The Meuse as a source of drinking water

RIWA-Maas

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Deltares

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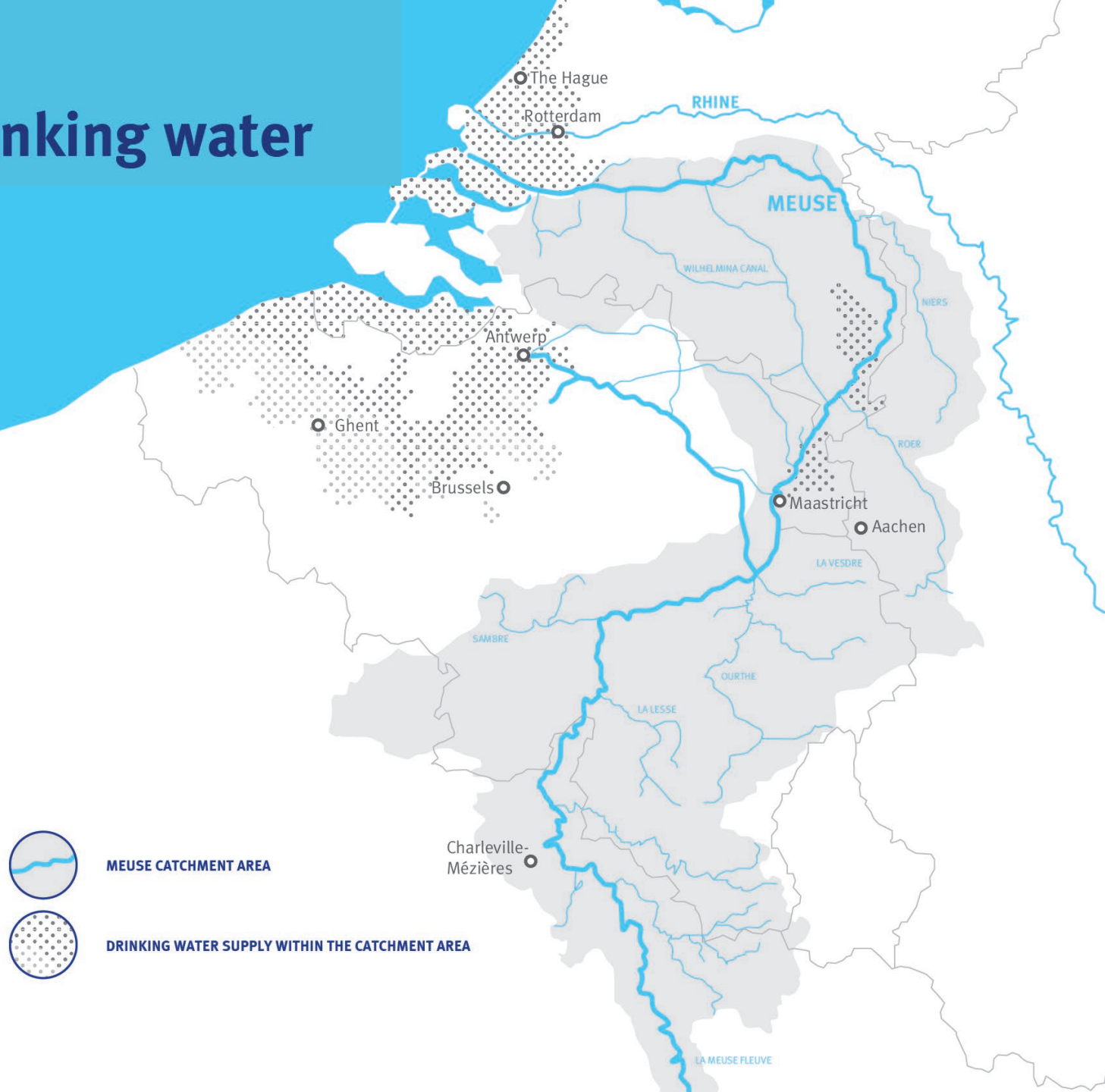
International Meuse Symposium
October 17th, 2022, Liège



Deltares

RIWA

RIWA-Maas

Lage afvoeren in de Maas

Bijdrage zijrivieren

Inzicht waar het water van de Maas vandaan komt

RIWA - Vereniging van Rivierwaterbedrijven

Download via website: riwa-maas.org

Deltares

RIWA

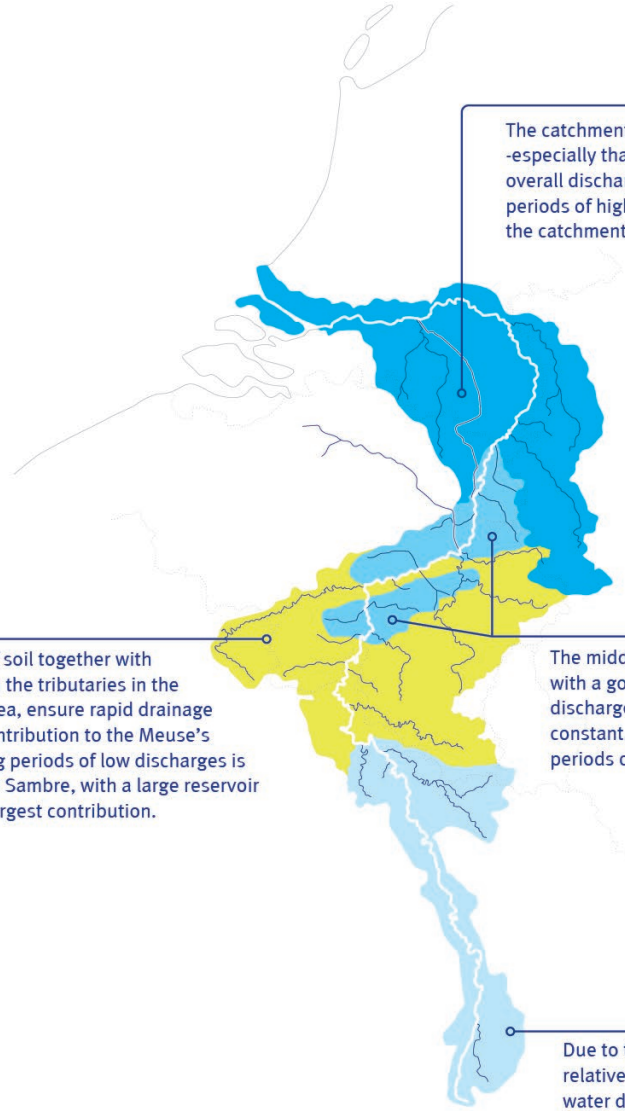
RIWA-Meuse

Low river discharge of the Meuse

A Meuse River basin water management modelling study using RIBASIM

RIWA - Vereniging van Rivierwaterbedrijven

Hydrographic division of the Meuse River basin



Lower Catchment

25% Catchment Area

The catchment area extending from Roermond to the estuary -especially that of the Roer- contributes relatively more to the Meuse's overall discharge during periods of low water discharge than during periods of high water discharge. This is partly due to the reservoirs in the catchment areas of the Roer and the Eifel in Germany.

Ardennes

40% Catchment Area

The low permeability of soil together with the large slope found in the tributaries in the Ardennes catchment area, ensure rapid drainage of precipitation. The contribution to the Meuse's overall discharge during periods of low discharges is proportionally less. The Sambre, with a large reservoir upstream, makes the largest contribution.

