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Sustainable water use – the way forward towards comprehensive measurement and management

Special Session:
Towards an Ecological Economics of Water

ESEE 2017, Budapest 21.6.17

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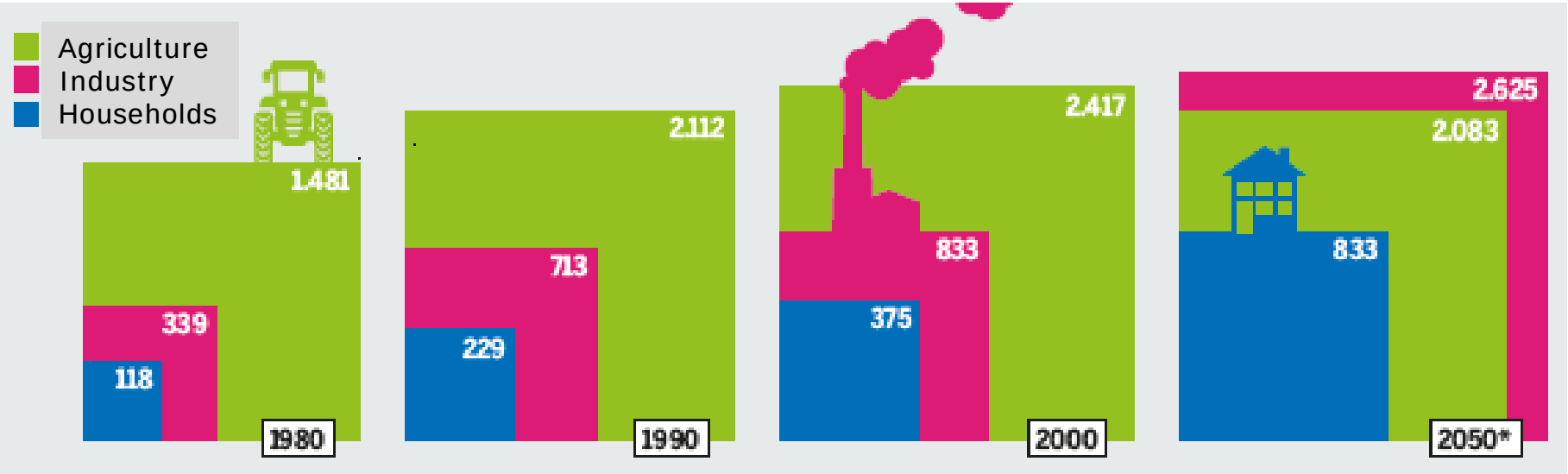
Content

- Water – a renewable but scarce resource
- Accounting aspects relevant for the resource water
- Water accounting approaches
- Modelling direct and indirect water appropriation
- The way forward

Increasing water input



Source: OECD, 2012

Increasing water stress

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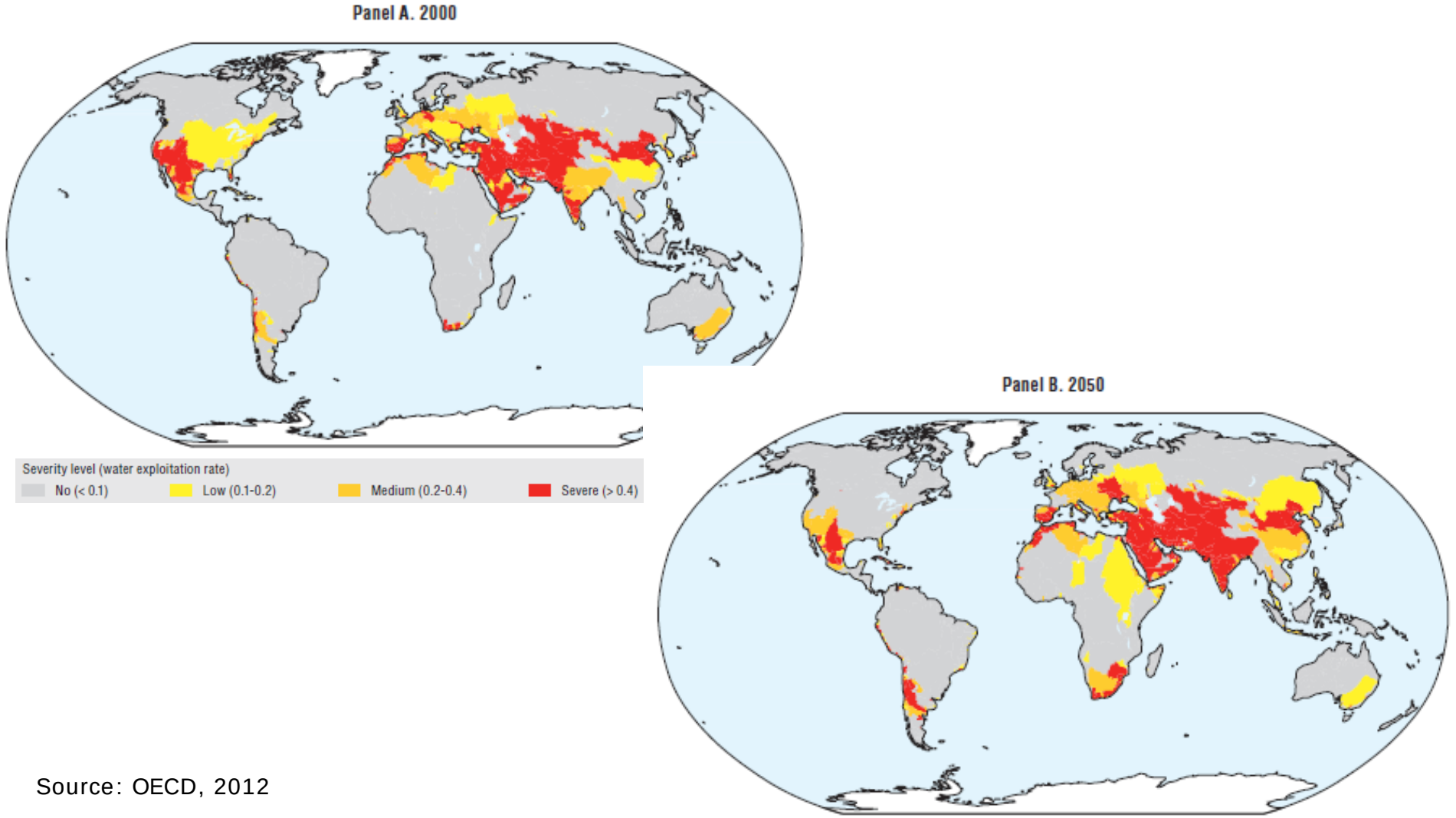


