

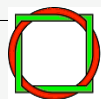
# FORE • SCENE

## Development of a Forecasting Framework and Scenarios to Support the EU Sustainable Development Strategy



SIXTH FRAMEWORK PROGRAMME PRIORITY 8.1  
Policy-oriented research, Scientific support  
to policies, Integrating and Strengthening  
the European Research Area

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**Wuppertal Institute**  
for Climate, Environment  
and Energy



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# The Water submodel

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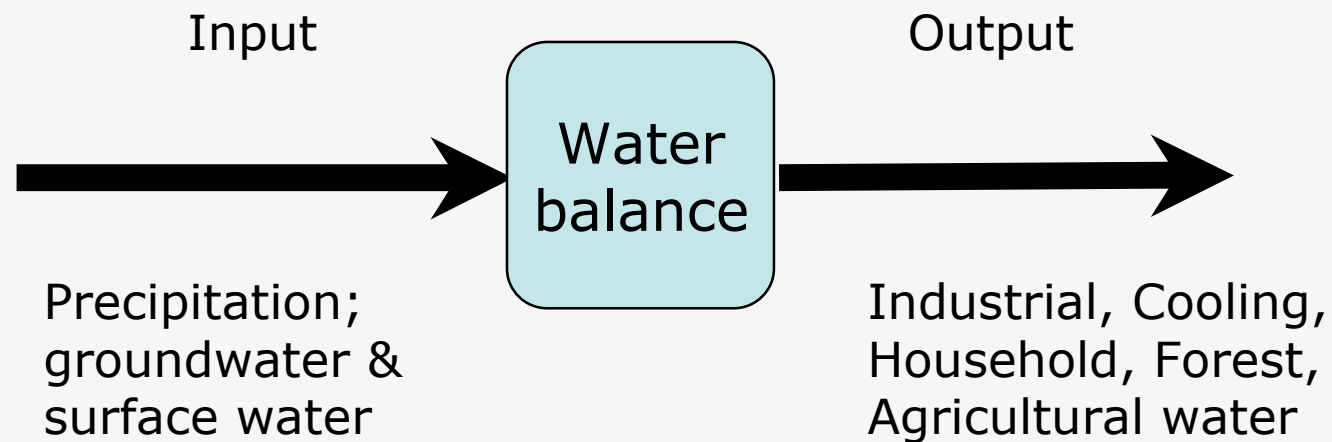
# Specifics

- Attempting to keep the Water submodel as simple as possible
- Integration of submodels always call for simplifications
- Will develop the water submodel further, as the water future is very different, particularly for North and South Europe, “regionalising” the model.
- “Green water” - which is water use by various ecosystems, is greatly simplified into Forest and Agricultural water

