

Information products for climate adaptation of inland waterways - from science to service -



Foto: Nilson 05/2019

Upper Rhine at Basel



Foto: Nilson 04/2022

Middle Rhine near Kaub



Foto: Nilson 09/2021

Lower Rhine at Cologne

Dr. Enno Nilson, Dennis Meissner, Bastian Klein, Claudius Fleischer
(Federal Institute of Hydrology, Germany)

Timeline

selected events and items



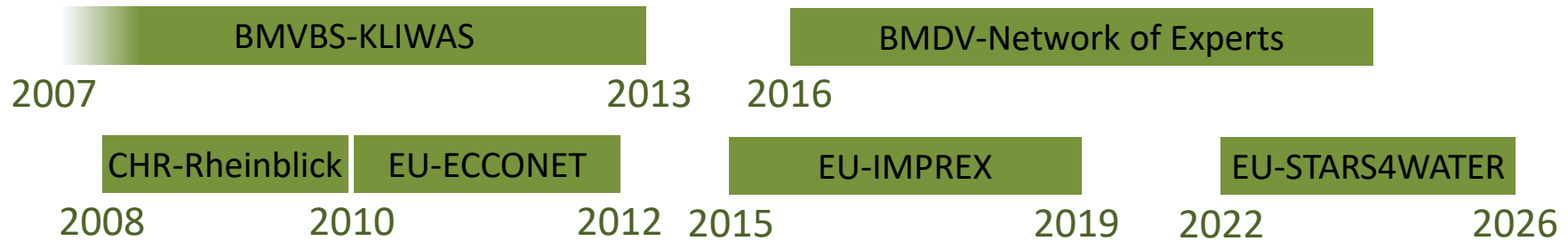
Low flow years

(Years with > 30 days below GIW at Kaub)



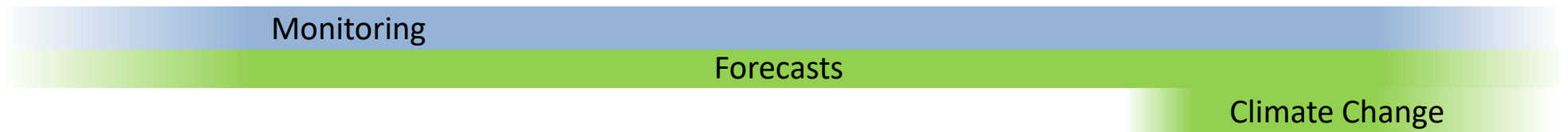
Research projects

(Climate change, hyd. extremes, IWT)



Information Services

(Monitoring, Forecasts, Climate Change)

