



Institute of Meteorology and Water Management
National Research Institute

**13th International Conference « EUROPE-INBO 2015 »
for the implementation of the European Water Directives**

Thessaloniki – Greece – 21-24 October 2015

**Water resources development in changing climatic
conditions - a challenge for adaptation activities
in Polish-German cross-border area**



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Water resources based on climate change simulations are currently projected around the world. An example of such activities was the project NEYMO – Neisse River climatic and hydrological modeling, analysis and forecast. Project was carried out on the border between Poland and Germany in the period 2013 - 2015, and was financed by the ERDF Interreg III A.

Project was initiated by German-Polish Water Commission because are observed changes in the natural hydrological regime of surface water.

Topic of the project

Developing a common methodological approach to forecasting climate change and its impact on water resources in the Neisse River transboundary basin



Lusatian Neisse River:

- cross-border basin
 - left tributary of the Oder River
 - water resources shortage
 - strong anthropogenic pressure
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- Opencast mining
 - Hydropower plants
 - Industrial water use
 - Water supply

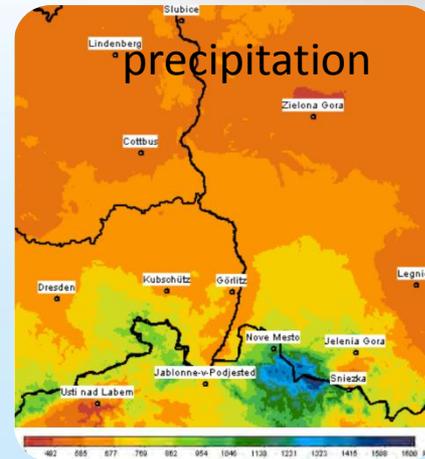
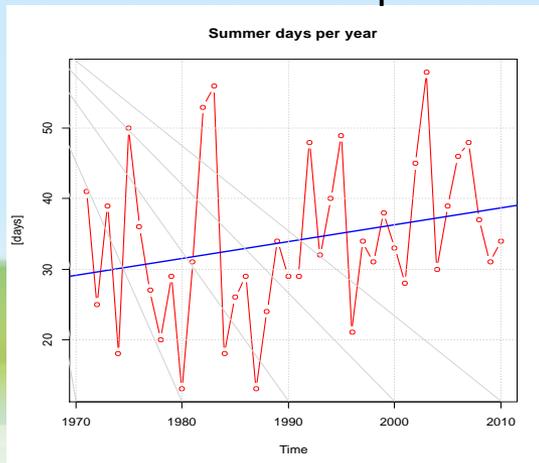


Every water use is very relevant to the overall water balance.

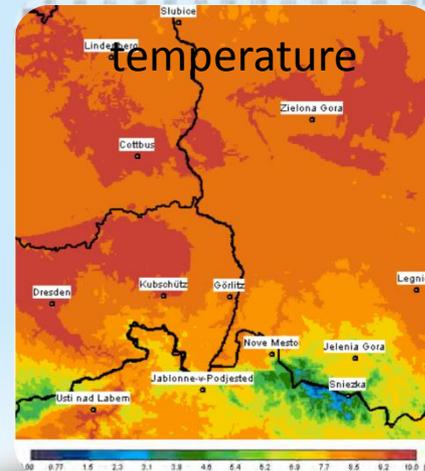
The Lusatian Neisse basin could be characterised by a high evaporation, low runoff, high infiltration which lead to water resources reduction.

Changes observed in the period 1971-2010:

- The average total annual precipitation was 643 mm and increasing trend was registered
- Significant rise of temperature of about 2 °C in summer period



Yearly Precipitation: **643** mm
Min: Legnica 595 mm
Max: Jakuszyce 1668 mm

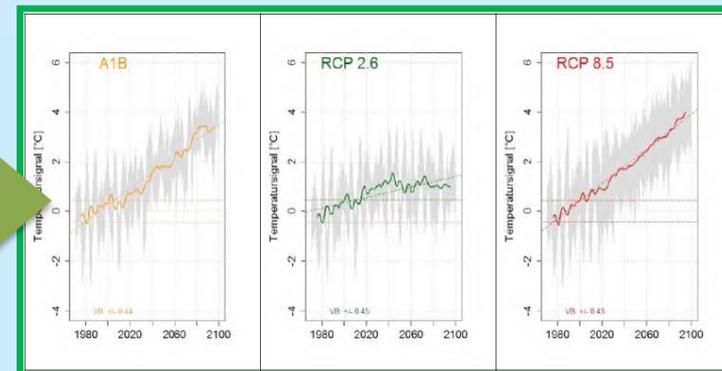
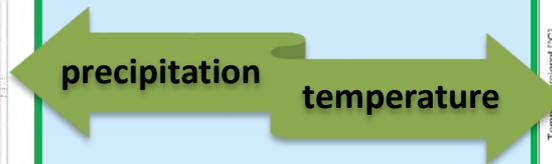
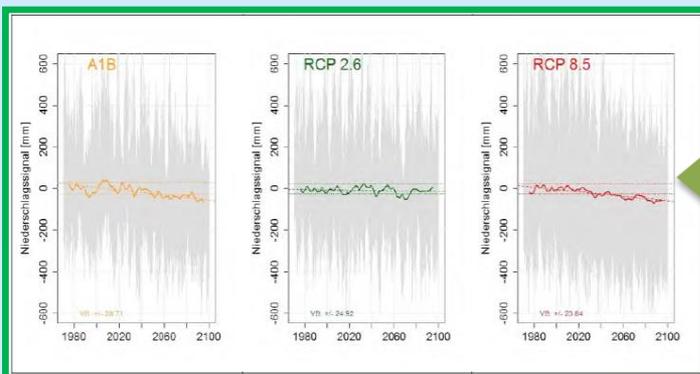
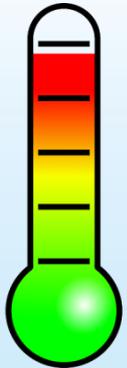


