



Impacts of developments in neighbouring countries on the Dutch Meuse

Bernhard Becker, Marjolein Mens, Rolien van der Mark

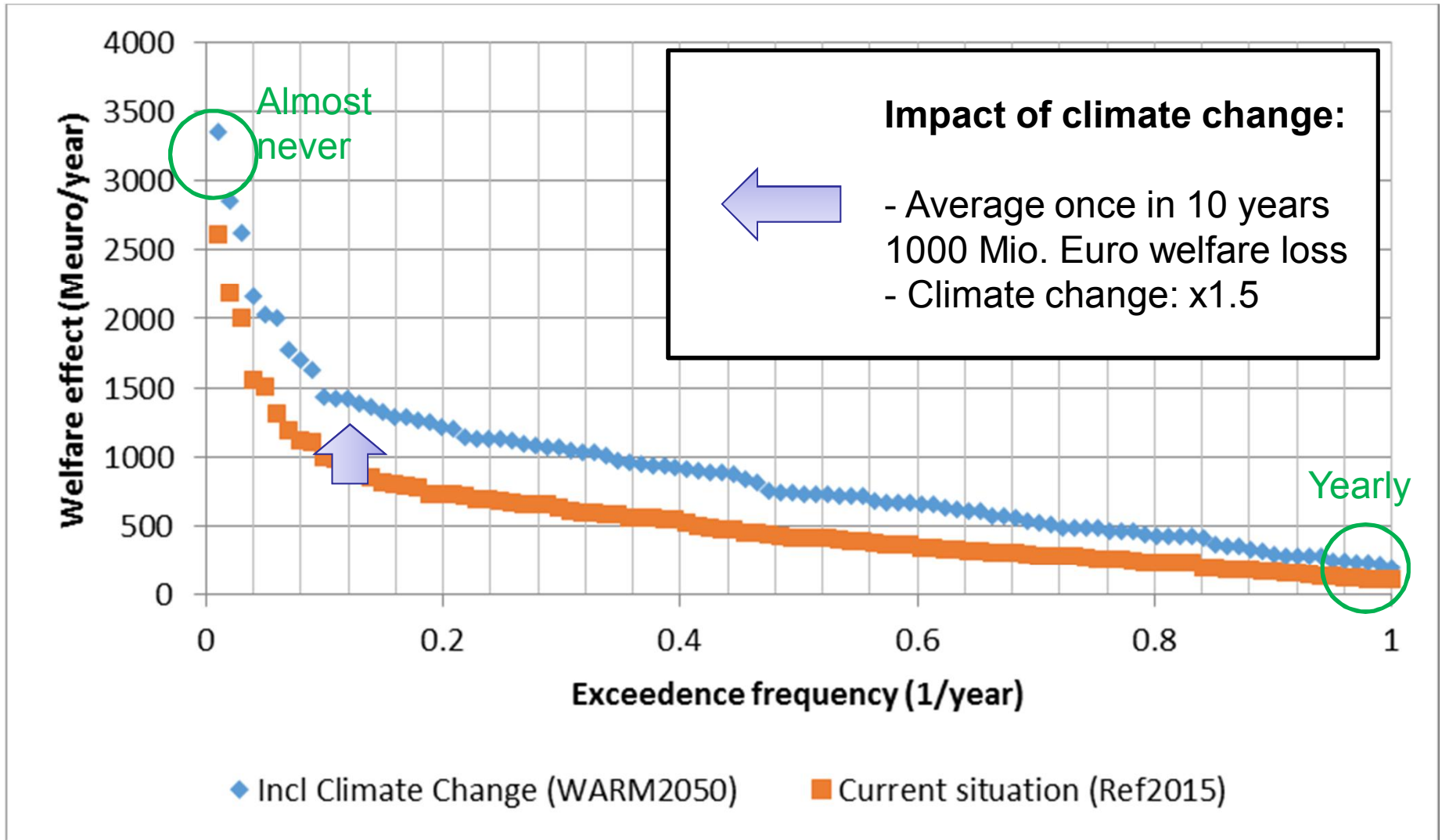
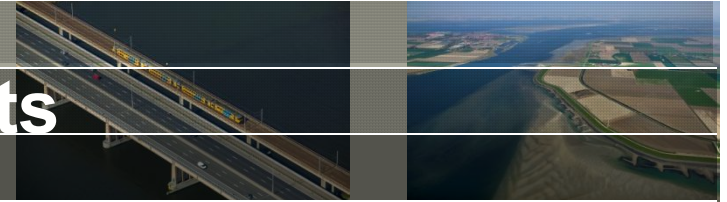
5th symposium on the hydrological modelling of the Meuse basin
Liège, 13 September 2018