Middle Catchment

10% Catchment Area

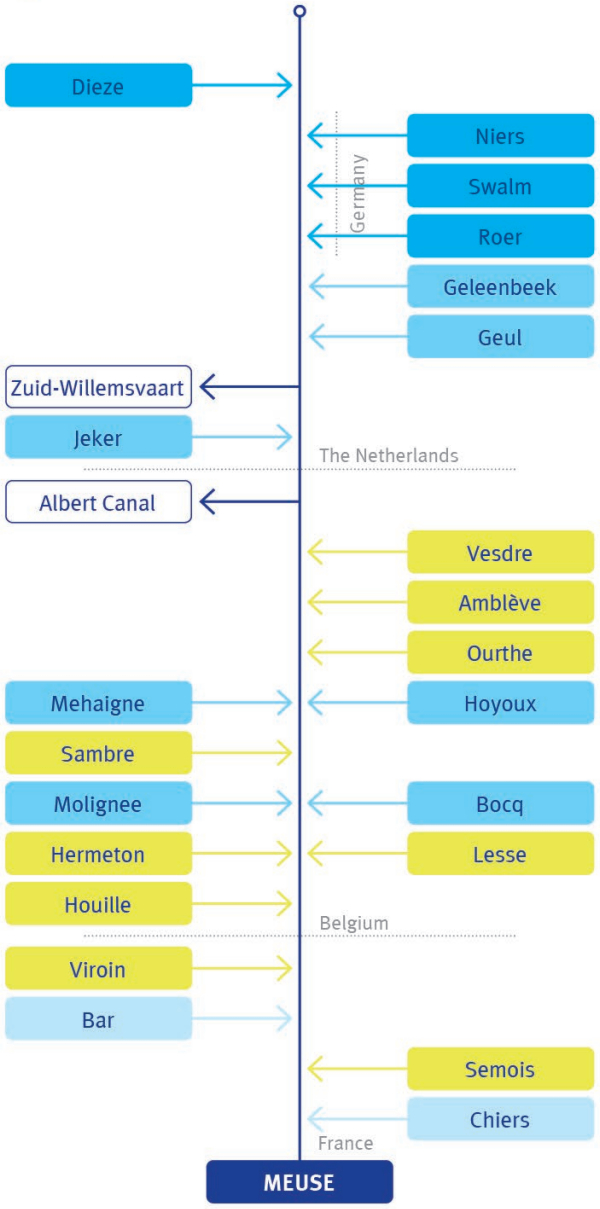
The middle course of the catchment is composed by a flat area with a good permeable river floor. The contribution to the overall discharge of the Meuse is relatively small but nevertheless constant. As a result, these tributaries contribute more during periods of low water discharge than during high ones.

Upper Catchment

25% Catchment

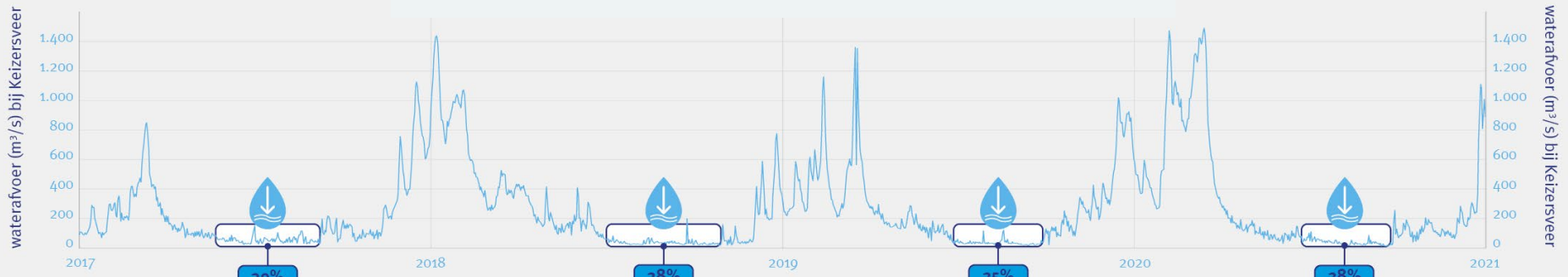
Due to the buffering capacity of the subsoil, this area makes a relatively large contribution to the Meuse during periods of low water discharge.

Schematic representation of the Meuse's tributaries



Tributary in the lower catchment
Tributary in the middle catchment
Tributary in the Ardennes
Tributary in the upper catchment
Withdrawal

