agency

Low flow management in Lower Franconia

2nd expert workshop: Drought risk management in the Alps

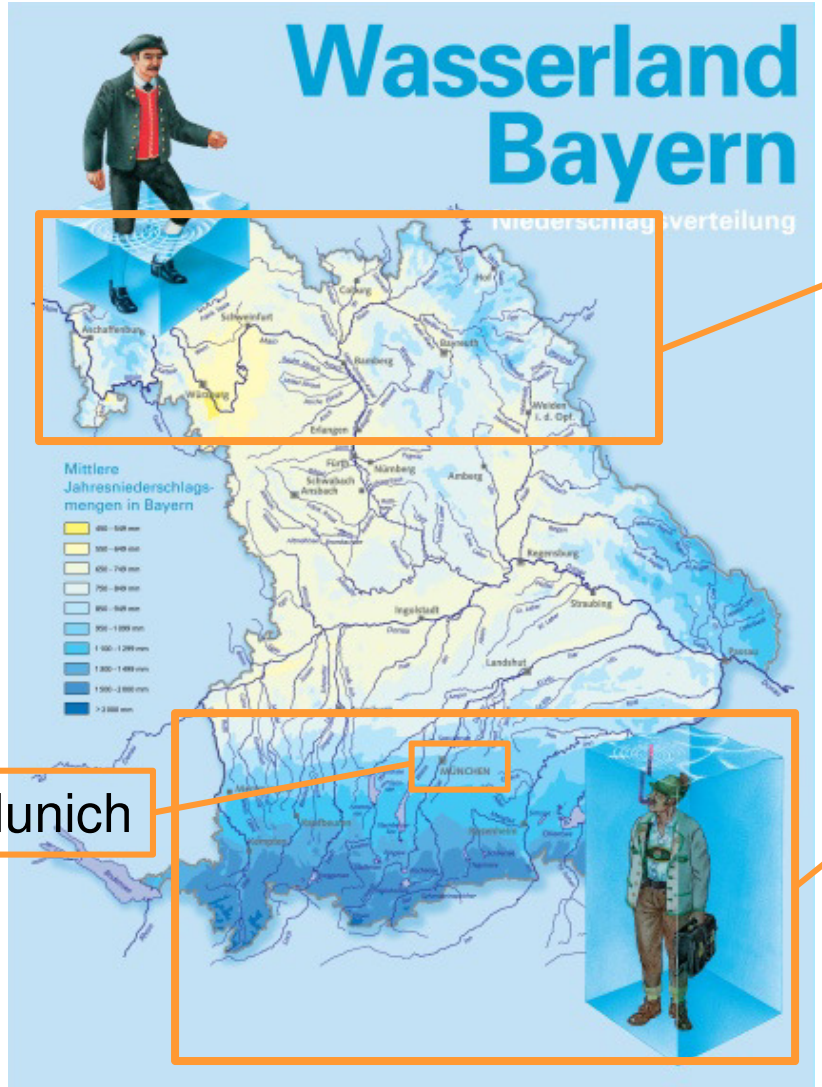
Water platform of the Alpine Convention

23. January, *Vienna, Austria*

outline

- Overview
- Situation in Lower Franconia
- Drought year 2015
- Overall aims & goals of the low flow management
- Planned process of a low flow management
- Summary of focus areas
- Conclusion

