HFFA Research GmbH

Steffen Noleppa and Matti Cartsburg

The social, economic and environmental value of agricultural productivity in the European Union

Part II: Impacts on water trade and water use

hffa RESEARCH

HFFA Research Paper 01/2015

The social, economic and environmental value of agricultural productivity in the European Union

Part II: Impacts on water trade and water use

Steffen Noleppa
Matti Cartsburg
agripol – network for policy advice GbR

Content

HFFA Research Paper 01/2015

Acknowledgement

This research has been made possible, in part, by financial support from the European Crop Protection Association (ECPA). We particularly thank Claudia Michel from ECPA for valuable feedback throughout the entire study phase. The results of this study are the sole responsibility of the authors and have never been influenced by the supporter of the study.

List of figures

List of abbreviations

CIS – Commonwealth of Independent States

EC – European Commission

ECPA – European Crop Protection Association

EEA – European Environment Agency

EU – European Union

GIZ – Deutsche Gesellschaft für Internationale Zusammenarbeit

GRDC – Grains Research and Development Corporation

IEEP – Institute for European Environmental Policy

ILSI – International Life Science Institute

MENA – Middle East and North Africa

SITC – Standard International Trade Classification

UBA – Umweltbundesamt

UNESCO – United Nations Educational, Scientific and Cultural Organization

VWT – Virtual Water Trade

WP – Water Productivity

WUE – Water Use Efficiency

Executive summary

Productive agriculture in the EU matters and generates various benefits to farmers, consumers and the entire society. This has been the major finding of a first study on the social, economic and environmental value of agricultural productivity in the EU, which was conducted by Noleppa et al. (2013). Water issues were not included in the previous analysis of the benefits of productive EU agriculture. Consequently, it is the overarching objective of this study to add respective considerations to the overall discussion and more particularly to analyse the effects of agricultural productivity in the EU on important indicators of water use in domestic production and international trade, such as the virtual water trade (VWT) and the water productivity (WP). The basic hypothesis of this second study is that productive agriculture in the EU additionally offers various positive impacts on the VWT and the WP.

Following some introductory remarks setting the scene, chapter 2 of this study describes the methodologies and data used. Important definitions, analyses and calculations obtained from the precursor study are listed, first: Once more, productive agriculture is mirrored against low input farming in the EU. Essentially, yields of productive agriculture and low input farming are differentiated and subsequent crop supply and corresponding agricultural trade volumes with or without productive agriculture in the EU are used as a prerequisite for further analyses, here the impacts on water use. Further methodologies applied and additional data used are described as well: Standardised international trade data and scientific information on the 'national water footprint of crops and livestock or secondary products thereof' allow for the sound calculation of the VWT and for analysing the WP of agriculture in the EU.

Subsequently, the status quo of European agriculture with respect to its water use in terms of both, foreign trade and domestic production, is outlined in chapter 3. It becomes obvious that the EU, on balance, imports agricultural water. More than 100 billion m^3 of water or more than the water reservoir of Lake Geneva are virtually net imported by EU member states from world regions out-side the EU in form of agricultural products and products thereof. However, at least three distinctions have to be made. The first distinction concerns the source of water: On balance, water associated to rain-fed agriculture (green water) is imported, whereas water accounted for irrigation agriculture (blue water) is exported. Secondly, regional differences are apparent: The MENA region and the Rest of Europe, on balance, virtually import agriculturally used water from the EU, whereas the EU virtually net imports agricultural water from all other world regions. Thirdly, the commodity-specific balances are very diverse too: On balance, agricultural water as an input to wheat and other cereal production is virtually net exported by the EU; the par-

tial volume is as large as 58 billion m^3. On the other hand, net agricultural water imports are the greatest for soya as well as for coffee and cocoa; both trade categories account for around 62 billion m^3 each.

Wheat, corn, and other cereals, oilseed rape and other oilseeds, sugar crops, potatoes, and pulses constitute the eight target crop clusters of this study. Looking only at such major arable crops cultivated in the EU, the region does not net import but net exports virtual water. The particular net agricultural water export amounts to more than 20 billion m^3, i.e.: By producing crops for which the EU has a comparative advantage, the EU member states are obviously able to help combating water scarcity in other world regions, most pronounced in the MENA region.

