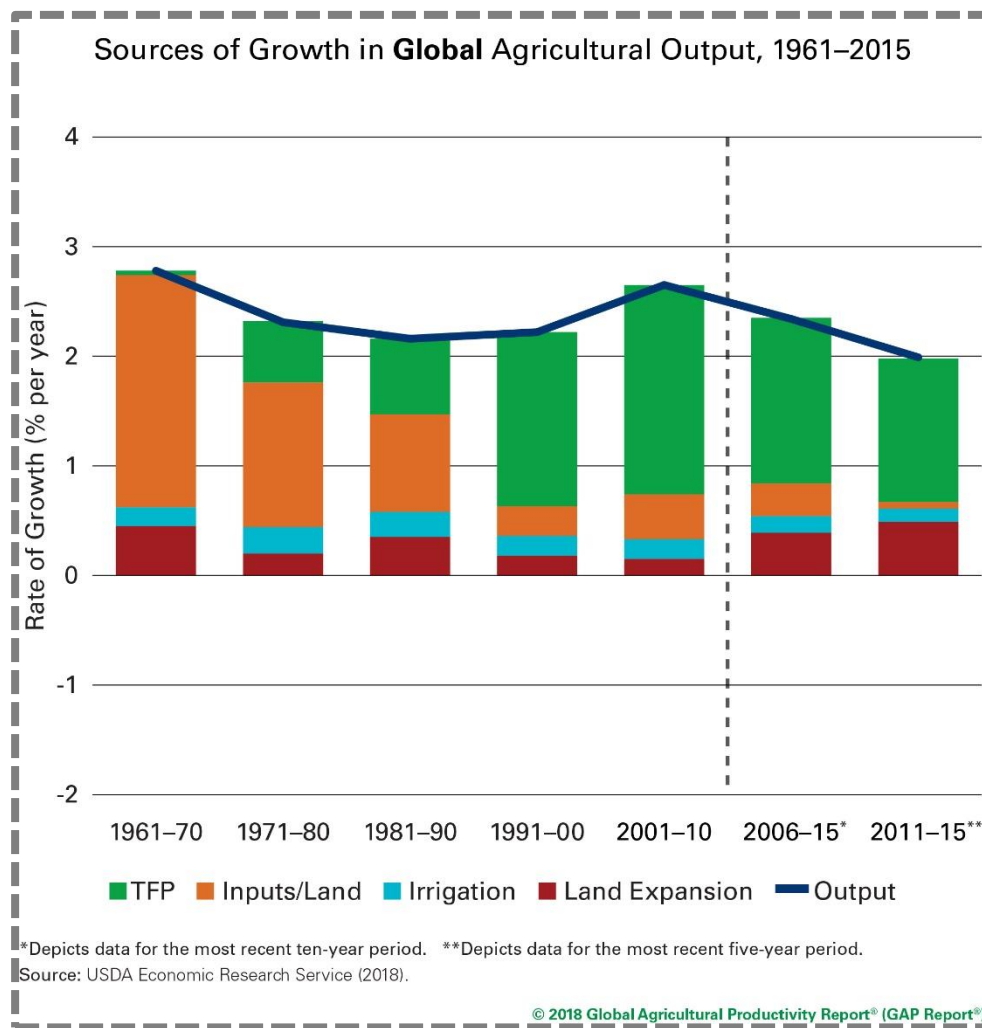


Prioritizing Productivity for Food Security

Total Factor Productivity (TFP) is the primary contributor to global agricultural output growth. (Figure 1, green bar.) Agricultural productivity benefits producers, consumers and the environment. Productive use of inputs and capital helps farmers control costs during volatile business cycles. Consumers benefit from lower food prices. Natural resources, particularly land and water, are protected for future use or put into conservation.

However, the most recent ten-year period of available data (2006-2015) reveals that TFP's contribution to global agricultural output growth has declined while the contribution of land expansion to output growth is rising. (Figure 1, red bar.) The data for the most recent 5 years (2011-2015) show a continuation of these concerning trends.

