Working on low water in the Rhine basin

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UN-ECE WS on Water Scarcity
Session 2: Addressing water scarcity through transboundary cooperation: legal and practical experiences

11-12.12.2017, Geneva, Switzerland

IKSR
CIPR
ICBR

Internationale Kommission zum Schutz des Rheins

Commission Internationale pour la Protection du Rhin

Internationale Commissie ter Bescherming van de Rijn

International Commission for the Protection of the Rhine

Structure

(1) ICPR: The new topic of “Low water/Low flows”

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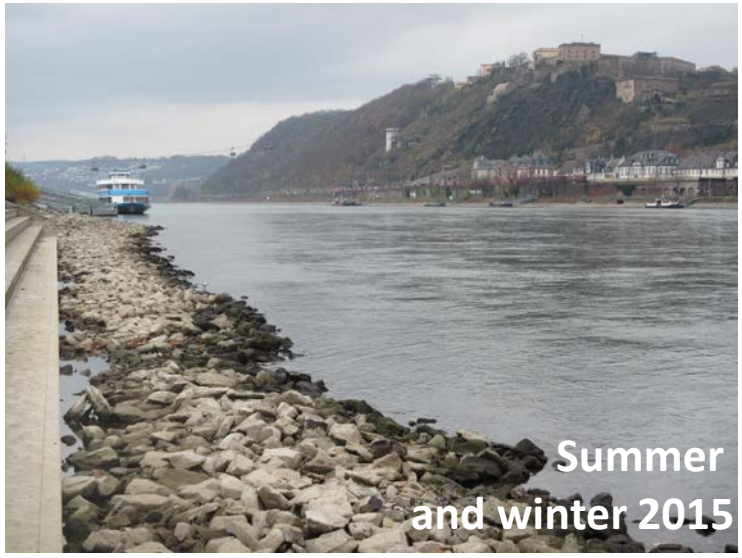
(1) ICPR: The new topic of “Low water / Low flows”


GENERAL-ANZEIGER BLICKPUNKTE Freitag, 25. November 2011 3

Das Rekord-Niedrigwasser und seine Folgen

Immer weiter zieht sich der Rhein in sein Bett zurück: Blick auf die Kennedy-Brücke von der Beueler Rheinseite aus. FOTO: VOLKER LANNERT

Die große Trockenheit



(1) ICPR: The new topic of “Low water/Low flows”

15th Conference of Rhine Ministers (Basel, Oct. 2013)

Extract from the communiqué on “Low water”:

“In the near future the ICPR will decide on further steps, eventually on an ICPR low water (management) plan”.

Issue treated since then by the ICPR Working group “Floods and low water”

Establishment of an Expert group “Low Water” in 2016

1st meeting of the EG LW 17 January 2017

(2) Mandate of the EG LW

1. Survey of knowledge on low flow in the IRBD Rhine

- Analysis of low flow events by gauge-related **evaluation of monitoring data** (long term)
- **Analysis** of selected **extreme low flow events**
- **Compilation of impacts** on low flow and **uses affected** by low flows (inventory, different uses)
- Considerations on the **impacts of climate change** on low flow using the results of the ICPR climate study (= decrease up to – 10 % in summer halfyear, see report 188)
- **Exchange on national low flow monitoring, on aspects of low flow management and transboundary aspects.**

(2) Mandate of the EG LW

2. **Establishment of low flow monitoring** (monitoring network and parameters)

3. **Exchange of information with the other working groups** (Water quality and ecology) and eventually further uses with respect to specific impacts

4. Drafting of a **contribution** (report) resulting from the mandate of the Conference of Rhine Ministers 2013 (and in the run-up to the next **Conference of Rhine Ministers**) with deliverables, state of knowledge and on the **relevance / necessity of an ICPR low water management plan**

