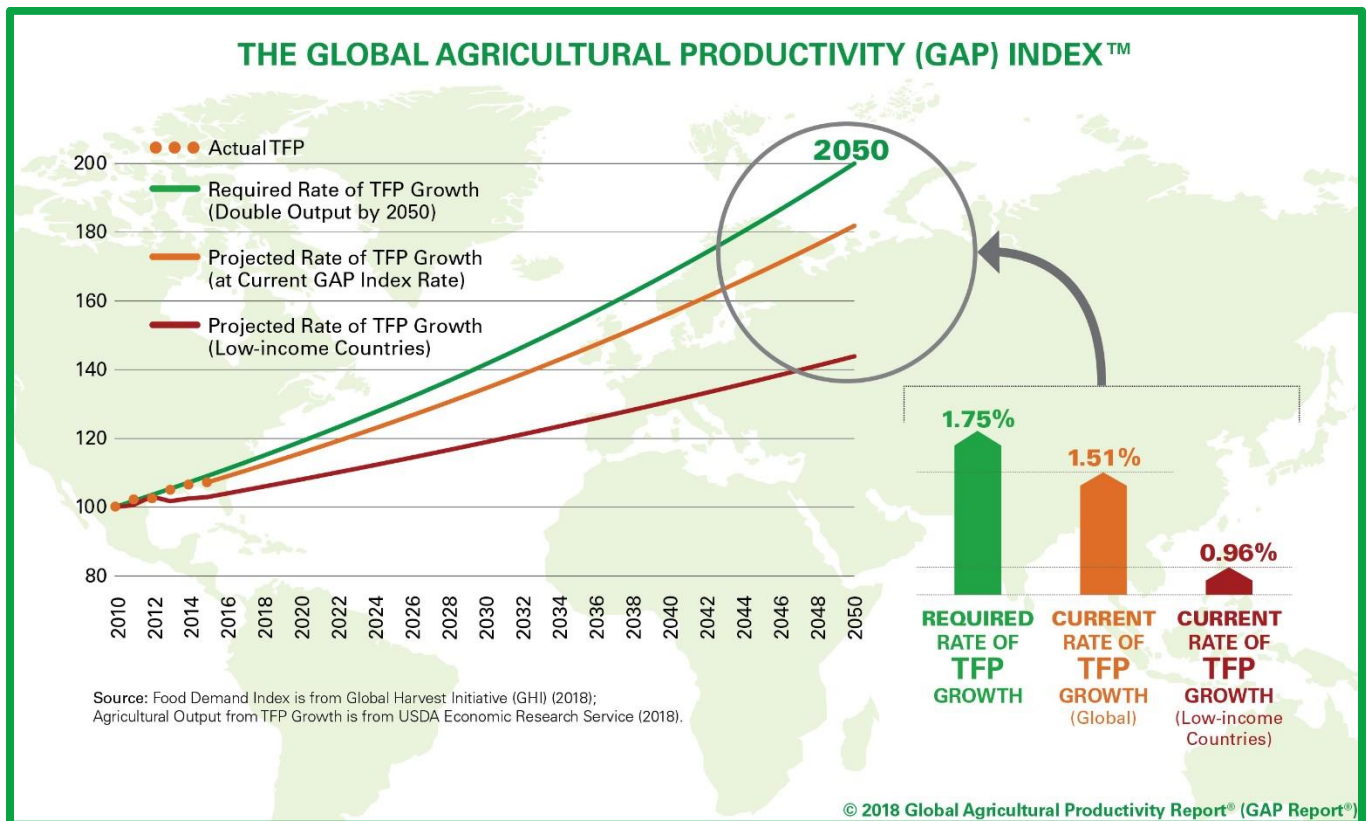


Tracking Productivity: The GAP Index™

The 2018 Global Agricultural Productivity Index™ (GAP Index™) reveals that for the fifth straight year, global agricultural productivity growth is not accelerating fast enough to sustainably meet the food, feed, fiber and fuel needs of nearly 10 billion people in 2050.



In 2010, GHI calculated that global agricultural productivity (as measured by TFP) must grow by an average rate of 1.75 percent annually to double agricultural output through productivity growth by 2050.

The [U.S. Department of Agriculture's Economic Research Service \(USDA ERS\)](#) estimates that since 2010, **TFP growth globally has been rising by an average annual rate of only 1.51 percent.**

The average annual TFP growth rate in low-income countries is particularly troubling. [Sustainable Development Goal 2 \(SDG2\)](#) calls for doubling productivity for small-scale farmers in the lowest income countries. **The current rate of TFP growth in low-income countries is only 0.96 percent**, down from a 1.5 percent three years ago.

