SUSTAINABLE AGRICULTURE IS BUILT ON PRODUCTIVITY GROWTH

While global population and incomes are growing more slowly that they did at the turn of the century, 30 years from now, the world's farmers, ranchers, fishers, and foresters will need to sustainably produce food and agricultural products for nearly 10 billion people.

Agricultural producers have a variety of strategies and production practices to choose from, but many threaten the sustainability of our agricultural systems.

Land Expansion: Expand the amount of land used to produce crops and livestock by converting forests and grasslands to agricultural production.

Irrigation Extension: Deploy or extend irrigation systems to protect land against drought, improve its productive capacity, and permit multiple cropping seasons.

Input Intensification: Increase applications of fertilizer, machinery, labor, seeds, herbicides, animals, and other inputs to increase crop or livestock output on currently cultivated crop and rangeland.

These strategies are needed in some circumstances, but if not used appropriately they can lead to negative outcomes: loss of biodiversity, soil degradation and erosion, higher GHG emissions, declining yields over time, reduced water quantity and quality, and vulnerability to environmental shocks and climate change.

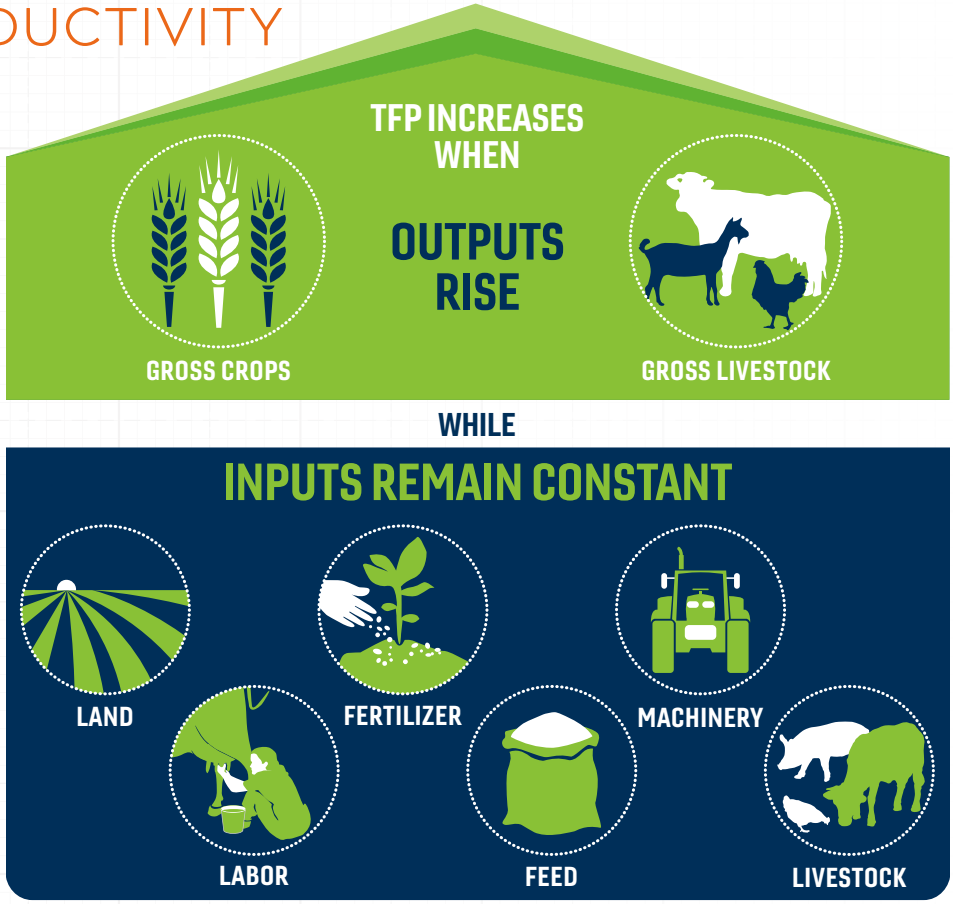


Figure 1: Total Factor Productivity

TOTAL FACTOR PRODUCTIVITY FOR SUSTAINABLE GROWTH

A strategy that emphasizes **sustainable productivity growth** will help meet the needs of producers and consumers today, while safeguarding the environmental, economic, and social sustainability of agriculture for future generations.

Agricultural productivity rises when producers use technologies and production practices that produce more crops and livestock from existing or fewer resources. This increase in efficiency is measured as **Total Factor Productivity, or TFP.**

TFP is not a measure of *output*, the total quantity of crops or livestock produced, nor is it a measure of *yield*, the amount of output per unit of production, usually land.

TFP is a ratio that measure changes in how efficiently agricultural inputs (land, labor, fertilizer, feed, machinery, and livestock) are transformed into outputs (crops and livestock.)

TFP growth indicates that producers are adopting improved technologies and practices. **Tracking TFP gives us insight into how efficiently and sustainably we are using our land, water, human, and capital resources.**

THE GAP INDEX™: GLOBAL TFP GROWTH STAGNANT; LOW-INCOME COUNTRY TFP ALARMINGLY LOW

Data from the USDA Economic Research Service indicate that TFP is not growing fast enough to sustainably meet the demand for food, feed, fiber, and bioenergy needed in 2050.

