

DEPENDENCIES OF EUROPE'S ECONOMY ON OTHER PARTS OF THE WORLD IN TERMS OF WATER RESOURCES

Executive summary: EU's vulnerability to water scarcity and drought

Climate change is leading to increased water scarcity and drought in many parts of the world. This has implications for the European Union (EU) because many of the goods consumed or used in the EU are produced abroad. This makes its economy dependent on water resources well beyond its borders.

“ *Water Footprint Network has mapped the EU's global water demand and assessed how water scarcity and drought could disrupt supplies of key food crops that it imports.* ”

This reveals where potential vulnerabilities to the EU's food security and economic stability exist and identifies which food products may become more expensive in Europe in the near and longer term future.

In the near future, supplies of soybeans, rice, sugar cane, cotton, almonds, pistachios and grapes are most likely to be affected because they come from areas with significant or severe levels of water scarcity. In the longer term, products such as coffee and cocoa could be impacted if climate change alters rainfall patterns and thereby increases the risk of drought or other water-related problems in their countries of origin.

EUROPE'S GLOBAL WATER DEMAND

The EU uses approximately 668 km³ of water for all of the goods it produces, consumes and exports, annually¹.

Around 38% of this water comes from outside its borders, which means that the EU economy is highly dependent on the availability of water in other parts of the world.

Two thirds of the foreign water that the EU depends upon comes from nine countries: Brazil (20%); Argen-

tina (11%); Indonesia (8%); Ivory Coast (8%); Ghana (4%); the United States of America (USA) (4%); Ukraine (3%); Malaysia (3%) and India (3%).

Most of this external water demand, in terms of the water embodied in imported products, is for **agricultural commodities (98%)**, followed by **industrial products (2%)**. This means that the EU is particularly vulnerable to lack of water availability affecting supplies of agricultural commodities from these nine countries.

¹ Green and blue water footprints of the European economy. The green water footprint is the amount of rainfall used to grow crops. It is used to assess vulnerabilities due to drought. The blue water footprint is the water consumed from lakes, rivers and aquifers to produce the commodities that are used by the European economy. It is used to assess vulnerabilities due to water scarcity.

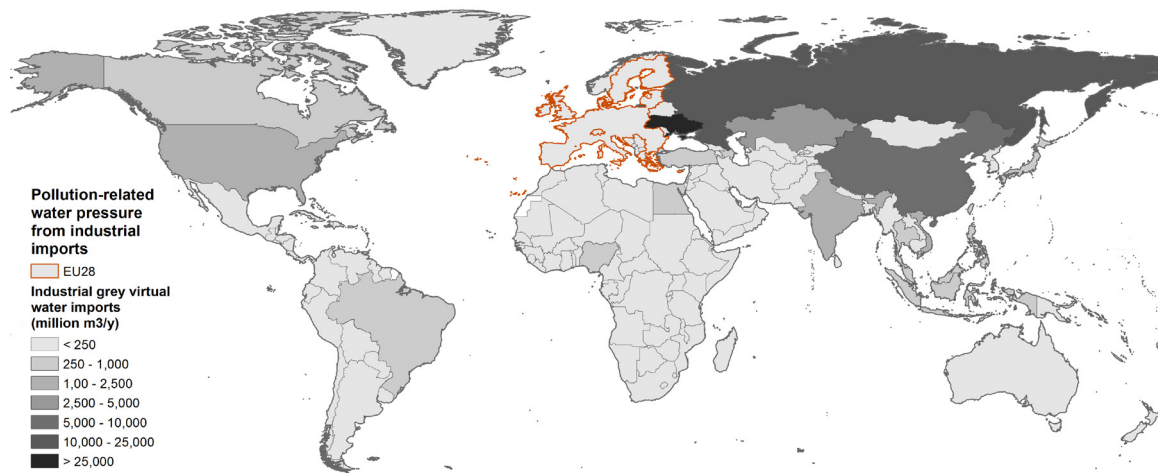
EUROPE'S GLOBAL WATER PRESSURE: POLLUTION



Although the EU's global water demand is mainly related to the import of agricultural commodities to make food and related products for domestic consumption or for export, **the largest impact the EU has on global water resources is pollution**. On average, the pro-

duction of goods imported to the EU pollutes 77 km³ of water² per year. This is mainly caused by industrial production and occurs in the Ukraine (46%), followed by Russia (18%), China (10%), Kazakhstan (4%), the USA (4%), Vietnam (2%) and India (2%). This is shown below in Map#1.

As drought and water scarcity intensify, water pollution levels will increase in certain areas because there will be less water available to assimilate pollution in any particular water body.