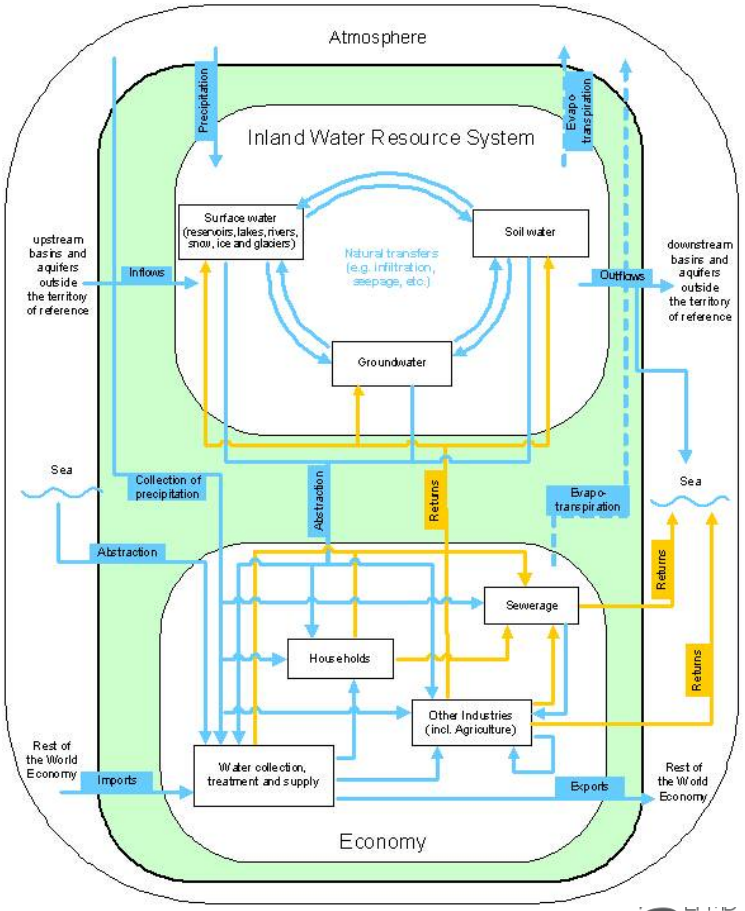
Source: OECD, 2012

Accounting aspects relevant for the resource water

- Water abstraction vs. water consumption
- Blue vs. green water
- Spatial, temporal and sectoral differentiation
- Direct vs. indirect water use

Water accounting

- UN System of Environmental-Economic Accounting for Water (UN, 2012)
  - SEEA sub-system
  - agreed concepts, definitions, …
  - i.a. physical supply use tables, emission-, hybrid-, asset accounts
- Physical water flow accounts (Eurostat, 2014)
  - Physical supply and use tables of water flows
  - Physical supply and use tables of emissions to water
  - Key indicators (water consumption, water use, net emissions)



