© Rosana Kral

supported by AUSTRIAN DEVELOPMENT AGENCY

December 11th 2017

# Summary: Water, Food, Energy – One Planet for All?

Everybody needs water, food and energy; but we just have one planet and limited resources. How can we best use them?

We invited **Dominik Ruffeis** (Inst. of Hydraulics and Rural Water Management) and **Johannes Schmidt** (Inst. for Sustainable Economic Development) to discuss with **Maria Wurzinger** (CDR and Division of Livestock Sciences).

## WATER, MEAT AND ENERGY CONSUMPTION ON THE RISE

Agriculture represents 70% of the global water consumption, followed by industry, energy generation and domestic. Drinking water only accounts for about 10% of the global demand. As the population grows, water withdrawals increase to meet our food demands; so does water consumption for energy generation, and the demand for energy in general. Whereas meat demand is rather stable in the Global North, only shifting between types of meat, it is steadily on the rise in the Global South. Some meat is cheap and has a good public image, Maria Wurzinger pointed out, but is it really cheap or are there trade-off's that we are overlooking?

## WE USE RESOURCES GLOBALLY

Each time we decide to buy a product, we also buy the water that has been used to produce it and thus affect the countries or regions in which the product has been manufactured. The concept of virtual water tries to reflect this link. The average Austrian has a virtual water footprint of impressive 1600 $m^3$ per year, most of which (70%) actually arises out of Austria. Europe, for example, is a net importer of water from Latin America.

Similar principles apply to meat consumption and livestock production. Most countries are not self-sufficient in meat or feed production. Thus we do not just import water, livestock, or meat from the other countries we also use agricultural land abroad.

## SUSTAINABLE PRODUCTION: HOW TO EVALUATE IT?

It is necessary to understand how a production system works to estimate and ameliorate its sustainability. Evaluating production systems in a fair way is not straightforward. For livestock production systems, for example, it is critical to

### HUNGER FOR RESOURCES

The demands for water, food and energy will continue to increase. Based on the figures for the years 2005-2007, water demand will increase by 60% until 2050. We will need 20% more energy until 2030, and 85% more water to produce it (source: IAEA, 2015).

Global meat production has risen sharply since the 1960s. While demand for beef, goat and sheep has roughly doubled between 1961 and 2007, pig production has multiplied almost five-fold, poultry ten-fold (source: FAO).

### VIRTUAL WATER FOOTPRINT

The concept of virtual water explores how much water is needed for the production of goods. Depending on source, there is

- **Green** water: water from **precipitation**, stored in soil root zone, incorporated into plants, and
- **Blue** water: sourced from **surface or ground water; freshwater**

Thus, rainwater is considered green water, that either stays green (soil moisture) or becomes blue (groundwater). If blue freshwater is required for diluting polluted water to meet quality standards, it becomes **grey water**. This is important for agriculture (lower fertilizer or pesticide charge) and industry.

It is not just the absolute size of the virtual water footprint that matters; it is also the ratio of blue and green water.

The virtual water concept is currently based on technical considerations, but lacks means to incorporate social or institutional factors of water use.

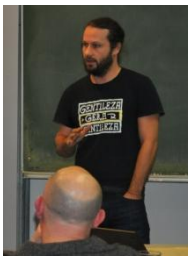
reduce food-feed competition. Grassland-based production systems could additionally improve animal welfare, but are likely to increase greenhouse gas emissions.

Energy generation faces the same challenges: technologies evolve, new ones are developed, but how are they implemented? We need to dismiss fossil fuels, if we want to achieve zero net emissions by 2050, explained Johannes Schmidt. Renewable sources of energy can be an alternative, also in terms of financial cost: in many parts of the world, solar energy is already cheaper than coal-based one. While sources of renewable energy have a positive image in society, also their ecological and social impacts need to be addressed, e.g. distribution of benefits and costs.

The global economic growth is thirsty, said Dominik Ruffeis, by 2050 water demand will increase by 60% compared to the years 2005-2007.

