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Institute on Comparative Regional Integration Studies

GR:EEN
**Global Re-ordering:
Evolution through European Networks**

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Title of the report

Water Footprint Scenarios for 2050 – A Global Analysis and Case Study for Europe

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Energy and Environment

Reporter

UNESCO – Institute for Water Education (IHE)

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Short summary

This report develops four water footprint scenarios for 2050 based on a number of drivers of change: population growth, economic growth, production/trade pattern, consumption pattern (dietary change, bioenergy use) and technological development. The study comprises two assessments: one for the globe as a whole, distinguishing between 16 world regions, and another one for Europe, whereby it zooms in to the country level. The objective of the global study is to understand the changes in the water footprint (WF) of production and consumption for possible futures by region and to elaborate the main drivers of this change. In addition, it assesses virtual water flows between the regions of the world to show dependencies of regions on water resources in other regions under different possible futures. In the European case study presented, the objective is to assess the water footprint of production and consumption at country level and Europe's dependence on water resources elsewhere in the world.

Key trends

• **Scenario S1**, *global market,* is characterised by high economic growth and liberalised international trade. The global economy is driven by individual consumption and material well-being. Environmental policies around the world heavily rely on economic instruments and long-term sustainability is not in the policy agenda. Trade barriers are gradually removed. Meat and dairy products are important elements of the diet of people. A rapid development of new and efficient technologies is expected. Energy is mainly sourced from fossil fuels. Low fertility and mortality are expected.

• **Scenario S2**, *regional markets*, is driven by economic growth, but the focus is more on regional and national boundaries. Regional self-sufficiency increases. Similar to S1, environmental issues are not important factors in decision-making, new and efficient technologies are rapidly developed and adopted, and meat and dairy are important components in the diets of people. Fossil fuels are dominant, but a slight increase in the use of bio-fuels is expected. Population growth is highest in this scenario.

• **Scenario S3**, *global sustainability*, is characterised by increased social and environmental values, which are integrated in global trade rules. Economic growth is slower than in S1 and S2 and social equity is taken into consideration. Resource efficient and clean technologies are developed. As the focus is on environmental issues, meat and dairy product consumption is decreased. Trade becomes more global and liberalised. Reduced agro-chemical use and cleaner industrial activity is expected. Population growth is the same as for S1.

• **Scenario S4**, *local sustainability*, is dominated by strong national or regional values. Self-sufficiency, equity and environmental sustainability are at the top of the policy agenda. Slow long-term economic growth is expected. Personal consumption choices are determined by social and environmental values. As a result, meat consumption is significantly reduced. Pollution in the agricultural and industrial sectors is lowered. Bio-fuel use as an energy source is drastically expanded.

• The size of the population is the major driver of change of the WF of production and consumption. The WF of production and consumption is largest in the scenario in which the population projection is the highest.

• The effect of economic growth is observed in terms of income levels and GDP changes. Increased income levels result in a shift toward high consumption of water-intensive commodities. GDP growth significantly increases industrial water consumption and pollution. S1 has the largest WF of industrial production and consumption among all scenarios because it foresees the highest GDP.

• The diet of people strongly influences the WFs of consumption and production. Diets with increased meat and dairy products result in very large WFs in 2050 (S1 and S2). In S3 and S4, the scenarios with low meat content, the total WF of consumption and production in the world drastically decrease. This shows us that a reduction in humanity's WF is possible in 2050 despite population increase.

• Existing plans related to bio-fuel use in the future will increase the pressure on water resources. A high demand for bio-fuel increases the WF of production and consumption in the world and especially in Western Europe, the US and Brazil.

• Reduction in WFs is possible in 2050 by liberalisation of trade (S1 versus S2 and S3 versus S4). Trade liberalisation, on the other hand, will imply more dependency of importing nations on the freshwater resources in the exporting nations and probably energy use will increase because of long-distance transport.

• The global agricultural production and trade structure will be affected by climate change. The production volumes will decrease in some parts of the world and will increase in others. The production changes across the world will affect the WF of production. The results show that the total WF of production will decrease because of climate change effects on the global agricultural production pattern. However, it does not result in a similar change in all parts of the world.

• Technologic development directly affects water productivity, water use efficiency and wastewater treatment levels. Increased water productivity as a result of technological development results in reduction of the WF of consumption and production.

• The most critical driver of change that affects the future WF of production and consumption for Europe is consumption pattern. The WF of production and consumption in Western Europe increase in the "high-meat" scenarios and decrease in the "low-meat" scenarios. In addition, extra demand created by bio-fuel needs put additional pressure on European water resources (S3 and S4). The European countries with a large external WF of consumption ratio in 2000 decrease their dependencies on foreign water resources (e.g. the Netherlands, Belgium and Luxembourg).

Suggestions

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Methodology

Modelling

Reference to other trends reports? If yes, which reports?

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