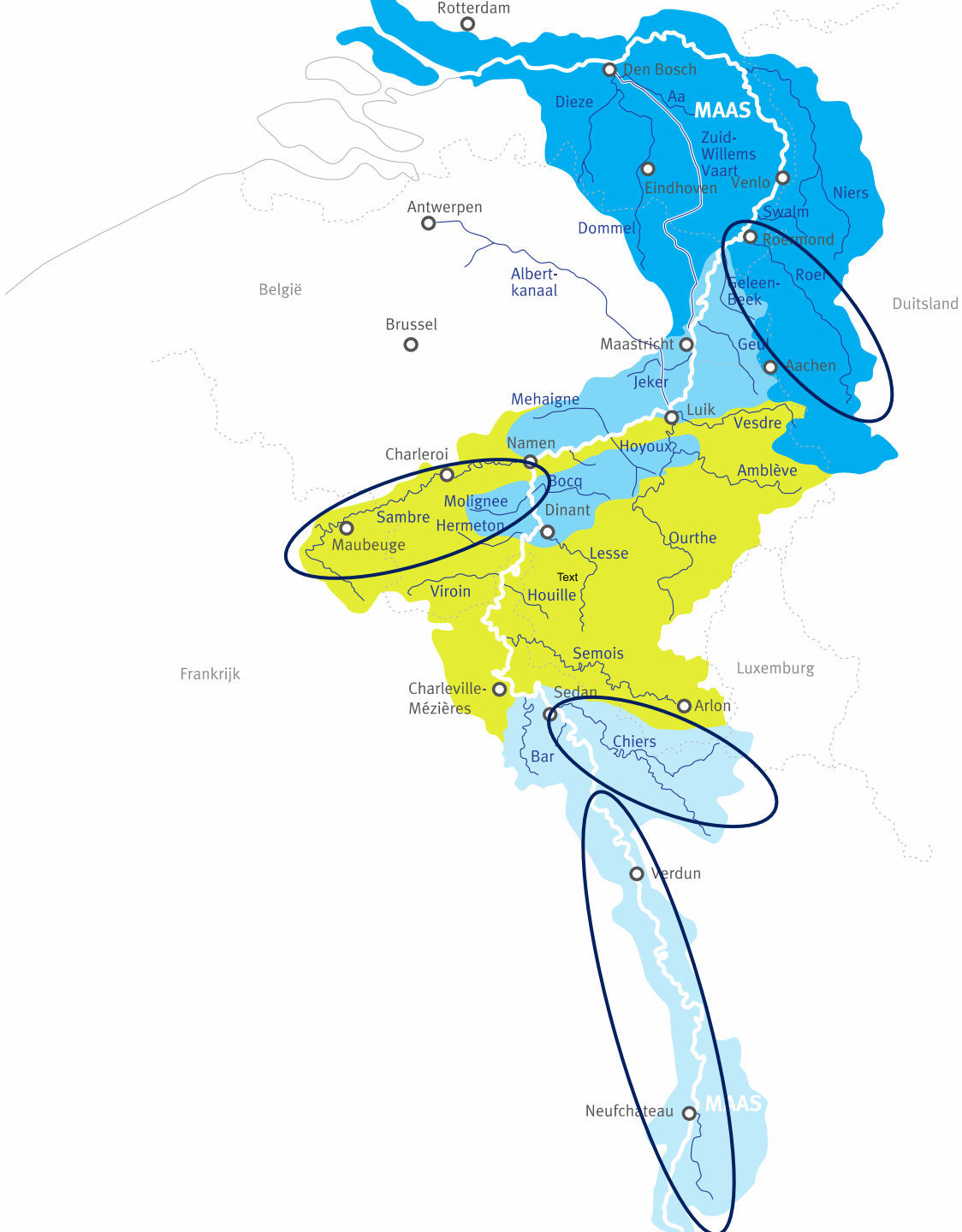
Contribution of Main Tributaries



% bijdrage per stroomgebiedsdeel

		2017		2018		2019		2020		2021	
		30%		28%		25%		28%			
benedenloop	Dieze	10,6		5,0		5,4		4,2			benedenloop
	Niers	5,3		4,5		4,4		5,1			
	Swalm	1,8		1,8		2,3		2,4			
	Roer	12,2		16,5		13,1		16,4			
		9%		9%		11%		12%			
middenloop	Geleenbeek	2,4		2,1		2,5		2,6			middenloop
	Geul	2,4		2,3		3,3		3,3			
	Jeker	1,8		1,8		2,0		1,9			
	Mehaigne	0,6		0,6		0,7		0,7			
	Houyoux	0,4		0,5		0,5		0,8			
	Bocq	0,9		1,4		1,3		1,7			
	Molignee	0,5		0,6		0,7		0,9			
		41%		33%		35%		33%			
Ardennen	Vesdre	5,0		4,7		5,8		5,0			Ardennen
	Amblève	8,4		4,9		6,2		5,0			
	Ourthe	5,2		3,2		4,1		3,5			
	Sambre	9,0		11,9		10,0		11,7			
	Lesse	3,9		2,8		3,0		2,6			
	Hermeton	0,2		0,3		0,3		0,5			
	Houile	0,6		0,3		0,3		0,2			
	Viroin	1,2		1,2		1,4		1,5			
	Semois	7,3		3,8		3,6		3,0			
		20%		30%		29%		27%			
bovenloop	Bar	1,6		1,8		1,6		1,5			bovenloop
	Chiers	9,7		14,2		14,9		15,8			
	Maas @Stenay	8,9		13,9		12,5		9,8			
		%	bijdrage per zijrivier	%		%	bijdrage per zijrivier	%			

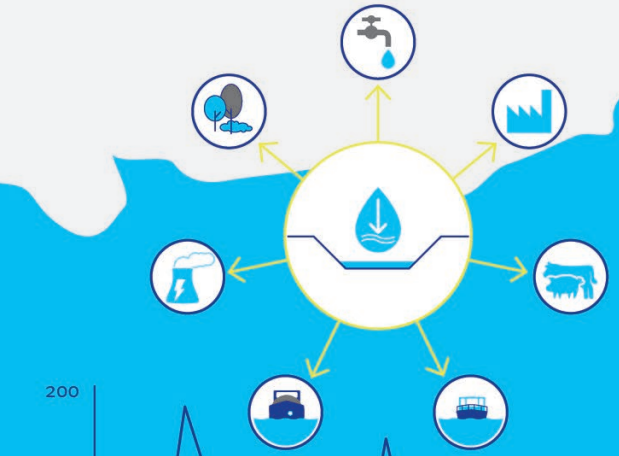
% bijdrage per stroomgebiedsdeel

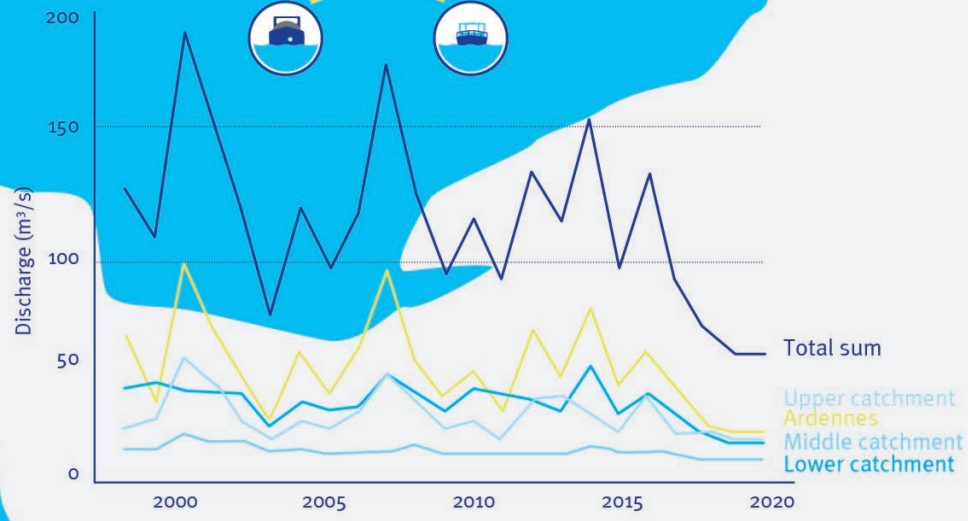

Rotterdam
Den Bosch
Dieze
Aa
MAAS
Zuid-
Willems
Vaart
Eindhoven
Venlo
Niers
Swalm
Roermond
Dommel
Antwerpen
België
Albert-
kanaal
Geleen-
Beek
Roer
Duitsland
Brussel
Maastricht
Geul
Aachen
Jeker
Mehaigne
Luik
Vesdre
Namen
Hoyoux
Charleroi
Amblève
Bocq
Molignee
Sambre
Hermeton
Dinant
Maubeuge
Ourthe
Lesse
Text
Viroin
Houille
Semois
Frankrijk
Luxemburg
Charleville-
Mézières
Sedan
Arlon
Chiers
Bar
Verdun
Neufchateau
MAAS

Water Balance Model for the Meuse

A model to gain insight into the current and future water availability in the river Meuse basin:

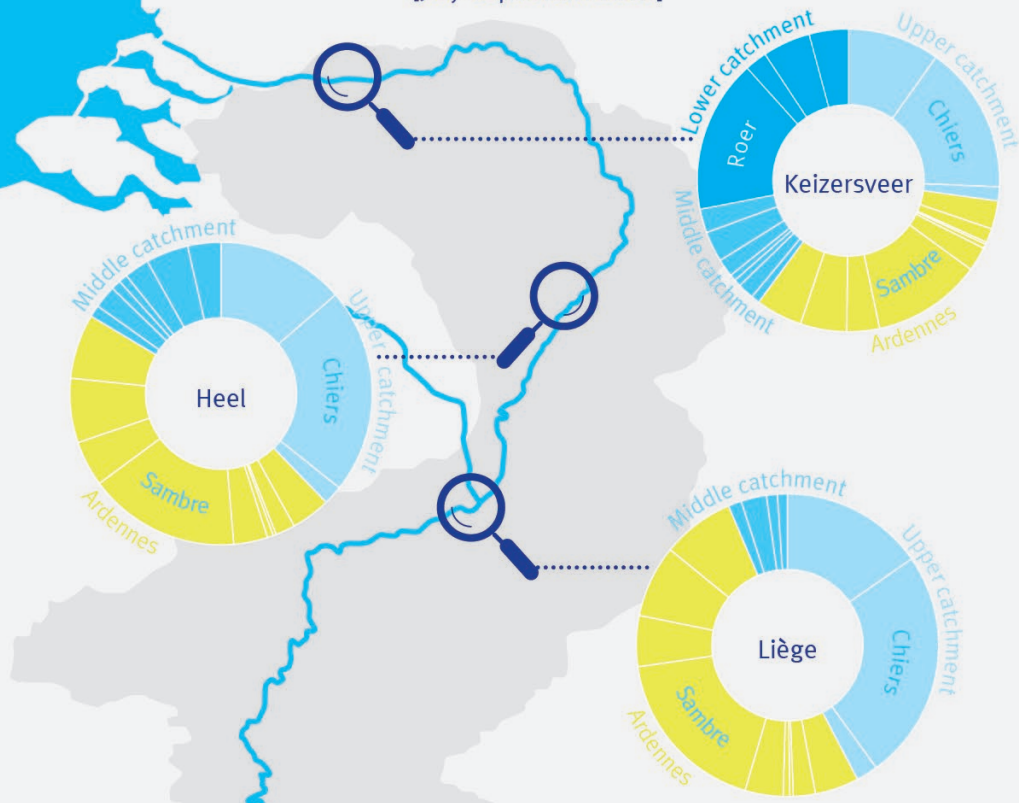
- Understanding the hydrological system including all tributaries.
- Instrument for dialogue and exchange between users and countries.
- Insights into the impact of low river discharge on water availability:





Discharge of different tributaries per area and per summer (July-Aug-Sept) in the period 1998-2020.