Outline

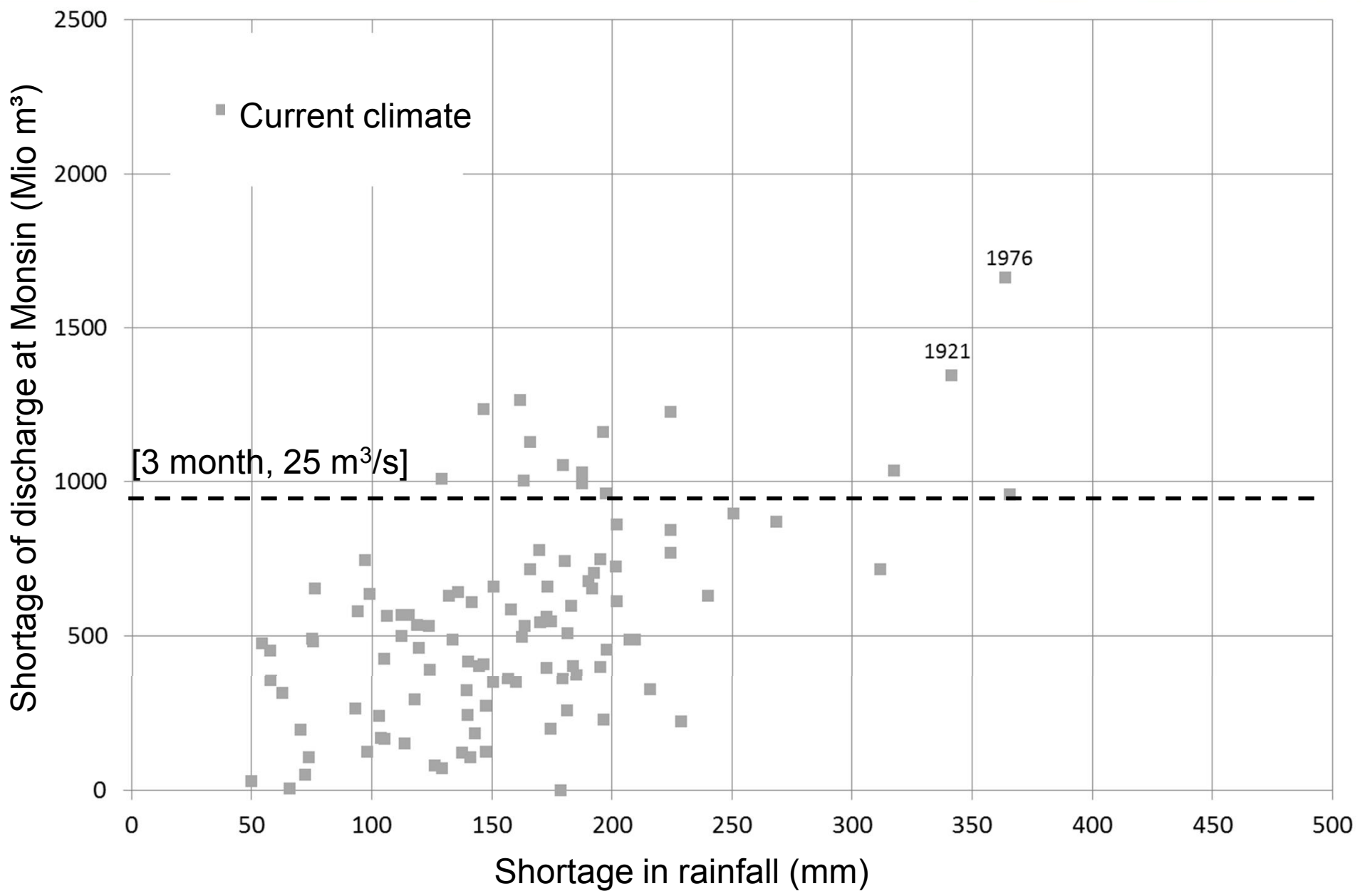
- Drought
 - Welfare losses
 - Combination of discharge and rainfall
- Discharge composition of the river Meuse
- Developments in neighbouring countries with (direct) impact on the Meuse discharge?
 - Method
 - Findings
- Outlook