Map1: Pollution-related water pressure, caused by production of industrial goods imported to the EU

GLOBAL WATER SCARCITY IS LIKELY TO DISRUPT SUPPLIES OF KEY CROPS TO EUROPE

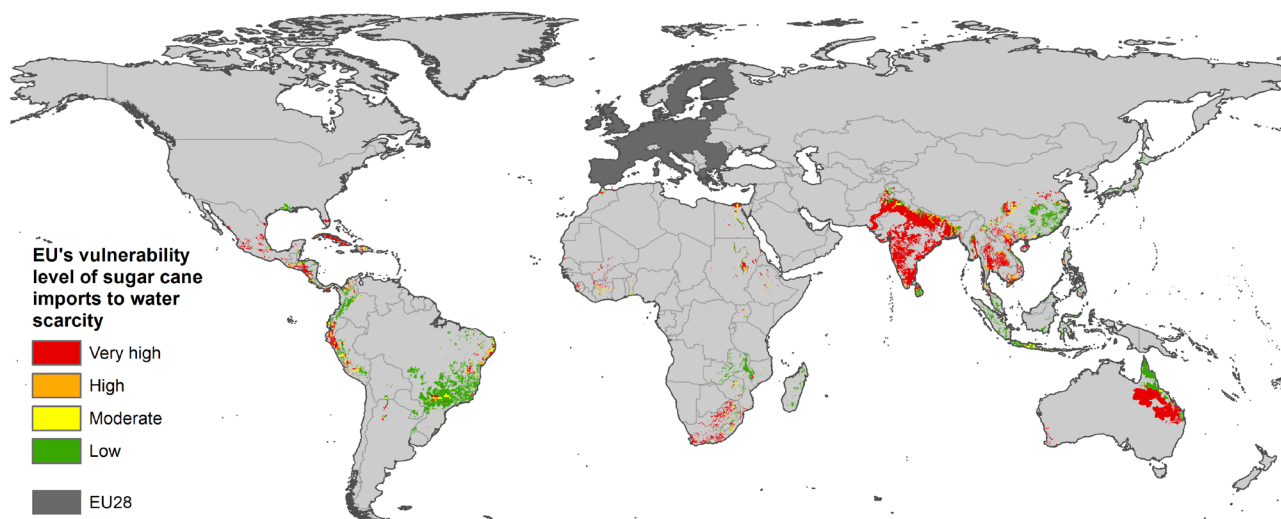
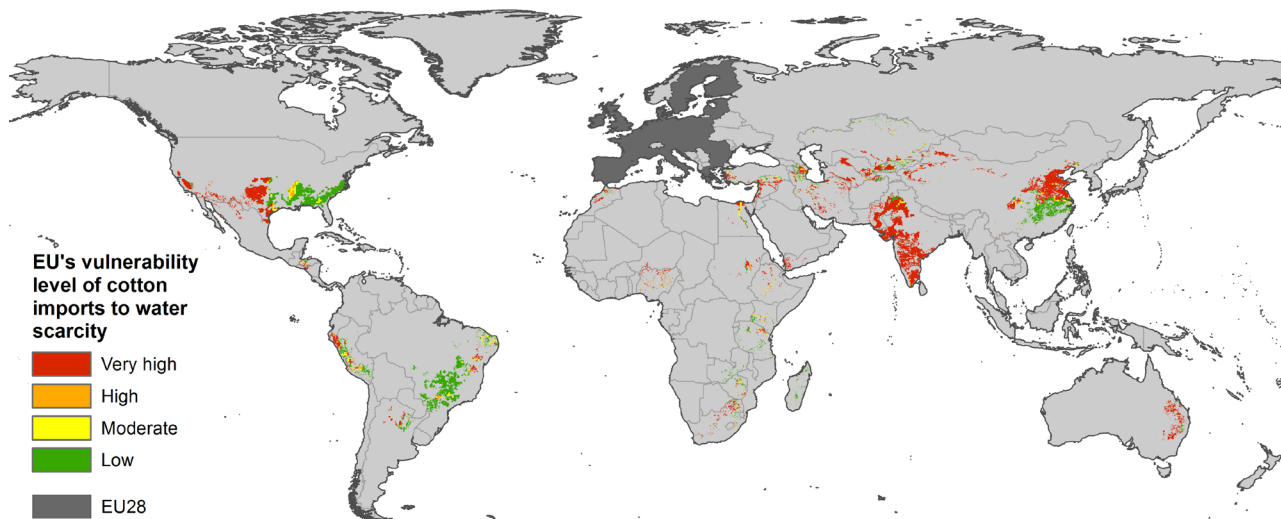
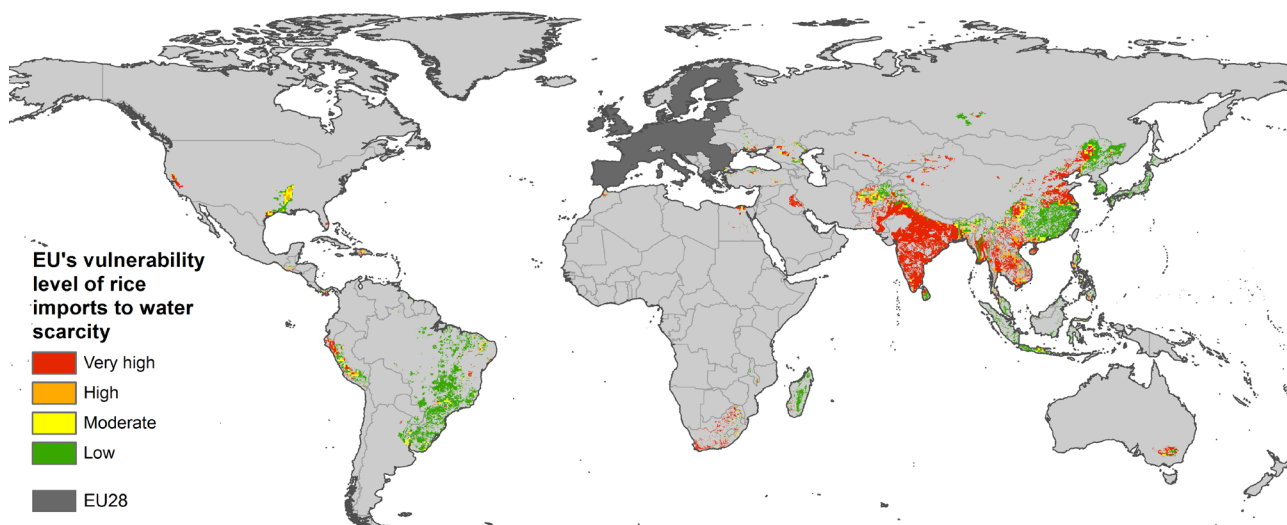