overview



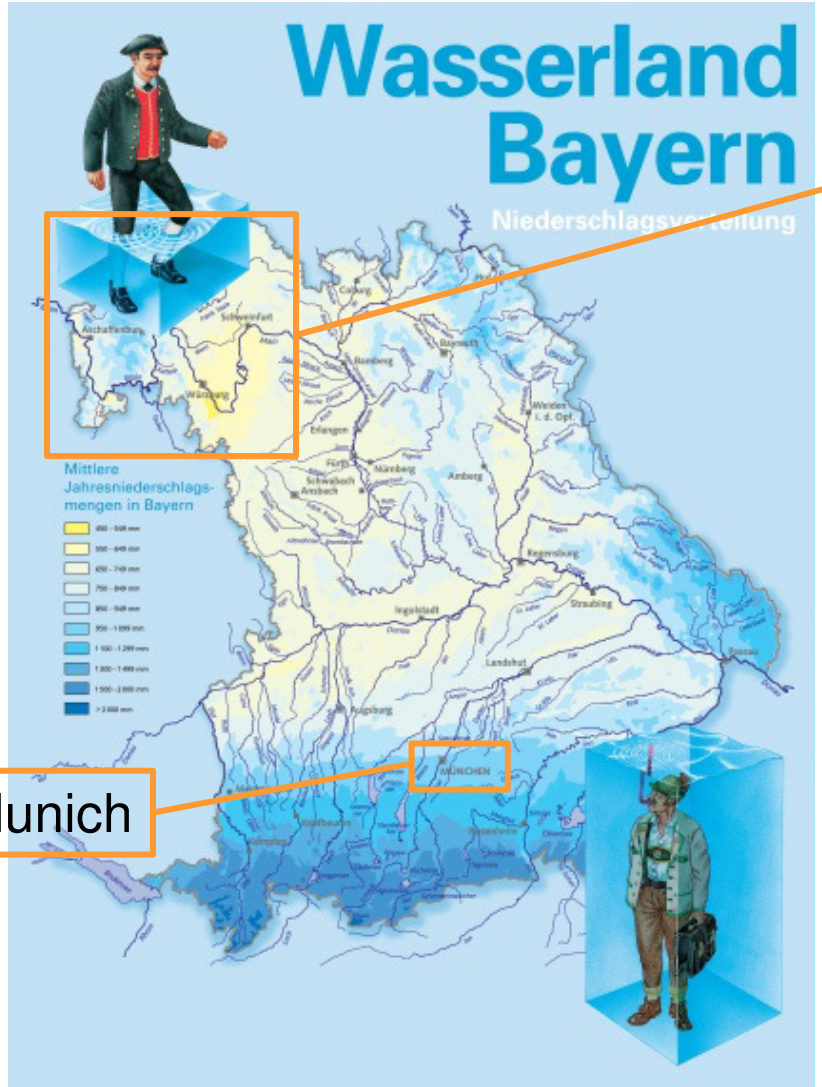
Some regions in Northern Bavaria: below 450mm precipitation per year

Average for Bavaria: 940mm precipitation per year

Alpine region: over 2000mm precipitation per year

Munich

overview



Lower Franconia:
lowest precipitation rate in Bavaria and lowest ground water formation rate

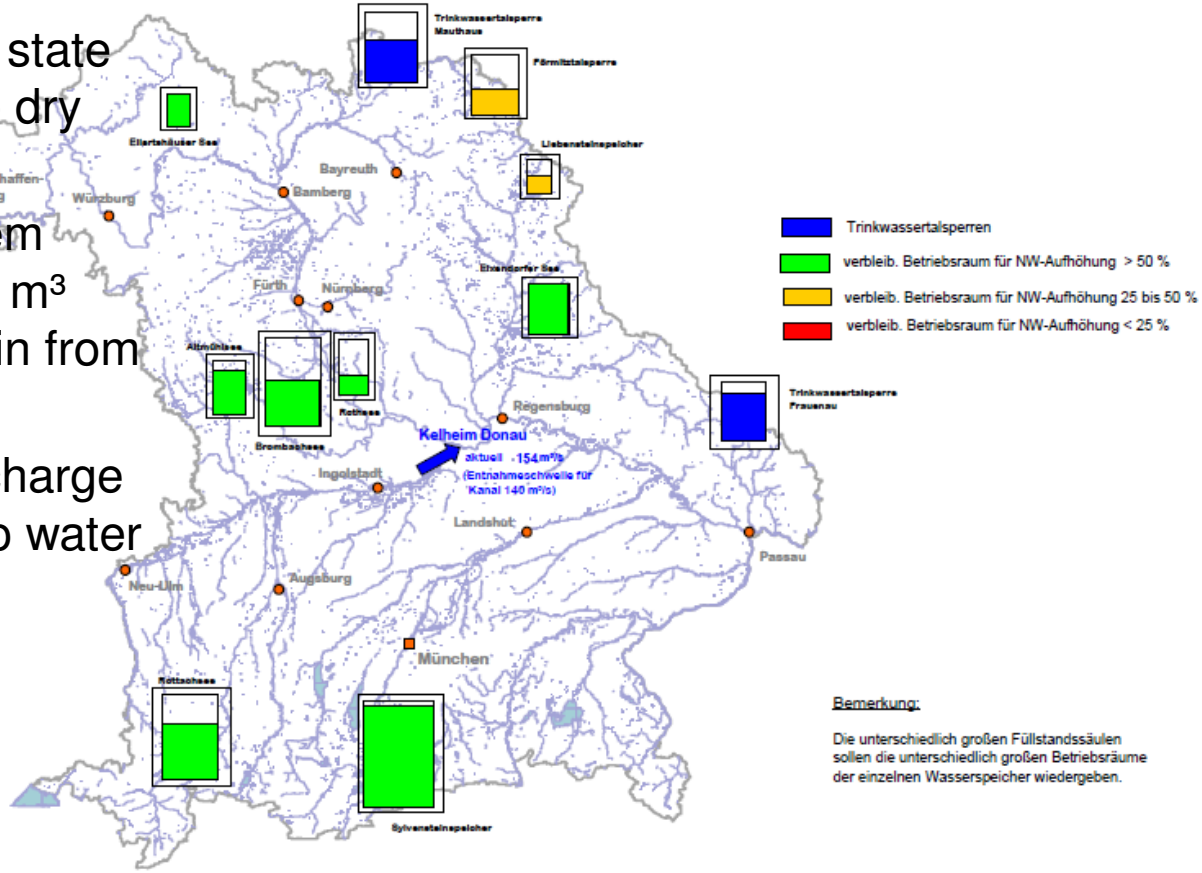
- Some parts of Lower Franconia below 450mm precipitation per year,
- In 2015 only around 350mm precipitation
- in 2015 only 25% of usual ground water formation