Modelling direct and indirect water appropriation

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- 3 main approaches:
  - Bottom-up → Water Footprint (Utwente)
  - Top-down → environmentally-extended input-ouput analysis (W-MRIO)
  - Hybrid approaches

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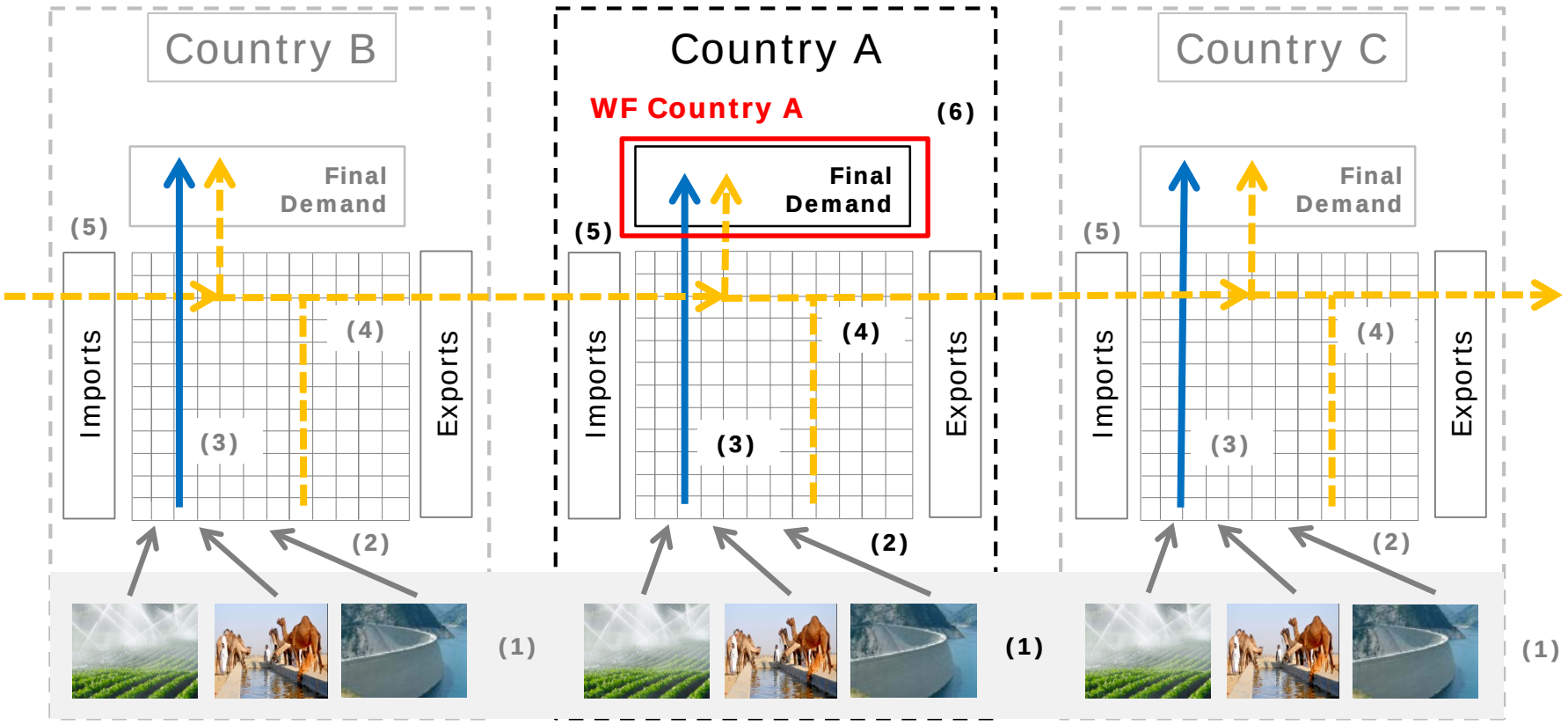
W-MRIO



Water extensions: Global water extraction / consumption by country and sector (blue/green)

