

DEVELOPMENT OF HYDROLOGICAL
SERVICES IN EUROPE
- WMO HYDROLOGICAL PROGRAMME

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DEVELOPMENT OF HYDROLOGICAL SERVICES IN EUROPE - OUTLINE

- WMO and National Hydrological Services
- Structure of Regional Association Europe and its Working Group on Climate and Hydrology
- WMO global hydrological forum: Commission for Hydrology
- Hydrological Services capabilities in WS&D related issues
- Monitoring programmes, data management and reporting
- Hydrological modeling, forecasting and warning
- Climate related issues
- The European picture

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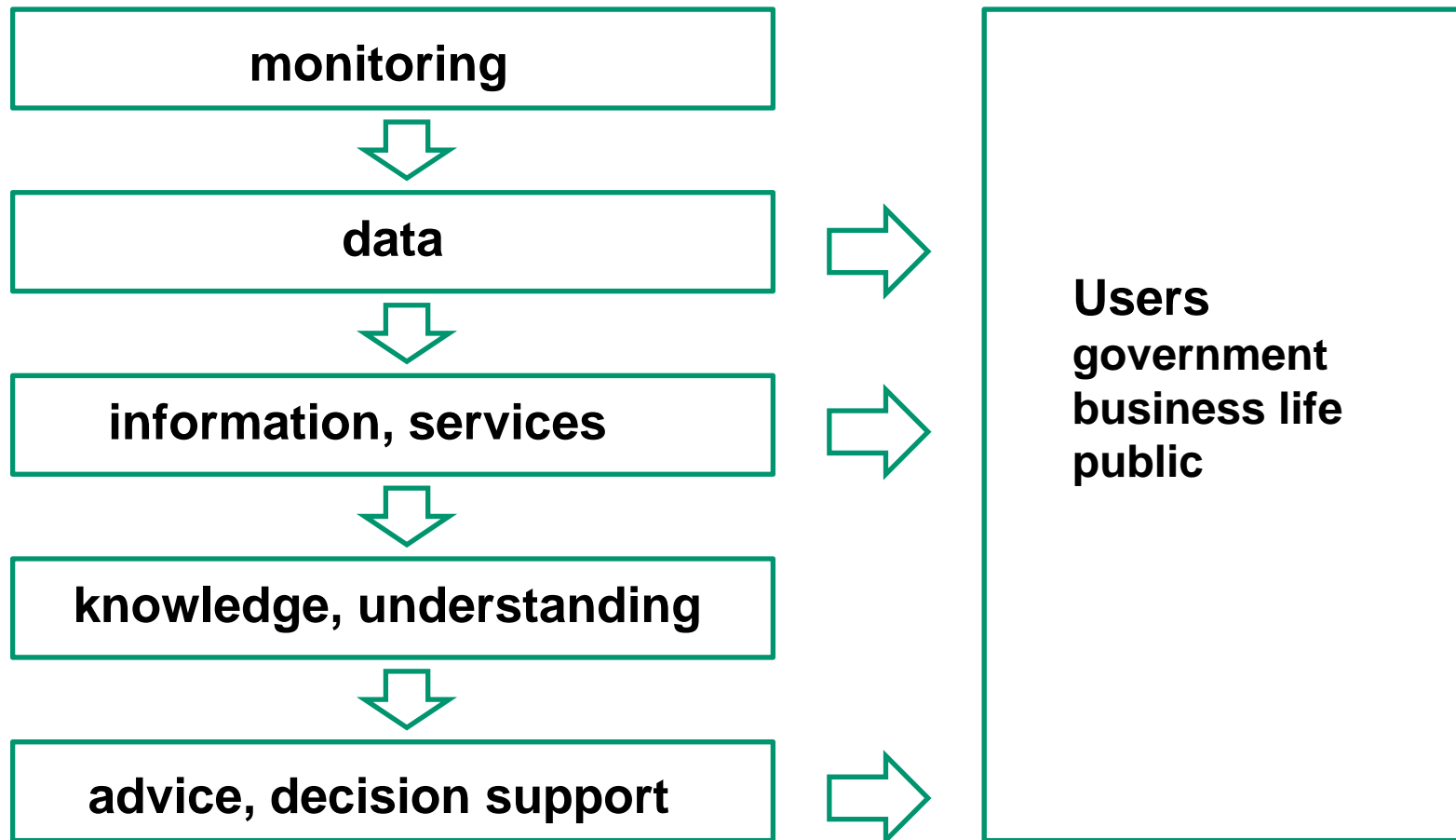
WMO IN BRIEF