Situation in Lower Franconia

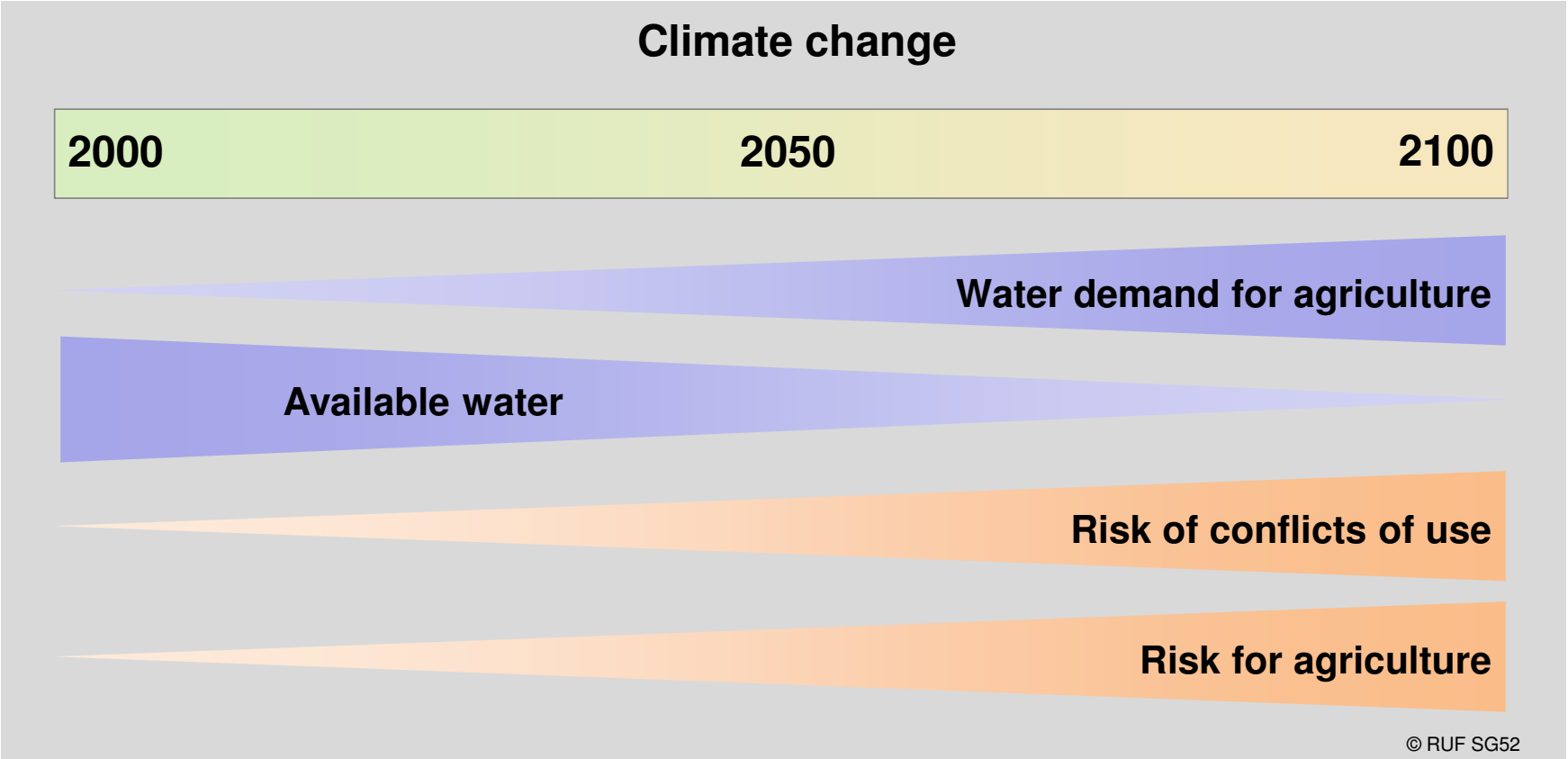
- Through heat and drought periods the overall water resources are getting scarce, at the same time the water demand is rising for drinking water supply but also for service water.
- Especially water demand for irrigation rises rapidly during dry and hot months.
- Due to the recent clustering of heat and drought the pressure on water resources to be used for agricultural practices is noticeable.
- Conflicts between competing uses are more likely. Especially the use of groundwater for drinking water supply and service water bears conflicts. Also due to the fact that in Bavaria ground water is a major source for drinking water supply. In Lower Franconia over 98%.