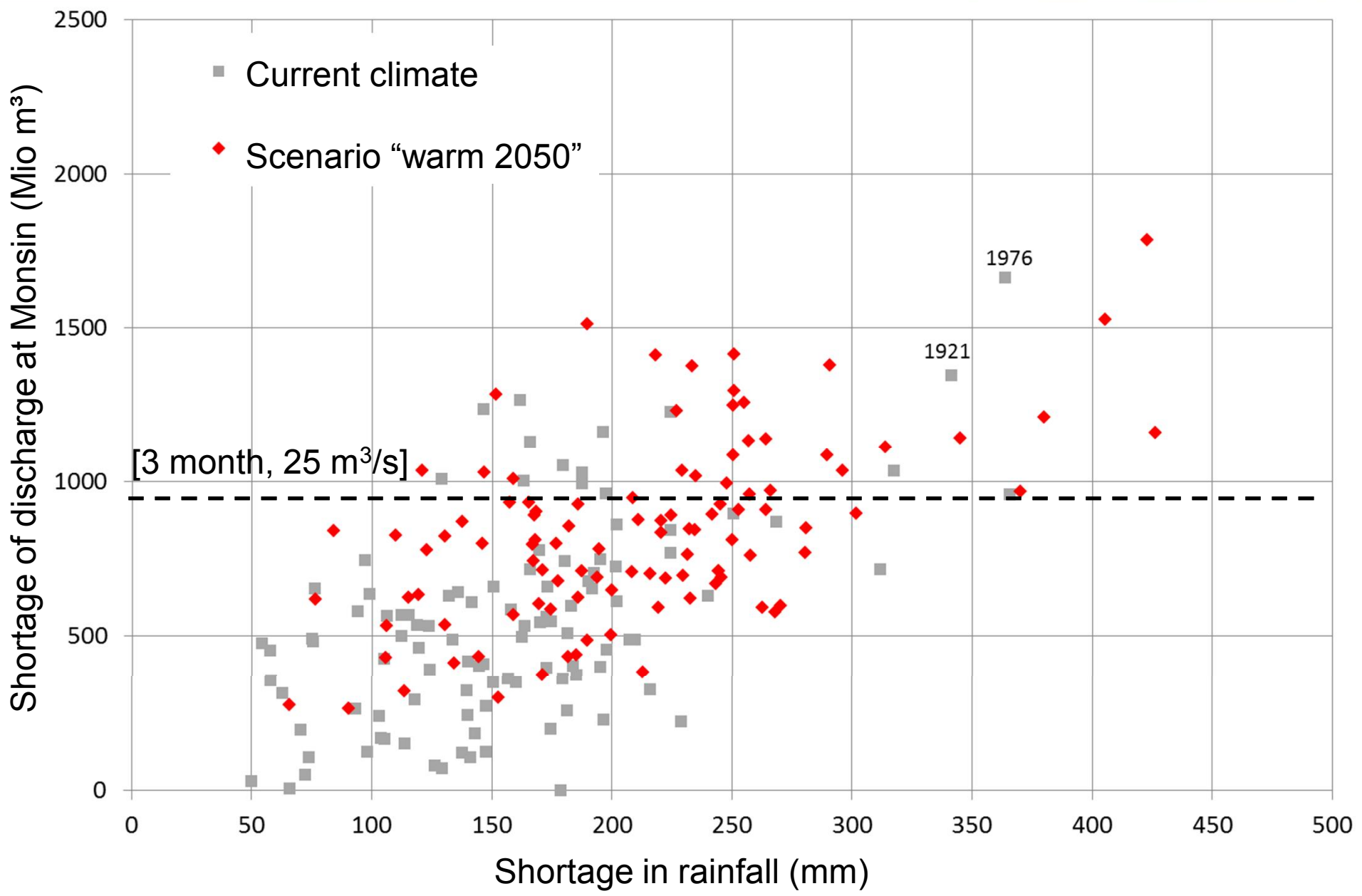
Welfare losses due to droughts



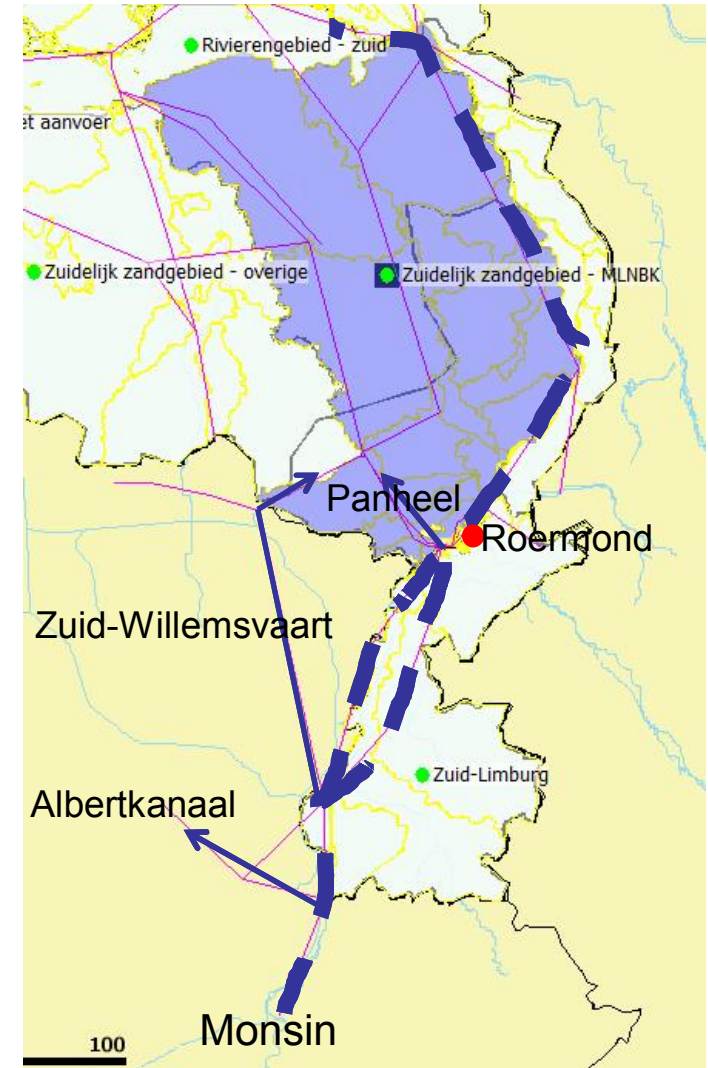
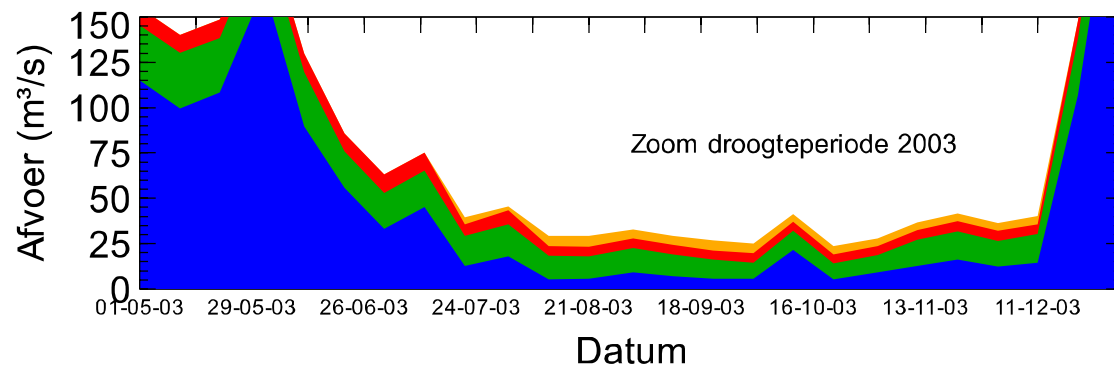