- The World Meteorological Organization (WMO) is a specialized United Nations agency for meteorology (weather and climate), operational hydrology and related geophysical sciences
- WMO was established in 1950, and currently it has 189 member states and territories
- WMO Secretariat is located in Geneva
- The acting national representatives are Meteorological and Hydrological Services
- WMO has long-standing regional and thematic activities, as well as topical / short-term programmes

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NATIONAL HYDROLOGICAL SERVICES

“Producers of water-related data and information”



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THE WATER SECTOR IS FRAGMENTED

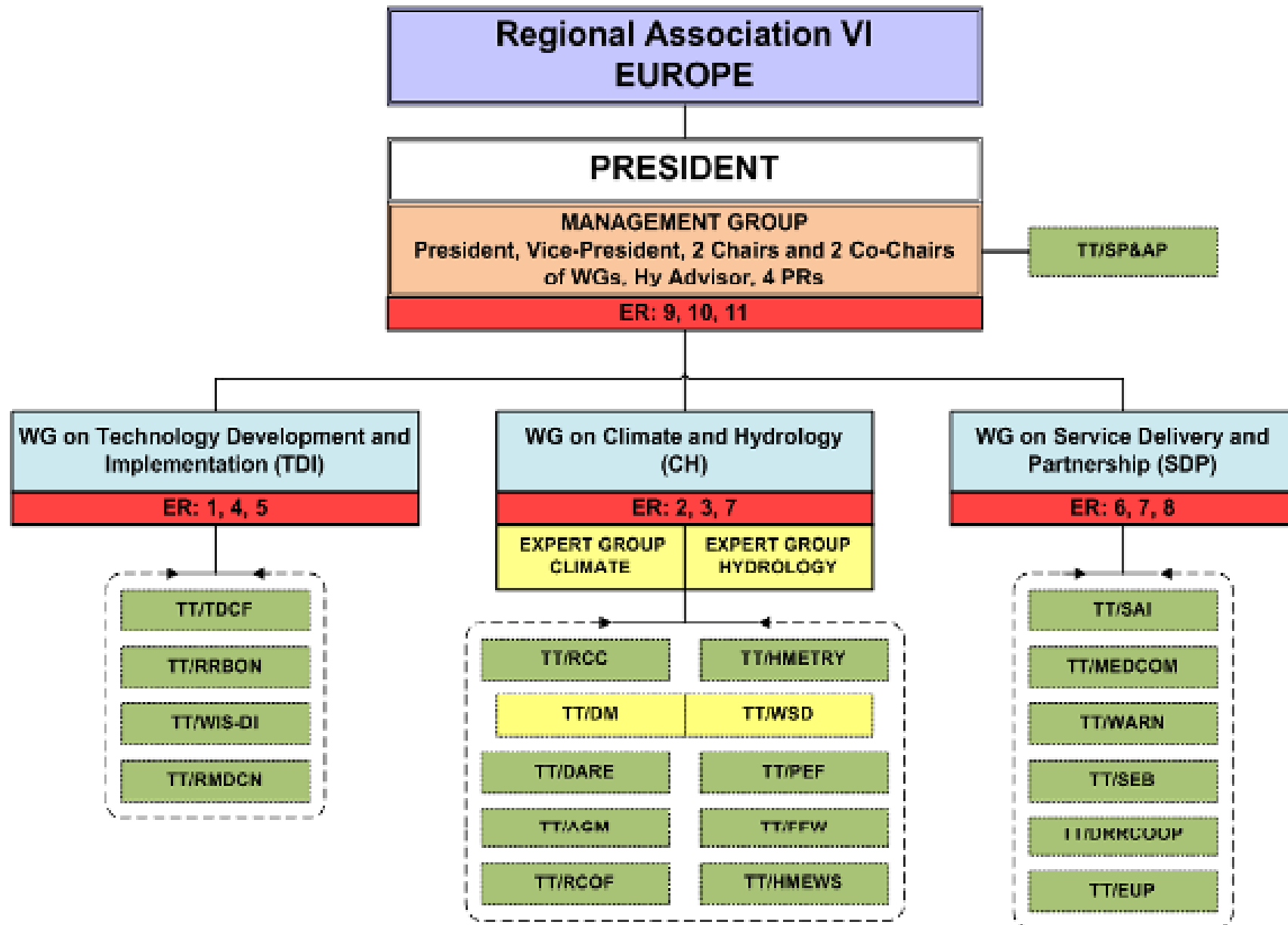
- Hydrological Service is not always well defined