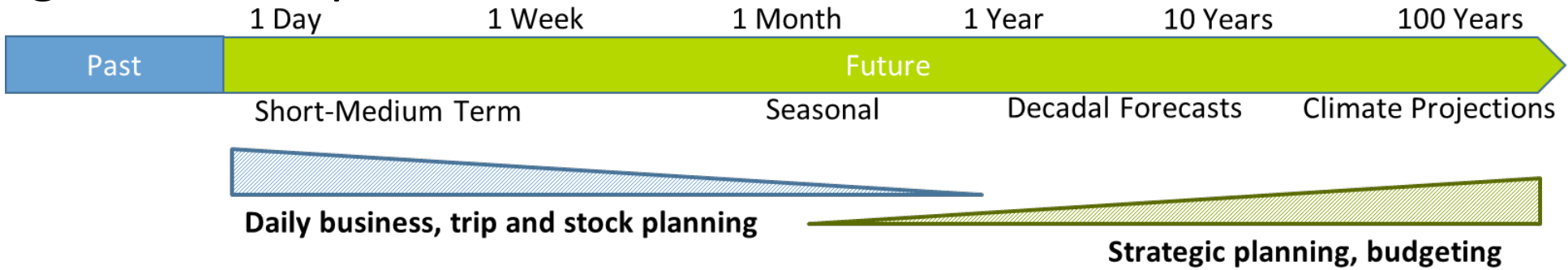


CCNR Workshops

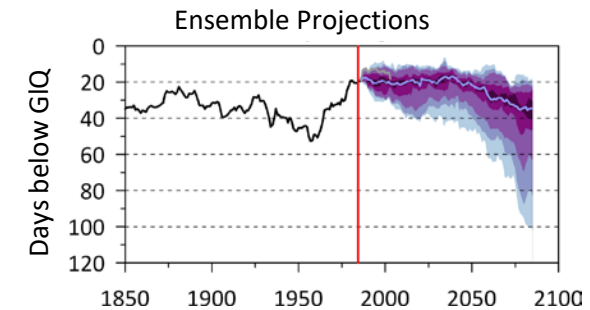
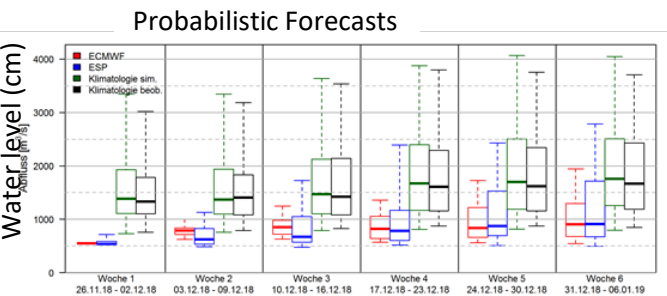
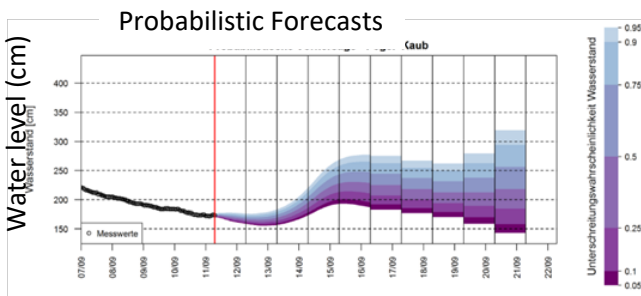
(Climate change & low flow)



Time scales of forecasts and management/adaptation decisions



Maritime – IWT *economic outlook* *future fleet planning*
optimize load *stock management*
transport management *security energy supply* *Investment stock facilities*
plan transport cycles *transport capacity planning* *alternative transport concepts*
multi-modal split planning *infrastructural waterway management*

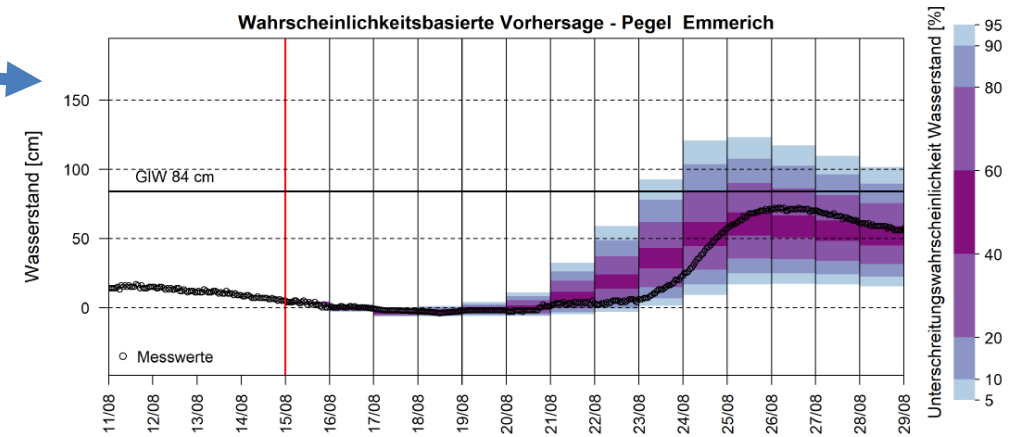


What is new since the start of "actNow!"?