(3) Monitoring stations and data basis

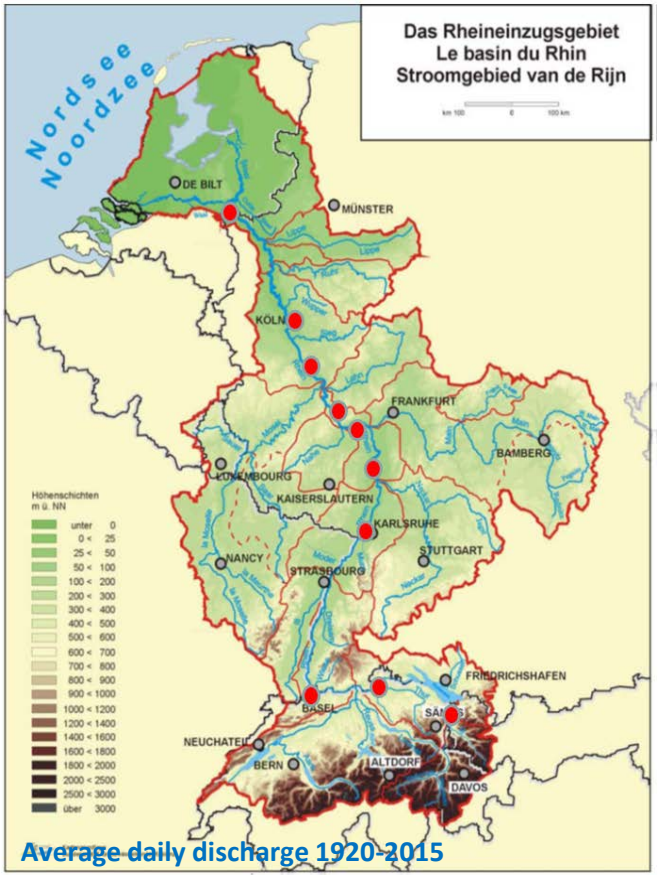
Parameters of the study:

Low flow discharge: NM7Q (1, 3, 7, 21, 60 days)

Low flow duration: maxD < MNM7Q

Mean **A**nnual **M**inimum (7days)

Threshold values: Above values of defined return periods



Average daily discharge 1920-2015

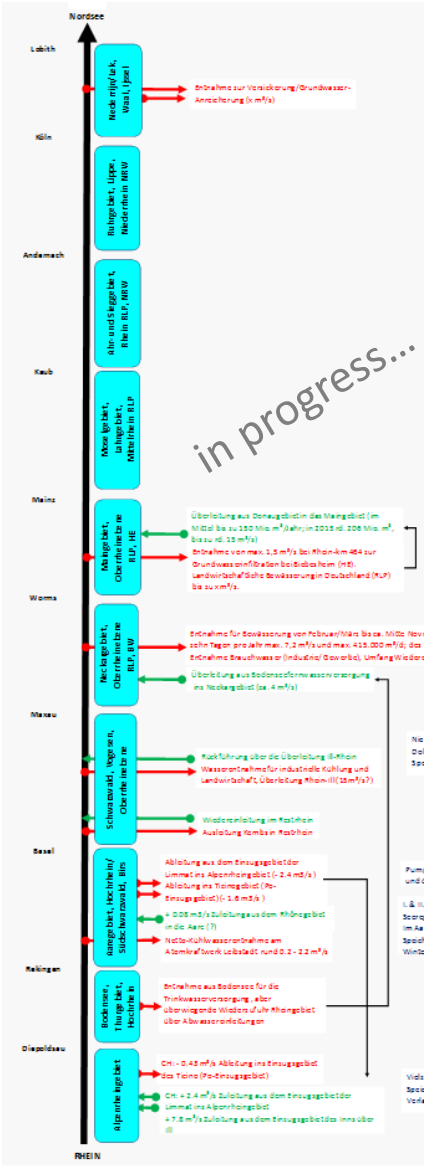
Monitoring gauging station

MNM7Q an Rheinpegeln:

(1961 -2011)

Lobith	1095 m³/s
Köln	1028 m³/s
Andernach	998 m³/s
Kaub	851 m³/s
Mainz	850 m³/s
Worms	720 m³/s
Maxau	645 m³/s
Basel	527 m³/s
Rekingen	238 m³/s
Diepoldsau	92 m³/s

(4) Inventory: Diversion of water and abstractions, lag time of discharge by management



Expansion and management of reservoir volumes
(Total reservoir volume upstream of Basel is in excess of 1.8 billion m³ with retention during the summer and release during the winter)

Diversion of water and abstractions (max. daily values)

Diversion into Ticino catchment		-0.43	m³/s
Diversion from R. Inn vial R. Ill		+7.8	m³/s
Abstraction Lake Constance	~	- 4	m³/s
Return flow via R. Neckar	~	+ 4	m³/s
Diversion into Ticino catchment		-1.6	m³/s
Diversion into Rhone area		- 3	m³/s
Abstraction for irrigation	up to	- 4.8	m³/s
Abstraction to raise ground water	up to	- 1.5	m³/s
Diversion from Danube area	up to	+15	m/s
		=========	
		+ 11.5	m³/s

plus surplus discharge in winter ~~ + 120 m³/s ?
(Due to reservoir management)

(4) Inventory: Impacts

Impacts on water quality and ecology
(together with other working groups)

E.g.: During low water events in summer with high water temperatures (as in 2003): Fish and mussel die-offs

