Towards adaptation to climate change

Ben van de Wetering

Executive Secretary of the International Commission for the Protection of the Rhine

IKSR
CIPR
ICBR

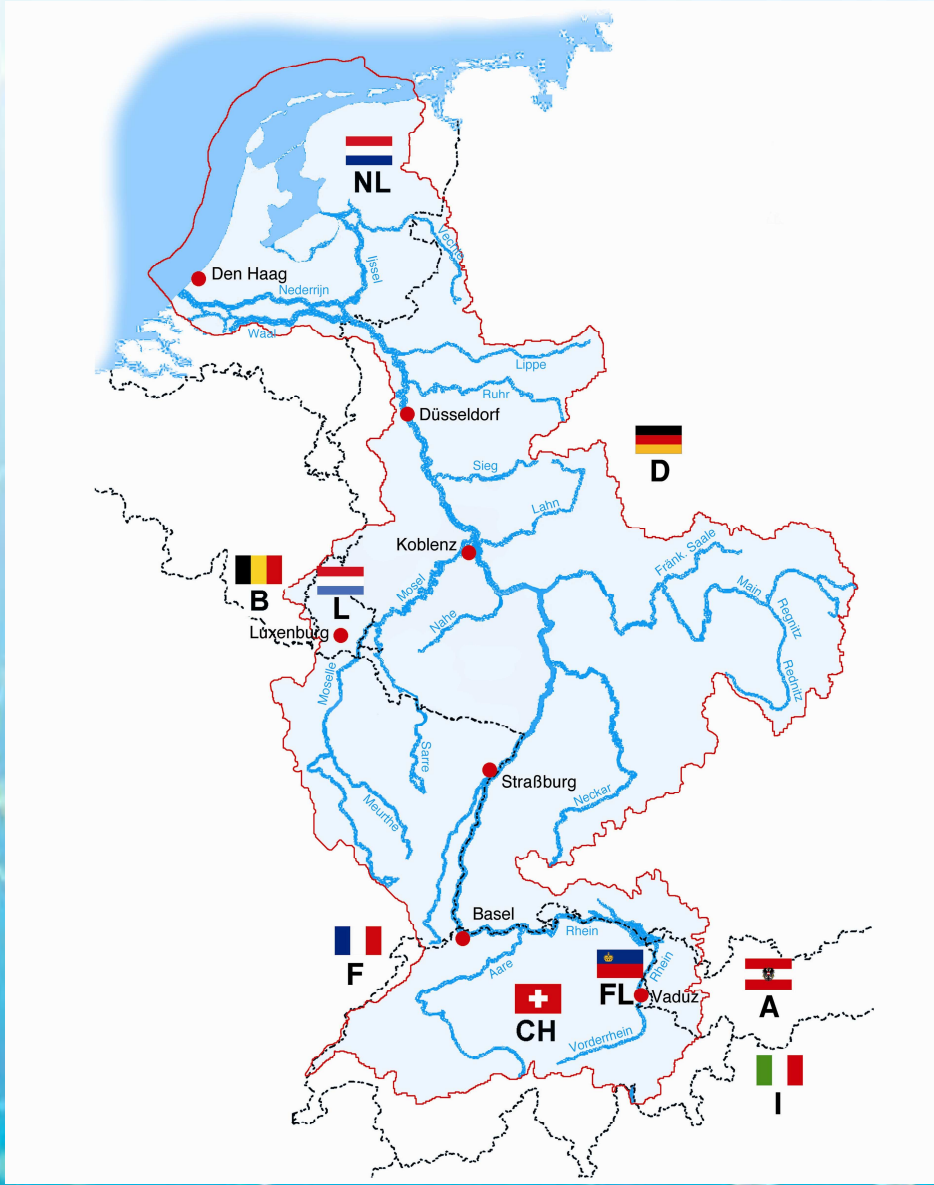
Internationale Kommission zum Schutz des Rheins

Commission Internationale pour la Protection du Rhin

Internationale Commissie ter Bescherming van de Rijn

International Commission for the Protection of the Rhine

The Rhine catchment area



3rd biggest European river

9 countries, 58 million Inhabitants

International Rhine Commission

Starting point for discussion on adaptation to climate change: Ministerial Meeting in 2007

- **Establishment of Expert Group (KLIMA) under the responsibility of the thematic Working Group on Flooding**
- **Main task of KLIMA:**
  - **developing hydrological scenarios**
- **Cooperation with the International Commission for the Hydrology of the Rhine Basin (CHR)**