Water and ...

- Agriculture
- Climate
- Communities
- Environment & biodiversity
- Energy & industry
- Fishing
- Global perspective
- Health
- Natural hazards
- Science & education
- Stakeholder participation
- Transport

Both surface and ground water information is needed in many fields
Both water quantity and quality information is needed in many fields

WORK STRUCTURE OF RA-VI (EUROPE)
 (Approved by MG/2, Feb 2010)



WORKING GROUP ON CLIMATE AND HYDROLOGY – HYDROLOGICAL SERVICES COORDINATED ACTIVITIES

- Task Team **Hydrometry** – strategies and structures of hydrological monitoring networks
- Task Team **Potential Extreme Floods** – new guidelines for extreme flood management
- Task Team **Water Scarcity and Drought** – aspects of WSD observatories, drought forecasting and drought impacts in river flow and ecology / integrated with the Task Team of Drought Management
- Task Team **Flood Forecasting and Warning** – follow-up of methods development
- Task Team **Hydro-meteorological Early Warning Systems** – review of best European practices
- Mapping of **climate related challenges** identified by National Hydrological Services

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MAPPING OF CLIMATE RELATED CHALLENGES IN HYDROLOGICAL SERVICES – SOME RESULTS

- 20 countries have responded
- 17 out of 20 have assessed water scarcity and drought to be one of the three most severe climate change impacts in their country
- At least 10 out of 20 Hydrological Services are involved in R&D programmes to tackle water scarcity and drought related issues
- Topics of R&D cover wide spectrums of water environments, tools, methods, applications and beneficiaries

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WORKING GROUP ON CLIMATE AND HYDROLOGY – NEW OPPORTUNITY FOR BOTH COMMUNITIES

- Established in 2009; before that two individual groups
- Even if Climate and Hydrology Work Programmes were mainly fixed before the new structure, several important linkages between groups could be identified
- The next Work Programme (2013 – 2017) will be clearly more integrated
- Some high priority WMO programmes (e.g. Global Framework for Climate Services) strongly support development of integrated climate-water activities
- Climate-hydrology collaboration has a lot of potential from the point of view of water scarcity and drought challenges

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WMO GLOBAL HYDROLOGICAL FORUM – COMMISSION FOR HYDROLOGY

Four main themes – some WS&D related activities

- Water, Climate and Risk Management
 - Use of regional climate models in hydrology
 - Data rescue
 - Guidance material on drought forecasting
- Quality Management Framework for Hydrology
 - Guidance material for Quality Management Systems in hydrology (focus on observation networks and data quality control)
- Water Resources Assessment
 - Current status of hydrological networks design,
 - Information note on ecological flow requirements
- Hydrological Forecasting and Prediction
 - Collection of material related with low flows forecasting
 - Development of activities that support NHSs capabilities in drought prediction