Drought year 2015

- The reservoirs of the free state functioned well during the dry year of 2015.
- The water transition system supplied around 200 mio. m³ water for Rednitz and Main from April – November 2015.
- In 2015: 1/3 of whole discharge in Lower Franconia due to water transition system.



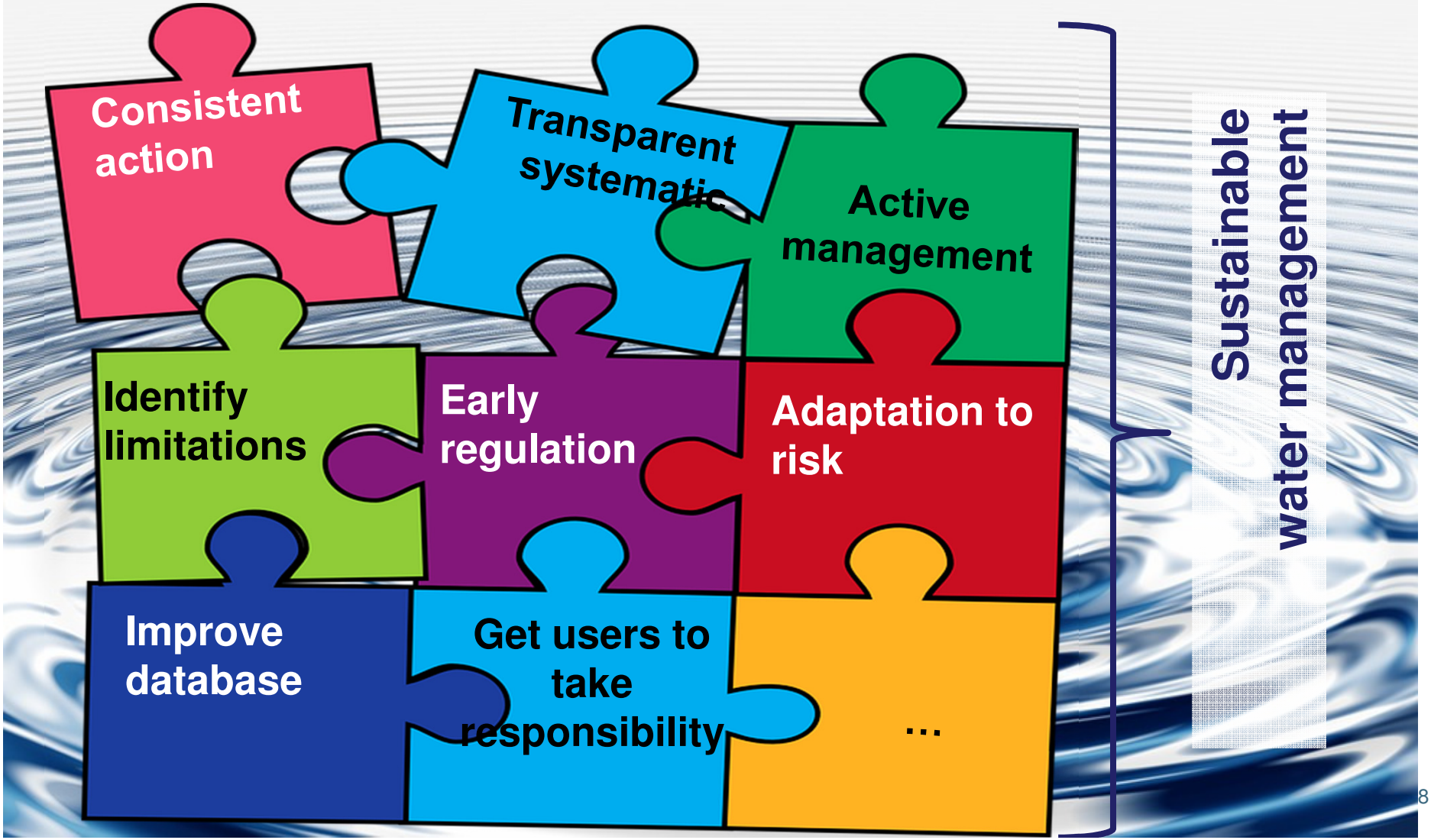
Climate change: rising risks for the environment and agriculture



