



Tropentag, September 20-22, 2017, Bonn

“Future Agriculture:
Socio-ecological transitions and bio-cultural shifts”

Food-Energy-Water Nexus: What Would Be the Impact of a Carbon Tax?

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Abstract

The food, energy and water sectors are inextricably interlinked and face many common challenges in an era of growing natural resource scarcity, increasing environmental externalities, and lack of good governance. The importance of those linkages can be further seen through the adoption of the Sustainable Development Goals, which includes a set of goals and targets on food (SDG2), water (SDG6) and energy security (SDG7). It will be extremely challenging to achieve these goals equitably, efficiently and by 2030 due to important interlinkages and growing natural resource scarcity. This paper assesses implications for the nexus based on changes from the energy side: among the three sectors, the energy sector is most dynamic and while many linkages between the food and water sectors have been studied, energy has been neglected. This study assesses the impact of a carbon tax on fossil fuels on food and water outcomes.

We find that changes in the energy sector in response to a potential carbon tax that reduces the relative comparative advantage of fossil fuels particularly affect those regions that are both net exporters of primary fossil fuels and net importers of refined petrol, such as East and West Africa, but that impacts on global food prices are limited. The number of people at risk of hunger would increase by 9 million people in response to the carbon tax, with the largest increases changes in the South Asia and sub-Saharan Africa region. At the same time, the carbon tax would increase the share of unmet water needs in all regions of the globe due reduced household incomes. Importantly, depending on the adaptation measures chosen in response to the carbon tax, the food and water security situation could substantially worsen, for example, if biofuel areas are expanded to compensate for the reduced use of fossil fuels under the carbon tax. Under such a scenario the number of people at risk of hunger by 2050 could be 31 million higher. On the other hand, to the extent that the reduction in fossil fuel use due to carbon taxes lessens climate change, these taxes can improve food security substantially.

Keywords: Energy, food, water