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HYDROLOGICAL SERVICES HAVE POTENTIAL FOR WS&D RELATED ACTION

- Well developed **monitoring infrastructures**
- **Database management** and development
- **Production processes** (monitoring – data – information)
- Tools for **water resources assessment** (modelling)
- **Geo-informatics** (GIS, mapping) for water resources
- Close **links with meteorological communities** – forecasting, climate change and variability
- Flood and **drought research**
- **Hydraulics applications** – links with aquatic ecology

HOW WELL DO CURRENT MONITORING AND DATA SYSTEMS SUPPORT WS&D MANAGEMENT?

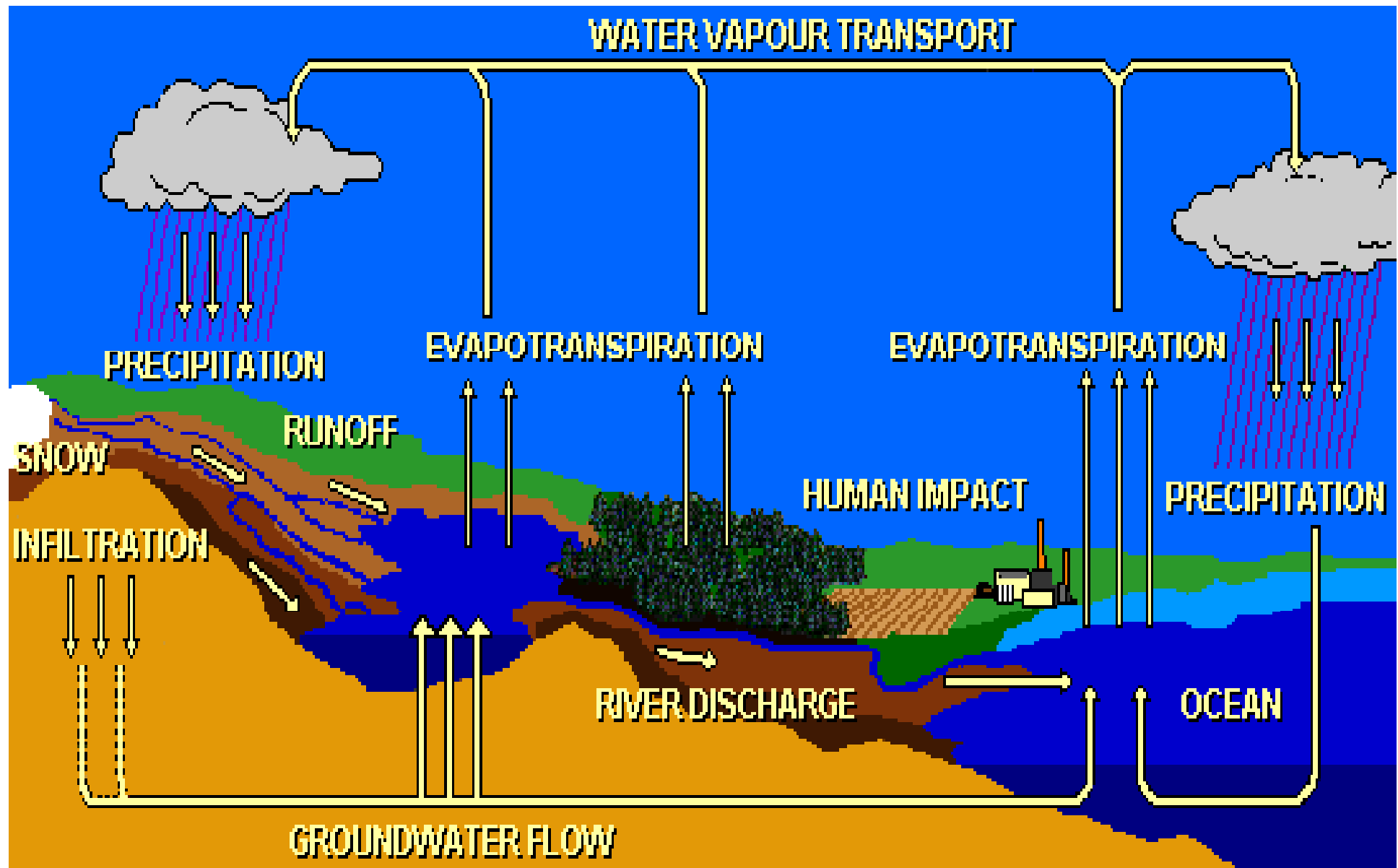
- Is WS&D a priority in the design of monitoring programmes?
- Coverage of hydrological monitoring networks
 - Surface water flows and storages, groundwater storages
 - Data for the calculation / assessment of water balance
 - Network density / spatial resolution of the monitoring system
- Data on water use (normally not managed by NHS)
 - Agriculture
 - Communities
 - Industry
- Time-lag in data storing
 - From almost real-time to annual update
- Access to data
- Quality of data
 - Low flow measurements are highly demanding!
- Hydrology Forum May 2012
 - To assess the current status of monitoring