Spatially explicit assessment of water embodied in trade

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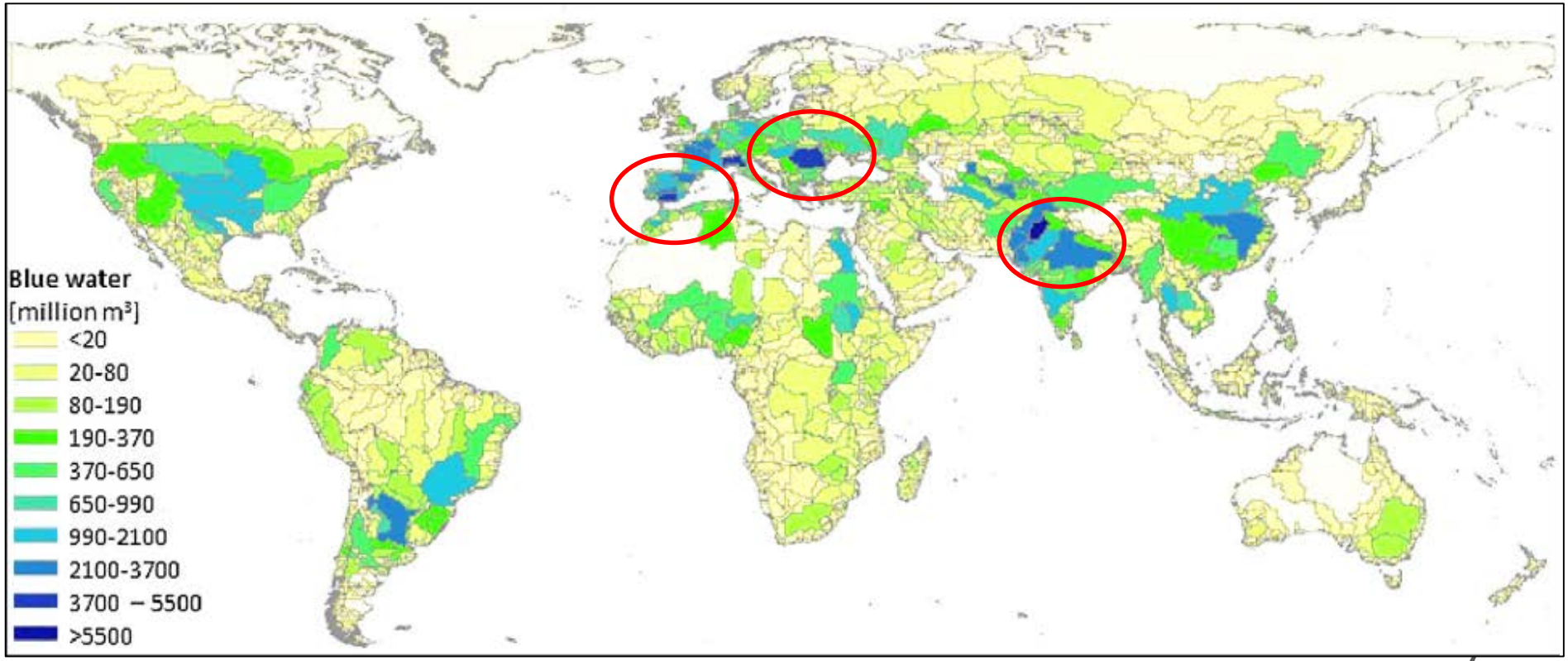
Consumption of blue water induced by agricultural products consumed in the EU, 2007



Source: Lutter et al., 2016

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Spatially explicit assessment of water embodied in trade

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Analysis of source watersheds with highest scarcity impacts

Watershed	EU-27 BW [Mm^3]	Blue water scarcity [no. of months]	EU-27 induced water scarcity [Mm^3 month]	Rank BW
Indus	25'107	12	297'556	1
Guadalquivir	5'459	7	38'216	4
Mississippi	8'895	4	35'582	3
Ganges	3'658	7	25'610	9
Ebro	3'478	3	10'434	10
Nile	4'850	2	9'701	5
Po	4'276	2	8'552	7
Danube	9'485	0	0	2

W-MRIO – pros/cons

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Key advantages	Key disadvantages
Calculating **water footprints for all products and sectors**, also with complex supply chains	**Assumption of a homogenous product output** for aggregated economic sectors and product groups, leading to distortions of results
Precise definition of **system boundaries**	**Use of monetary** use **structures** of industries and product groups to allocate water extraction to final demand, which differ from physical use structures, in particular for water/materials
Avoidance of double counting as supply-chains clearly distinguished from each other	**Quality of data for input-output tables** of particularly non-OECD countries often difficult to evaluate
Full **consideration of different water intensities** in a large number of countries	**Data availability** of water input on the **sectoral level scarce**
Accounting framework **closely linked to standard** economic / environmental **accounting**	**Data availability** of **spatially explicit** water input even **scarcer**
Disaggregation of indicators by categories of final demand, industries or product groups	
Possibility to carry out **spacialy explicit** footprinting analysis **and nexus analysis**	

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Next steps in W-MRIO

- Disaggregation of economic sectors of high water appropriation – e.g. agriculture, electricity
- Improve availability of data for sectors with high impact – e.g. mining
- Combine MRIO with spatially more explicit data on water input
- Combine quantitative MRIO with data on impacts – e.g. scarcity

Résumé

- Meaningful water management needs comprehensive water accounting.
- Useful water accounting needs data of high quality and high detail.
- W-MRIO builds the link between direct and indirect water use to ensure comprehensive water management.
- To improve modelling results, besides methodological aspects, also W-MRIO depends heavily on the data on water input.

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