1. Innovative forecasting services for IWT (since 2019/2022)

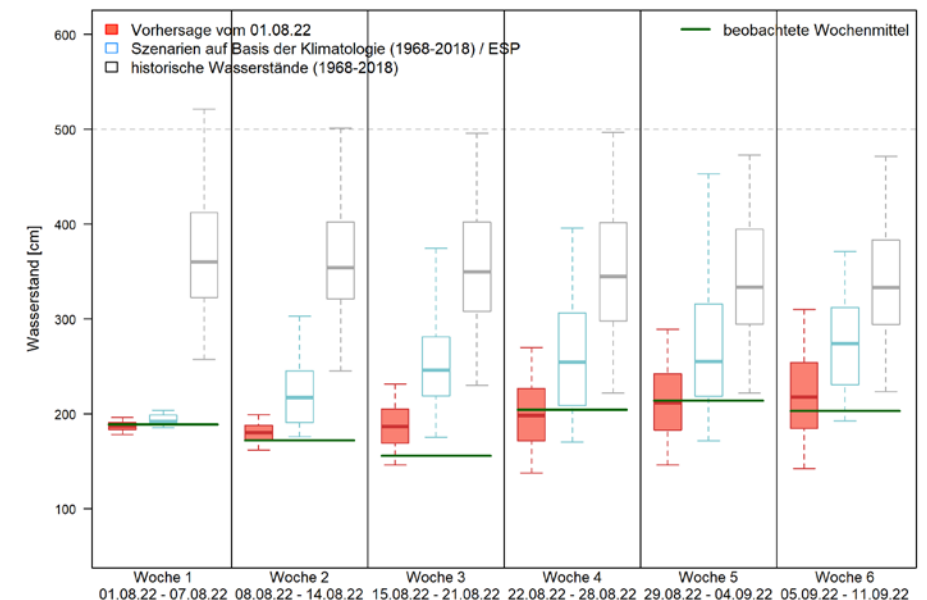
14-day forecast of river flow and water levels

- Probabilistic
- Rhine waterway, 7 gauges, hourly to daily resolution
- daily update
- access via www.ELWIS.de
- operational and online since July 2022 (precursor: 10-day forecast since 2019)
- for transport planning (load factors)



6-week forecast of river flow and water levels

- Probabilistic
- Rhine and Elbe waterways, 3 gauges each, weekly resolution
- bi-weekly update
- access via www.ELWIS.de
- operational and online since July 2022
- for logistics planning (stocks, capacity)



Future development options and targets

Forecasting services

Lead times

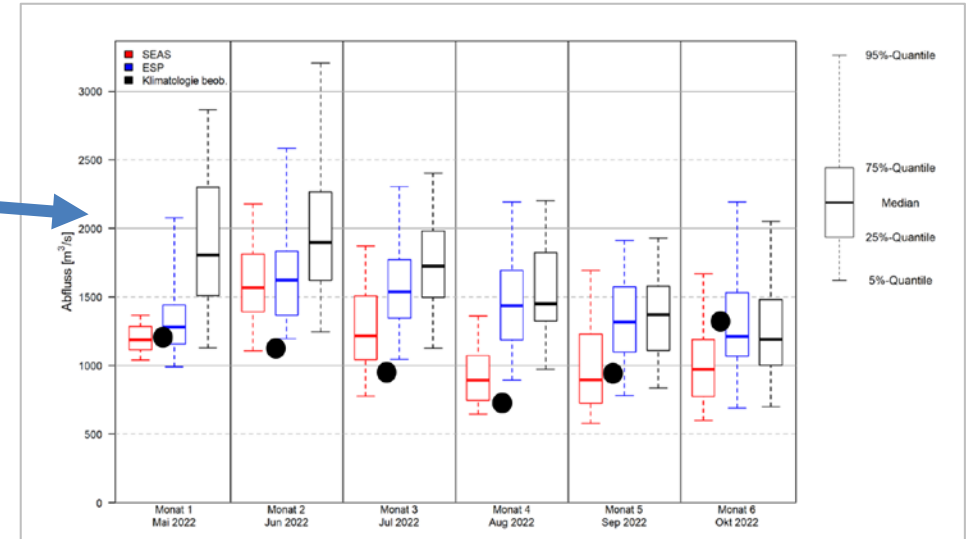
- Extending forecast lead-times to seasonal time-scales (up to 6 months)