Overall aims and goals of the low flow management

- Project contracted to the local administration of Lower Franconia by the Bavarian State Ministry of the Environment and Consumer Protection
- Project area: Lower Franconia
- Development of a guideline for a streamlined approach for (ground) water extraction

Overall aims and goals of the low flow management



Planned process of low flow management I

- Drilling notification ground water extraction
  - Important steering tool to avoid potential conflicts.
  - If agricultural use → working together with the agricultural agencies to evaluate irrigation worthiness. E.g. if ground water is used as a drinking water resource in the area and is already scarce, most agricultural uses are not irrigation worthy (e.g. crops for energy production such as maize).
  - The ground water extraction is not to be seen separate but is to be evaluated for the whole area to avoid concentration.
  - The drilling notification should result in an assessement if ground water extraction can be approved.

Planned process of low flow r

- Risk analysis for planned water e
  - For the whole area not for single
  - Goal of the risk analysis → to ide
- Based on wider area around plan

wetlands

hydrogeology

objects of protection

intensity of use

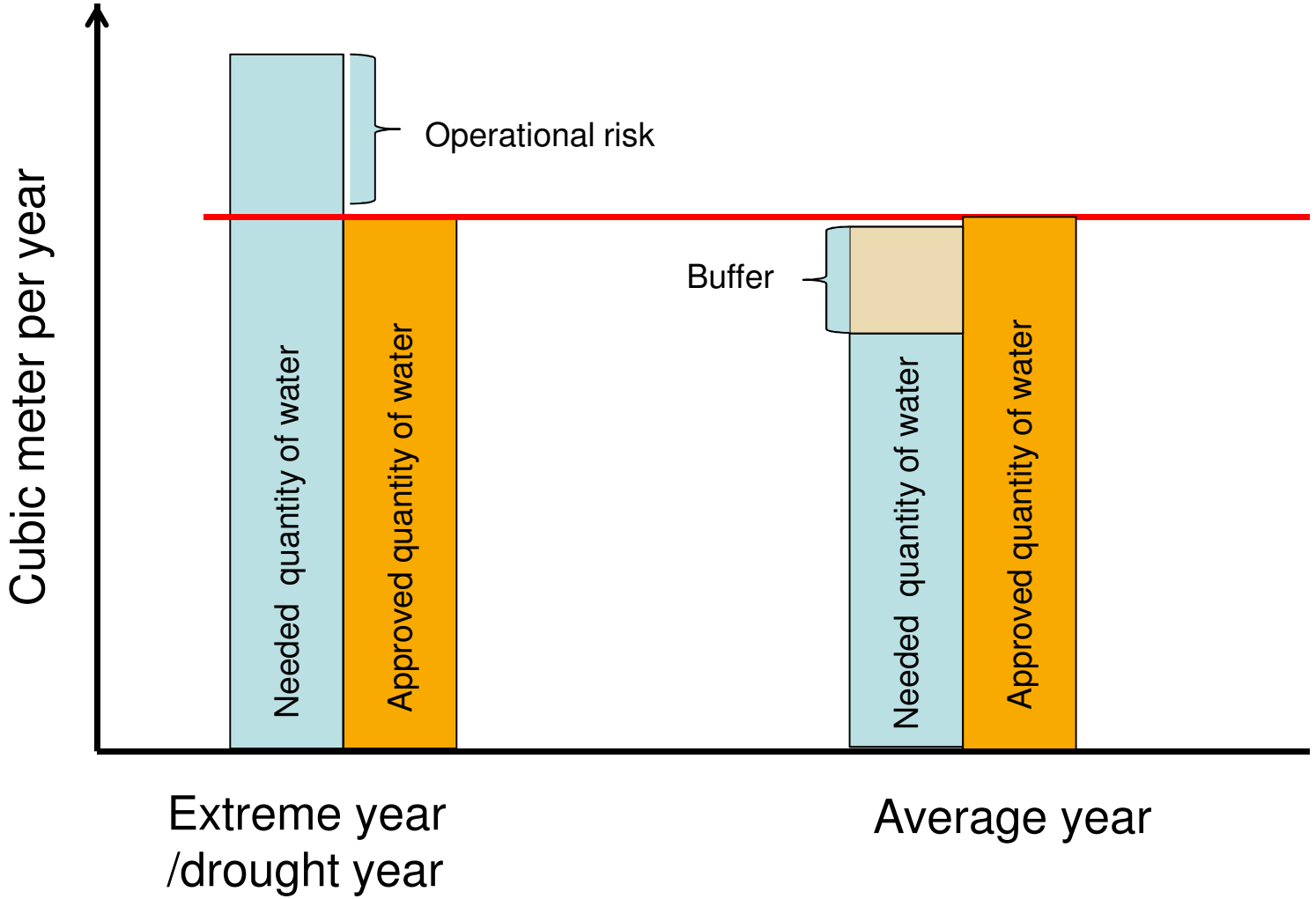
Indikatorgruppe	Indikator	Parameter	Größe o. Ausprägung des Parameters / Wirkung auf das Risiko*		
			gering selten fehlend	**mittel** mittel	**hoch** häufig vorhan-den
Feuchtflächen	GW-Flurabstand oberer GW-Leiter	Einfluss auf durchwurzelte Zone	⇩		⇧
	Hydromorphe Böden	Flächenanteil gesamt, Flächenanteil Moorböden	⇩	⇨	⇧
	Feuchtbiotope	Flächenanteil gesamt, Flächenanteil besonders sensibler Typen (z.B. Nasswiesen, Moore)	⇩	⇨	⇧
