

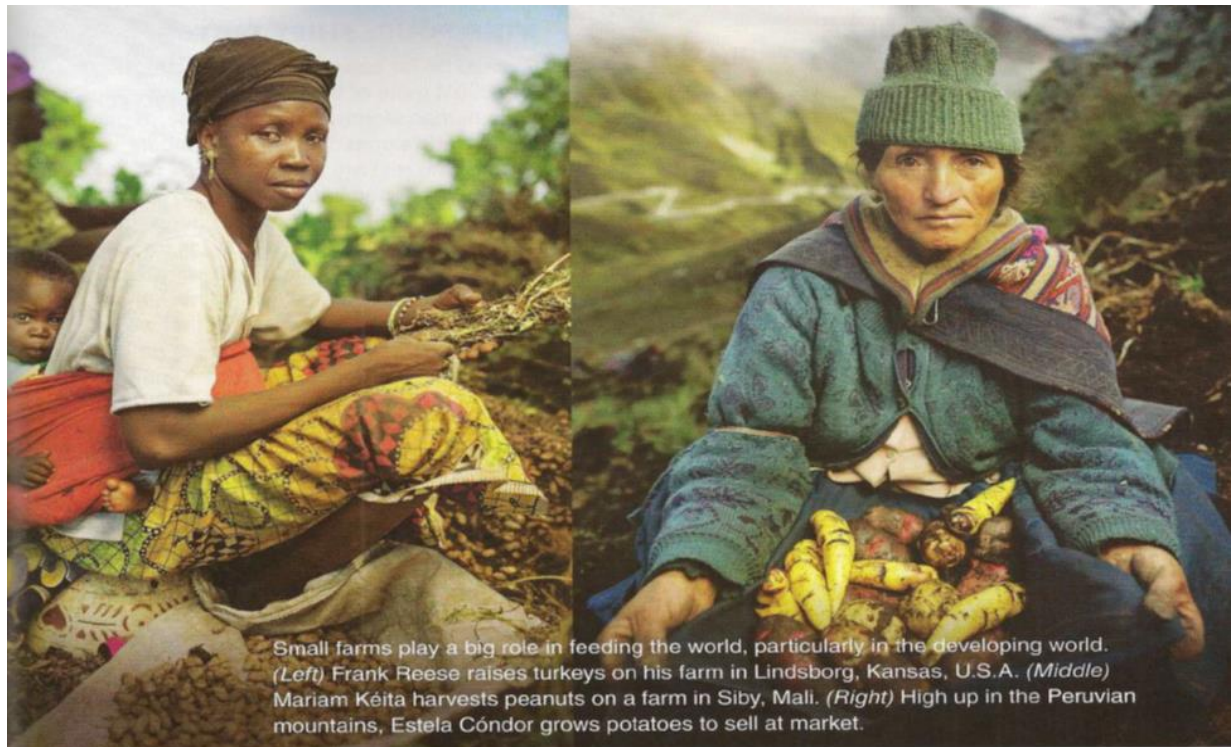
When we think about threats to the environment, we tend to picture cars and smokestacks-not dinner. But the truth is, our need for food poses one of the biggest dangers to the planet.

1 Agriculture is among the greatest contributors to global warming, emitting more greenhouse gases than all our cars, trucks, trains, and airplanes combined-largely from methane released by cattle and rice farms, nitrous oxide from fertilized fields, and carbon dioxide from the cutting of rain forests to grow crops or raise livestock. Farming is the thirstiest user of our precious water supplies and a major polluter, as runoff from fertilizers and manure disrupts fragile lakes, rivers, and coastal ecosystems across the globe. Agriculture also accelerates the loss of biodiversity: As we've cleared areas of grassland and forests for farms, we've lost crucial habitat, making agriculture a major driver of wildlife extinction.