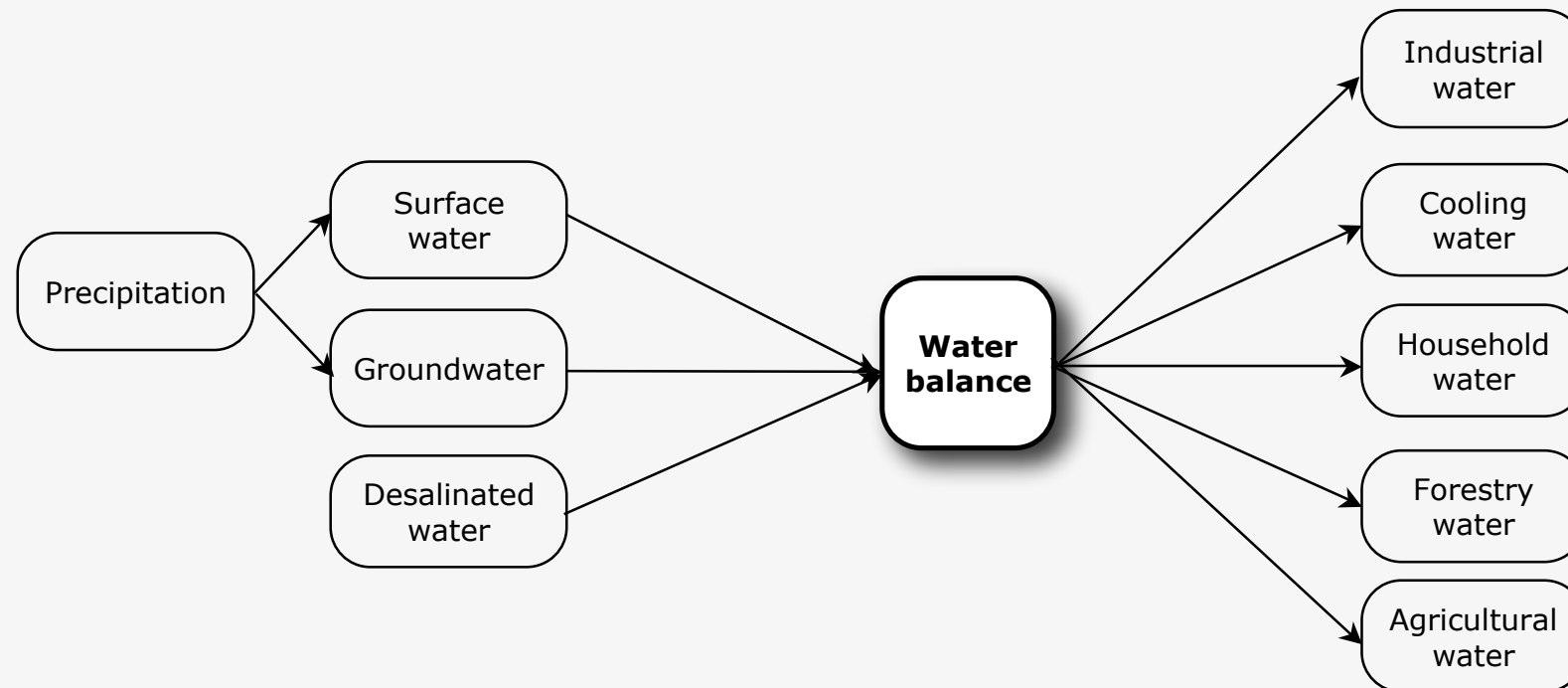
## The Water submodel

- the submodel is built on simple principles of input-output balances
- Output: Industrial water, Cooling water, Household water, Forest water, Agricultural water (including Evapotranspiration and Evaporation)
- Input: Precipitation, divided into surface and groundwater + desalinated water

# Water Input-Output balance



# Water balance



# Other assumptions

- Efficiency factor - Industrial, Cooling and Household water are all affected by 'Efficiency' - factor covering infrastructure losses etc
- Household water is affected by Water quality, where Nitrogen load is used as a proxy for this. A lower water quality means a higher quantitative water consumption
- Evapotranspiration factor - Forest water is affected by evapotranspiration losses
- Irrigation - Agriculture is divided into irrigated and non-irrigated crops

# Water input trends and scenarios - *climate change*

- “Europe is expected to suffer under climate change. Global warming will magnify existing differences in natural resources and increase most climate-related hazards. There will be greater health risks and challenges to economic sectors like agriculture. Adaptation is expected to be difficult.”
- “In Southern Europe, climate change is projected to worsen conditions (high temperatures and drought) in a region already vulnerable to climate variability, and to reduce water availability, hydropower potential, summer tourism and, in general, crop productivity. It is also projected to increase health risks due to heat waves and the frequency of wildfires.”

*(IPCC report Climate Change 2007: Impacts, Adaptation and Vulnerability)*



# Water output trends and scenarios

## - *change in demand*

- Increase in demand; Industrial, Cooling, Household, Irrigation
- Increase in efficiency
- Increase in Evapotranspiration
- Increase in Forest and Agricultural areas

# Uncertainties

- Model result is dependent on width of value classes
- Determination of value classes is parameter specific, no general rule can be applied.
- Direction and trend more important than the actual number.
- Uncertainties may not be normally distributed

# First model results - Water

- The water balance will decrease
- The water balance will not be significantly improved by efficiency measures
- Improvement of water quality will not counteract likely increase in household water usage
- Water will likely stall growth in forest during dry periods, and limit agriculture