

Growing food and protecting nature don't have to conflict: Here's how they can work together

March 9 2021, by Thomas Hertel



Paul and Becky Rogers converted 14 acres of land in Kent County, Mich. to habitat that supports pollinators, songbirds and wildlife. Credit: [USDA/Flickr](#), [CC BY](#)

Growing food in a sustainable, environmentally friendly way—while also producing enough of it—is among the most important challenges facing the U.S. and the world today.

The ongoing COVID-19 pandemic has reminded us that [food security](#) can't be taken for granted. Putting affordable [food](#) on the table requires both innovative producers and well-functioning markets and global supply chains. With disruptions to the system, prices rise, food is scarce—and people go hungry.

But feeding the world's [7.8 billion](#) people sustainably – [including 332 million Americans](#) – presents significant environmental challenges. Farming uses [70% of the world's fresh water](#). Fertilizers pollute water with nitrates and phosphates, sparking algal blooms and creating dead zones like the one that forms every summer in the [Gulf of Mexico](#).

Clear-cutting land for farms and ranches is the main driver of [deforestation](#). Overall, the planet loses about 48,000 square miles (125,000 square kilometers) of forest each year. Without habitat, wildlife disappears. Farming also produces roughly [one-quarter of global greenhouse gas emissions](#).

All of these challenges make balancing food production with environmental security a crucial issue for the Biden administration, which is working to address both a [hunger crisis](#) and an [environmental crisis](#) in the U.S.

Two different pathways

As an [economist studying food systems](#), I'm keenly aware that trying to provide affordable food and a thriving agricultural sector while also preserving the environment can result in [many trade-offs](#). Consider the different strategies that the U.S. and Northern Europe have pursued: The U.S. prioritizes increased [agricultural output](#), while the EU emphasizes environmental services from farming.

Over the past 70 years, the U.S. has [increased crop production](#) with ever

more [sophisticated seed technologies](#) and highly mechanized farming methods that employ far fewer workers. These new technologies have contributed to farm [productivity growth](#) which has, in turn, allowed U.S. farm output to rise without significant growth in the aggregate economic index of agricultural input use.

This approach contrasts sharply with Northern Europe's strategy, which emphasizes using less land and other inputs in order to protect the environment. Nonetheless, by achieving a comparable rate of agricultural productivity growth (output growth minus the growth rate inputs), Northern Europe has been able to [maintain its level of total farm output](#) over the past three decades.

Productivity growth in agriculture since 1961 has made food more abundant and cheaper in North America

This economic index of all inputs used in agriculture in North America is roughly at the same level today as in 1961. Farms now use less labor and more technological inputs, such as machinery and fertilizers. U.S. agricultural policy has used productivity gains to increase output.

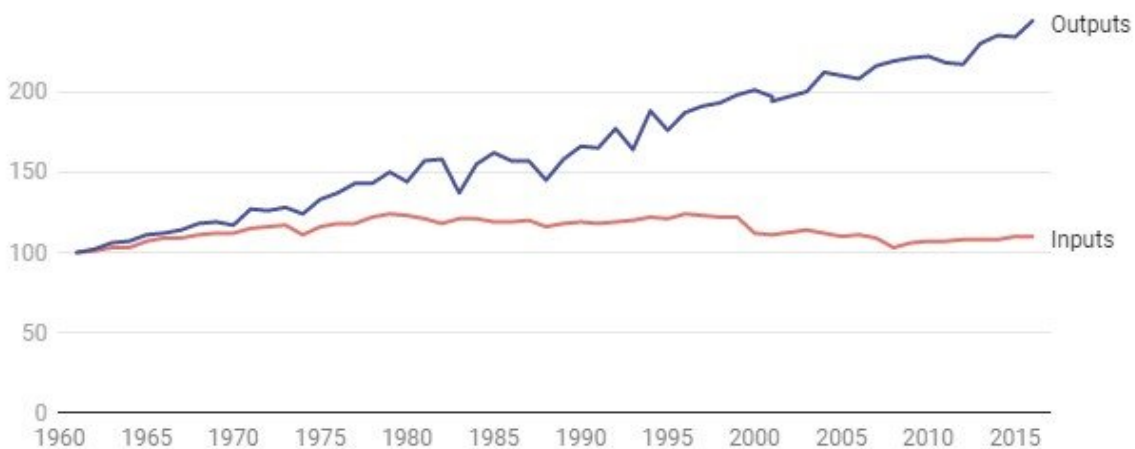


Figure shows an economic index of all agricultural inputs and outputs with 1961 as the base year. Credit: Chart: The Conversation, CC BY-ND Source: USDA ERS

Boosting prices versus benefiting nature

The U.S. also has a long history of [setting aside agricultural land](#) that dates back nearly a century. In response to low prices in the 1920s, farmers had flooded the market with grain, pork and other products, desperately seeking to boost revenues but only pushing prices down further.

