

UNEVEN PRODUCTIVITY GROWTH THREATENS SUSTAINABLE LAND USE

During the past 40 years, TFP growth has been the primary driver of global agricultural output growth, with significant benefits for environmental sustainability, economic growth, and food security. (Figure 2, green bar.) **During that time, agricultural output has increased by 60 percent, while global cropland has increased by just five percent.**²³

Productive use of inputs and capital helps farmers control costs, protect natural resources, and manage risk during volatile business cycles. Many consumers enjoy access to a variety of nutritious foods that are affordable and safe.

Much of this global improvement can be attributed to a variety of high-income countries where nearly all agricultural output growth is generated by productivity gains. (Figure 3, green bar.)

In the U.S., agricultural output has increased by 36 percent since 1982.²⁴ At the same time, the total amount of annual soil erosion has decreased by 44 percent, due to wide-spread adoption of advanced seed technologies, precision agriculture, and water management practices. As a result, the **amount of soil erosion per unit of agricultural output has decreased by 60 percent.**

Improvements in animal breeding, feed efficiency, manure management, and animal care make it possible for U.S. livestock producers to provide the world with nutritious meat, milk, and eggs with significantly fewer GHG emissions per unit of output. In Latin America, India, and China, GHG emissions per unit of livestock production are two to 10 times higher than in the U.S.²⁵

If animal agriculture was eliminated in the U.S., as some are advocating, it would reduce U.S. GHG emissions by only 2.9 percent, while depriving consumers around the world of the nutrient-dense foods they need and want.²⁶

Despite the sustainability progress made in the U.S. and higher-income countries, producers have recently put more land into production and intensified input use as they struggle to adapt to the booms-and-busts of the agricultural markets. Soil health, water quantity and quality, increasingly severe weather events, a warming climate, uncertainty in agricultural markets, and an aging agricultural workforce all pose significant threats to future productivity gains.

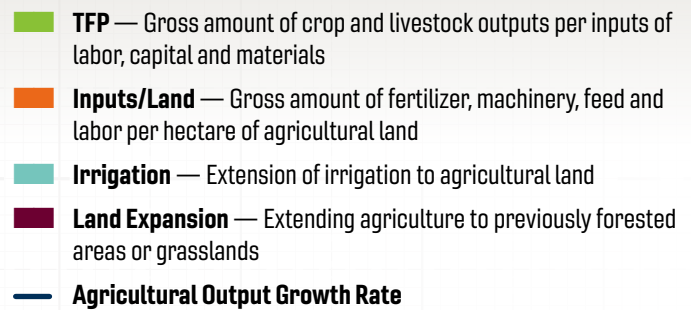


Figure 2: Sources of Growth in Agricultural Output: Global, 1961–2016

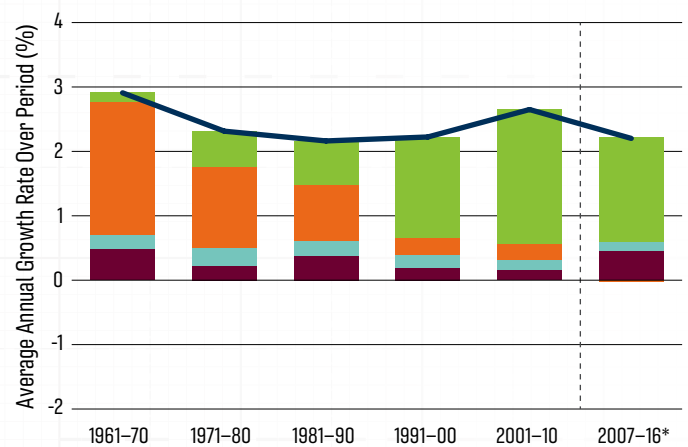
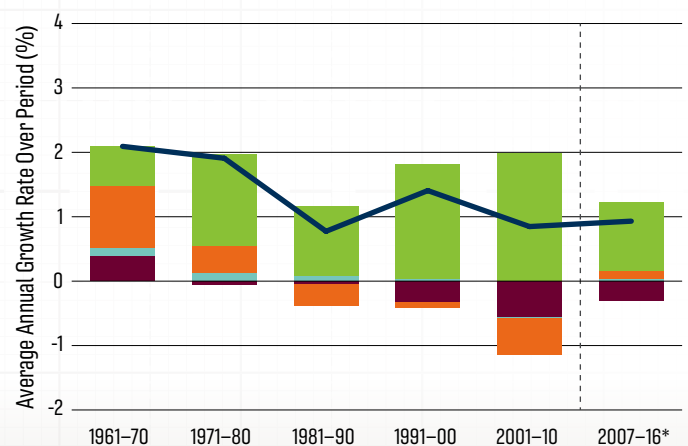


Figure 3: Sources of Growth in Agricultural Output: High-Income Countries, 1961–2016



*Depicts data for the most recent ten-year period.
Source: USDA Economic Research Service (2019).