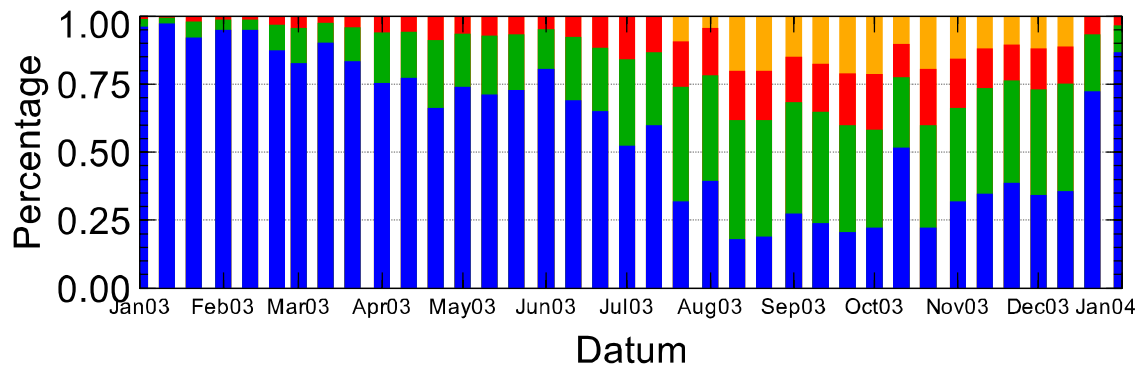
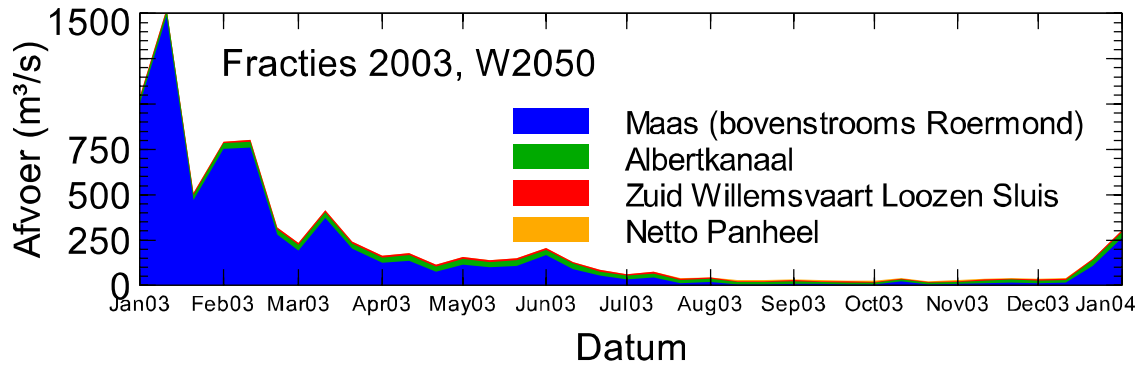
Drought: combination of rainfall and river discharge