Coverage

- Expanding extended-range forecasting services to further German waterways
- Linking of forecasting services along international waterway corridors

Technology

- Applying AI-methods to further improve forecast results
- Developing prognostic information dashboards allowing the user to customize extended-range forecast outputs

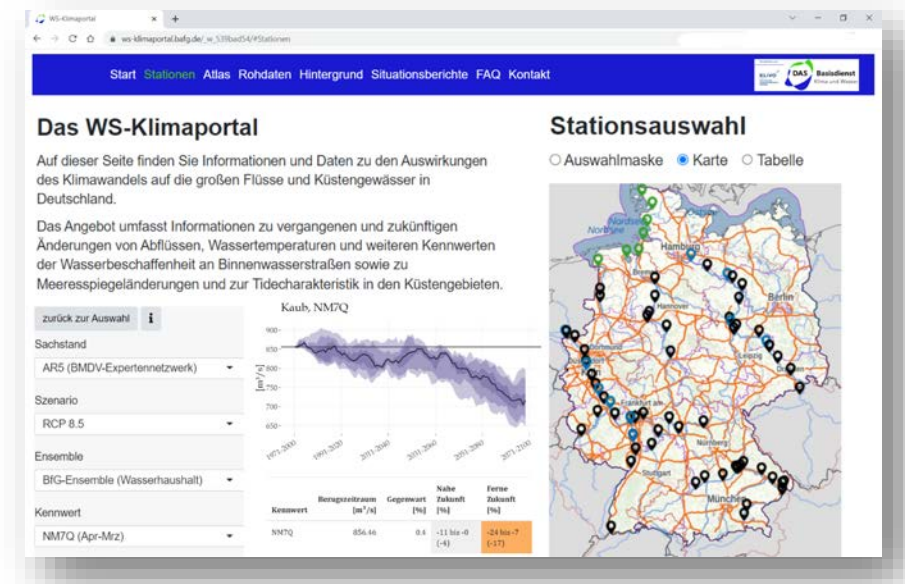
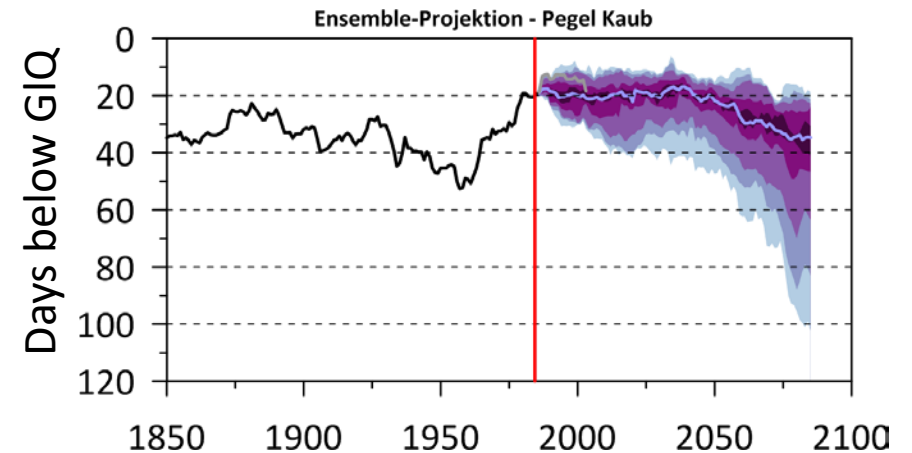


What is new since the start of actNow?