Hydrogeologie	Hydrogeologie (allgemein)	Sensitivität der hydrogeol. Einheit (z.B. Poren-, Kluft, Karst-GW-Leiter), Druckentlastung GW-Leiter	⇩	⇨	⇧
	Zuströme in das Bilanzgebiete	Zustrom aus Fließgewässern (z.B. in Poren-GWL) oder angrenzenden Gebieten (z.B. angrenzende BG)	⇨		⇩
	Abströme aus dem Bilanzgebiet	Abstrom in angrenzende Gebiete oder tiefere Grundwasserleiter	⇨		⇧
	Entwicklung der GW-Stände	fallende Tendenz, zunehmende Amplitude	⇨		⇧
	Instabilität der GW-Stände	Schwankungsamplitude des GW	⇩	⇨	⇧
	Instabilität der GW-Neubildung	Quotient GW-Neu 1971-73/mittlere	⇧	⇨	⇩
	Instabilität der Quellschüttungen	Quotient min./mittl. Quellschüttung	⇩	⇨	⇧
	Instabilität der Abflüsse	Quotient min./mittl. Abfluss	⇩	⇨	⇧
	Trockenfallen von Kleingewässern (Quellbäche, kleine Bäche, Tümpel)	Häufigkeit	⇩	⇨	⇧
	Gefahren für die GW-Qualität	Altlasten, Versalzung	⇩	⇨	⇧
Rechtliche Schutzgüter	Wasserrahmenrichtlinie	Gefährdung des „guten Zustandes“, Grundwasser, Fließgewässer gw-abhängige Landökosysteme	⇩	⇨	⇧
	Schutzgebiete	Vorkommen und Wertigkeit relevanter Schutzgebieten (WSG, HQS, FFH, VSG, NSG)	⇩	⇨	⇧
	Naturschutz (GW-abhängige Lebensräume und Arten)	FFH-Lebensraumtypen gesetzlich geschütze Biotope gesetzlich geschützte Arten	⇩	⇨	⇧
Nutzungsintensität	öffentl.Trinkwasserversorgung	Risiko der Beeinflusssung	⇩	⇨	⇧
	weitere konkurrierende Nutzungen (andere Brauchwasserentnahmen, Freizeitgewässer u.a.)	Existenz bzw. rechtliche Stellung im Vergleich zur Bewässerung	⇩	⇨	⇧
	Anteil landw. Bewässerung am Gesamtbedarf	Anteil Bewässerungsbedarf am Gesamtbedarf	⇩	⇨	⇧
	Förderdichte	Dichte und Fördermengen benachbarter Brunnen	⇩	⇨	⇧
	bekannte Umweltschäden, Konflikte	Existenz, Größenordnung	⇩	⇨	⇧

