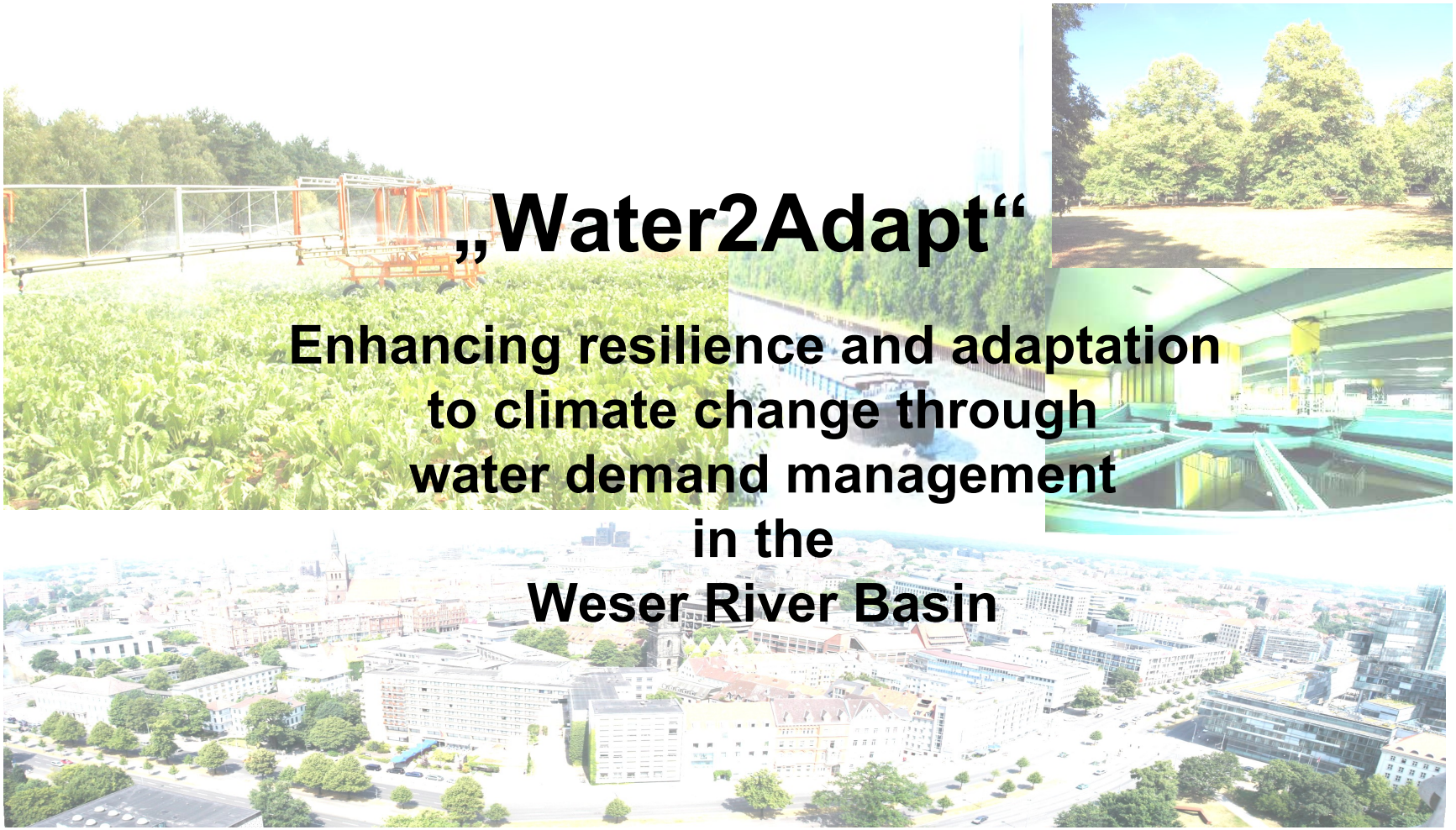

„Water2Adapt“

Enhancing resilience and adaptation to climate change through water demand management in the Weser River Basin

seeconsult: C. Grambow
CALS: D. Spindelndreher

Outline

1. Climate change effects in Lower Saxony

1.1 Impacts of climate change: rural areas

1.2 Impacts of climate change: urban areas

2. Measures to adapt to water scarcity: rural

3. Key recommendations for rural areas

4. Measures to adapt to water scarcity for urban region of Hanover

5. Key recommendations for urban areas

1. Climate change effects in Lower Saxony

- Increase in temperature and temperature extremes, with an expected increase of 1-2°C by 2050
- Increase in extreme events: heavy rainfalls, hail and droughts
- Experts anticipate a moderate increase in annual precipitation
- With a seasonal shift of rainfall:
  - decrease in precipitation in summer months
  - an increase in rainfall in the winter season