In the near future, supplies of certain crops to Europe could be disrupted due to water scarcity in other parts of the world; a large portion of the water used in producing soybeans, rice, sugar cane, cotton, almonds, pistachios and grapes for import to the EU comes from areas with significant or severe levels of water scarcity. This means that surface and ground-water resources are already seriously depleted and that there is too much competition for the remaining available water in those areas.

Ninety-one percent of almond imports are categorized as “highly vulnerable”. Of other key products, 87% of pistachio imports, 74% of grape imports, 70% of rice and cotton imports, 57% of soybean and 56% of sugar cane imports are all considered vulnerable. Almost all the crop products imported to the EU from India and Pakistan are sourced from locations with high levels of water scarcity. Ninety-six percent of sugar cane from India and 90% from Pakistan is produced in locations that are very highly vulnerable to water scarcity. Ninety-three percent of rice from India and 91% from Pakistan is produced in locations that are very highly vulnerable to water scarcity.

The vulnerability of rice, cotton and sugar imports to the EU due to water scarcity are shown below in Map#2.

² The grey water footprint of the European economy. The grey water footprint is an indicator of pollution. It shows how much water is required in freshwater bodies to assimilate the pollutants discharged, based on ambient water quality standards.



Map2: Vulnerability of cotton, rice and sugar cane imports to the EU due to water scarcity

EUROPE'S ECONOMY IS VULNERABLE TO CHANGES IN GLOBAL RAINFALL



Although the immediate risks to the EU economy are due to current water scarcity levels, any disruption to rainfall patterns that occurs in the future due to the effects of climate change in the countries of origin of key crops could have a far greater impact on the EU.

“Disruption to rainfall patterns in the future could have a far greater impact on the EU's economy.”

Lack of rainfall can lead to drought. Prolonged drought can increase demand for additional water for irrigation. This, in turn, exacerbates water scarcity and reduces the amount of water available which leads to increased competition for the resources that remain.

Currently, the majority of agricultural commodities imported to the EU originate from areas with “low” or “moderate” drought risk. This includes locations where soybeans, cocoa, coffee, oil palm, sunflower, maize and olives are produced for import to the EU. The highest vulnerability is observed in olives, where 32%

of the EU's supply comes from areas under “moderate” drought risk, mainly located in Tunisia.