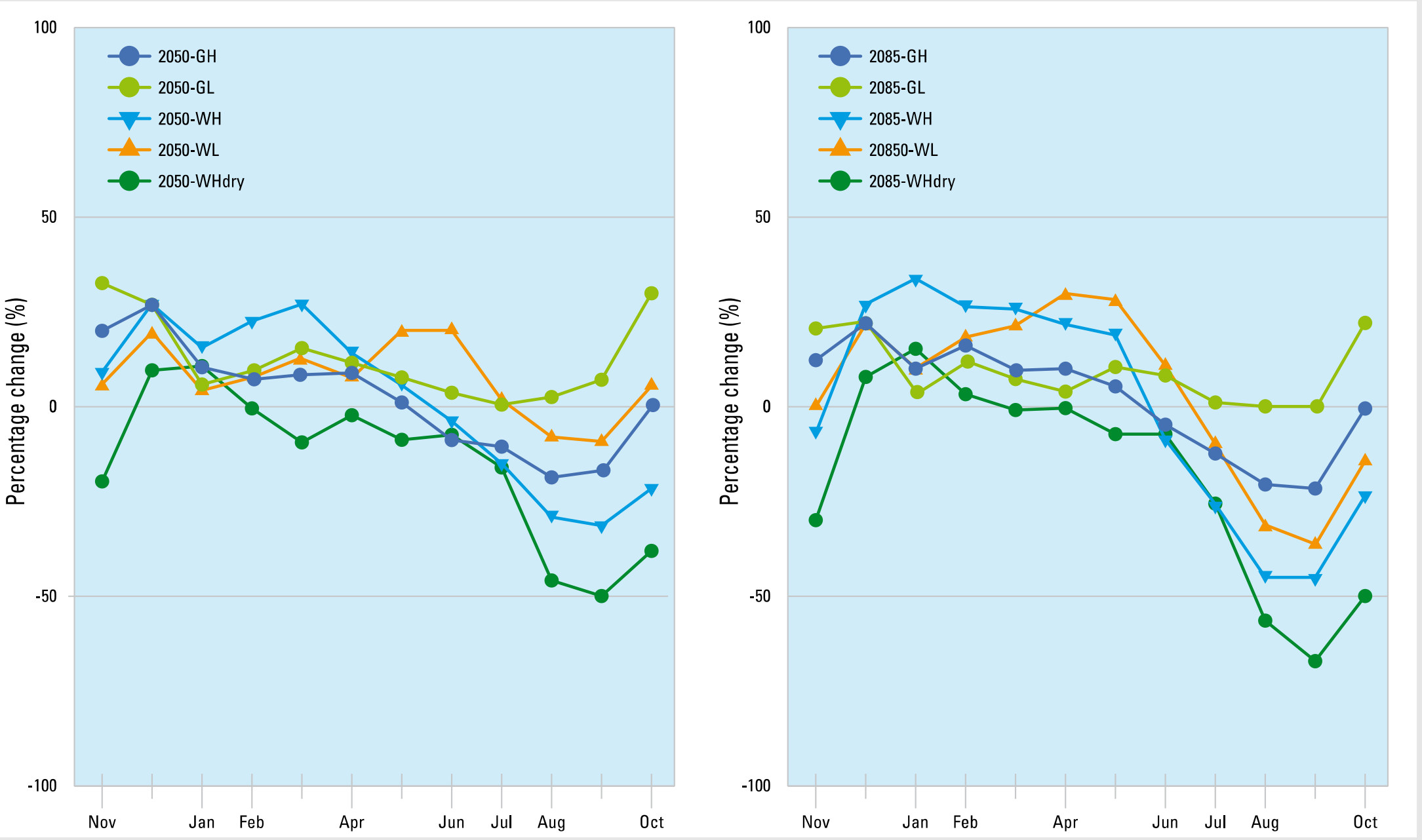
Composition of the Meuse discharge along the river
[July-September 2020]



STEPS for analysis and modelling

Deltares

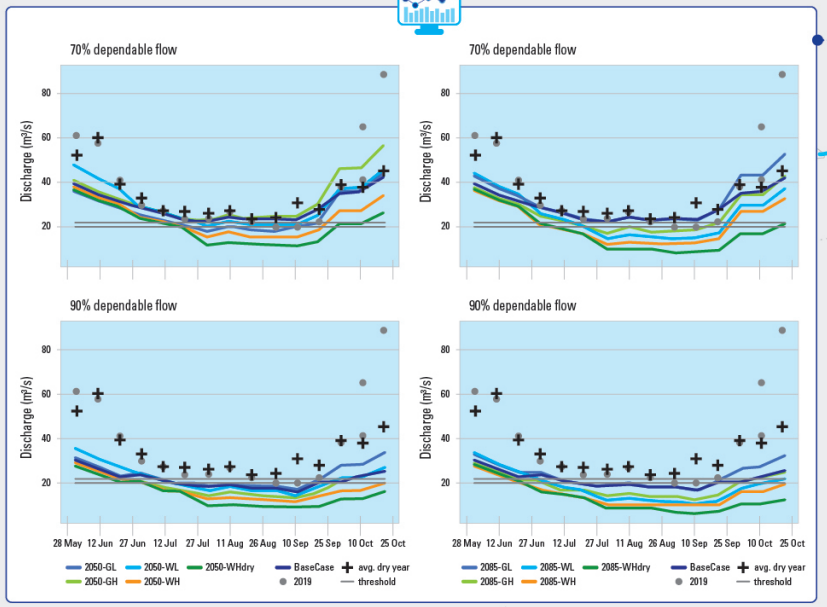
1. Selection of hydrological and water quality scenarios
2. Specify the data simulation and control
3. Edit the catchment's network and database on the map
4. Simulate the catchment area
5. Analyze the results of the simulation