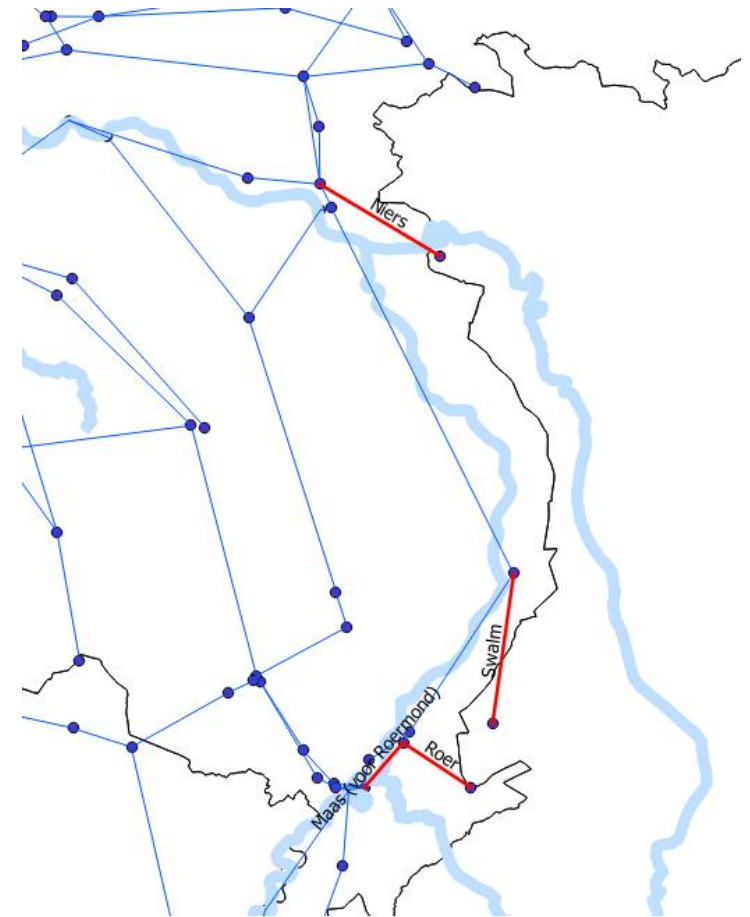
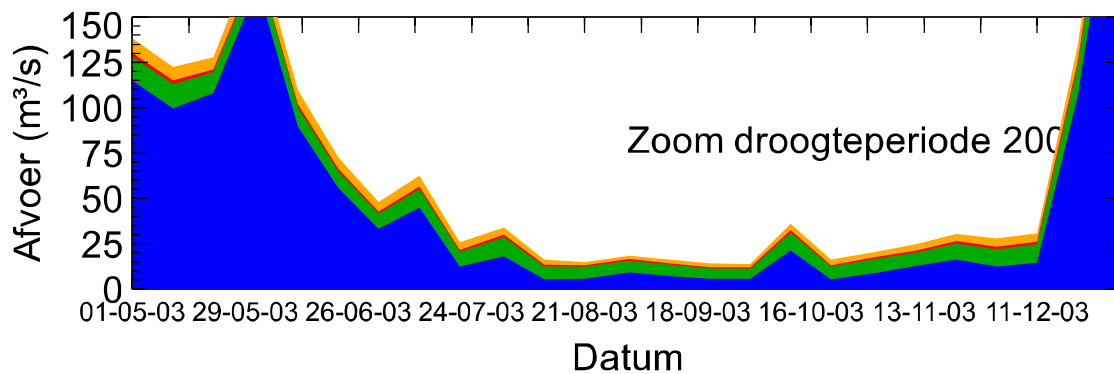
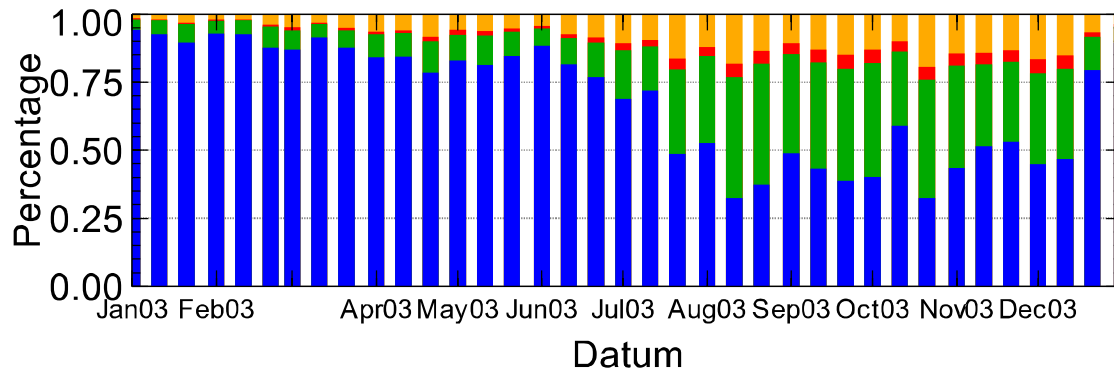
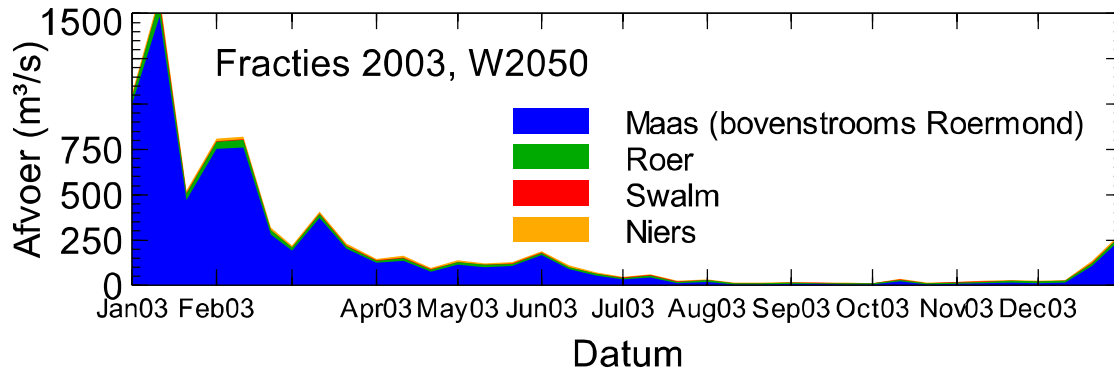
Kans op droogte neemt toe in Warm2050



Discharge composition of the Meuse (1)



Discharge composition of the Meuse (2)





Are there developments in neighbouring countries with impact on the discharge in the Dutch Meuse?