2 The environmental challenges posed by agriculture are huge, and they will only become more pressing as we try to meet the growing need for food worldwide. We will likely have 2 billion mouths to feed by mid-century-more than 9 billion people. But sheer population growth isn't the only reason we will need more food. The spread of prosperity across the world, especially in China and India, is driving an increased demand for meat, eggs, and dairy, boosting pressure to grow more corn and soybeans to feed more cattle, pigs, and chickens. If these trends continue, the double whammy of population growth and meat-and-dairy-intensive diets will require us to roughly double the amount of crops we grow by 2050.

3 I was fortunate to lead a team of scientists who confronted this simple question: How can the world double the availability of food while simultaneously cutting the environmental harm caused by agriculture? After analysing reams of data on agriculture and the environment, we proposed five steps that could solve the worlds' food dilemma.

4 Taken together, these five steps could more than double the world's supplies and dramatically cut the environmental impact of agriculture worldwide. But it won't be easy/ these solutions require a big shift in thinking. For most of our history, we have been blinded by the imperative of more, more, more in agriculture-clearing more land, growing more crops, using more resources. We need to find a balance between producing more food and sustaining the planet for future generations.



STEP ONE: FREEZE AGRICULTURE'S FOOTPRINT

5 For most of our history, whenever we've needed more food, we've simply cut down forests, or plowed grasslands to make more farms. We've already cleared an area of roughly the size of Africa. Agriculture's footprint has caused the loss of whole ecosystems around the globe; including the prairies of North America and the Atlantic forest of Brazil, and tropical forest continue to be cleared at alarming rates. But we can no longer afford to increase food production through agricultural expansion. Trading tropical forest for farmland is one of the most destructive things we do to the environment, and it is rarely done to benefit the 850 million people in the world who are still hungry.

STEP TWO: GROW MORE ON FARMS WE'VE GOT

6 Starting in the 1960s, the green revolution increased yields in Asia and Latin America using better crop varieties and more fertilizer, irrigation, and machines-but with major environmental costs. The world can now turn its attention to increasing yields on less productive farmlands-especially in Africa, Latin America, and Eastern Europe-where there are "yield gaps" between current production levels and those possible with improved farming practices. Using high-tech, precision farming systems, as well as approaches borrowed from organic farming, we could boost yields in these places several times over.

STEP THREE: USE RESOURCES MORE EFFICIENTLY

7 Organic farming can also greatly reduce the use of water and chemicals-by incorporating cover crops and compost to improve soil quality, conserve water, and build up nutrients. Many farmers have also gotten smarter about water, replacing inefficient irrigation systems with more precise methods, like subsurface drip irrigation. Advances in both conventional and organic farming can give us more “crop per drop” from our water and nutrients.

STEP FOUR: SHIFT DIETS

8 It would be far easier to feed 9 billion people by 2050 if more of the crops we grew ended up in human stomachs. Today only, 55 percent of the world’s crop calories feed people directly; the rest are fed to livestock (about 36 percent), or turned into biofuels and industrial products (roughly 9 percent). Though many of us consume meat, dairy, and eggs from animals raised in feedlots, only a fraction of calories in the feed given to livestock make their way into the meat and milk that we consume. For every 100 calories of grain we feed animals, we get only about 40 new calories of milk, 22 calories of eggs, 12 of chicken, 10 of pork, or 3 of beef. Finding more efficient ways to grow meat and shifting to less meat-intensive diets-even just switching from grain-fed beef to meats like chicken, pork, or pasture-raised beef-could free up substantial amounts of food across the world.

STEP FIVE: REDUCE WASTE

9 An estimated 25 percent of the world’s food calories and up to 50 percent of total food weight are lost or wasted before they can be consumed. In rich countries, most of that waste occurs in the homes, restaurants, or supermarkets. In poor countries, food is often lost between the farmer and the market due to unreliable storage and transportation. Consumers in the developed world could reduce waste by taking such simple steps as serving smaller portions, eating leftovers, and encouraging cafeterias, restaurants, and supermarkets to develop waster-reducing measures. Of all of the options for boosting food availability, tackling waste would be one of the most effective.

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