Impacts due to usage

Water provision - abstraction restrictions

Agriculture - Ban on abstracting water from groundwater or surface waters

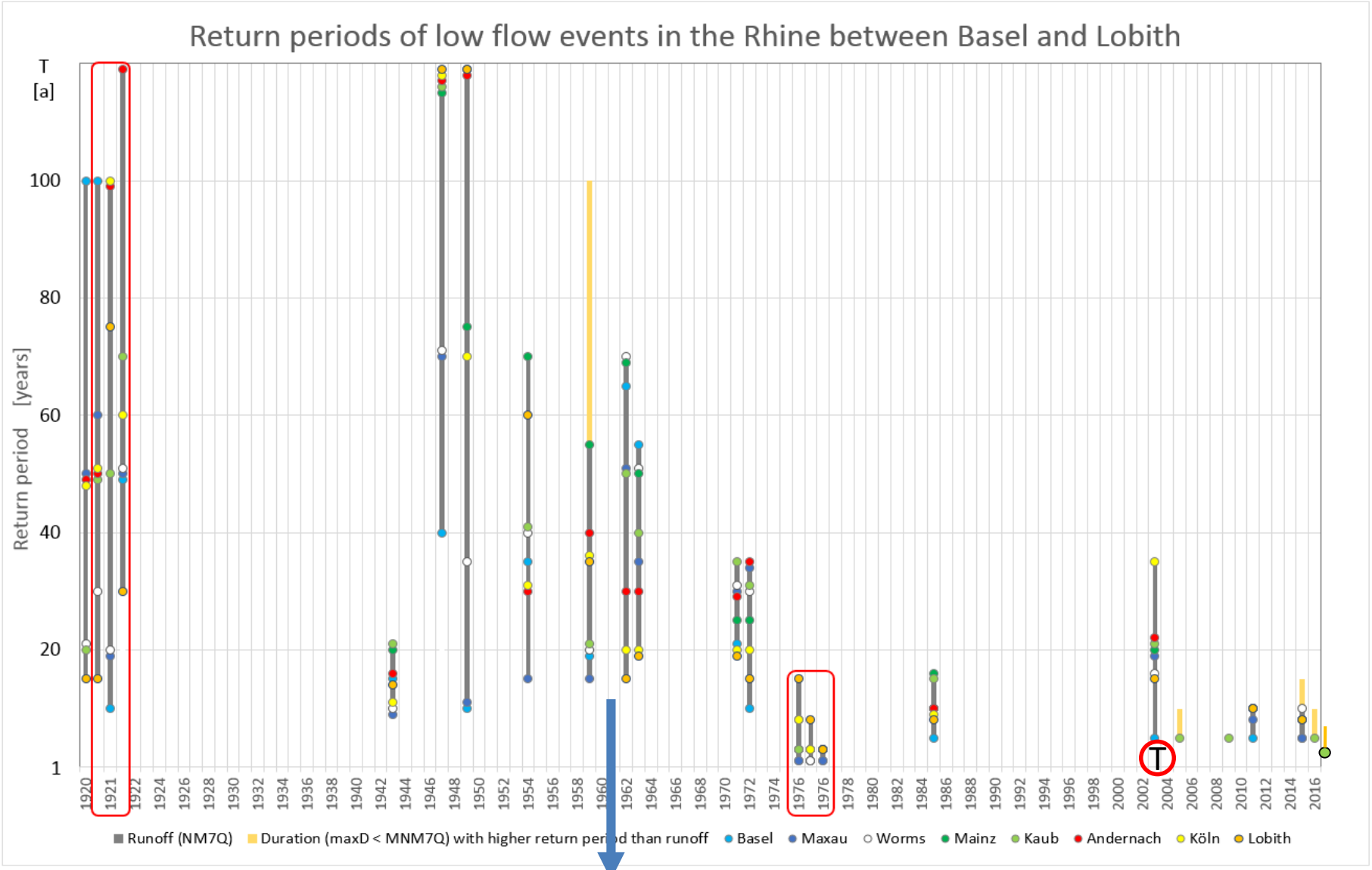
Energy production - restrictions on thermal discharges
- reduced power plant output
- increased prices for electricity

Navigation = main transboundary affected actor
less loading capacity (in 2003 only 20-30 %)

Industry - supply of raw materials and sources of energy

Security - instability of protecting dikes in the Netherlands (2003 subsidence of peat dikes)

(5) Analysis of historic discharge series (results)



NM7Q development: 2d Half of 20th century: less low flow events/more discharge.