Source Deltares

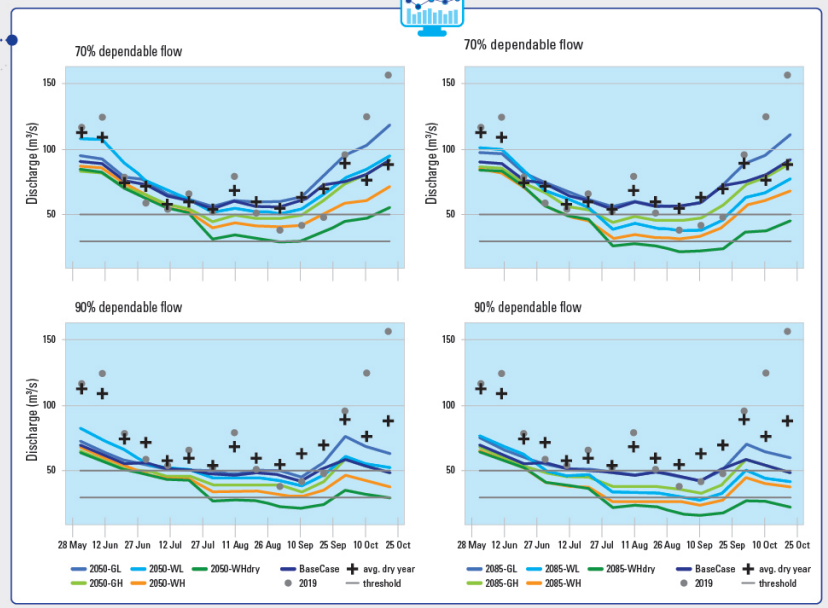
Low discharge

CHOOZ

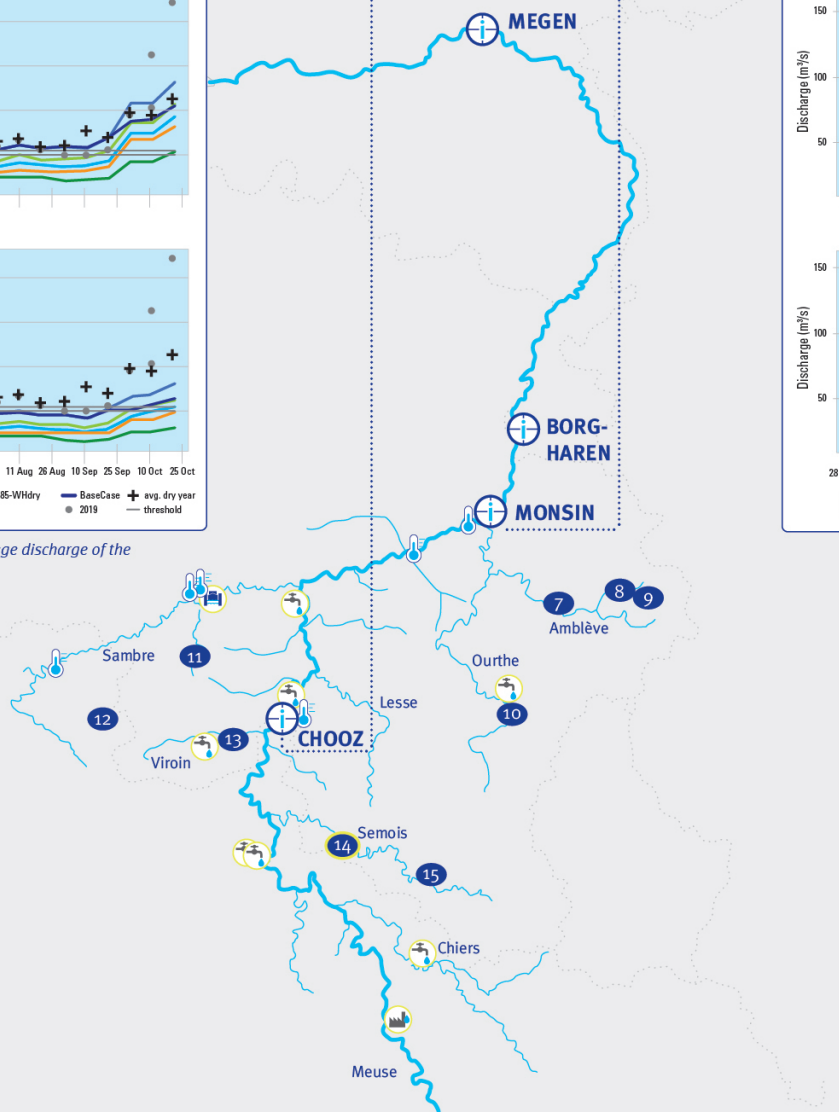


Dependable flow at Chooz for different scenarios, discharge from 2019 and average discharge of the drought years 2003, 2011 and 2017 to 2022