If this downward trend continues, farmers in low-income, food-deficit countries (where population growth is rapidly rising) will use more land and water to increase their output, straining a natural resource base already threatened by extreme weather and climate change.

Low-income countries will need to import food but lack sufficient income to purchase enough to meet the needs of their citizens. Poor urban households will bear the brunt of higher food prices in these countries, but they will also impact low-income rural populations since they are net food buyers.

Productivity Is Critical to the SDGs

The United Nations Sustainable Development Goal 8 (SDG 8) lays out specific targets for the economic growth required to end poverty and hunger; in the least developed countries, this must reach at least 7 percent annual GDP growth. The realization of UN SDG 8 will lead to higher demand for agricultural output in developing countries, where there is presently insufficient agriculture and food production.



In fact, the highest demand growth for many agricultural products is coming from regions with high rates of population growth and low rates of agricultural productivity, such as sub-Saharan Africa.

These regions are characterized by small farms, with little access to productive inputs. As production increases to meet the growing demand, concerns are rising about the environmental impact these low-productivity systems will have on the natural resource base, along with rising greenhouse gas emissions.

Doubling agricultural productivity from 2005 to 2050 is aligned with the SDG 2 target of doubling agricultural productivity and incomes of small-scale farmers and food producers. It also considers the additional demand generated by achieving the SDG 8 target for economic growth. And it provides for the

need to increase agricultural output while also conserving natural resources and reducing the climate impacts of agricultural production.

Increasing R&D investments is required to meet the SDGs. These investments enable farmers to produce food more sustainably while conserving natural resources. Without these innovations, farmers, particularly in food-deficit countries, will put more fragile land into production to increase output and will experience greater hunger and poverty.

Doubling Agricultural Productivity Is the Right Goal

The previous 10 years have witnessed unprecedented demand for agricultural commodities, driven by income increases and population growth in China and India, as well as demand for biofuels stimulated by high energy prices.



Over the next decade, the OECD and the United Nations Food and Agriculture Organization (FAO) project that the rate of demand growth for all agricultural commodities will slow compared with the last decade. The rate of demand growth for cereal grains, meat, fish and vegetable oil will be cut nearly in half, the notable exception being increasing demand for fresh dairy.¹

The projected slowdown in demand for food and agriculture products over the next decade has prompted calls for a reduction in the agricultural output targets for 2050.²

Yet a large and growing body of sophisticated modeling by agricultural economists examining long-term scenarios for agriculture, food and the environment indicates that it may be too soon to consider revising these goals downward.

The [Agricultural Model Intercomparison and Improvement Project \(AgMIP\)](#) is an international collaborative effort to improve agricultural economic models. AgMIP coordinates regional and global assessments of climate impacts and uses multiple

scenarios for crop and livestock production across differing geographies to explore the effects of uncertainty, data selection and methodology on the models' results.

AgMIP's analysis of 10 leading global multi-sectoral projection models found that world agricultural production of crops and livestock between 2005 and 2050 will need to rise by between 60 and 111

percent, with demand growth particularly strong for ruminant products (cows, sheep) as well as for commodities used in the production of biofuels - sugar, coarse grains and oilseeds.³ (The OECD/FAO prediction of a decrease in the rate of demand growth for food and agriculture products extends only to 2026, not to 2050.)

OECD and FAO attribute the decline in the rate of food demand growth to moderating rates of economic and population growth, particularly in China, and a decline in demand for biofuels. While the rate of demand growth may be slowing (compared to the previous 10 years), the overall demand for food and agriculture products is still rising, as is the global population.



Agricultural Model Intercomparison and Improvement Project (AgMIP) scientists visited Wote, Makueni County in Kenya. They held discussions with county policy makers on climate change adaptation strategies. Photo credit: V. Atakos/CCAFS

Most importantly, AgMIP points to the impact climate change will have on the ability of agriculture to meet future demand. The 10 models suggest that **climate change will generate higher prices for agricultural commodities in general and particularly for crops. The impact of climate change must be considered to avoid a downward bias in projected supply estimates.**

Endnotes

¹ OECD-FAO Agricultural Outlook 2017-2026, OECD Publishing, 2017

² Hunter, M.C. et al., "Agriculture in 2050: Recalibrating Targets for Sustainable Intensification," BioScience, published by Oxford University Press for the American Institute of Biological Sciences, 2017.

³ Von Lampe, M. et al., "Why Do Global Long-term Scenarios for Agriculture Differ? An overview of the AgMIP Global Economic Model Intercomparison," Agricultural Economics, January 2014.