Mean Temperature: **8.6** °C
Min: Sniezka 0.7°C
Max: Cottbus 9.3°C

In order to determine the climate change the global scenarios A1B, RCP (in accordance with the IPCC) and the regional model (WETTREG) were used.

The performed analyses of climate modelling show for the further future 2071-2100:

1. The average **annual temperature** will **increase** from 1 to 3,7°C
2. Total **precipitation** during the **summer** will **decrease** from 2 to 15 %
3. **Precipitation** in **winter** will **decrease** from 3 to 10%
4. **Potential evaporation** will **increase** from 30 to 110 mm
5. **Climatic water balance** will **decrease** from 50 to 250 mm



Both the results of historical observations and climate projections show the increasing trend of temperature and decreasing trend of precipitation, which will lead to a significant reduction of available water resources.



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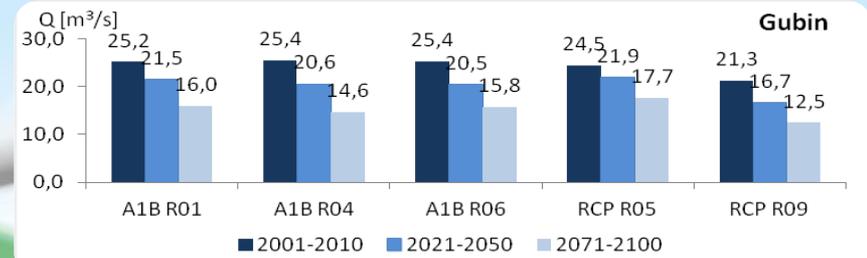
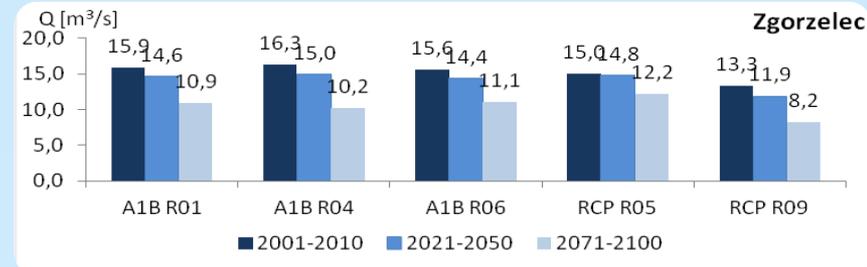
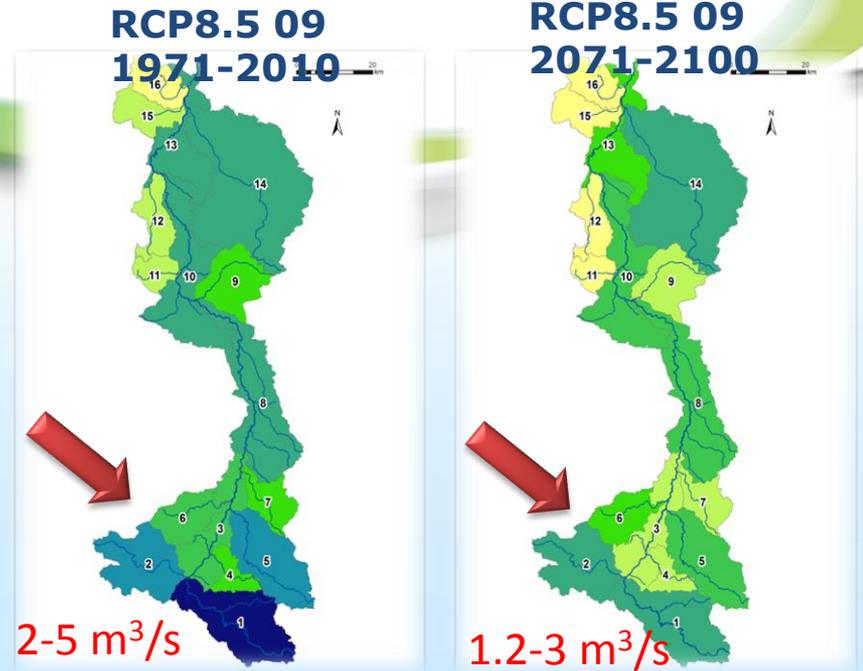
Performed climatic analysis were input material to the water balance models



Simulations of water resources changes, carried out using mathematical modelling indicate that in the future components of the water balance will be reduced.