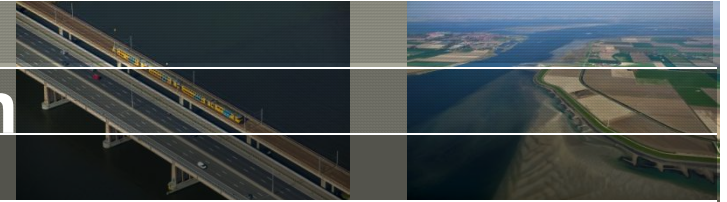
Developments:

- Socio-economic developments
- Impact on water resources (management)

Neighbouring countries

- Belgium, France, Germany

Results of brainstorm session

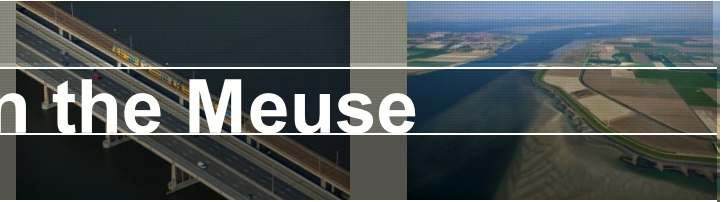


Bron	Ontwikkeling	Kans	Impact	Score
W	klimaatverandering, socio-economische ontwikkelingen, beleid			0
W	de Maasroute wordt belangrijker voor scheepvaart	3	3	9
W	relatie stuwmeren Duitsland (Eifel)			0
W	vierde sluis Ternaaien		3	0
W	infiltratiecapaciteit van de bodem vergroten			0
W	sponswerking-herstel (effekct grondwater op afvoer bij droogte)	1	1	1
W	sluiting industrie langs de Roer	1	2	2
W	aanpassing beheer stuwmeren (Wallonië, Duitsland)			0
W	watebehoefte Vlaanderen beneden Albertkanaal	2	3	6
W	watergebruik belgische kanalen in toekomst (watertekorten in België)	2	3	6
W	sluiting kerncentrale Thiang (hoe verder met energie?)	3	1	3
W	verandering van de landbouwpraktijk	2	1	2
W	toename fruitteelt in stroopgebied stroomopwaards (--> variable watervraag)			0
W	meer onttrekkingen landbouw (Frankrijk, Wallonië), intensivering			0
W	energiebeleid per land: kool, kernenergie, waterkracht (ook samenhangend te bekijken)	1	1	1
W	effect (gesloten) mijnen in Nederland	1	1	1
W	Temporisering bruinkoolwinning	3	1	3
W	Maasverdrag wordt opgezegd, nieuw verdrag (trilateraal)	1	3	3
W	grondwaterstijging door stijgend mijnwater Limburg (waterkwaliteit)			0
W	recreatie en natuur vragen meer water (Maasplassen, Grensmaas)	2	1	2
W	vistrappen in Frankrijk	1	1	1
W	meer industrie in Frankrijk en Wallonië	1	2	2
W	beperken risico's bruinrot (aardappelziekte) in Brabantse kanalen	2	1	2
W	bouw RWZI's en riool in België	2	1	2
W	zuivering en hergebruik (RWZI): minder grondwateronttrekkingen, dus minder water naar de Maas	2	2	4
W	Maas als bron van drinkwater --> eisen waterkwaliteit	2	2	4
W	DMZ --> water vasthouden --> minder afvoer			0
W	andere scheepvaartbelasting door Rijn-Seine-verbinding?	3	2	6
W	afkoppelen dakwater en bergen, gescheiden rioolstelsel	2	1	2
W	verharding stroomgebied, urbanisatie	2	2	4
W	vervanging stuwen in Frankrijk --> meer fluctuatie (nu: 1 keer per maand)	2	1	2



The top 4 developments with high scores (impact and probability)

More cargo ship navigation on the Meuse



Source: European Commission

TEN-T Multi-Annual Programme



Source: TEN-T Executive Agency

Probability: high
Impact: high
(negative)

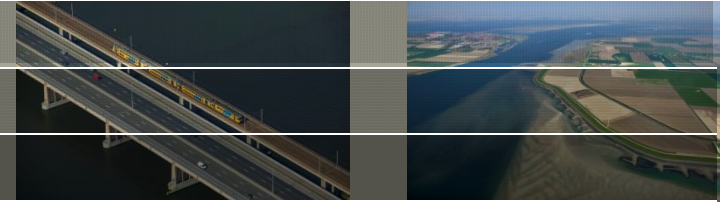
More ships → more lock
operations → more water losses

Larger ships → larger water depth
→ more water



Deltares

Seine-Nord Europe Canal



www.wikipedia.nl

More ships → more lock operations →
higher water demand

Project start planned for October 2017



<https://www.french-waterways.com/waterways/north/seine-nord-europe/#fw-tab-content-0-0>

Deltares

Pump-hydropower-installations Albertkanaal



Probability: high
Impact: low
(could have a positive impact)