Under the Agricultural Adjustment Act of 1933, the U.S. government paid farmers to reduce their output and limited the supply of land under cultivation to boost farm prices. This strategy is [still in use today](#).

In 1985 the U.S. launched a new program that created real incentives to protect environmentally sensitive land. Farmers who enroll in the [Conservation Reserve Program](#) "rent" environmentally valuable tracts to the U.S. Department of Agriculture for 10-15 years. Withdrawing these acres from production provides food and shelter for pollinators and wildlife, reduces erosion and improves water quality.

But this is a voluntary program, so enrollment ebbs and flows in tandem with crop prices. For example, when corn, soy and wheat prices fell in the late 1980s and early 1990s, enrollment grew. Then with the commodity price boom of 2007, farmers could make more money from cultivating the land. Protected acreage dropped more than 40% through 2019, erasing many of the environmental benefits that had been achieved.

Northwest Europe has reduced farm inputs without sacrificing food production

Farms in Northwest Europe use fewer inputs than they did in the 1960s and 1970s, particularly land, but strong productivity growth has enabled them to produce a consistent amount of food. These nations' agricultural policies emphasize conserving resources without reducing output.

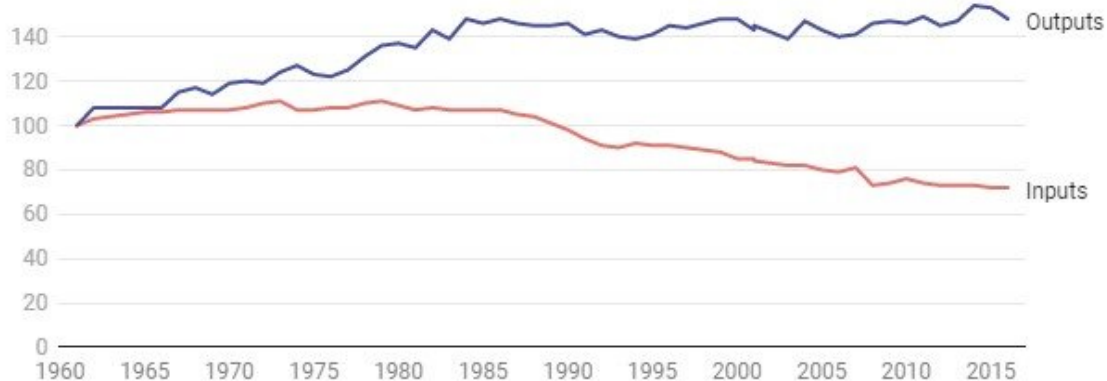


Figure shows an economic index of all agricultural inputs and outputs with 1961 as the base year. Credit: Chart: The Conversation, CC BY-ND

Rental rates for agricultural land in the U.S. vary widely, with the most productive lands bringing the highest rent. Current rental rates under the Conservation Reserve Program 2021 range from US\$243 per acre in Cuming, Nebraska to [just \\$6 in Sutton, Texas](#).