## NO TRANSITION WITHOUT FAIR SHARING OF BENEFITS AND COSTS

The technologies for an energy transition from fossil fuels to renewable sources are available, but it is still unclear how to achieve this transition in a socially and environmentally acceptable and economically viable way. Current fossil fuel producing countries will have to revisit their economic strategies; producers of renewable energies will need to aim for fair sharing of impacts and benefits, as sustainability demands. Johannes Schmidt made his point with an example from Brazil, where smallholder farmers lost access to their traditional grazing land upon construction of a wind park, but were unable to benefit from the energy generated.



There is no such thing as a good technology or a bad technology, said Johannes Schmidt, technologies always have impacts. It is critical how a technology is implemented.

Conflicts of interest (e.g. land use), need to be tackled, and all stakeholders need to have access to the same information to negotiate rules (e.g. for co-use or prices for rent and purchase of land). Strong institutions that enforce these rules and ensure that the population can participate in decision making are essential. "People have to get involved, to get organized", said Schmidt, "this is true for the Global South, but also for the Global North. The only way to change things is to get involved with the political process."

## THINK HOLISTIC, NOT JUST TECHNICAL

Water is needed for food production in agriculture, but also for industry and energy generation. Despite its fundamental role in our economy, the management of water resources is fragmented, said Dominik Ruffeis. Many national strategies, he criticized, neglect how much water is actually available, and focus on technical issues instead of more holistic approaches.

We like to eat diverse, said Maria Wurzinger, but which meat we favour can be culturally quite different: habits, religious and financial constraints influence our meat choices.

Considering production and resource use systems in their entirety is necessary also in other contexts. Maria Wurzinger surprised with results from modelling studies: switching to a vegan diet and thus eliminating livestock contributions to GHG emissions, would not reduce emissions as much as expected. Also the loss in fertilizer would have to be complemented through other channels.

## TRANSFORM SYSTEMS OF RESOURCE USE, BUT HOW?

Reducing our hunger for resources might be desirable, but was judged unrealistic: availability increases demand. The evening's speakers and the audience agreed that a transition to more sustainable use of resources will

involve change on many levels, global, local and personal, with complex decisions that no longer allow for simple differentiation into good or bad options, cheap or expensive ones. We might be ready to provide technical solutions, but we should not forget to address social issues.

To meet rising demand for livestock, our production systems are being intensified. Water productivity can be increased through water saving technologies and re-using purified waste water. Our energy is increasingly generated through renewable sources like wind or the sun; we should cut back on bioenergy, said Johannes Schmidt, and thus reduce competition for land resources with food and feed production.

While high-tech solutions for many challenges in food production are being elaborated, there still remain questions of acceptance (e.g. in-vitro meat) and feasibility at large scale (e.g. non-soil based crop production systems).

Further reading:

White, RR and Hall, MB (2017) **Nutritional and greenhouse gas impacts of removing animals from US agriculture**, PNAS (114) no. 48, p.10301 - 08

## WATER SCARCITY

Scarcity can be **physical** (availability-based limit) or **economical** (available, but limited access, e.g. lack of financial capital.

With water scarcity rising, decisions which sector to allocate water to (and how much) become increasingly difficult.

The Global Risk Report continuously ranks water crises among the top 5 risks by impact since 2015.

## MEAT CONSUMPTION

Annual peat consumption per person is highest in Oceania (116 kg) and North America (115 kg), followed by South America (78 kg) and Europe (76 kg). The average Asian (31 kg) and African (19 kg) eats far less meat per year (source: FAO).

**University of Natural Resources and Life Sciences**
Centre for Development Research
Peter Jordan Straße 82
1190 Vienna

www.cdr.boku.ac.at
cdr@boku.ac.at

www.facebook.com/CentreforDevelopmentResearch

**Water, Food, Energy – One Planet for All?**
**December, 11th 2017**

Text and photos: Rosana Kral

December, 2017