Operating the Northern Eifel Reservoir-System Using SPI for Dry Seasons

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Agenda

- Who we are
- The Rur catchment
- The Northern Eifel Reservoir-System
- Operation plan
- Representative model-input-data
- Modification of management policies

WVER: Waterboard Eifel-Rur
Corporate body under public law (since 1993)

Duties by law (Eifel-Rur Verbandsgesetz NRW):

- Waste water treatment
- Controll of water discharge in the catchment area
- River maintenance and restoration
- Supply of raw water for drinking-water production
- Supply of water for industrial use
- Hydrology (for own purposes)

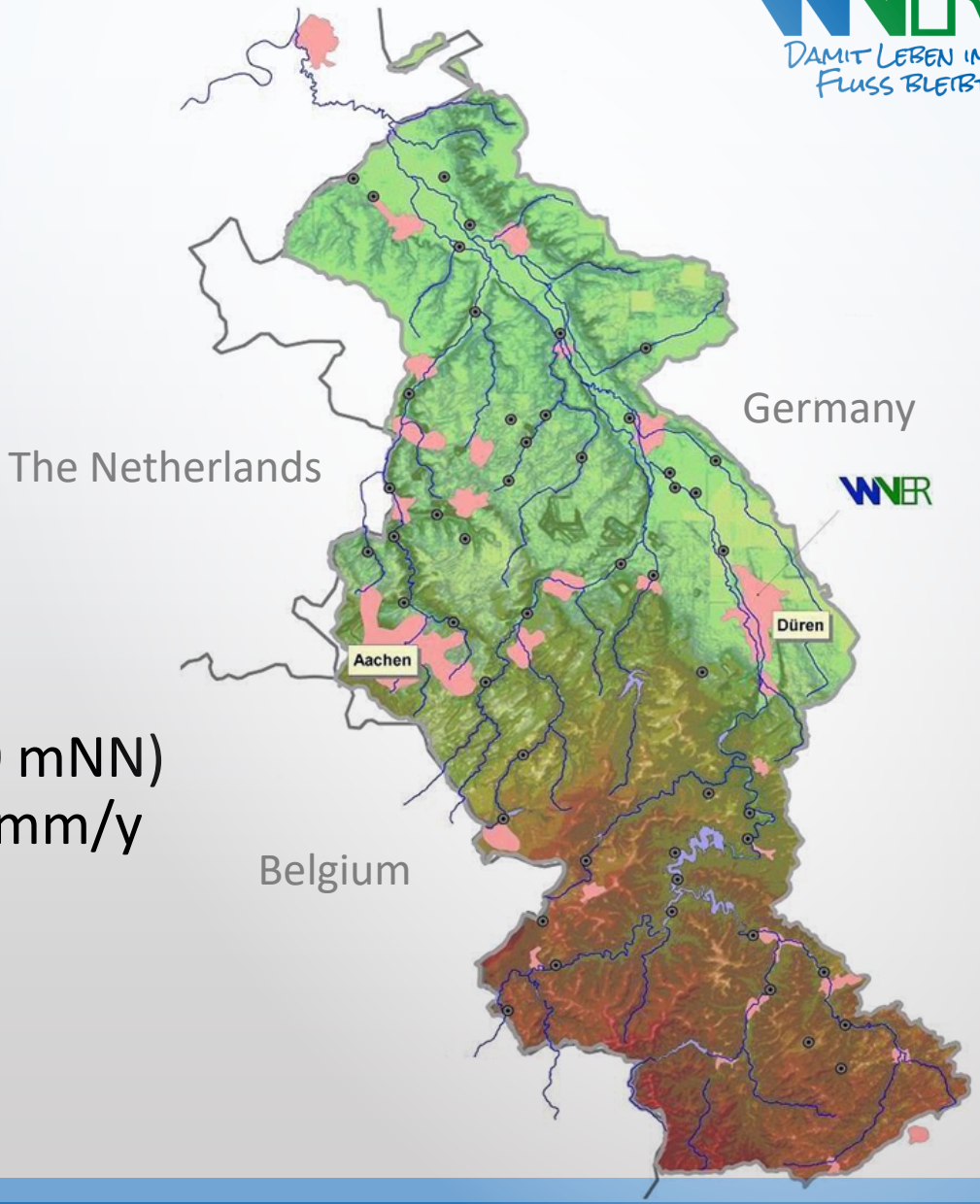
Legal members of the WVER:

- 43 cities and municipalities in the catchment area of the Rur
- 5 counties (Euskirchen, Aachen, Düren, Heinsberg, Viersen)
- 4 companies for drinking water supply
  - Water Board Olef Valley
  - Water Board Perlenbach
  - Drinking Water Production and Treatment Association Nordeifel mbH
  - Municipal Enterprises Düren GmbH
- 35 industrial and commercial companies

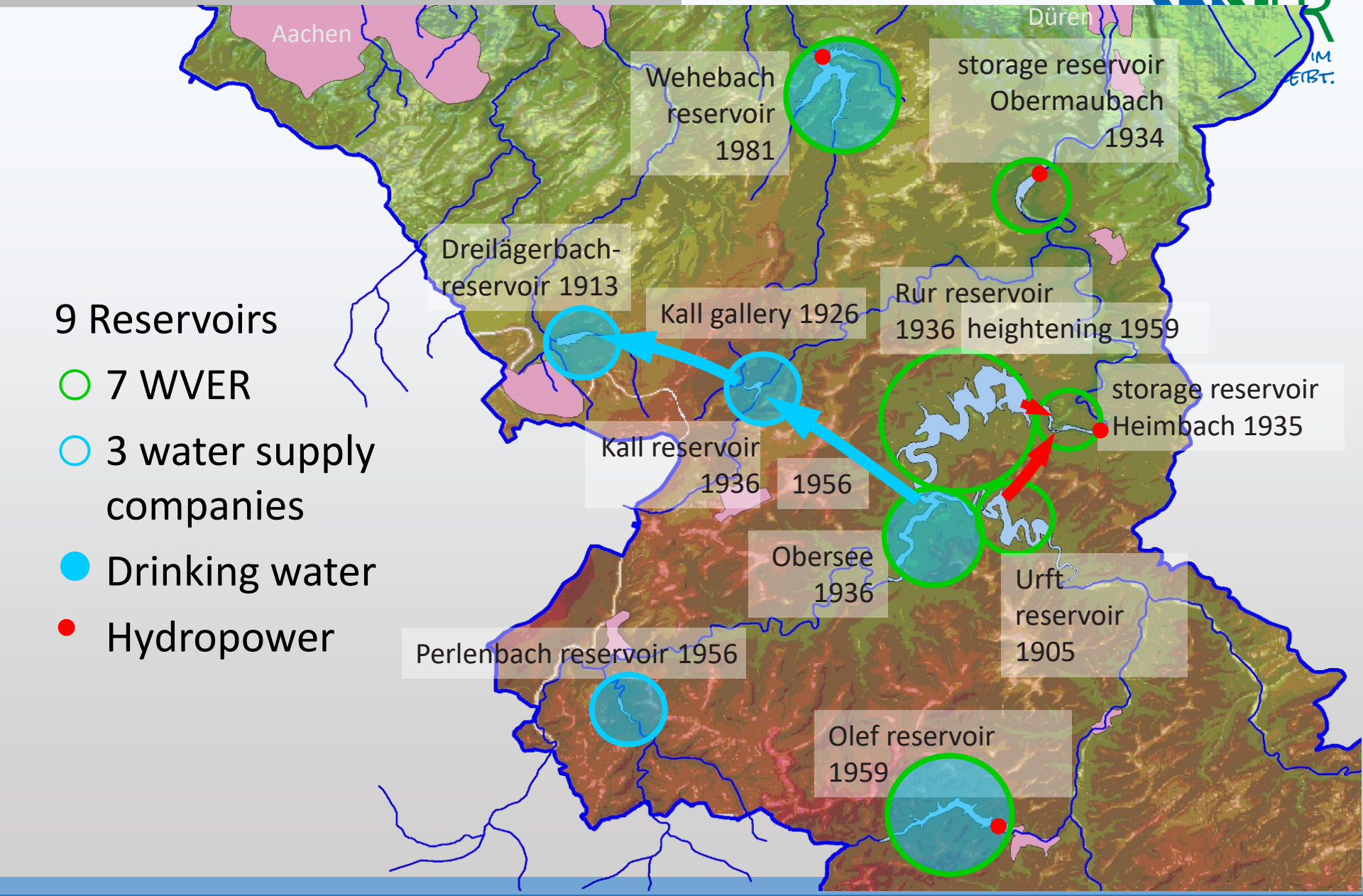
The Rur catchment

Hydrology:

- Catchment 2087 km²
- Flow length 2500 km
  Rur: 165 km
- North:
  lowlands (30 mNN)
  precipitation 600 mm/y
- South:
  low mountain range (620 mNN)
  precipitation up to 1300 mm/y



