May we have some more land use change, please?

Editorial

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'Possible connections between land use change and the emerging bioeconomy are the subject of current research efforts and public debate'

Perhaps the most evident human change to the Earth system is the conversion of a range of ecosystems into land for agriculture and forestry, i.e., for biomass production. To serve our needs, almost half the planet's land area has undergone this kind of change, and we have caused extensive land degradation and biodiversity loss. A majority of ecosystem services are being degraded or used unsustainably. Biodiversity loss is of particular concern since the variety of life at the genetic, species, and ecosystem levels is a prerequisite for many of these services, which in turn are essential for sustainability.

Our land use provides food and other products necessary for sustaining the growing human population, so our 'footprint' will continue to be large. Further, attractive biomass production systems need to be developed, along with efficient technologies for converting biomass to fuels and other bio-based products, in order to replace fossil fuels. Expanded consumption of biomass requires deriving feedstocks from landscape management systems that promote biodiversity and provide a broad range of other ecosystem services.

The links between land use change (LUC) and the emerging bioeconomy are the subject of current research efforts and public debate. The focus is mainly on

bioenergy, often with a view that LUC is– by definition –"bad" and bioenergy should use feedstocks such as harvest residues and organic waste in order to minimize LUC. Considering well-documented impacts of forest conversion and cropland expansion into uncultivated areas, such as habitat loss, greenhouse gas emissions, and degradation of soils and water bodies, this viewpoint is substantiated – and developing technologies and systems for using residues and waste as feedstock also helps to address waste management challenges and contributes to improved resource use efficiency.

However, the "no-LUC" view ignores the issue that many current land uses are unsustainable. We face the double challenge of addressing the negative impacts of current land use while increasing biomass production to support phasing out fossil fuels. Would it not be reasonable to look for synergies between these two objectives? For example, by investigating options for achieving beneficial LUC with new biomass production systems that are integrated into agricultural and forestry landscapes, mitigating some of the impacts associated with current land use and improving the way we manage land, water, and other essential resources.

In many cases, biomass can be produced alongside food and feed, but the promotion of attractive options for expanded biomass production need not be premised on the requirement that current levels of food production in a region be maintained or increased. Cultivating short rotation forests or perennial grasses can be a welcome opportunity for land owners who seek to address land use impacts such as soil erosion, compaction, salinization, sedimentation, and eutrophication of surface waters due to excess fertilization.

Integrated production systems, including double-cropping and various agroforestry systems, can provide several products from the same land area and in this way increase land productivity and resource use efficiency. Feedstock conversion systems can also produce several products, e.g., biofuels together with animal feed that can replace cultivated feed and also reduce grazing requirements. Such integration can, in some instances, help maintain or increase food production in a region. In other instances, reduced food production will be compensated by increased production elsewhere, which need not imply that forests are cut down to make place for agriculture.

Last year, the Global Bioenergy Partnership (GBEP) launched a call for examples of positive bioenergy and water relationships, inviting scientists and other experts to share results and experiences of how good management of resources, drawing on the complementarity of different systems, can deliver food, materials, and bioenergy whilst improving the state of water. Selections from these examples were presented at a workshop–the seventh in a series of events exploring linkages between bioenergy and water. The results also formed the basis for a joint publication by GBEP and IEA Bioenergy[1] that presents an encouraging variety of positive bioenergy and water relationships, in terms of both feedstocks and geographical distribution, highlighting the multiple environmental and socio-economic benefits of good practices.

In a recent workshop organized by IEA Bioenergy, in collaboration with six other organizations and networks, participants addressed methodological and governance aspects of landscape management and design for food, bioenergy, and the bio-economy, including inspiring examples of initiatives to support stakeholder interaction and identify opportunities.[2]

Many of the examples discussed at these workshops involve constructive stakeholder dialogues on finding solutions supported by empirical data and science-based information. This is a breath of fresh air compared to some experiences from recent years' bioenergy debate, which has seen opposing sides appearing to be more interested in crafting strong messages than in keeping up-to-date with progress in science and practice.

In this issue of BioFPR, Gerd Sparovek and colleagues present an illustrative example in this regard. Based on a structured exchange on land use and nature conservation in Brazil, involving experts associated with major producer interests as well as environmental NGOs, the authors conclude that the majority of actions and expected future trends reflect the balancing of, or the ambition to balance, production and conservation. At the same time, much of public opinion–and in turn decisions in the parliament and government regarding agriculture and conservation–is shaped by a perceived conflict between these two objectives and by a debate that has become, at least to some extent, an end in itself. The expert exchange resulted in a common ground agenda for sustainable agricultural development, but it was also noted that there were many barriers to overcome, not least associated with old and deeply rooted mutually exclusive conceptions and positions.

At the upcoming European Biomass Conference & Exhibition (EUBCE 2016) in Amsterdam in June, the workshop 'The world needs more land use change' will highlight bioenergy as an opportunity to promote more sustainable land use, where participants are invited to share experiences and views on how biomass production can be localized, designed, and managed to support both provisioning and regulating ecosystem services to meet future demand for food, energy, and materials, as well as nature conservation needs.

A colleague recently proposed that the acronym iLUC should stand for *intelligent* land use change. In this sense, we very much look forward to learning how to achieve far-reaching iLUC whilst promoting further growth of a sustainable bio-based industry.

References

1. Some of the research associated with these events is presented in a previous Special Issue of BioFPR and in an In Focus section in this issue. The recent publication by GBEP and IEA Bioenergy, workshop presentations, and videos can be found at: www.globalbioenergy.org/programmeofwork/working-group-on-capacity-building-for-sustainable-bioenergy/activity-group-6/pt/.
2. www.ieabioenergy.com/ieaevent/landscape-management-and-design-for-food-bioenergy-and-the-bioeconomy/.

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