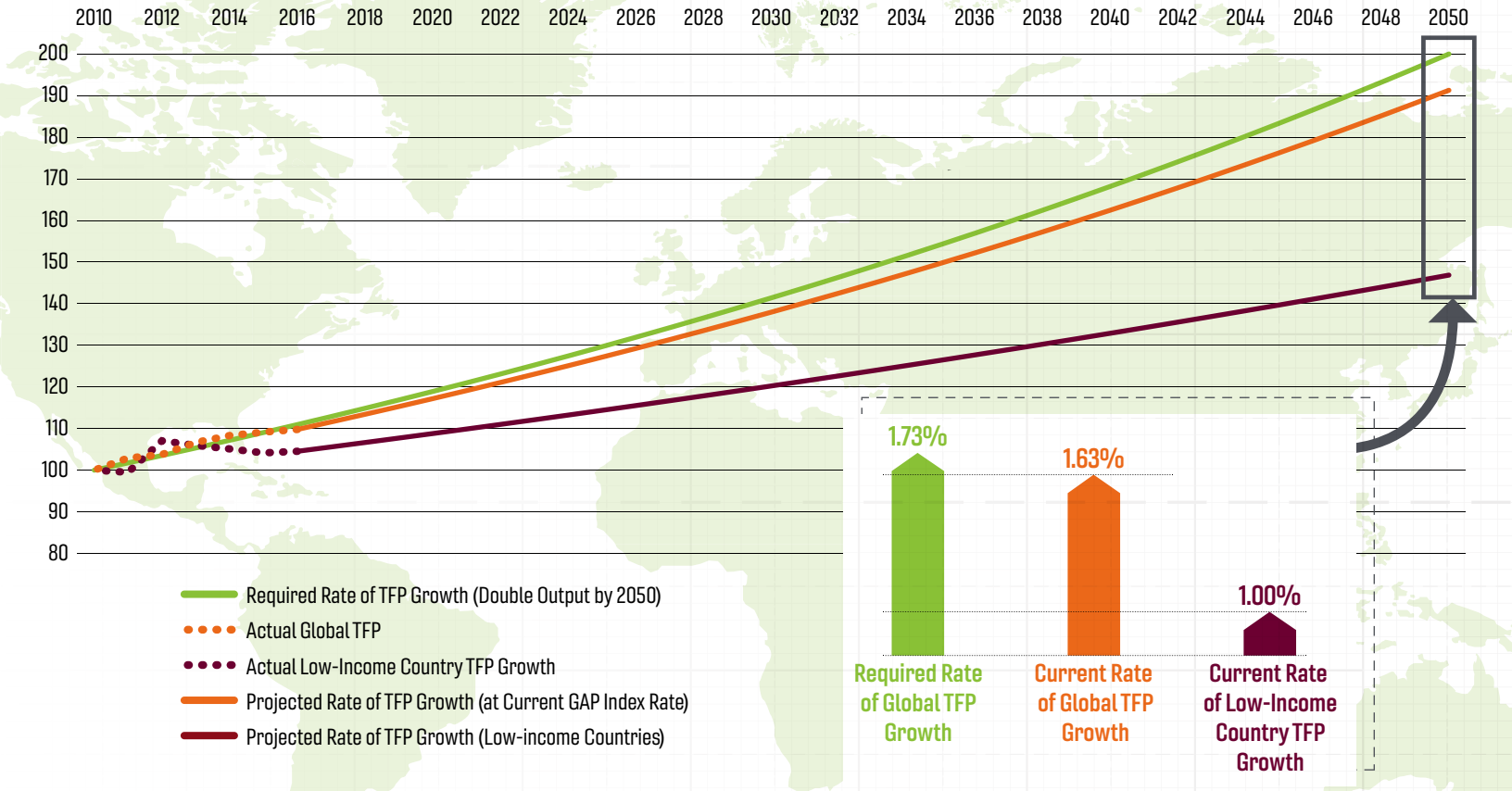
Globally, TFP is rising by an average annual rate of 1.63 percent, less than the estimated 1.73 percent needed to sustainably double agricultural output (2010-2050) through productivity growth. TFP growth is strongest in China and South Asia, but it is slowing in the agricultural powerhouses of North America, Europe, and Latin America.

TFP growth in low-income countries is alarmingly low, just 1.00 percent.

Urgent attention is needed to reverse this trend and achieve Sustainable Development Goal 2 (SDG2), which calls for doubling the productivity for small-scale farmers in the lowest-income counties.

Without timely interventions, productivity trends will produce significant negative consequences for environmental sustainability, economic development, and human nutrition. Farmers will use more land and water to increase output, straining a natural resource base already threatened by climate change. Unable to afford higher-priced nutrient-dense foods, such as animal proteins and fruits and vegetables, consumers will rely on foods made from cheaper cereal grains for most of their calories, exacerbating skyrocketing obesity rates in adults and children.

Policymakers, producers, and consumers can help reverse these trends by investing in agricultural R&D and extension services, adopting science-based technologies and better farm management practices, paying greater attention to ecosystem services, improving transportation infrastructures, reducing food loss and waste, making regional and global trade efficient and cost-effective, and supporting programs for agricultural development, gender equity, and nutrition.



Source: Current and projected TFP growth provided by USDA Economic Research Service (2019).