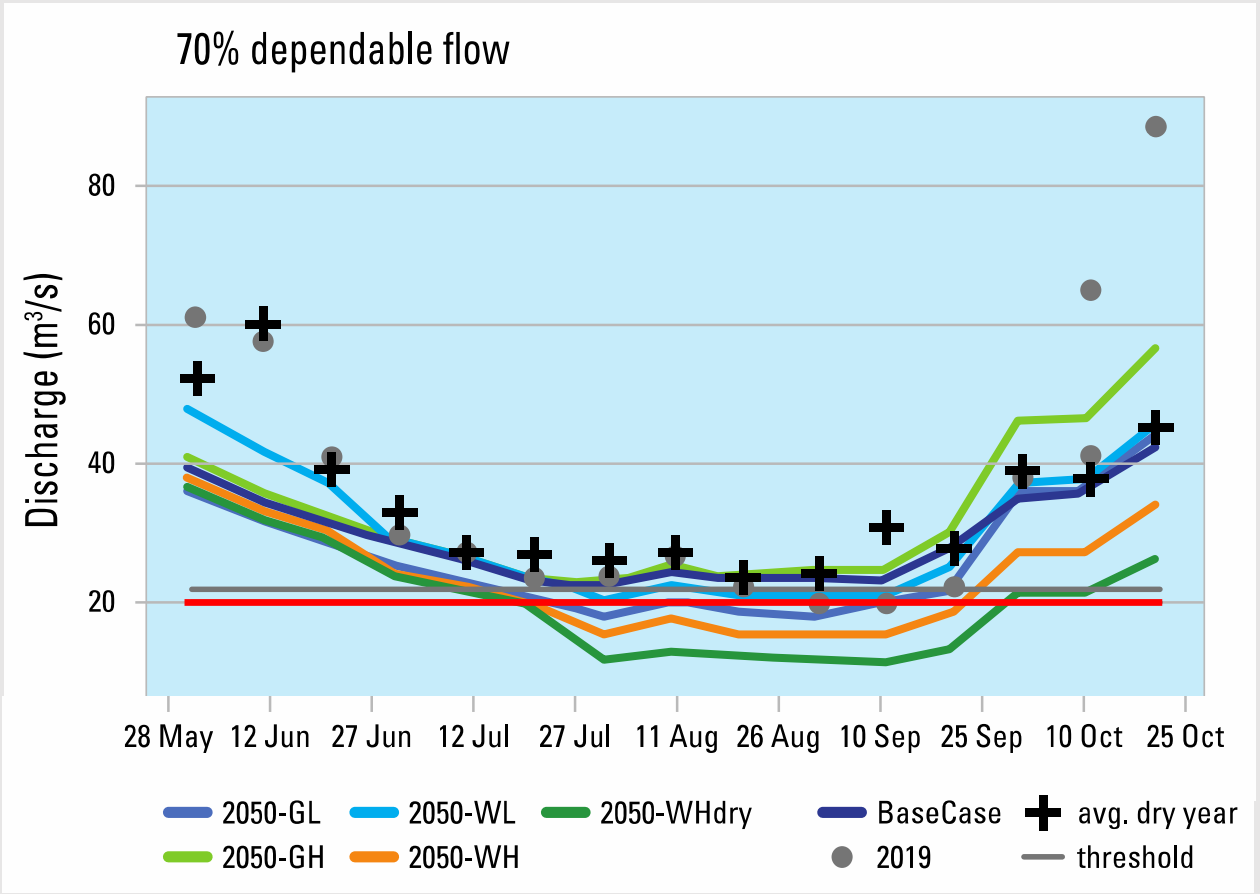
MONSIN

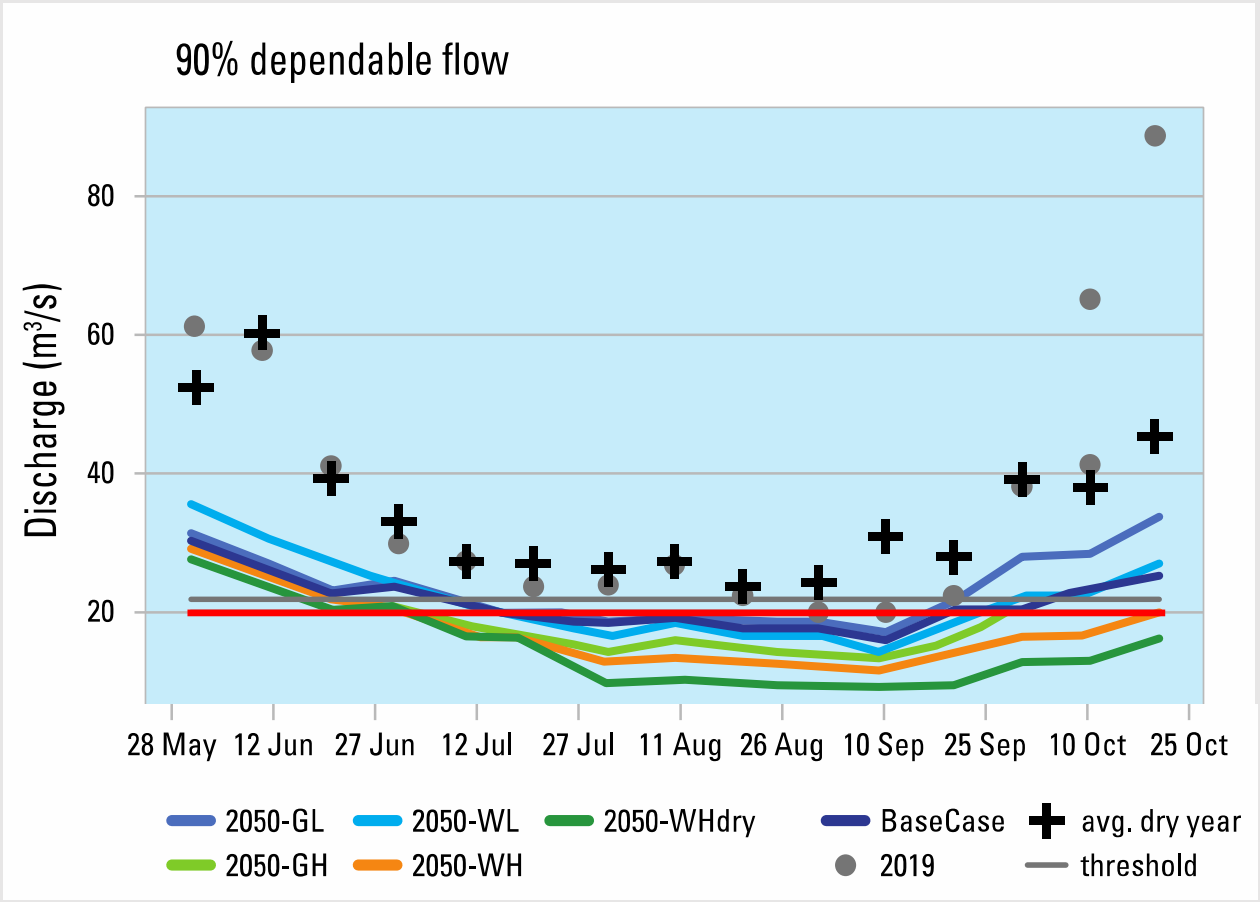


Dependable flow at Monsin for different scenarios, discharge from 2019 and average discharge of the drought years 2003, 2011 and 2017 to 2022



- Meuse
- tributary
- canal
- drinking water utilities
- industrial water use
- cooling water
- locks (and canals)
- reservoirs


70% dependable flow
Discharge (m³/s)
80
60
40
20
28 May
12 Jun
27 Jun
12 Jul
27 Jul
11 Aug
26 Aug
10 Sep
25 Sep
10 Oct
25 Oct
2050-GL
2050-WL
2050-WHdry
BaseCase
avg. dry year
2050-GH
2050-WH
2019
threshold


90% dependable flow
Discharge (m³/s)
80
60
40
20
28 May
12 Jun
27 Jun
12 Jul
27 Jul
11 Aug
26 Aug
10 Sep
25 Sep
10 Oct
25 Oct
2050-GL
2050-WL
2050-WHdry
BaseCase
avg. dry year
2050-GH
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2019
threshold

Low discharge

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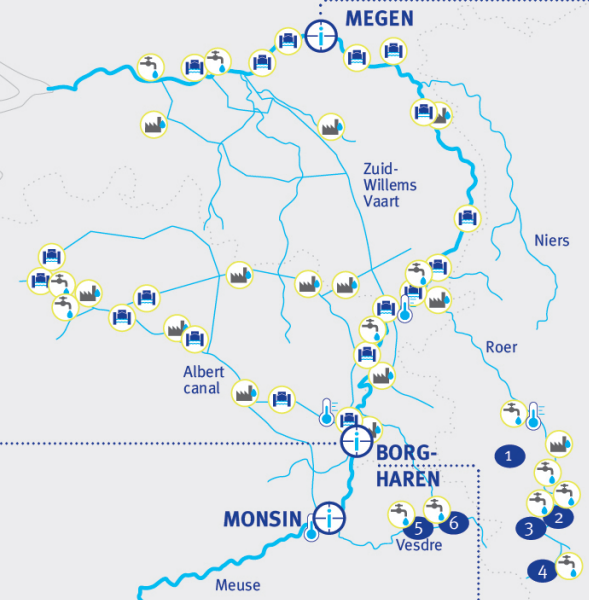
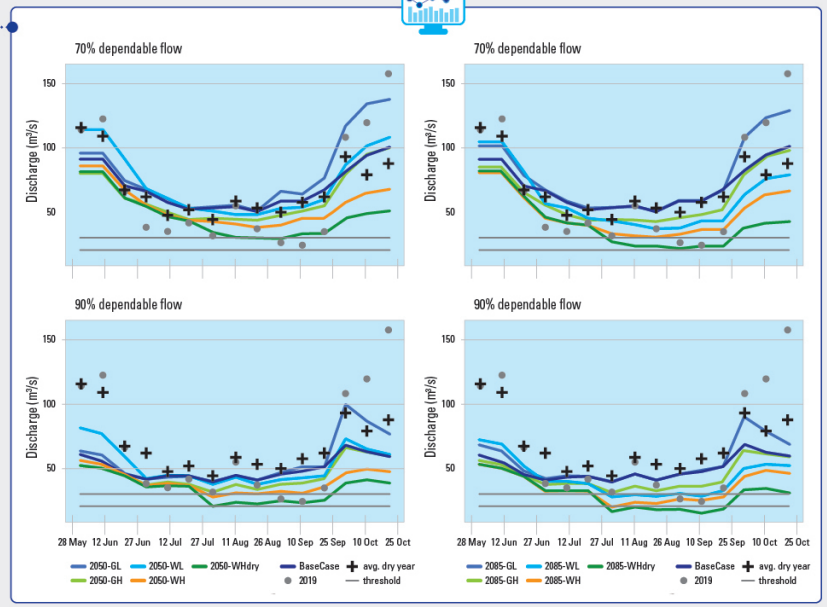
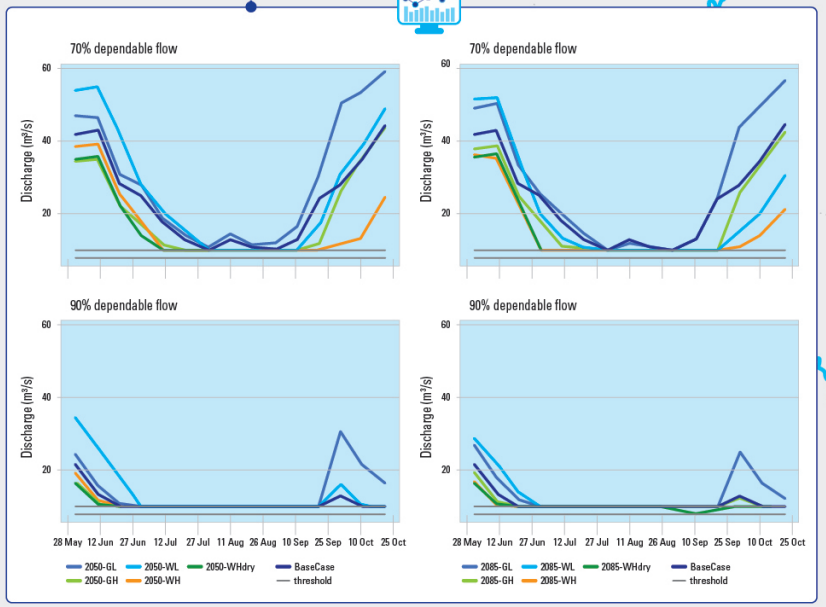