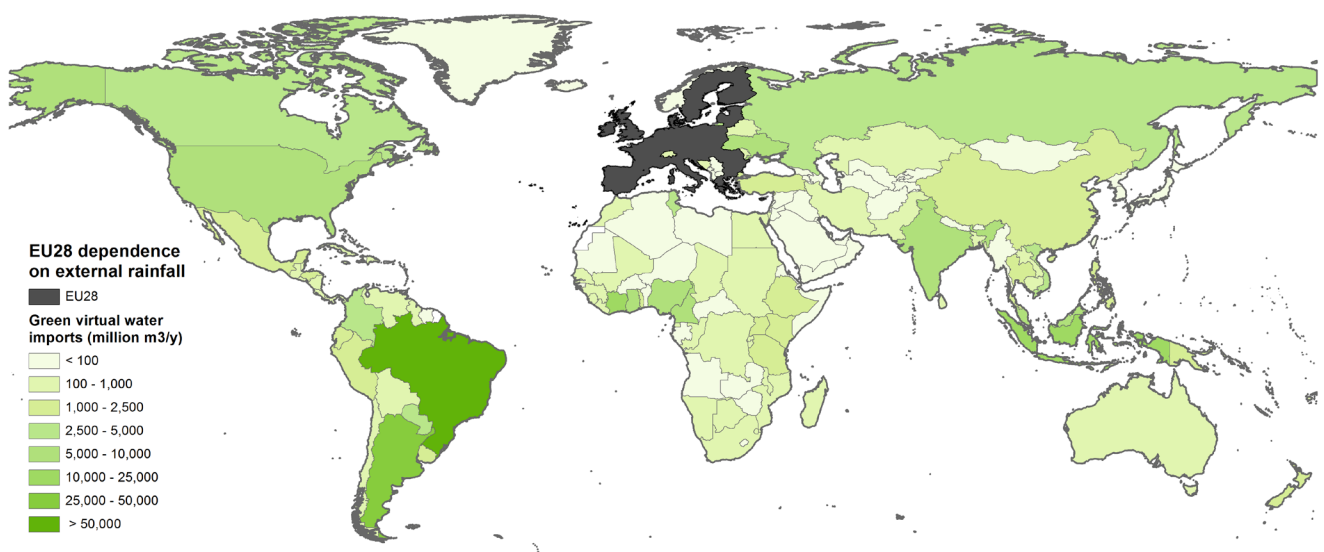
However, rain-fed agriculture accounts for as much as 92% of the EU's total external water demand from agriculture. Because this type of agriculture is so highly dependent on rainfall, any disruption to weather patterns as a result of climate change in these countries would have serious implications on the EU's economy.

This vulnerability is particularly related to imports of agricultural commodities that account for 41% of the EU's rainfall water demand. The amount of rainfall used across the exporting countries is shown below in Map#3. Twenty percent of this comes from Brazil, 12% from Argentina, 9% from Indonesia, 9% from Ivory Coast, 5% from Ghana, 4% from Malaysia and 4% from the USA. It is used to produce soybeans (28%), cocoa (19%), coffee (15%) oil palm (10%) and their derived products.

EUROPE'S RELIANCE ON SOYBEAN IMPORTS COULD DISRUPT MEAT AND DAIRY PRICES



Soybean is the crop with the largest dependency on countries outside the EU in terms of water. Approx-



Map3: The EU's dependence on external rainfall

imately 82% of the EU's soybean import comes from Brazil, Argentina and the USA. These three countries also constitute the largest share in soybean-related external water dependencies of the EU.