(http://www.chr-khr.org/en/general)

International Rhine Commission

Main steps toward an Adaptation Strategy

- ✓ **Preparation of summary synthesis of available literature (2009)**
- ✓ **Development of hydrological scenarios with the help of models (water discharges and temperature) (end 2010)**
- **Assessment of impact on quality status and uses (2010-2011)**
- **Identification of possibilities to remediate impact (2010-2011)**
- **Development of adaptation strategy**

International Rhine Commission

Scientific Basis

Summary synthesis of available literature

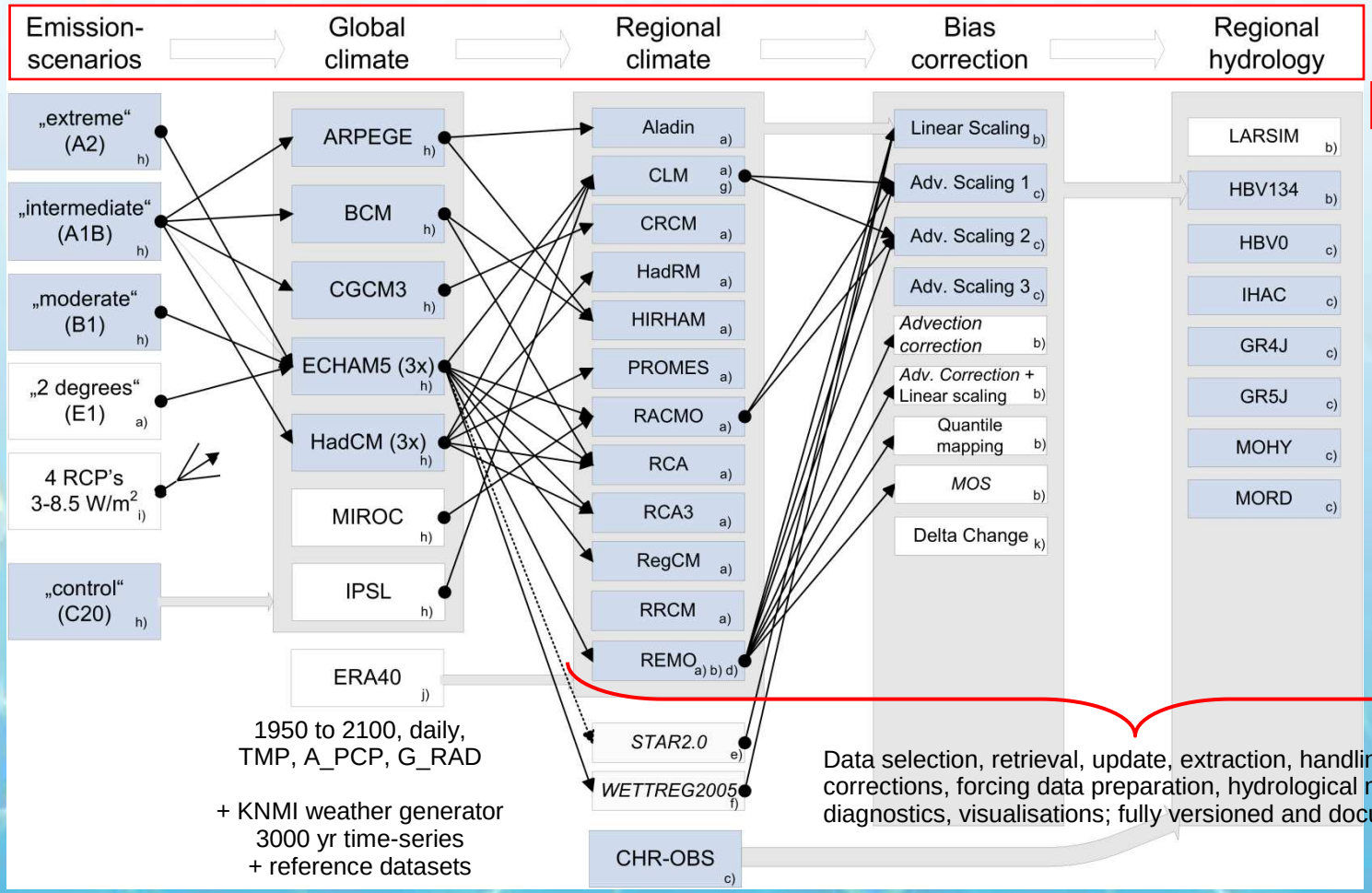
- ✓ First draft prepared by an independent consultant
- ✓ Discussed in the KLIMA Expert Group and the Working Group on Flooding (WG H)
- ✓ Findings presented to Heads of Delegation
- ✓ Published as Report Nr 174 on www.iksr.org (summary available in English)