The Northern Eifel Reservoir-System



Objectives

- Protection against floods
  - 70 Mio. m³ storage volume
  - Reduction of the Rur peak discharge for a hundred year return period from 307 m³/s to 60 m³/s in Heimbach
- Low-water enrichment
  - NNQ of < 0,5 m³/s increased to 5 m³/s
- Provision of Water (Total System)
  - Up to 42 Mio. m³/a for drinking water (600.000 inhabitants)
  - 100 Mio. m³/a for industrial use
- Power generation
  - 60 GWh/a (minor role)

Opponent Tasks:

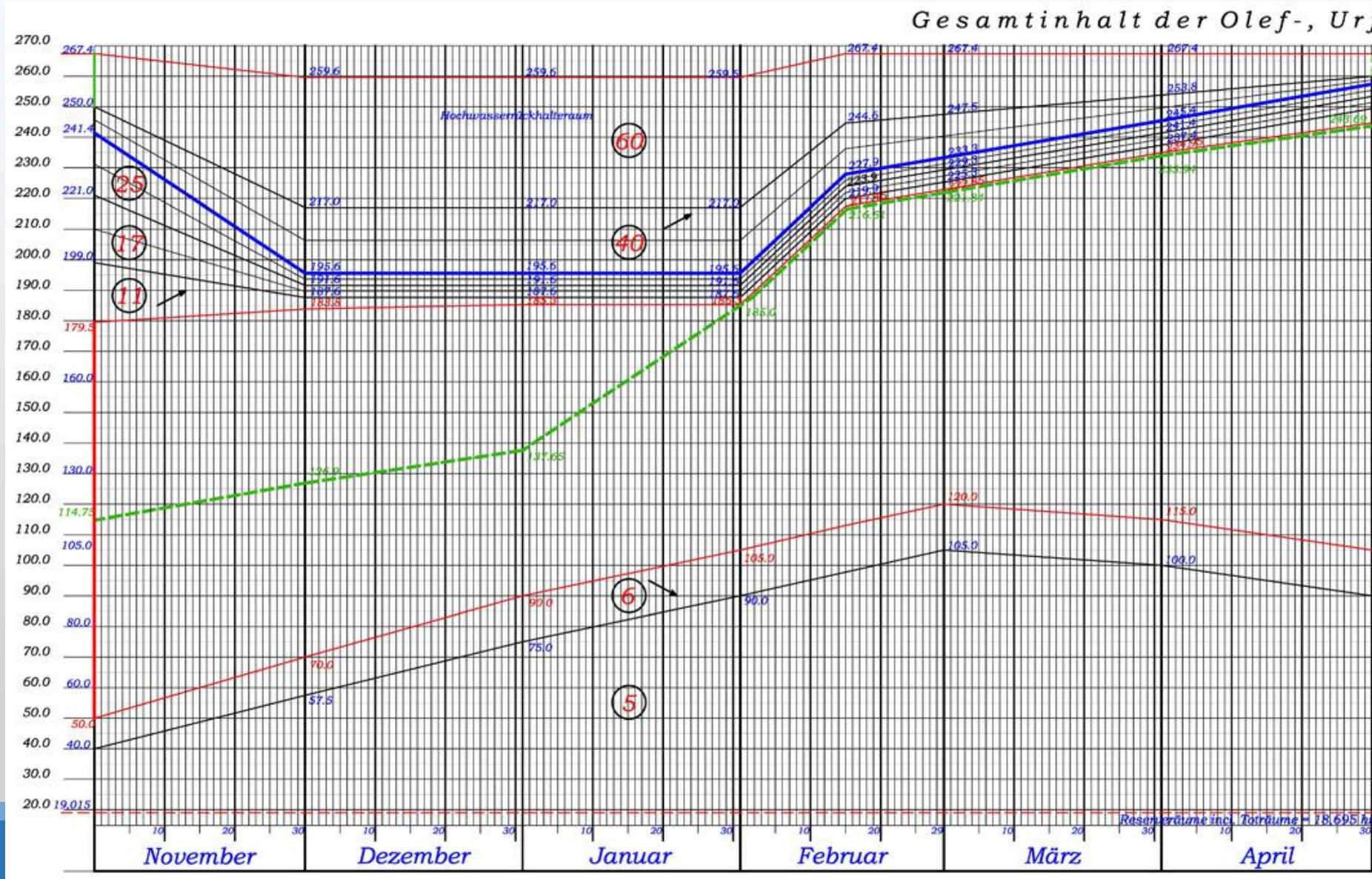
Low-water enrichment and provision of water demand full reservoirs

