

Living the high life leaves its footprint

Fertile soil is regarded as an important limiting factor in human society's future development. Mankind's global ecological footprint already exceeds the available area of bioproductive land by 20%. A joint Austrian and American research team has investigated the relationship between land use and sustainability. They present their results that for the first time allow comparisons over time and between countries in a special issue of *Land Use Policy* (Vol. 21/3, pp. 193-320).

Only on part of the earth's surface do soil characteristics, temperature and precipitation allow for enough plant growth to make human's use of the land possible. Humans need such bioproductive land for agriculture and forestry, yet at the same time more and more land area is being built over for housing, transportation and industry.

Land areas that can be classified as productive belong at the same time to regions with the greatest species diversity. The biological production (net primary production, or "NPP") of an ecosystem is necessary for the maintenance of this diversity as well as for the maintenance of a multitude of ecosystem services such as carbon dioxide absorption, climate regulation, regulation of the water household, etc. - all of which make human life on earth altogether possible. In using more and more land area for agriculture and forestry, for the extraction of raw materials, and for building and infrastructure, humans increasingly compete with all other species and thus endanger the ecosystem services.

At present, two main indicators are used internationally in the observation of these processes over time in a variety of countries:

- The **ecological footprint** measures the entire productive area of land and water that is necessary to sustainably maintain a country's (or the world's) consumption levels. The hypothetical area that would be necessary to absorb the carbon dioxide resulting from the combustion of fossil fuels is also included.
- The **human appropriation of net primary productivity** (HANPP) calculates which proportion of a region's (or the world's) net primary productivity is already lost for ecosystems due to human activities such as soil sealing, land-use change and its effects (e.g., soil degradation) or harvest.

In collaboration with one of the founders of the concept of ecological footprints, Dr. Mathis Wackernagel of the Global Footprint Network, and with a group of landscape ecologists from the University of Vienna directed by Dr. Thomas Wrбка, a joint Austrian and American research team directed by Prof. Helmut Haberl (IFF Social Ecology) has published a special issue of the renowned journal "Land Use Policy" (Vol. 21/3) in which new methods of calculating and interpreting the two abovementioned indicators are discussed on the basis of concrete results for Austria, the Philippines and South Korea.

Project director Helmut Haberl: "Especially for ecological footprint time series, up until now the necessary methods have been missing. On exactly this point, we were able to make substantial progress in our project." Humanity's global footprint already exceeds 20% of the world's available bioproductive land area. Humans already appropriate 20-40% of the net primary productivity (NPP) of the world's land area. Consequences of this situation include over-use of ecosystems, species endangerment and the accumulation of CO₂ in the atmosphere. The special issue also contains detailed data and calculations: on resource use in Austria in the last 80 years; on the ecological footprint of a variety of countries; and on the relationship between land use intensity (measured as HANPP) and landscape quality (landscape diversity, etc.).

The special issue is the result of a project which took place in the context of the Austrian programme "Cultural Landscapes Research" (KLF) and was made possible by funding from the Austrian Federal Ministry for Education, Science and Culture. The IFF Social Ecology research team will continue to work on the basis of the insights gained, next in a project to calculate global HANPP for the years 1700-2000. The project will be carried out together with the influential "Potsdam Institute for Climate Impact Research" (PIK) in Germany.



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Land Use and Sustainability Indicators

Haberl, H., Wackernagel, M., Wrбка, T., guest editors

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Editor A. Mather

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