2. Climate services for water(way)management (since 2020)

100-year projections of river flow, water levels, water temperatures

- part of the core service "climate and water" of the German adaptation strategy (DAS-Basisdienst "Klima und Wasser")
- based on current climate model ensembles (e.g. CORDEX)
- Rhine, Danube, Elbe, Weser, Ems, and coastal waterways, daily resolution
- updates and scenarios according to IPCC cycles and the "German adaptation strategy to climate change" (DAS)
- access via ws-klimaportal.bafg.de
- operational and online since December 2020
- for strategic planning (transport concepts, infrastructure)
- for the workflow 'WSV-Climateproofing'

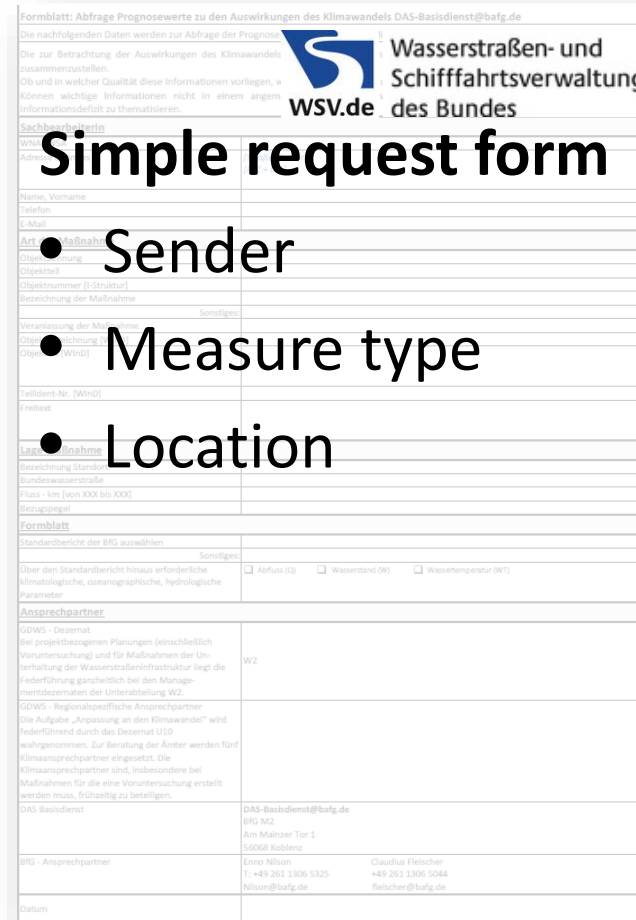


What is new since the start of actNow?

3. WSV-Climateproofing (since 2021)

New workflow of the German Waterways and Shipping Administration (WSV)

- to meet current legal requirements
- regarding the consideration of climate change
- in many new planning projects (construction, operation and maintenance)
- supported by the core service "climate and water" of the German adaptation strategy (DAS-Basisdienst "Klima und Wasser")
- accompanied by a user manual, training and a permanent advisory service
- introduced by official order in April 2021



Simple request form

- Sender
- Measure type
- Location

Anspruchspartner		
GDWS - Dezernat Bei projektbezogenen Planungen (einschließlich Voruntersuchung) und für Maßnahmen der Unterhaltung der Wasserstraßeninfrastruktur liegt die Federführung geographisch bei den Managementebenen der Unterabteilung W2.	W2	
GDWS - Regional spezifische Ansprechpartner Die Aufgabe „Anpassung an den Klimawandel“ wird federführend durch das Dezernat 0222 wahrgenommen. Zur Beratung der Ämter werden fünf Klimansprechpartner eingesetzt. Die Klimansprechpartner sind, insbesondere bei Maßnahmen für die eine Voruntersuchung erstellt werden muss, folgend zu beteiligen.		
DAS Basisdienst	DAS-Basisdienst@bafg.de BfG 62 Am Malheur Tor 1 56068 Koblenz	
BfG - Ansprechpartner	Erna Nilson T: +49 261 2306 5325 Nilson@bafg.de	Claudia Fleischer +49 261 2306 5044 Fleischer@bafg.de

