Geophysical Research Abstracts
Vol. 19, EGU2017-15490, 2017
EGU General Assembly 2017

Dependencies of Europe's economy on water resources outside its borders and its vulnerability to weather extremes

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Europe's economy is dependent on water resources elsewhere in the world since many of the goods consumed in the EU are not produced domestically, but abroad. Reliance on food, energy and goods produced in regions outside of the EU may impose water related risks on different economic sectors within the EU due to vulnerability of water resources used in their production to hydrological extremes and climate change. IMPREX project addresses this economic dependency and water resources vulnerability to hydrological extremes and climate change under WP12 "Water Economy". This study presents the results of the first task of WP12, mapping current dependencies of European economy on water resources outside its borders and their vulnerability to drought and water scarcity. In our assessment, we have used water footprint, which is a measure of the appropriation of freshwater resources for human activities, and is comprised of three components – green (consumption of rainfall), blue (consumption of surface and groundwater) and grey (refers to water pollution). We first calculated virtual water import, the amount of water consumed in producing products imported to the EU, and we identified key products – those making up the largest virtual water inflows to the EU. After mapping the dependencies, we assessed water scarcity and drought severity in producing locations. Coupling this with the water footprint enabled us to map the EU's external water dependencies and to identify when and where vulnerabilities may lie, in terms of blue water scarcity and drought.

Overall, external green water resources account for 41% of the total green water footprint of the EU's economy. Soybean, cocoa, coffee, oil palm, sunflower, maize and olives are identified as key products from the perspective of green virtual water import to the EU. Soybean is the crop with the largest virtual water import volume to the EU with imports coming from Argentina, Brazil and USA. Europe relies on soybean import to meet demand for meat and dairy products. Although around 99.5% of the green virtual water import to the EU related to soybean comes from locations with low drought risk, this is likely to change due to disruption of rainfall patterns under climate change in coming years. The vulnerability of 91% of the green virtual water import related to other key products is determined as "low".

Thirty percent of the blue water resources consumed in production fueling Europe's economy come from external sources. The key products identified for blue virtual water import are rice, sugar cane, cotton, almonds, pistachios, grapes and soybean. These key products are sourced from areas under significant or severe water scarcity, thus making most blue water imports highly vulnerable. For example, 91% of almond and 74% of rice blue virtual water import to the EU are categorized as highly vulnerable. The results of this study and future tasks of WP12 will help governments, European policies and companies in their mid- and long-term planning for sustainable development in light of climate change, population growth and increased demand for products and services.