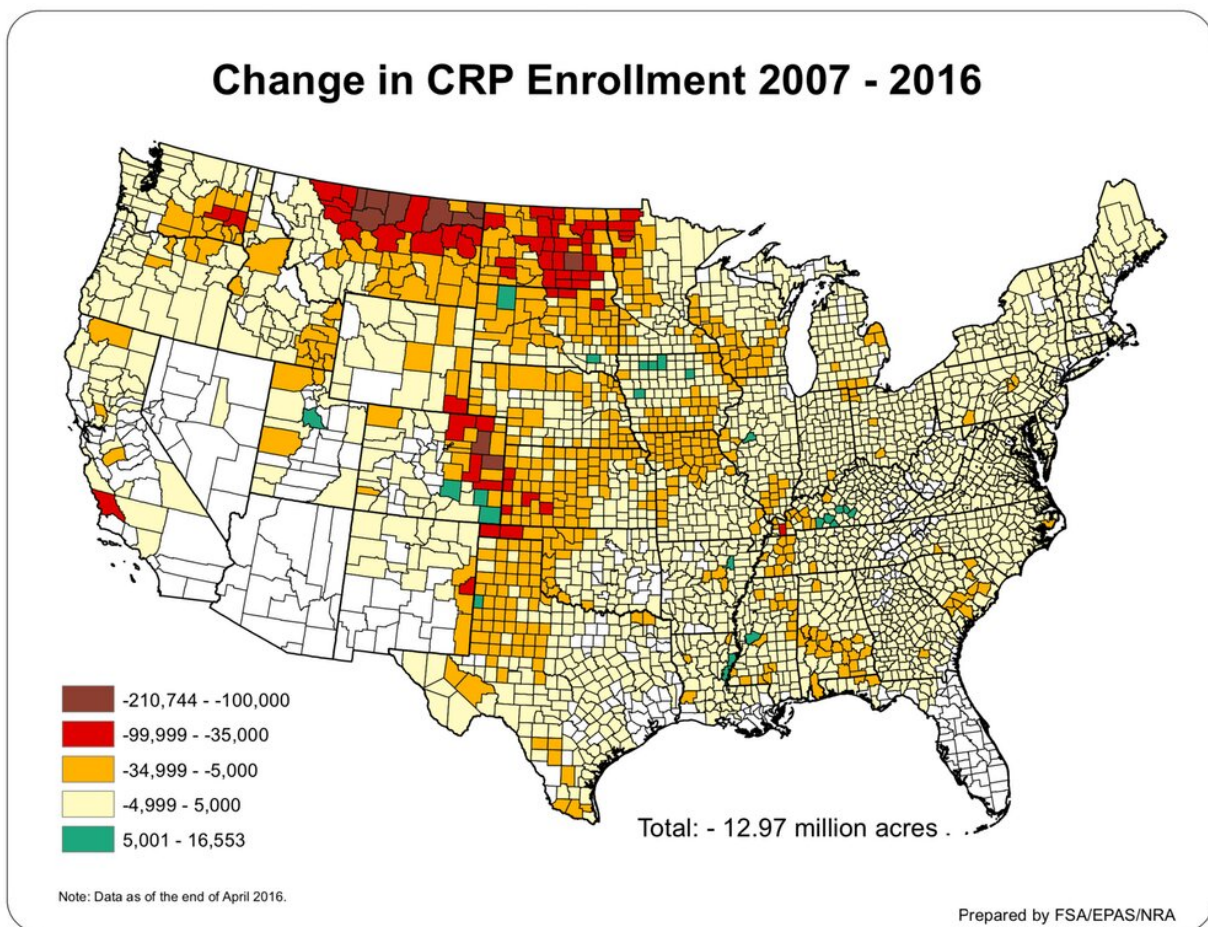
The EU also began [setting aside farmland](#) to [curb overproduction](#) in 1988. Now, however, their program focuses heavily on environmental quality. Policy reforms in 2013 required farmers to allocate 5% of their land to [protected ecological focus areas](#). The goal is to generate long-term environmental benefits by prioritizing nature.

This program supports both production and conservation. Within this mix of natural and cultivated lands, wild pollinators benefit both native

plants and crops. Birds, insects and small predators offer natural bio-control of pests. In this way, "rewilded" tracts foster biodiversity while also [improving crop yields](#).

Who will feed the world?

What would happen if the U.S., a major exporter of agricultural products, followed the EU model and permanently withdrew land from production to improve environmental quality? Would such action make food unaffordable for the world's poorest consumers?



Enrollment in the USDA Conservation Reserve Program dropped by almost 13

million acres from 2007 to 2016. Credit: [U.S. Department of Agriculture](#)

In a study that I conducted in 2020 with colleagues at Purdue and the U.S. Department of Agriculture, we set up a computer model to find out. We wanted to chart what might happen to food prices across the globe through 2050 if the U.S. and other rich economies followed Northern European conservation strategies. Our analysis focused on [the world's most food-insecure region](#), sub-Saharan Africa.

We discovered that altering food production in this way would raise food prices in that region by about 6%. However, this upward price trend could be reversed by [investing in local agriculture and new technologies](#) to increase productivity in Africa. In short, our research suggested that conserving the environment in the U.S. doesn't have to cause food insecurity in other countries.

Implications for US farm policy

Many experts on hunger and agriculture agree that to feed a growing global population, world food output must [increase substantially](#) in the next several decades. At the same time, it's clear that agriculture's [environmental impacts need to shrink](#) in order to protect the natural environment.

In my view, meeting these twin goals will require renewed government investments in research and dissemination of new technologies. Reversing a two-decade [decline in science funding](#) will be key. Agriculture is now a [knowledge-driven industry](#), fueled by [new technologies and improved management practices](#). Publicly funded research laid the foundations for these advances.



A rewilded area in Germany, near Dresden. Credit: Thomas Hertel, Author provided

To reap environmental gains, I believe the U.S. Department of Agriculture will need to revamp and stabilize the Conservation Reserve Program, so that it is economically viable and enrollment does not fluctuate with market conditions. The Trump administration [reduced incentives and rental payment rates](#), which drove down enrollments. The Biden administration has already taken a modest step forward by [extending the yearly sign-up for the program indefinitely](#).

As I see it, following Northern Europe's model by permanently protecting ecologically rich areas, while simultaneously investing in knowledge-driven agricultural productivity, will enable the U.S. to better preserve wildlife and its natural environment for future generations, while maintaining an affordable food supply.

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