Reason: Human footprint at the alpine Rhine (Until 1960's: construction of water reservoir in CH)

(6)Low water monitoring and assessment in the int. Moselle-Saar basin: Work of the ICPMS

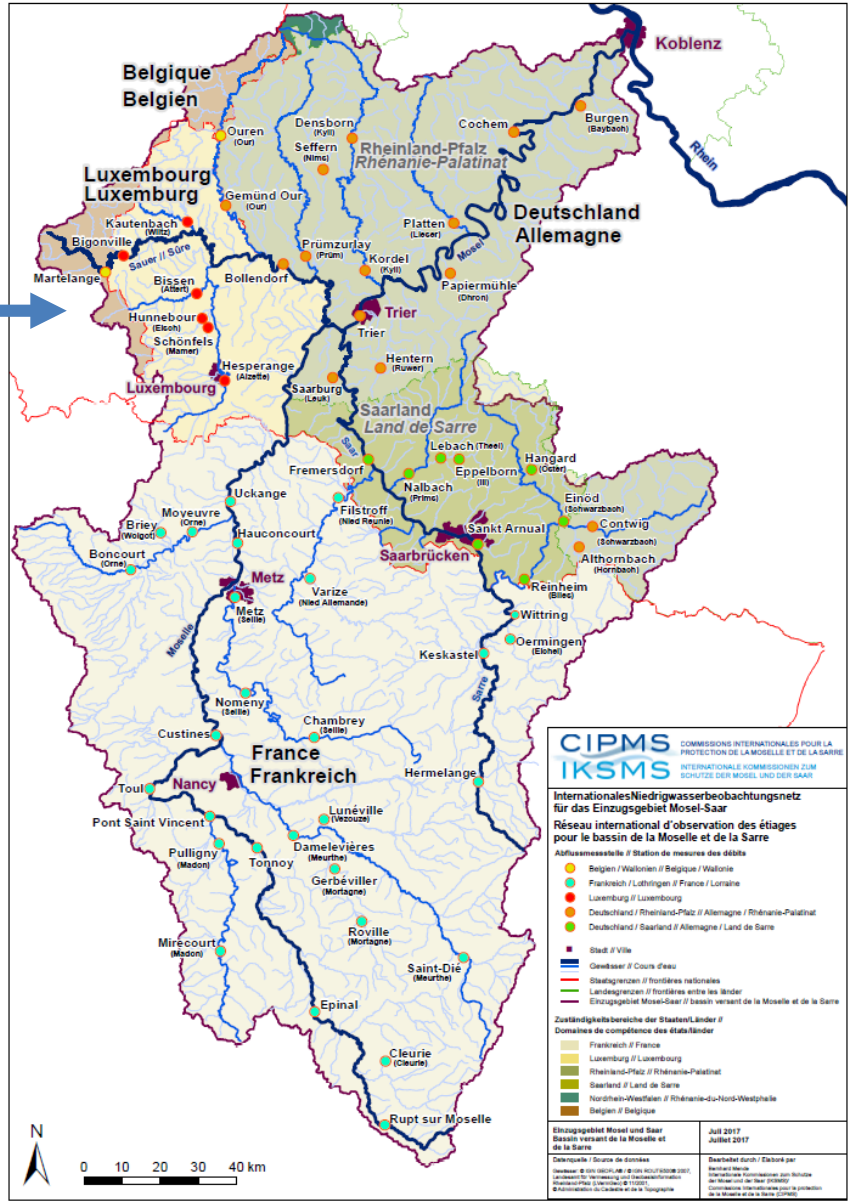
1st assessment report Dec. 2014, Final report in 2018

Operational low water monitoring → internet
Low water forecast tests

Focus: Impacts of the reduced discharge on the waterbody ecological status (WFD)

With ICPR:

- **Exchange on approach**
- **Coordination of threshold values for monitoring**



(7) Threshold values / Monitoring (retrospective, prospective, operational)

Determination on low flow classification

Colour	Classification	Characteristic	Description
green	0	>= NM7Q(T2)	normal = no low flow
yellow	1	< NM7Q(T2)	frequent low flow
orange	2	< NM7Q(T5)	less frequent low flow
red	3	< NM7Q(T10)	rare low flow
violet	4	< NM7Q(T20)	very rare low flow
black	*5*	*< NM7Q(T50)*	*extremely rare low flow*

(coordinated with ICPMS)

(8) (Preliminary) Conclusion

Compared to the first half of the last century, recent low flow events can rather be designated as minor to moderate.

Direct impacts on the discharge of the Rhine rather tend to support low flow discharge.

It seems difficult to imagine direct possibilities of intervention.

Low flow events in summer together with high water temperatures seem to indicate a new challenge.

Based on current knowledge such situations could increased in the future.

→ **Better understanding and monitoring the low flows = way of adapting to climate change!**
(see ICPR climate change strategy, Report 229)

Rhine at Wiesbaden, August 2003