



# ASSESSING GLOBAL LAND USE: BALANCING CONSUMPTION WITH SUSTAINABLE SUPPLY

*TRENDS IN THE AGRICULTURAL SECTOR AND FOOD SUPPLY CHAIN POINT TO A DRAMATIC TRANSFORMATION OVER RECENT DECADES.*

Global land use plays a central role in determining our food, material and energy supply. Many countries have started to support the use of biomass for biofuels and biomaterials, and, at the same time, are becoming concerned about the increasing consequences of land competition, such as rising food prices, land use change, and land use intensification. This report is intended to support the international discussion and to provide decision makers in national and regional governments and NGOs with an overview of key challenges and possible options related to sustainable land use. It explores how the management of land-based biomass production and consumption can be developed towards a higher degree of sustainability across different scales: from the sustainable management of soils on the field to the sustainable management of global land use as a whole.

While feeding a growing number of people, intensification and extension of agriculture have also led to widespread environmental degradation. This includes losses in the productive capacity of the soil, impacts related to nutrient pollution, biodiversity loss, and climate change.

Over the last five decades agricultural land has been expanding at the expense of forests, in particular in tropical regions.

A global agricultural industry has emerged, characterized by high levels of agribusiness concentration, a rapid increase in the share of retail food sales by supermarket chains, and growth in the trade of foodstuffs, fertilizers, and pesticides.

Food prices today remain below their 2008 peak, but are higher than the pre-crisis levels in many developing countries. If predictions of several organizations are correct, we are facing two decades of steadily rising food prices—something that has not happened before.

Large-scale land acquisitions increased significantly over the last few years. Proponents regard such foreign investments as an opportunity to increase agricultural productivity on land which has seen little industrialized agriculture. Opponents see it as a new form of the resource curse, crowding out or displacing smallholders and exacerbating food insecurity for the world's most impoverished.

**Available data indicate it is very likely land competition will increase in the future.**

Worldwide, yield increases of cereals and primary crops have been slowing down, and most experts expect a

continued decline in comparison with past achievements. This implies that future demand must be met with an expansion of cropland.

World population is expected to continue increasing; adequately supplying these people with food under business-as-usual conditions will require an increase in cropland area.

The share of people living in cities is expected to increase from around 50 per cent in 2010 to 70 per cent in 2050; this will contribute to urban sprawl, often at the expense of agricultural lands and fertile soils.

A combination of rising income and urbanization are changing diets. In particular, shifts toward more processed foods and animal-based diets significantly increase the need for agricultural land.

As first-generation biofuels are derived from plants and areas which could otherwise be used for food production, existing biofuel quotas increase the demand for cropland.

Products based on biomass are regarded as promising future markets. However, while little research exists on the potential environmental consequences of an extended biomaterials industry, crop based biomaterials might meet the same limitations of land availability as energy crops.

A number of studies have calculated the expected cropland requirements for meeting future food, fuel or fiber demands, and estimates are available regarding the scale of future displacement for urbanization and degradation. Aggregating modest estimates from key studies reveals that meeting all these different expectations would require a gross expansion of cropland of around 20 to 55 per cent by 2050.



**One of the strengths of the safe operating space concept is that it highlights current over-use of the earth's resources.**

The safe operating space concept is a starting point for understanding global limits. As a metaphor it defines the outer road markings for keeping development on a viable track. How to control direction and speed and make use of the "possibility space" is a subsequent challenge.

Defining a safe operating space for global land use means looking at how much more land use change can occur before the risk of irreversible damages (in particular through biodiversity loss, release of carbon dioxide, disruption of water and nutrient cycles, and loss of fertile soil) becomes unacceptable.

If the goal of halting global biodiversity loss until 2020 is to be reached, cropland expansion, a key driver of this loss, will need to be halted. This implies that business-as-usual development could "safely" continue until 2020. At that time, an additional 100 Mha are expected for meeting future demand (7 per cent net expansion) and 90 Mha are expected to be displaced (13 per cent gross expansion) compared to 2005. It means that an area of 1,640 Mha would be within the safe space for supplying demand in 2050.

Expected global land demands by 2050 would overshoot this "safe operating space" in all cases.

Monitoring global land use requirements of countries and regions gives an indication of whether they have exceeded or are within the safe operating space. To this end, the method of global land use accounting can be applied.

**The challenges facing society must be addressed through a consideration of both consumption and production.**

Improving sustainable agricultural production, and the provision of other ecosystem services, depends on a continued willingness to explore, integrate and apply both scientific and local knowledge. The active participation of farmers and other stakeholders is critical for developing and disseminating best management practices.

Steering consumption towards sustainable supply implies not only treating the symptoms of unsustainable land use, but also the underlying causes. New targets and adjusted policies can be used to establish a framework for efficiency. A mix of measures—enhancing vegetal diets in high meat-consuming regions, reducing food waste, scaling back biofuel quotas, controlling biomaterial consumption, improving land use planning and investing in the regeneration of soils—could save around 160 to 320 Mha by 2050, limiting the gross expansion of cropland to 8 to 37 per cent and keeping development (in the best cases) within the safe operating space.

**Securing supply of food, fiber, and partially also fuels, while protecting and enhancing the natural resource base**

**requires a policy design that fosters cross-level synergies and supports dynamic learning processes across different policy levels.**

Systematic knowledge is needed to improve resource management from the level of the farm (e.g. toward capacity building) to the globe (e.g. toward international cooperation on soil restoration). A number of issues are relevant at the country level, including:

- Improving information systems, especially to monitor domestic land use and foreign land use for domestic production and consumption.
- Land use planning to help prevent the loss of high-value nature areas due to expanding agriculture and livestock production and to avoid the expansion of built-up area on fertile soils.
- Programmes for economy-wide sustainable resource management could provide the context for "sustainable biomass action programmes", with the aim of harmonizing food security, energy, rural development and industrial policies.
- Economic instruments to trigger sustainable supply and demand, e.g. a "subsidy to sustainability" approach to foster long-term soil productivity.
- Improved targeting of public investments, especially focused on the needs of smallholders to enhance food security and living conditions in rural areas.
- Land tenure and ownership as important prerequisites for motivating people to invest in maintaining and improving their land and soil resources.
- Reducing food loss at the production and harvest stage by investing in infrastructure and encouraging the build-up of storage facilities and co-operatives.
- Reducing avoidable food waste through education and food waste prevention campaigns.
- Programmes that foster a greater use of residues— after taking into account soil fertility needs—and the use of biowaste to help reduce the demand for land.
- Programmes promoting a healthy and balanced diet in high-consuming countries, especially in schools.
- Family planning programmes to slow down population growth.
- Delinking the markets for fuels and food by reducing the direct and indirect subsidization of fuel crops and phasing out biofuel quotas.

A summary and the full report as well as a PowerPoint presentation with the main findings can be downloaded at: <http://www.unep.org/resourcepanel/>. For further information, please contact the Secretariat of the International Resource Panel at: [resourcepanel@unep.org](mailto:resourcepanel@unep.org).