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1.1 Impacts of climate change: rural areas

- Increase in temperature with water reduction in the vegetation period
  - → Negative climatic water balance *(Precipitation–Evaporation)*
  - → Decrease in groundwater recharge capacity
  - → Decrease in availability of water for plants
- Heavy rainfall, hail and storms

Impacts on Agriculture

⇒ Reduction in volume and quality of yields

⇒ Increasing demand for irrigation water

1.2 Impacts of climate change: urban areas

- Groundwater availability in Hanover region is not significantly affected

- Surface water levels, water quality, air quality and temperature will be influenced by climate change

  - excessive and prolonged increase in air temperatures, water shortages and reduced water quality affect urban life in the summer season
  - heat island effect and tropical-like night temperatures and humidity, reducing quality of life
  - Reduced opportunities for recreation (swimming, angling)

2. Measures to adapt to water scarcity: rural

Local, Farm level and nature of improvement	Regional Rainwater retention	Institutional
Improving agriculture techniques	**Improving the water resources**	**Improvements of institution organizations**
Mulching	Seepage reservoirs	Organized in irrigation Assoc.
Limited tillage	Weirs in ditches to stop water	Long-term abstraction allowances for irrigation water of 10 to 15 years
Early seed	Redirected drainage systems	
Winter crops	Using "cleaned sewage" for irrigation	Sliding mean of 7 years in the volume of irrigation water provides flexibility for regulating water use over this period
Plant breeding	Forest conversion from coniferous to deciduous forest	
Efficient irrigation systems	-	A new association, which adresses the needs of a region and its natural resources could concentrate diverse interests

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3. Key recommendations for rural areas

Enhancement of social resilient

- Extension of agrarian training and education
- Minimize the lack of understanding in the public for gross valued added of the agriculture and the use of irrigation

Farm-level and institutional level measures

- Improvement and implementation of water retention measures
- Establishment of associations, regarding the need of a region and its natural resources

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3. Key recommendations for rural areas

Spatial planning and others

- Climate change impacts, should be integrated in “Landscape framework plans”
- Using a *Geographical-Informatic-System (GIS)* for monitoring irrigation allowances and irrigated farmland
- Financial incentives for adaptation to climate change

3. Key recommendations for rural areas

• Climate change impacts should be integrated in “Landscape framework plans”

• Incorporating water scarcity in water management plan through a water scarcity management plan.

• Using a Geographical Information System (GIS) for monitoring irrigation allowances and irrigated farmland.

•Financial incentives for adaptation to climate change.

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4. Measures to adapt to water scarcity for urban region of Hanover

Tree planting on streets and public space

- Green roofs, facades

- Climate adaptive vegetation:

drought-resistant plants
e.g. recommendation of
Klima-Arten-Matrix
(ROLOFF, BONN and GILLNER 2008)

4. Measures to adapt to water scarcity for urban region of Hanover

Renaturalisation of rivers and streams

Retention of stormwater

- accept „water in the city“
- multiple use of urban areas e.g. green areas combination of water scarcity and flood protection measures

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4. Measures to adapt to water scarcity for urban region of Hanover

Economic measures

- Incentive for residents who create urban green areas especially green roofs and facades
- Increase permeable surfaces on private property.

5. Key recommendations for urban areas

a) Spatial Planning

Federal Spatial Planning Act (ROG, 2008): climate protection must be taken into account by implementing measures to **mitigate** the effects of climate change, as well as those that measures that are needed to **adapt** to climate change (§ 2 Abs. 6 ROG).

- Development & protection of climatic compensation areas for producing fresh, cool air;
- Increasing urban green space and vegetation (roofs, facades, more trees);
- Transboundary cooperation/ agreements among municipalities;
- Increasing rainwater retention areas and greywater collection.

5. Key recommendations for urban areas

b) Development of water scarcity/drought management plans

c) Improving the documentation and monitoring of water scarcity situations

d) Public education and awareness-raising campaigns for encouraging efficient use of water and reducing virtual water use

e) Industrial sector: Improve techniques for more efficient use of water for cooling, including the reuse of cooling water, use of rainwater and cleaning technologies that save water, and implementation of "closed cycles"

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GEFÖRDERT VOM Bundesministerium für Bildung und Forschung

iwrm-net Regional and national research programmes network on Integrated Water Resource Management

W2A Water2Adapt Resilience enhancement and water demand management for climate change adaptation

see consult

Landwirtschaftskammer Niedersachsen

Questions?

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