MEGEN



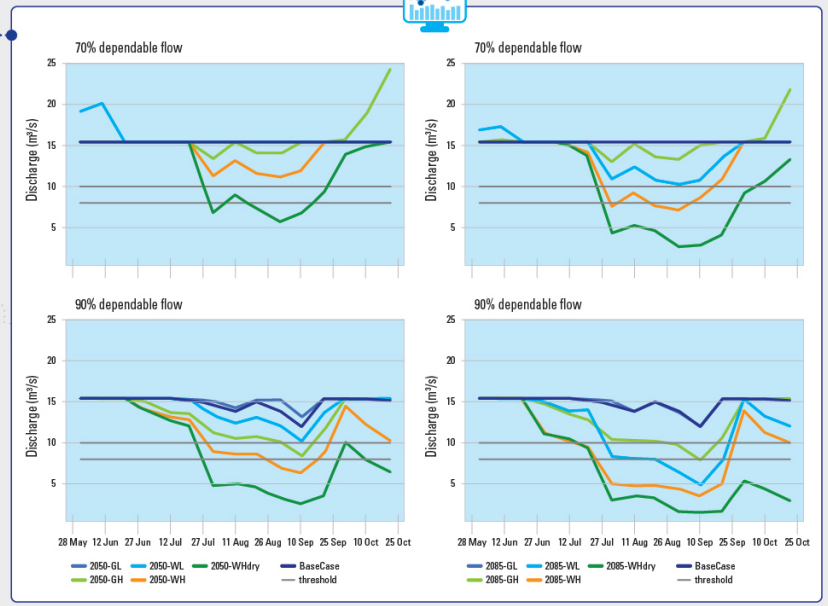
Dependable flow at Megen for different scenarios, discharge from 2019 and average discharge of the drought years 2003, 2011 and 2017 to 2022

BORGHAREN [COMMON MEUSE]



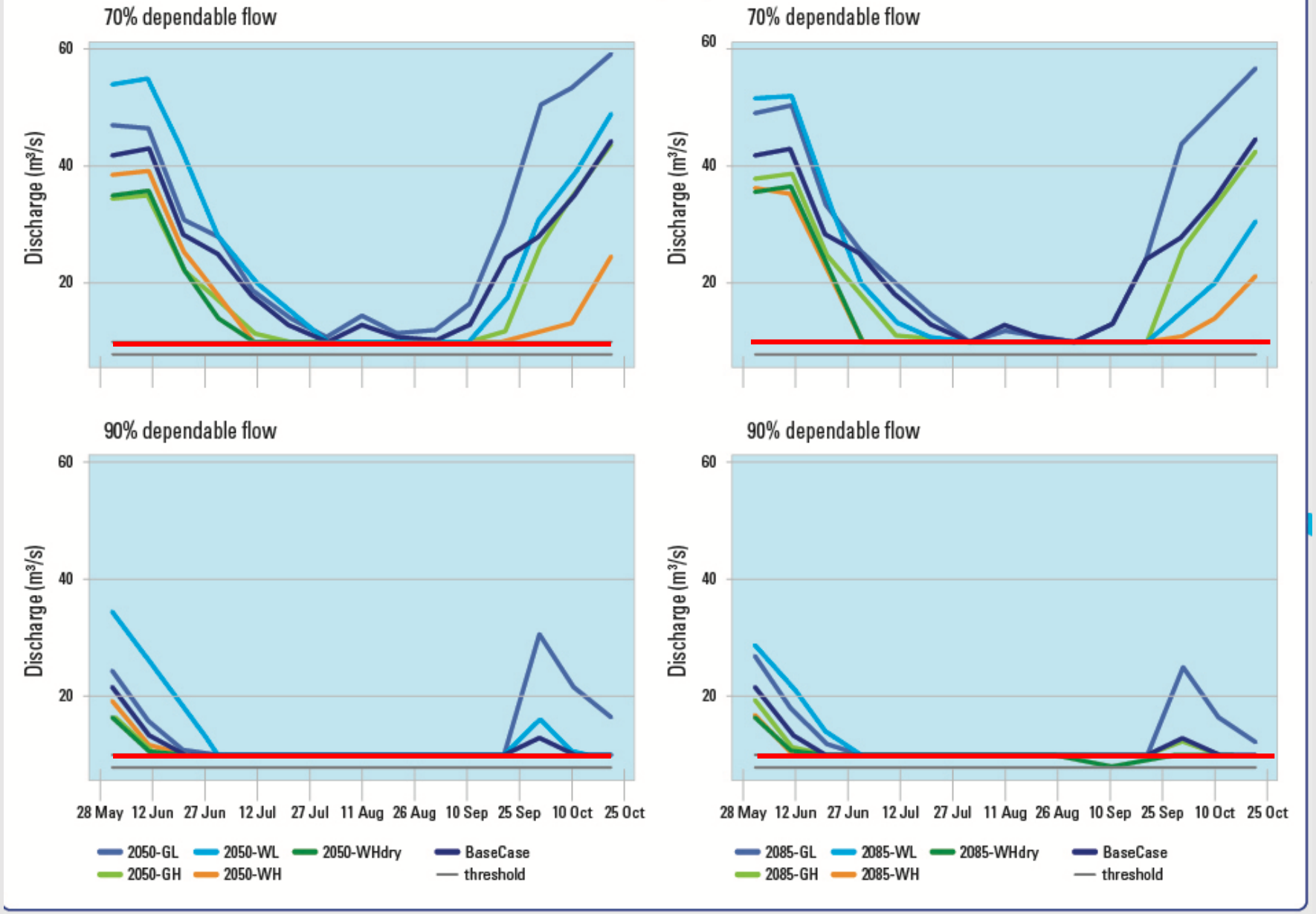
Dependable flow at Borgharen (Common Meuse) for different scenarios

BORGHAREN [JULIANA CANAL]