Planned process of low flow management III

- Assessment water extractions
  - After the risk analysis for the wider area the impact of the single water extraction is examined and an additional risk category added.
  - Higher risk class means higher requirements for the request for water extraction.
  - Ground water balance is also taken into account.
  - It is recommended to release only 30% of the ground water renewal for exploitation.
  - Indicators are used to have an equal share of water users, not „first come first serve“, partly related to surface area.

Planned process of low flow management IV

- Taking into account irrigation requirements
  - During drought years: drinking water supply rises on average by 5-7%.
  - Water consumption for agricultural use almost doubles during drought years.
  - This should be taken into account during approval procedures for agricultural water extractions.
  - Agricultural operations should be well under the maximum approved quantity of water during average years in order to stay inside their maximum approved quantity of water during drought years. It is their own decision if they keep this buffer for drought years or if they accept damage to crops during drought years due to not being able to irrigate.



Planned process of low flow management V

- Content of water extraction permits
  - Yearly quantity of water
  - Depending on risk analysis: requirements for water extraction
  - Duration of permit (e.g. if high uncertainty concerning the reaction of ground water due to climate change → shorter duration of permit)
  - Obligation to establish internal water- and riskmangement
  - Obligation to register extraction volume
  - Obligation to establish monitoring which includes position of water extractions and additional requirements during drought years (weekly/monthly measurement of water levels)

Low flow management: summary focus areas

Sustainable management of water resources for the environment and agriculture	**Climate change** early inclusion to steer uses	**irrigation** allow and secure
Steer position of wells early for safety of sensitive areas	**Consideration of larger area** instead of single water extractions	**Water balance** of hydrogeological areas as indicator
Speed-up of permits through **better application documents**	Coupling of approved quantity of water with **ground water formation**	**Reducing conflicts** through communication and management plans
Irrigation associations for better ground water managament	Systematic **long term monitoring**, better database	**Central database** for analysis and administrative tasks

Current situation

- **Water scarcity rather new topic in „water land“ Bavaria**
- **Droughts in 2015 significant**: reduction in yields (especially Northern Bavaria)
- High irrigation needs in agriculture and presumably rising in the longterm due to increase in yield, quality demands and demand for regional products (especially vegetables) as well as climate change
- Local excessive use of water ressources (e.g. Osterhofen)
- **2017: precipitation higher, but tendency that ground water levels partially strongly decreasing**
- Past winters especially in Northern Bavaria to dry: ground water formation very low

Conclusion

- Drought/water scarcity especially significant in Northern Bavaria
- Alpine part of Bavaria no problems so far
- Will gain more importance due to climate change
- It is an ongoing task: changes in the environment and water balance have to be taken into account as well as changes in irrigation practice.
- Important to analyse experiences of extreme years to think about consequences for the future
- All together needed for a sustainable water management

Foto: Schoberer, R. d. Opf.

Drip irrigation
Foto: Netafim.de

Thank you very much for your attention

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