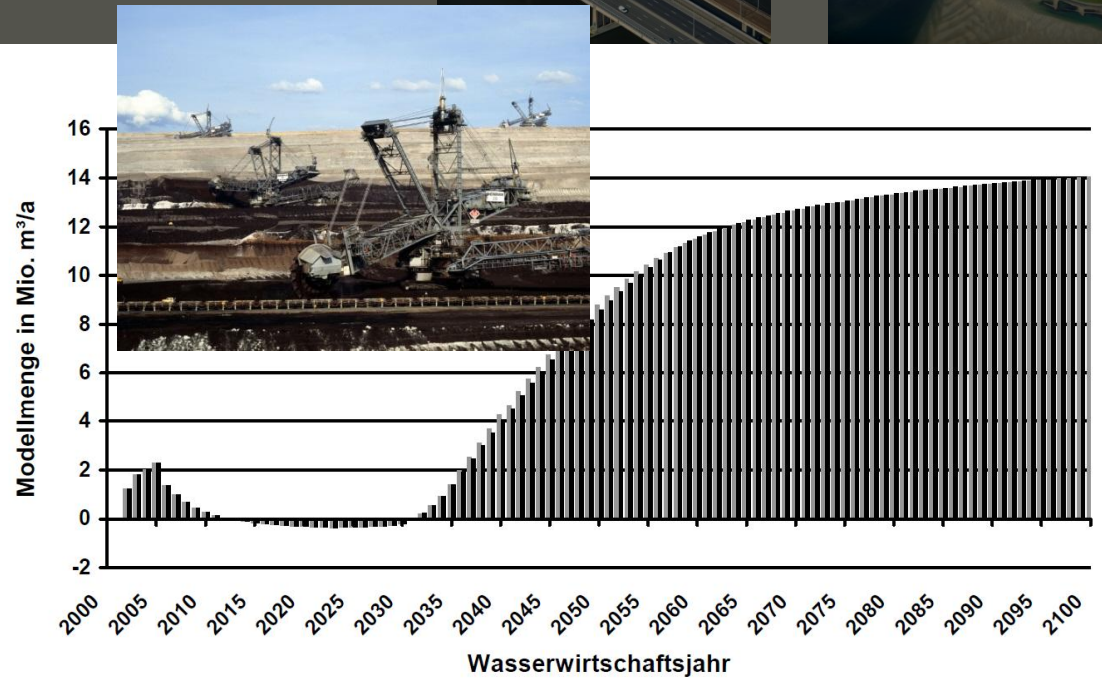
Source: van Steenbergen, Symp. Hydrol. Mod. Meuse 2017

Reasoning:

Lower losses due to lock operations → more space for other water usages

- No advantage expected for the Netherlands because of Meuse water treaty
- Less pressure on the water system during low flows.

End of lignite mine operations in Germany



Probability: high
Impact: average (positive)

Source: Königeter, Klauder & Becker, 2007; on behalf of the LANUV NRW

Groundwater modelling study „Rurscholle“ (Rur terrain, Roerdaalslenk)

- Until 2035: water from the Meuse flows “towards the mine” due to mine drainage of Inden mine
- 2035: end of mine operations, water will flow towards the Meuse

Filling of lignite mine relict lake Inden

Relict lake filling Inden

- 2030 – 2070: extraction of max 12 Mio. m³ (2.5 m³/s) of water per year from Rur river (Köngeter, Klauder & Becker, 2007)
- No extraction during low flow (Pyka, Symp. Hydrol. Mod. Meuse 2016)



Extraction strategy based on discharge at gauge Jülich (Drogue et al., 2010)

Lignite power plant Weisweiler

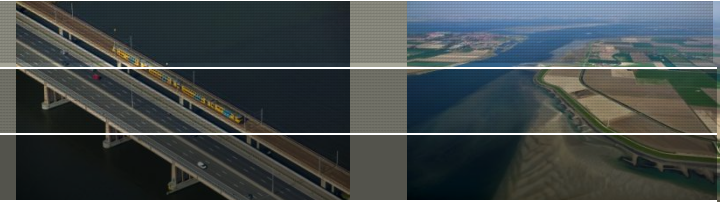
Power plant Weisweiler (lignite) uses mine drainage water for cooling. Cooling water is released into the Rur river.

With the end of the lignite mine operation this drainage water will no longer be released into the Rur river.