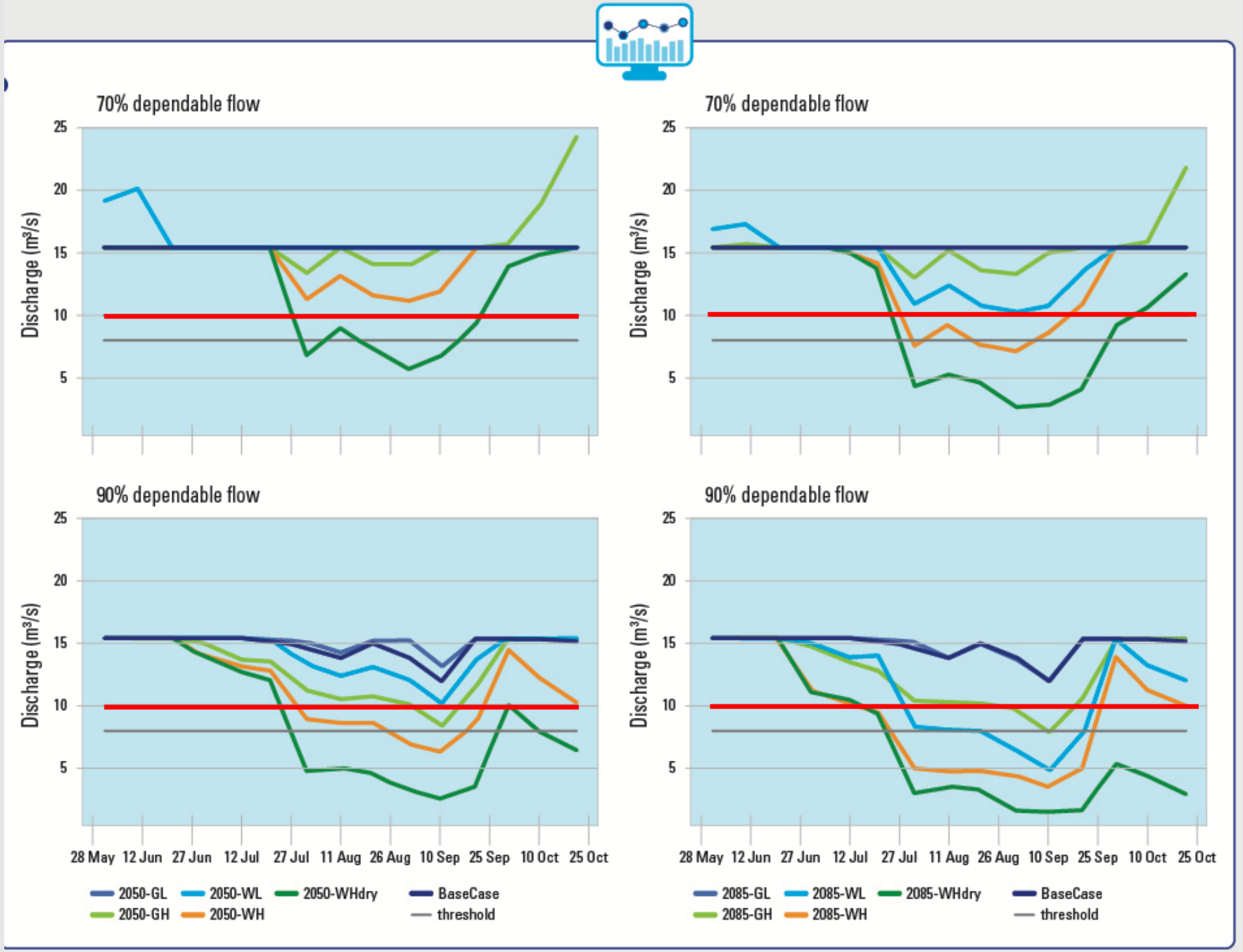


Dependable flow at Borgharen (Common Meuse and Juliana Canal) for different scenarios

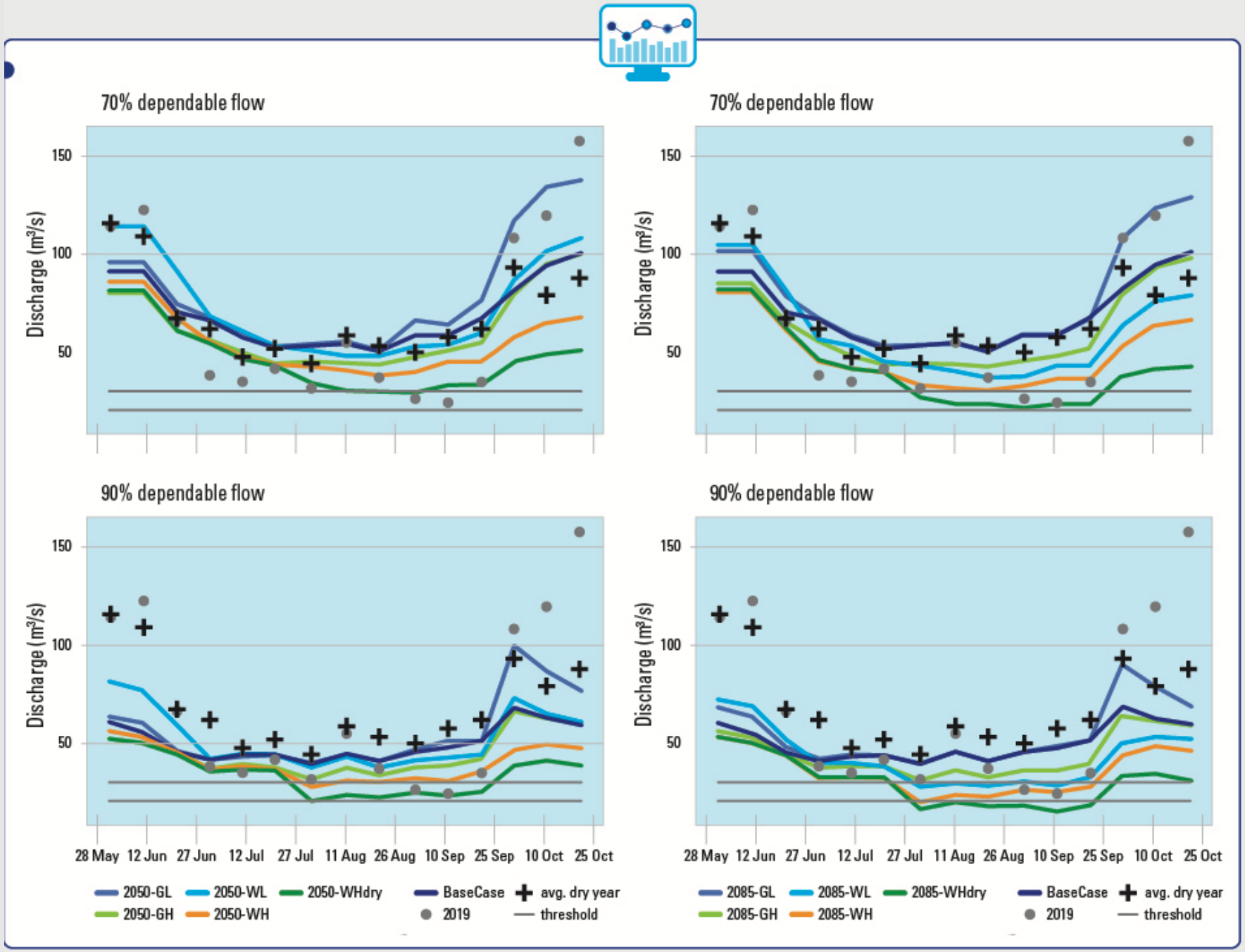
BORGHAREN [GRENSMAAS]



BORGHAREN [JULIANAKANAAL]



MEGEN


70% dependable flow
70% dependable flow
90% dependable flow
90% dependable flow
Discharge (m³/s)
150
100
50
28 May
12 Jun
27 Jun
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26 Aug
10 Sep
25 Sep
10 Oct
25 Oct
2050-GL
2050-WL
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2050-GH
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BaseCase
avg. dry year
2019
threshold
2085-GL
2085-WL
2085-WHdry
2085-GH
2085-WH
BaseCase
avg. dry year
2019
threshold

Dialogue & agreement over water usage

Importance of the Roer

Climate Change impacts whole Meuse basin

Better insight in water use and -extractions

Safeguard water quality at times of low river discharge