WS&D STATISTICS ARE FACING CHALLENGES

- Changing climate has impacts in renewable water resources: long-term drought statistics are not stationary
- Low flow measurements in rivers are technically difficult and involve uncertainties
- Also water use is highly dynamic: both savings and increased use may take place at the same time
- Water use statistics have various gaps
- Calculation of withdrawal ratio or similar indexes requires broad and good quality information on water balance and water use
- It is demanding to determine indexes for small river basins / sub-basins (spatial aspect I) or seasons (temporal aspect I)
- It is demanding to determine comparable time series of indexes (temporal aspect II)
- It is demanding to determine indexes for a number of countries / regions that have different technical infrastructures and data management practices (spatial aspect II)

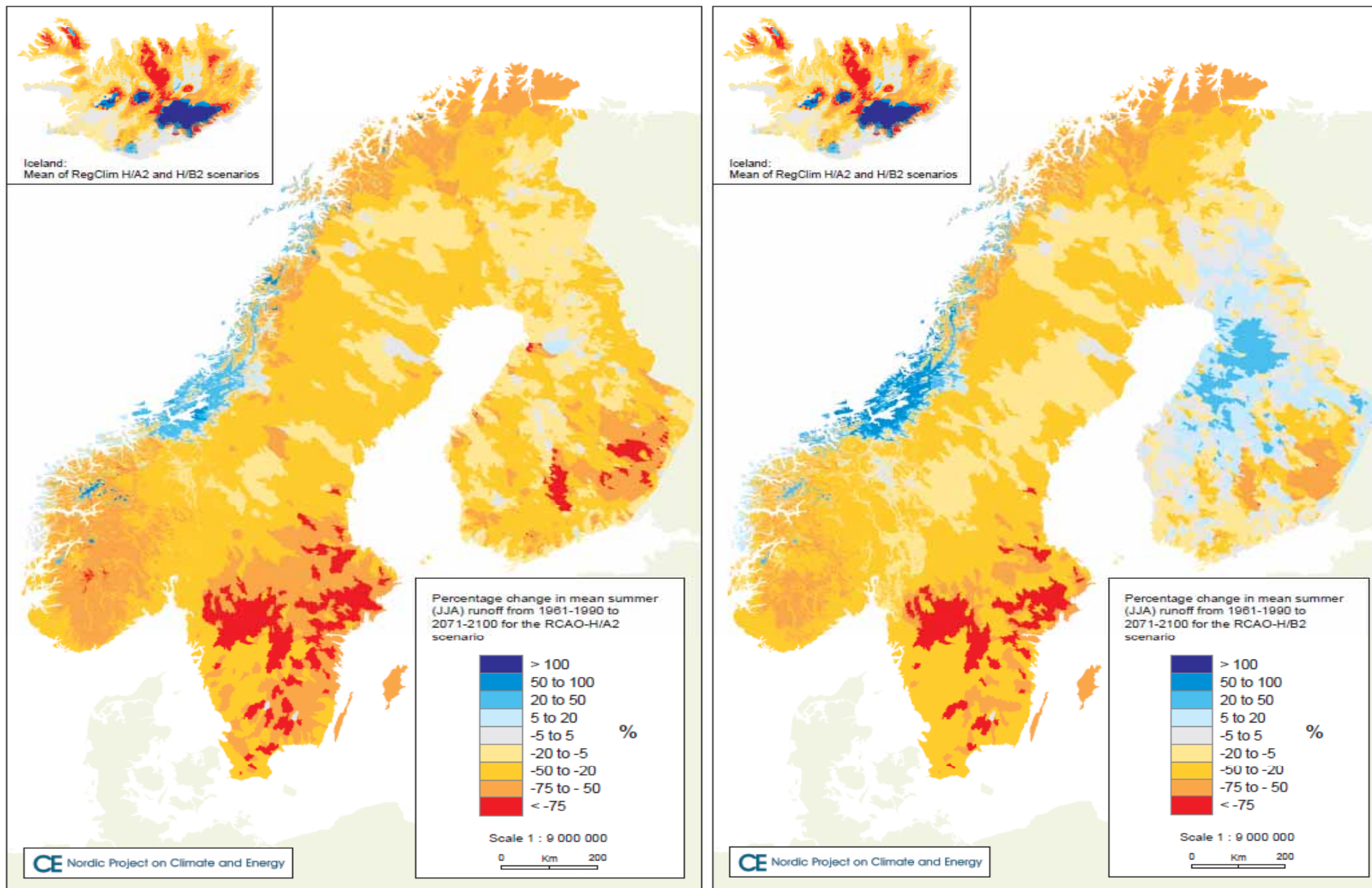
Operational hydrological modelling supports calculation of water balance and WS&D indicators
- as far as data sets are adequate and comparable



Climate change is a new sector of water use:

Country	Water resources (km ³ /a)	In use (%)	Use by sector (km ³ /a)			
			Water supply	Industry	Agriculture	Climate change 2050
Spain	110	33	4.3	9.4	22.3	20.9
Italy	159	37	8.3	16.2	34.8	19.1