Source: www.wikipedia.de

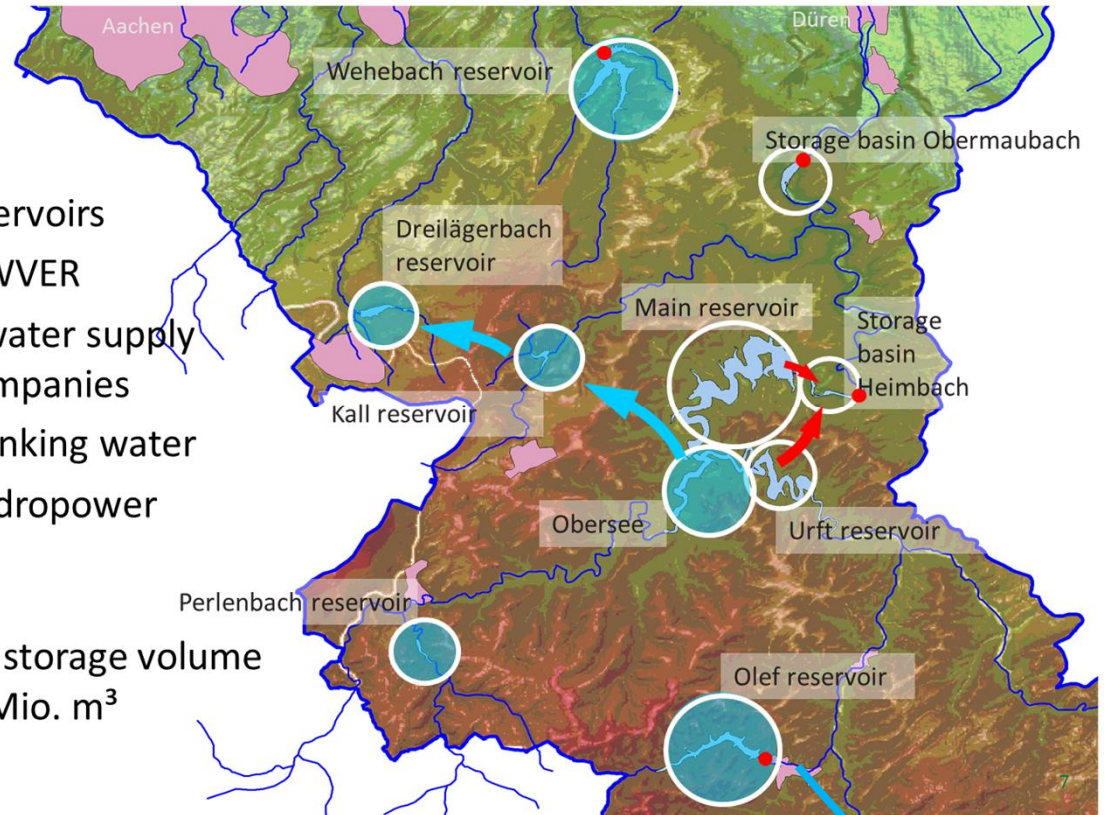
Reservoirs in the Rur system



Water authority
 “Wasserverband Eifel-Rur” is developing
 new operational
 protocols for reservoir
 management during
 drought periods.

9 Reservoirs

- 6 WVER
- 3 water supply companies
- Drinking water
- Hydropower

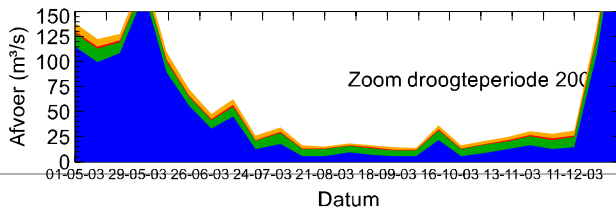
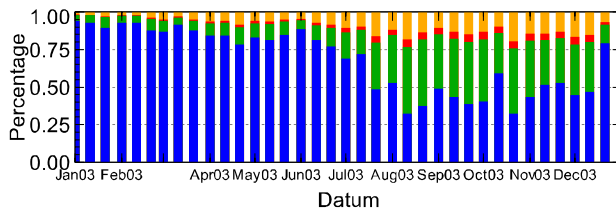
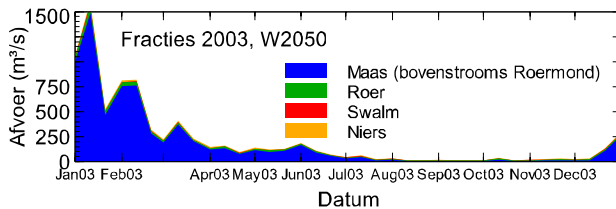


Total storage volume
 302 Mio. m³

Source: Homann, Symp. Hydrol. Mod. Meuse, 2017

Planned: connection to Rheinland-Pfalz for fresh water supply

← In low flow situations the Rur river contributes significantly to the Meuse discharge



For the Dutch national water management:

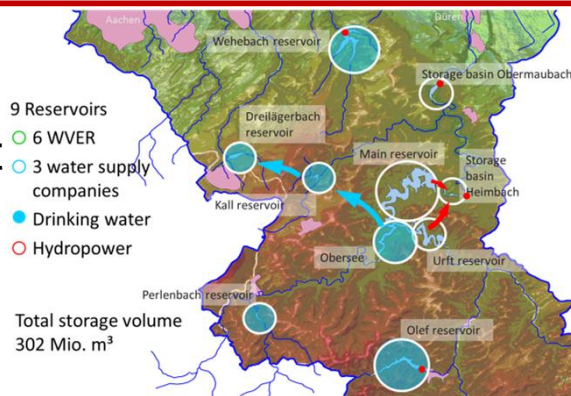
Most important developments for Dutch water management

Cargo ship navigation



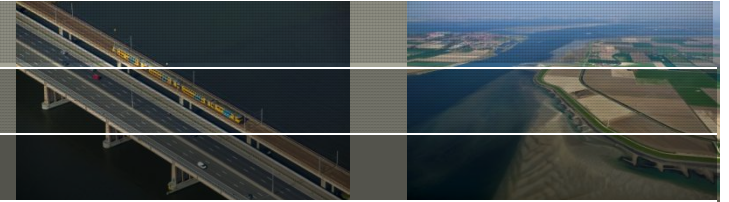
Water management on Albertkanaal

Reservoir management Rur



End of Lignite mining

Summary



Beside climate change, socio-economic developments have an impact on the water cycle (impact can be higher).

For the Netherlands, one major water supply component is the river discharge (“inflow at the borders”).

Importance of being informed about international developments → international network.

Developments to be taken into account in water resources management.

Additional information on socio-economic developments is very welcome!

Bernhard.Becker@deltares.nl