The total amount of land used for agricultural production in the next 10 years is predicted to be flat, as a decrease in pasture is balanced by an increase in cropping area.²⁷ However, land-use trends and sustainability practices vary greatly by country and region. New research by the **Agricultural Model Intercomparison Improvement Project (AgMIP)**²⁸, identifies the top three predictors of land use change: **population growth, levels of agricultural productivity, and changes in consumption patterns.**²⁹

Figure 4: Sources of Growth in Agricultural Output: Sub-Saharan Africa, 1961–2016

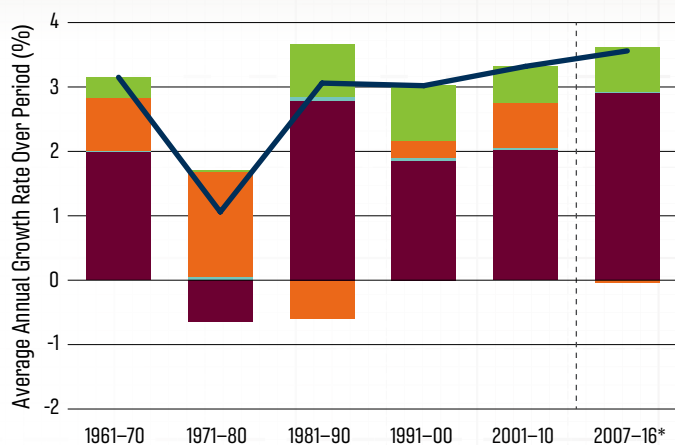
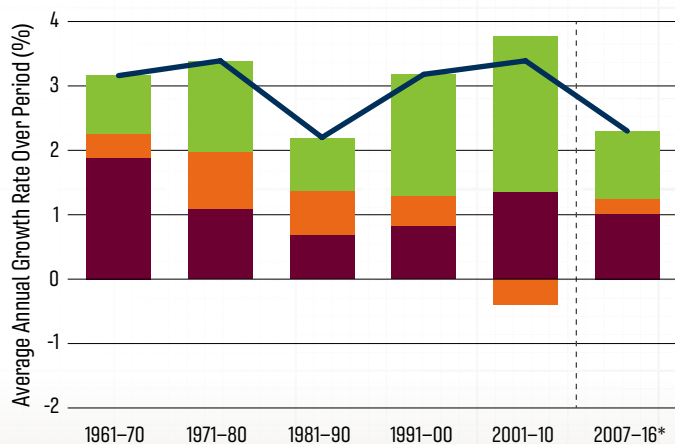


Figure 5: Sources of Growth in Agricultural Output: Latin America, 1961–2016



*Depicts data for the most recent ten-year period.
Source: USDA Economic Research Service (2019).

Sub-Saharan Africa and Latin America show how these dynamics can lead to unsustainable land use.

SUB-SAHARAN AFRICA

In the 1980s and 1990s, agricultural productivity grew as African governments reformed or removed state controls over the cost and quantity of agricultural inputs and outputs available in the market.³⁰

As the impact of those reforms has dissipated, **strong population growth and persistent low agricultural productivity** are driving farmers to open new lands for pasture and crop cultivation.

The size and buying-power of Africa’s middle class will grow more slowly during the next decade, suppressing per capita consumption of agricultural products. Total demand will continue to increase, however, due to rapid population growth. The UN predicts that **18 African countries will double, or even triple, their current populations by 2050.**³¹

Without better access to advanced agricultural inputs and mechanization, extension services, financing, and land tenure, Africa’s farmers will continue to convert forests and grasslands to agricultural production, while further depleting the soils and pastures already in use.

LATIN AMERICA

Since 1990, Latin America has become a global breadbasket. **In response to increased domestic and global demand for food and feed crops, fruits and vegetables, and livestock products**, producers invested in precision machinery, adopted advanced seed technologies, and improved their livestock management systems.³²

To maximize their investments and control costs, farmers specialized in fewer crops or livestock products. This contributed to remarkable TFP growth, but **it has also taken a toll on the region’s biodiversity as farmers take advantage of their increased efficiency and convert more forests and fragile lands to agricultural production.**

Smart land-use policy and increased investment in public agricultural R&D and extension can reduce land expansion and help producers improve the health and productivity of current crop and grazing lands.