



In a letter to Science, Karl-Heinz Erb from the Institute of Social Ecology Vienna and a number of co-authors discuss how the measurement of biomass production and consumption can be used to gain a better understanding of the limits of the productive capacity of ecosystems.

Future growth of population and GDP are challenged by global biophysical limits, such as the scarcity of resources (land, energy, raw materials) as well as the limited capacity of the biosphere to cope with end products (e.g. greenhouse gas emissions). One promising indicator, which is frequently mentioned in this context and is the subject of research at the Institute of Social Ecology Vienna (SEC) of the Alpen-Adria-Universität, is the human utilization or "appropriation" of net primary production (HANPP), that is, of the biomass production of green plants. Biomass represents the basis for all human and animal food chains. Furthermore, biomass is not only a source of energy, but also plays a significant role for the carbon sequestration of ecosystems.

In a current letter to the editor of Science, Karl-Heinz Erb discusses with two SEC colleagues and international colleagues, including Peter Verburg (VOLANTE module A), how the measurement of biomass production and consumption can be used to gain a better understanding of the "productive capacity of ecosystems". "In our letter we identify the factors - for example, land use intensity - which are important for a clearer grasp of the global limits of the productive capacity of ecosystems", Karl-Heinz Erb explains.

The issue has proven to be complex at the national level, for example in the case of Austria. This is due to the fact that trade in biomass is steadily increasing - trading volumes are growing at a much faster rate than production and consumption. As a consequence, national strategies, e.g. relating to bioenergy, regional planning, agricultural policy and food, are increasingly having global effects. These effects can be rendered visible with the indicator "embodied HANPP" (eHANPP), which measures the global impact of a country's biomass consumption (food, bioenergy, etc.) upon the global net primary production.

"If we include the total appropriated biomass in our calculation for the production of goods, Austria imports more biomass than it exports. This slightly negative balance might appear somewhat surprising. Compared to the national level of consumption, Austria imports and exports large volumes of biomass. This means that we must not ignore the effects of trade. The

global effects of biomass production can be illustrated using eHANPP, thus leading to a better understanding of the required measures", Helmut Haberl points out. In their article published in the December edition of "Ecological Economics" (vol. 84, p.66ff), Helmut Haberl and his team present this new method of calculating the Austrian consumption of biomass, which has been expanded to include the necessary trade data.

Both articles are directly related to research carried out within VOLANTE.

- Erb, K.-H., H. Haberl, R. DeFries, E. Ellis, F. Krausmann, P. Verburg, S.W. Running, W.K. Smith, 2012. Pushing the Planetary Boundaries. *Science*, 338, 1419-1420.

- Haberl, H., T. Kastner, A. Schaffartzik, N. Ludwiczek, K.-H. Erb, 2012. Global effects of national biomass production and consumption: Austria's embodied HANPP related to agricultural products in the year 2000. *Ecological Economics*, 84, 66-73