Hydrological scenarios

- ✓ Using a complex mix of different models
- • Final report end 2010

RheinBlick2050: "Development of joint climate and discharge projections for the international Rhine River catchments"

Research framework: regional climate change multi-model ensemble



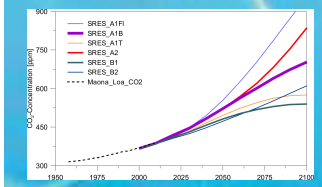
DIAGNOSTICS

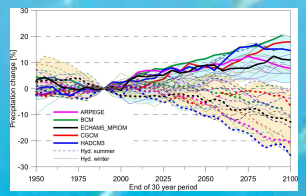
Target measures catalogue synchronized with ICPR members in 2009

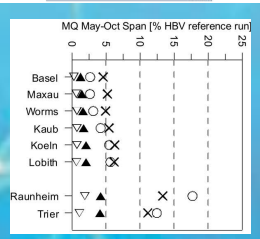
MQ
NM7Q
FDC_Q90
HQTn n=5,10,20,50,100, 200,500,1000,1250

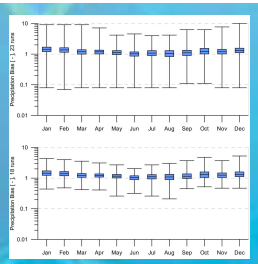
1961-1990
2021-2050
2071-2100

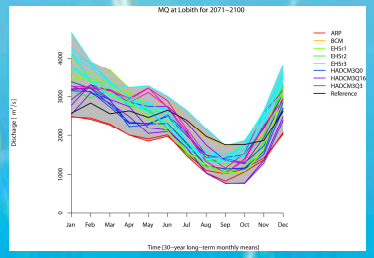
8 gauging stations:
Basel, Maxau, Worms, Kaub, Köln, Lobith, Raunheim, Trier











E. Nilson (BfG), K. Görgen (CRP-GL, RB2050 coordinator), O. De Keizer (Deltares) and the project group

International Rhine Commission

Indication of hydrological changes

1. Qualitatively: direction of changes
   - Increase, no tendency, decrease
   - 80% of ensemble members point into same direction
2. Quantitatively: bandwidth of change
   - %
   - 80% of ensemble members are within that span

Kennwert	Nahe Zukunft (2050)	Ferne Zukunft (2100)
MQ Sommer	Keine Tendenz Spanne +/- 10%	Tendenz Abnahme Spanne 10 bis 30%
MQ Winter	Tendenz Zunahme Spanne 5 bis 20%	Tendenz Zunahme Spanne 10 bis 25%
NM7Q Sommer	keine Tendenz Spanne +/-10%	Tendenz Abnahme Spanne 10 bis 30%
NM7Q Winter	Tendenz Zunahme Spanne 0 bis 15%	Tendenz Zunahme Spanne 0 bis 15%

International Rhine Commission

Assessing impact on quality status and uses

- Was recently started
- Will use hydrological scenarios as a basis
- Will be carried out in parallel by three thematic Working Groups (Flooding, Ecology and Chemistry)
- Periodic joint meetings to exchange information

International Rhine Commission

Some examples of impact

- Increased rainfall in winter
  - Increased risk of flooding, also due to frosen soil
- Reduced water levels in summer
  - Fish ladders at hydropower plants less efficient
    - Impairment of fish migration
- Increased temperature in summer
  - Impairment of fish migration

International Rhine Commission

Adaptation strategy

- Discussion not yet started
- Will need horizontal working group involving key members of all thematic Working Groups

and

- Close link to policy level

International Rhine Commission

Concluding remarks:

- **There is a well developed hydrological knowledge base for the Rhine**
- **Nevertheless, scientists can only provide information in terms of mean values, not in terms of (possible) extreme values**

On the other hand:

- **For adaptation (in particular for flood prevention), such extreme values are required**

Thank you for your attention!

Homepage: www.iksr.org