Along with the VWT, chapter 3 of the study also discusses the amount of water domestically used in EU agriculture. This is exclusively done for the eight target crop clusters of the analysis. The production of these major arable crops in the EU consumes approximately 340 billion m^3 of water. This is as much as the entire river inflow of water into the Black Sea in one year. Out of it 92 percent is green water, whereas only 8 percent is blue water, which shows the importance of rain-fed agriculture across the EU. The vast majority of agricultural water is used by cereal production in the EU: Wheat, corn and other cereals account for 265 billion m^3, i.e. almost 80 percent of the entire domestic agricultural water use. All other crops covered here consume the remaining agricultural water with oilseeds using more than 50 billion m^3, sugar crops and potatoes consuming almost 10 billion m^3 each, and pulses accounting for less than 5 billion m^3.

The water use effects of productive agriculture in the EU, compared to the alternative of low input farming in the region, is highlighted in chapter 4. If European agriculture was not managed under a productive agriculture scheme, but instead with a low input farming approach, yields would considerably decrease; consequently domestic production would remarkably decline, and the missing EU production would have to be substituted through additional international trade volumes. These changes in agricultural production transfer into a change of water use in European agriculture as well as a change in agricultural VWT.

Applying low input farming instead of productive agriculture in the EU would lead to a considerable decrease in the domestic use of agricultural water: Productive agriculture, in total, currently uses approximately 100 billion m^3 more agricultural water than what would be needed in case of low input farming. At first glance, this might be considered a positive effect of low input farming. However, these water 'savings' of low input farming have to be contrasted with substitution effects due to a necessarily increasing international trade of agricultural products and products thereof. Looking again at the eight target crop clusters of this analysis, an additional amount of altogether more than 142 billion m^3 virtual agricultural water would have to be imported to the EU in case of a complete shift from productive agriculture to low input farming. Instead of net exporting approximately 20 billion m^3 of agricultural water embedded in major arable crops and products thereof, as currently, the EU would then have to net import roughly 122 billion m^3 of water. The overall agricultural VWT of the EU (including all crop and livestock commodities) would change from around 107 billion m^3 to almost 250 billion m^3. This is more than half the water volume of Lake Erie in North America.

In essence, this additional net agricultural water import would overcompensate the 'savings' of water used domestically in the EU when shifting from productive agriculture to low input farming. The cumulative impact sums up to almost 40 billion m^3 more agricultural water to be virtually net imported by the EU than 'saved' in domestic production. In other words: Productive agriculture in arable farming of the EU currently saves, on balance, a water volume that is approximately eight times larger than the current water use of households in Germany.

Productive agriculture in the EU allows using less water compared to low input farming. This is the essential outcome of the analysis leading to the obvious conclusion that modern, science-based agriculture in the EU already contributes significantly to a reduction of water resource use at a global scale by using water more productively than other world regions. Regarding the major arable crops being in the focus of this study, it can be concluded that WP in the EU is 30 to 300 percent higher than in the rest of the world. The EU produces more crop per drop.

However, what has been achieved so far is only part of what is achievable, and further improvements in WP are necessary to meet future challenges. Many options – most of them 'ready to use' in farming practice – exist to further improve WP. These options include among others breeding, plant nutrition and protection and soil management and can be considered as good agricultural practice in productive agriculture in the EU and elsewhere.

Chapter 5 of the study finally provides conclusions of the research. The analysis conducted here marks a further step in the thorough investigation of the multiple benefits of agricultural productivity in the EU and especially highlights a particular environmental benefit: Productive agriculture in the EU has positive impacts on the efficient use of water resources. Productive agriculture in the EU helps reduce global water demand by lowering imports of water from abroad which overcompensate for partially higher domestic use. Thus, productive agriculture in the EU also helps combat water scarcity at a global scale. Altogether, the results of this study and its precursor study (Noleppa et al., 2013) lend support to the argument that agricultural productivity matters from a social and economic perspective, but it also matters from an environmental point of view.

HFFA Research Paper 01/2015

Imprint

The social, economic and environmental value of agricultural productivity in the European Union

Part II: Impacts on water trade and water use

Steffen Noleppa, Matti Cartsburg

Berlin, January 2015

HFFA Research GmbH
Bülowstraße 66
10783 Berlin, Germany

E-Mail: steffen.noleppa@hffa-research.com

Web: www.hffa-research.com