Flood protection demands empty reservoirs

⇨ Lamellae operation plan:

- Different volumes for flood protection storage in summer and winter
- Simulations of reservoir system based on over 100 year inflow data

Lamellae operation plan



- Lamellae operation plan for the Resevoir-System
- Dynamic Discharge: inflow regulated release
- Snow rule for snow depths over 10 cm
- Olef reservoir: local operation plan
- Urft reservoir : maximal discharge (17 m^3/s) when flood-retetion-room is entered
  - Provision of extra volume for drinking water supply in dry periods (Urft reservoir)

Climate variations observed!

⇨ Need of representative model-input-data to design and size measures

Predicted Climate change

AMICE Project (2009-2013):

- Hydrologic Models involving climate factors for temperature and precipitation for
  - a wet and a dry climate-szenario for each future period
  - different regionalizations for the Rur catchment and for the entire Meuse catchment

Precipitation data statistics **ExUS-Rur** (2012):

- Trends in rainfall-data (1960-2010)
  Extrapolation fits in between wet and dry szenarios

1971-2000 2021-2050 2071-2100
Reference period Near future Far future

Summary of input-data:

- Original long term time series (>100 years)
- Detrended long term time series (>100 years)
- 30 year time series of 10 future szenarios

A broad fundament for an optimization of the management policies for The Northern Eifel Reservoir-System

Integration of Drought-Indices DROP-Project (2013-2015)

Dry spring seasons: Difficulties in refilling reservoirs after winter season with large flood retention room

➡ **Dryness-Alarm**, using the *Standardized Precipitation Index* (SPI)

- react earlier
- support the communication of drought-situations

Further development of reservoir operation rules

- Optimisation of operation policies in dry periods
- Analysis of further indices (discharge, soil moisture, etc.)
- Dynamic discharge to support the Water Framework Directive, f.e. fish migration (migration-impulse for salmonidae)

BMU-Projekt TASK (2017-2019)
(**T**alsperren **A**npassungsstrategie **K**limawandel:
reservoir strategy for climate adaption)

- Collection of adaption strategies and operation tools
- Application of **SPI-forecast** (based on NOAA-models)

➡ Integration in new operation plan in 2021

➡ Integration in new operation plan in 2021 *simple approach*!

- 9-12 months aggregation based on Regnie-data
- SPI below threshold and stored volumen below flood-lamellae

  ➡ **fixed minimum dicharge of 5 m³/s**

- SPI-Forecast:
  - test-phase: information value
  - later: cautious integration in operational decisions


Thank you for your attention!
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