Figure 1



Land expansion has occurred as producers of all scales began converting forests and grasslands to crop production and livestock grazing in response to increased demand for food, feed and fuel. The demand was generated by several factors, including the food price crisis of 2007-2008, policies supporting the use of biofuels and increased consumption of meat by a rising global middle class.

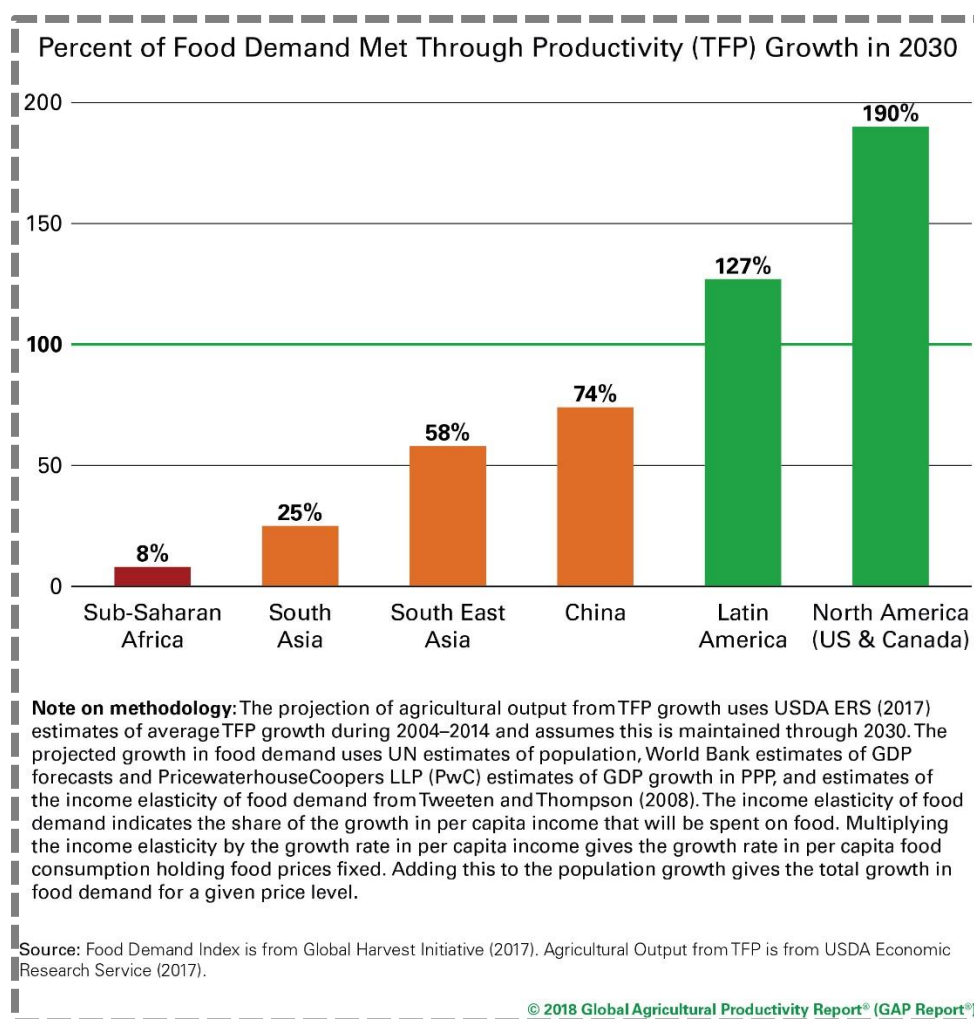
Only low-income countries show a reduced contribution to output from land expansion along with an increase in TFP in the last 10 years.

The Productivity – Food Security Connection

The decline in global TFP growth rates has profound implications for global food security and nutrition, as well as the sustainability of food and agriculture systems.

GHI established a series of regional estimates comparing food demand indexes against projected agricultural output from TFP growth for the period 2000 to 2030. Figure 2 compares the percentage of the estimated food demand for 2030 that can be met with projected TFP growth for five world regions and China.