Semi-automated reports within hours/days:

- Brief Background info
- Data basis, model quality
- Predefined measure and location specific indicator set

Product portfolio

- New indicators: sediment dynamics, flood plain ecology, water quality
- Weekly bulletin: Climatological evaluation of the hydrological system state
- Linking climate and socio-economic scenarios
- Update of scenarios (IPCC AR 6)

Coverage

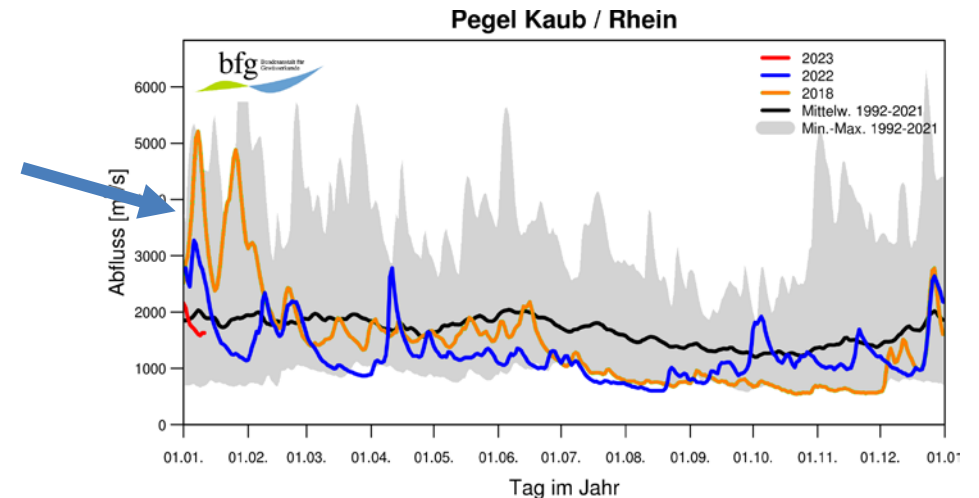
- Expanding the services to the Odra waterway

Technology

- Improvement of the hydrological model system; e.g. additional water management measures, water demands by various sectors
- Improvement of web interface

Coordination/Dialogue

- Comparison and integration of scenarios with federal and riparian states
- Comparison and integration of scenarios with other sectors; environment, agriculture



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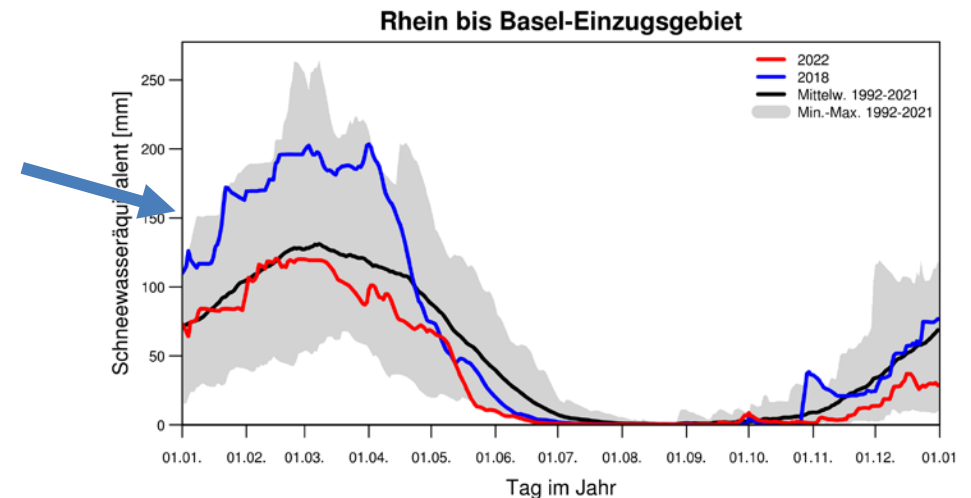
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Future development options and targets