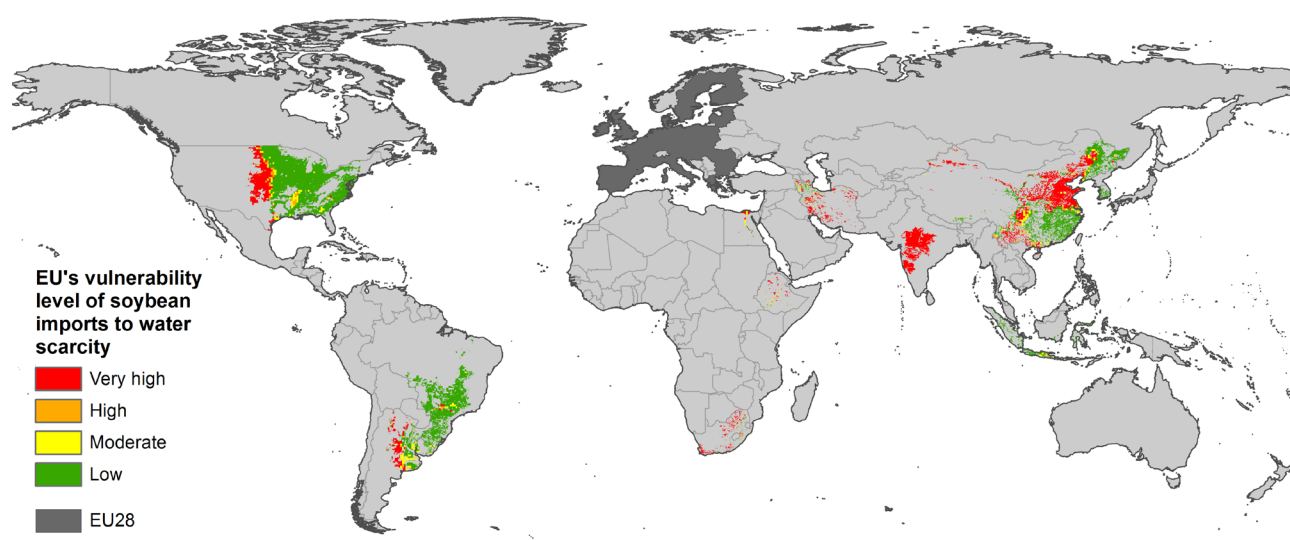
The EU relies almost entirely on imports of soybeans to meet demand for animal feed for meat and dairy products. It imports around 30-35 million tonnes per year³ and produces only 0.9 million tonnes/year domestically. The deficit in soybean production in the EU poses a significant risk to its economy and especially to the EU meat industry. This is due to high demand for the product, its high reliance on imports and the vulnerability of the crop to drought and scarcity in the countries of origin.

Around 57% of soybean supply is highly vulnerable to water scarcity in producing regions. This means that the EU dairy sector is particularly at risk from weather extremes and climate change disruption in Argentina and the USA. Prolonged droughts

and water scarcity in these regions could disrupt supplies or cause an increase in the price of meat. On the other hand, in Brazil, 96% of soybean production is classified as a low drought and water scarcity risk. Map#4 below shows the global picture figuratively for soybean imports.

Any disruption to the supply of soybeans would also have an impact on other grains. Because it is a good substitute for corn or wheat, fluctuations in soybean prices affect the demand and supply chains for these commodities, which in turn will affect the global grain system.

A report⁴ prepared for the Dutch Ministry of Economic Affairs says: "The potential damage caused by the disturbance of soya imports is significant: a sharp drop in the production of pork, poultry and eggs, followed by recovery based on more expensive animal feed. This will result in severe price fluctuations for pork and poultry."



Map4: Vulnerability of soybean imports to the EU due to water scarcity

³ Average for 2006-2013.

⁴ The vulnerability of the European agriculture and food system for calamities and geopolitics: A stress test, Platform Agriculture, Innovation and Society, 2011.

CONCLUSIONS

The EU's economic dependency on goods produced in regions that are vulnerable to water-related impacts should be considered in government policies and business strategies.

“ *The strategic importance of regions such as South-east Asia and South America will increase for Europe.* ”

The strategic importance of regions, such as South-east Asia and South America, will increase for Europe with respect both to potential climate-induced impacts on water resources and to the need for continuous supply of commodities imported from these regions. Investments, such as increasing drought resilience and strengthening water governance to ensure sustainable, efficient and equitable water use, can reduce the vulnerability of the EU's economy.

EU-wide strategies, such as the Climate Adaptation Strategy and the EU's agricultural trade policy and international development strategies at pan-European and regional level, should address these dependencies on a sectoral basis to mitigate any negative consequences that the European economy may face. The EU should also consider such vulnerabilities in developing bi-lateral relations with its trade partners.

“ *EU-wide strategies should address these dependencies on a sectoral basis.* ”

Businesses that are reliant on international commodity supplies should map their dependencies and understand the water-related vulnerabilities to sustain their businesses and put in place measures to secure future supplies.

NEXT STEPS

This report lays out the results of the first phase of this project. The second phase will further explore how climate change and weather extremes may alter the vulnerability levels of different economic sectors in the EU and will assess the economic consequences.

‘Dependencies of Europe's economy on other parts of the world in terms of water resources’ was produced by Water Footprint Network for the *Improving Predictions and Management of Hydrological Extremes* (IMPRES) project, part of the EU's Horizon 2020 grant programme. The project aims to improve society's ability to anticipate and respond to impacts of climate change.

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