Reduce of Discharge (Q) in surface water is expected to:

- up to 10% in the near future (2021-2050)
- up to 40% in the further future (2071-2100).





The most important challenges of adaptation activities in the border region of Poland and Germany related to the reduced availability of water resources are:

1. The hierarchy of water needs
2. Improving the monitoring and recording of real water use
3. The development of water saving strategies
4. Coordination of post-mining reservoirs flooding
5. Protection of water quality
6. Restoration of riverbeds
7. Raising awareness of water users
8. Adaptation of legal acts to projected changes

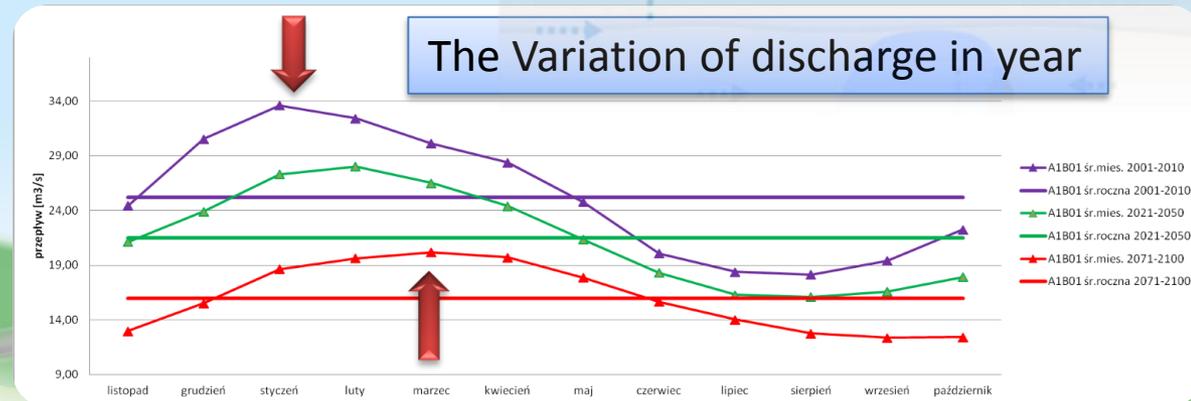
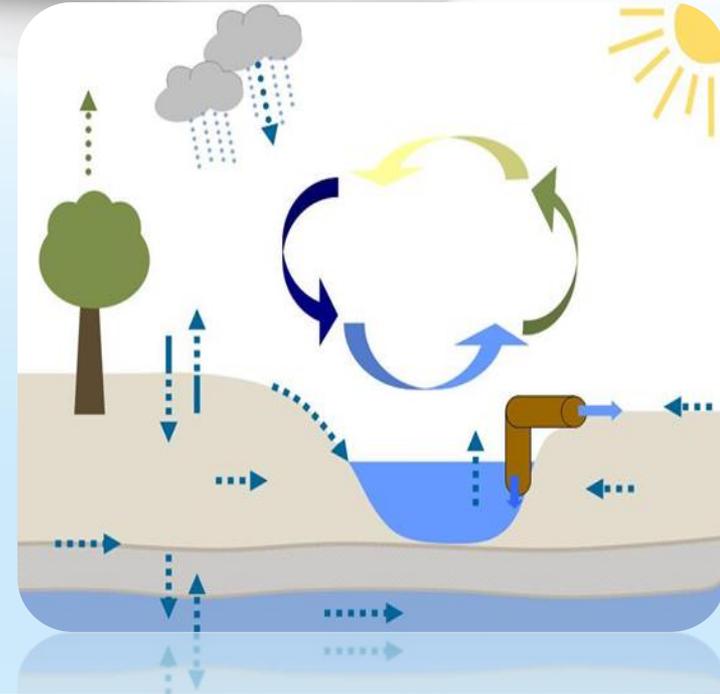


Summary

Current and future users of surface waters in Lusatian Neisse basin should take into account the projected reduction of discharge up to 40% and maximum will be moved two months later.

Due to the transboundary nature of the catchment a sustainable use of water resources by both sides is crucial.

The analysis conducted within the project could be a important basis for establishment of adaptation measures that will allow to fit water management to decreasing water resources.





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Water resources and climate don't respect any borders. The measures being taken to adapting to climate change will also impact on the water resources in the neighboring regions. Therefore, in the border areas joint standards should be prepared in accordance with the sustainable development rules.

Projected changes of water balance elaborated in the Neymo project provide good background material for assessment of potential scenarios of water resources development in cross-border Lusatian Neisse River in the future.

The adaptations for climate changes will be necessary for vulnerable sectors of water management as a challenge for the transboundary region.



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Thank you for the attention

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