Figure 2

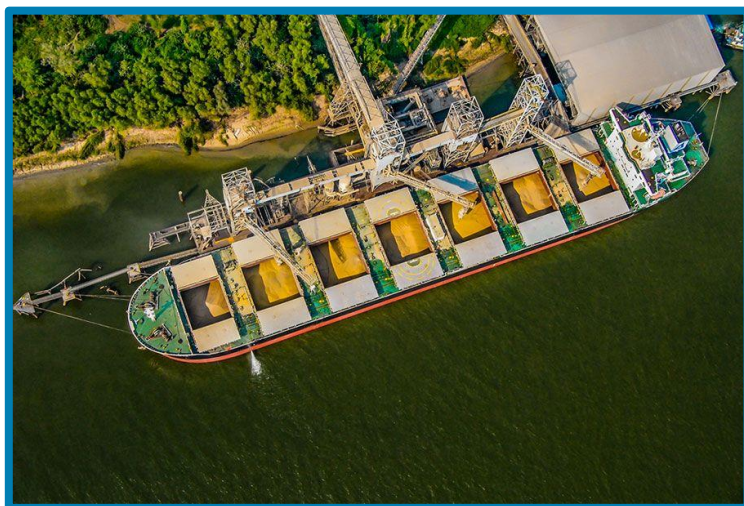


At current rates of TFP growth, sub-Saharan Africa will meet only 8 percent of its food demand through productivity. (Figure 2.) Without significant increases in agricultural productivity growth, African countries will not meet their Sustainable Development Goal (SDG) targets for reducing hunger, malnutrition and poverty.

With 60 percent of the world's population and considerable economic diversity, the **Asian regions (South Asia, South East Asia, East Asia, including China)** exhibit varying degrees of capacity to meet food demand through productivity.

China has prioritized agricultural productivity, development and food security and has achieved great progress in reducing hunger.

Other Asian countries, such as **India, Indonesia and Vietnam**, could potentially reduce hunger and improve agricultural productivity, but face significant threats from climate change, requiring accelerated investments to keep up with the challenge.



Trade will play a key role for closing the food demand gap in many of these countries. Harmonizing trade rules and improving the trade capacity of low-income countries, coupled with improvements in supply chains and infrastructure, will foster timely and beneficial trade.

The **breadbaskets of North and Latin America** will continue to be important sources of food, feed, fiber and biofuel for the world in 2030.

At present TFP growth rates, the **Latin America and Caribbean** region will be able to meet 127 percent of regional food demand through productivity growth, led by the southern cone countries of Argentina, Brazil, Paraguay and Uruguay. These countries and others in the region have the potential to increase their productivity to sustainably supply food and other agricultural goods to a growing world.

In 2030, **North America** is projected to reliably supply safe, abundant food for the world, producing 190 percent of its own food demand. However, the current trend toward trade protectionism has created uncertainty among about the future of traditional trading relationships and the prospects for trade growth in the coming decades.

In addition to trade, regions and countries that are unable to meet their food demand through TFP growth will produce more food using agricultural production strategies that do not conserve existing resources, such as converting forests and grasslands for agricultural production, or by relying on more inputs or more labor. This will place a significant burden on the world's land, water and human capital resources, making it difficult for future generations to meet their own food needs.

Policies, investment and innovations that improve the productivity of agriculture at all scales and reduce loss and waste in the value chain are essential. This is the foundation for environmentally, economically and socially sustainable food and agriculture systems.

Productivity for Sustainable Milk Production

India is already the world's largest fresh dairy producer, but it will need to increase its annual milk production by 56 million tons in the next 10 years to meet domestic demand.

India already has 90 million dairy cows and buffalo, but their milk productivity is very low. Dairy cows produce an average of 14,000 hectograms per animal and buffalo produce 19,000 hectograms. By contrast, the U.S. has just 9.2 million dairy cows, but each of them produces an average of 101,000 hectograms per animal.

Simply adding more animals to meet India's milk demand is environmentally, economically and socially unsustainable. Increasing the milk productivity of the animals through improved genetics, feed and animal care practices would help meet demand while lowering the climate impact of dairy production in a more sustainable way.