Ukraine	53	49	4.7	13.5	7.8	5.8
Morocco	30	50	0.6	3.6	11.0	4.8
South Africa	45	38	2.9	1.9	12.2	4.5
Turkey	196	9	2.8	2.0	28.8	33.0
Iran	128	46	3.5	1.5	54.0	21.0
California	101	51	9.3	0.7	41.8	24.0
Mexiko	357	25	4.8	7.2	77.5	28.6

Coupling of regional climate models and national hydrological models: percentage change in mean summer runoff from 1961-1990 to 2071-2100 for RCAO-H/A2 and RCAO-H/B2 scenarios (Nordic Project on Climate and Energy / 2006)



EUROPE 2020 PERSPECTIVE

One of the two Europe 2020 Flagship initiatives in the field of sustainability is “Resource efficient Europe”. Communication from the Commission recognizes the following key component of long-term framework: “A water policy that makes water saving measures and increasing water efficiency a priority, in order to ensure that water is available in sufficient quantities, is of appropriate quality, is used sustainably and with minimum resource input, and is ultimately returned to the environment with acceptable quality”

WMO is in the process of preparing its 2010s “flagship” – Global Framework for Climate Services (GFCS). The programme will aim at “massive benefits to the community, especially in disaster risk management, improved water management, sustainable agriculture and health protection”.

HOW TO LINK EUROPE 2020 AND GFCS ACTION?

THANK YOU!