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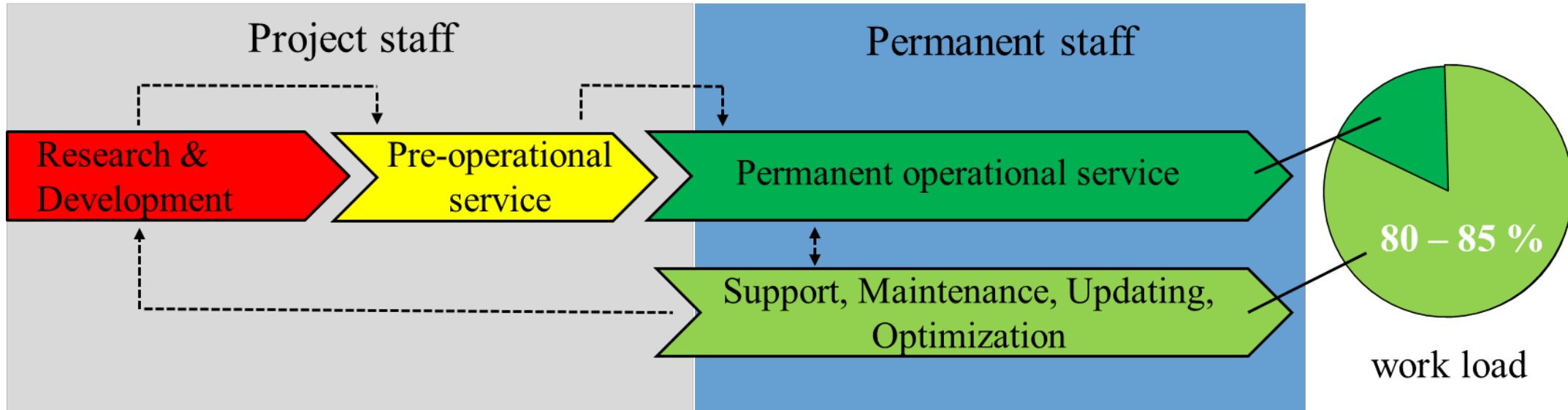
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Integration of different Rhine assessments 2022/2023

Matches and mismatches

	CHR-Rheinblick2050	KNMI06	CC-Hydro2013	DAS, KLIWAS	KLIWA	EXPLORE2070
AR4	...	...	...	...	...	...
AR5	CHR-ASG II	KNMI14	CC-Hydro2018	DAS, XPN	KLIWA	EXPLORE2
Scenario	RCP8.5	RCP8.5	RCP8.5, ...	RCP8.5, ...	RCP8.5	RCP8.5, ...
Climate	CORDEX	CMIP5	CORDEX	CORDEX	CORDEX	CORDEX
Members	7	AdvDC, RACMO	20	16	10	12
Hydrology	HBV-light/LARSIM	HBV	HBV-light/PREVAH	LARSIM	LARSIM	GRSD
Reference	1981-2010	1951-2006	1981-2010 2020-2049	1971-2000	1971-2000	1976-2006
Future 1	2031-2060	2021-2050	2045-2074	2031-2060	2021-2050	2021-2050 2041-2070
Future 2	2071-2100	2071-2100	2071-2100	2071-2100	2071-2100	2071-2100
AR6	...	...	...	...	...	...
	CHR-...	KNMI/Deltares	CC-Hydro	DAS	KLIWA	...

Prerequisites for activation of the new services



1. **Applied Research & development** is crucial to provide up-to-date information products for the waterways.
2. **Operational services** are required to distribute information products reliably to the waterway users permanent staff.
3. **Expansion of operational services** (time scales, waterways, indicators) highly depends on the availability of additional permanent staff and the preparation by powerful R&D programmes.

Questions/Comments?

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