

CARNEGIE COUNCIL *for Ethics in International Affairs*

Full Planet, Empty Plates

Public Affairs

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Transcript

Introduction

JOANNE MYERS: Good afternoon. I'm Joanne Myers, and on behalf of the Carnegie Council, I would like to welcome our members and guests to this Public Affairs program.

It has been a few years since Les Brown last [spoke](#) at the Carnegie Council, so we are delighted to welcome him back to this podium. For over 40 years, our speaker has been at the forefront of the environmental movement. He founded [Worldwatch Institute](#) in 1974 and [Earth Policy Institute](#) in 2001.

Long applauded for his outstanding contributions to understanding and analyzing environmental issues, many have included him on their list of the world's most influential thinkers. He has been awarded over 20 honorary degrees, given a MacArthur "Genius Grant," and was the recipient of the United Nations Environment Prize, a Worldwide Fund for Nature Gold Medal, and the 1994 Blue Planet Prize. The Library of Congress has requested his personal papers and manuscripts in recognition of the role of his work in shaping the global environmental movement of the late 20th century. Les Brown's [books](#) have been translated into more than 40 languages.

Today he will be discussing his book [Full Planet, Empty Plates: The New Geopolitics of Food Scarcity](#), in which he tells us that in this era of tightening world food supplies, the ability to grow food is fast becoming a new form of geopolitical leverage. Food is the new oil, he says.

Humanity has been striving against famine and hunger since ancient times, but it wasn't until 1996 at the World Food Summit that a concept was born to fight against hunger and malnutrition, [declaring](#) that food security exists when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life. In September, heads of state will [convene](#) at the United Nations to agree upon a set of post-2015 [developmental goals](#). Nutrition has captured global attention and has been included in one of those goals.

Yet when we are faced with a growing population, over-farming, over-grazing, eroding soils, resulting in fewer acres of arable land, limited supplies of available fresh water, and rising temperatures, it is understandable why we may be on a path to greater food shortages. Presented with these challenges, the question becomes, how can we ensure that all people in every country of the world will have a nutritious diet? What will the geopolitics of food look like in a new era dominated by scarcity? How serious is it, and what can we do about it?

Putting Les Brown's ideas into practice is critical if we are to have any hope of feeding a growing population. Please join me in welcoming a person who is known for anticipating global trends.

Though the questions that he raises may make you feel uncomfortable, they are necessary if we want to ensure that our demand for food will not outstrip the supply.

Les Brown, thank you for joining us today.

Remarks

LESTER BROWN: Thank you, Joanne, and thank you all for coming out tonight.

Some time ago, I read a story in *The New York Times* about a guy who was on his way to work. He was getting on the metro and another guy was getting off. The guy who was getting off sort of bumped into him. He remembered that pickpockets often do this; they bump into you to distract your attention. He reached for his wallet, which he always carried here, and it was gone. So he went after the guy who was getting off the car and grabbed him by the arm. The guy kept pulling, trying to get away. Then he had him by the sleeve only, and he was pulling. He pulled the sleeve off. The guy got away, and he had the sleeve. He was so frustrated. He was that close to getting the guy. He was just beside himself.

When he got to the office, he decided to share his frustrations with his wife. He called her at home. She said, "Oh, hon, I'm so glad you called. You left your wallet on the kitchen table." [Laughter]

That was in *The New York Times*, so it must be a true story.

We are in transition today, have been for the last few years now, from an age of surpluses to an age of scarcity. When I joined the Department of Agriculture in 1959, the big issue was food surpluses, grain surpluses. They were trying to figure out what to do with them. One of the things we did was establish the food aid program so we could use the surplus grain to reduce the amount of hunger in the world.

But it was difficult. It's one thing to have shortages and have to respond. To have surpluses and have them become a problem was a politically complex situation.

I would like to flash back to 2007-2008, when we had a poor harvest. That was a time when the [world grain price doubled](#). As the food situation tightened and prices began to rise, then even exporters got a little anxious. Russia and Argentina, both important wheat exporters, banned wheat exports. One thing led to another, and people began to panic. Countries that were traditionally dependent on imports began to think about buying land of their own someplace—could be in sub-Saharan Africa or Brazil, wherever they could find it. So we saw kind of a land rush of governments of importing countries buying land on which to produce food when they got in a difficult situation. It was every country for itself. The cooperation that had existed for most of the time since [World War II](#) had evaporated.

The land grabs eventually totaled 160 million acres, most of them in Latin America or in sub-Saharan Africa. One hundred and sixty million acres is roughly equal to the area the United States has in wheat and corn, so it's not a trivial situation. But prices did not decline. They continued to be strong. Food became the new oil; land, the new gold.

Why did we suddenly have so much trouble on the food front? One reason—we will look at the demand side of the equation first—is that population growth is continuing at 80 million or so a year. Eventually that begins to put pressure on resources. It means we are adding 219,000 people a day. That is, tonight there will be 219,000 more people at the dinner table than last night, and tomorrow

night another 219,000. This is one of the reasons why we are beginning to see grain prices and food prices rising.

Another one is that we decided some years ago that we could reduce our vulnerability to oil supplies in the Middle East by producing some of our own fuel for cars. So we began producing ethanol from corn. We produced about 400 million tons of grain per year in this country. Of that, 130 million went to ethanol distilleries to produce fuel for cars.

So we have population growth and we have a substantial part of the U.S. grain harvest being used for fuel. In fact, the use of grain to produce fuel exceeded all the grain we fed to livestock and poultry in this country. It was not trivial.

The other thing that we have is rising affluence. As incomes go up, grain consumption goes up, not directly, but most of it indirectly. Just to give you a sense of what this looks like in quantity terms—and I'm going to use round numbers now—the average grain consumption per person in India is about 400 pounds of grain per year, which means about a pound of grain per person per day. When you have only that much grain available, you can't afford to convert very much into animal protein. You need to consume most of it directly.

We have 3 billion people moving up the food chain in the world—at least 3 billion; it could be more. That is putting pressure on supplies. Meat consumption in China is climbing very fast. Total meat consumption in China today is double that in the United States, though per capita it is still only about half that in the United States. But China, with its rapidly rising income and 1.3 billion people, has been an enormous source of growth in the world demand for grain.

One of the other interesting things we have seen in the shifting structure of the world grain economy is that corn has become totally dominant in production. World production of corn today is about 1 billion tons. The production of wheat is maybe 600 million. Rice is 450 million. So corn production is almost equal to that of wheat and rice together. Wheat and rice are the world's two food staples. For most people in the world, it's either wheat or rice, one or the other.

So we have seen corn emerge as the leading grain by a wide margin.

On the supply side, we have run into water shortages. Half the world's people now live in countries where water tables are falling. That includes the United States. Water tables are falling in parts of the Southern Great Plains, for example. The Ogallala Aquifer, also known as the Great Plains Aquifer, is being depleted. We have seen shrinkage in irrigated area for the last few decades now in Texas and in Oklahoma. That is likely to spread into some other countries.

We also have climate change to deal with. When I was farming back in the 1950s, we worried about the weather, especially for growing tomatoes, as I was in Southern New Jersey. We worried about the weather, but we didn't worry about climate change. Farmers today still have to worry about weather, but also climate change. We know that there are much greater fluctuations now in the climate system.

The rule of thumb used to be that a one-degree-Celsius rise in temperature would reduce grain yields by 10 percent. The most recent research on this from Stanford, based on data over the last 30 years from 600 counties in the United States, is that a one-degree-Celsius rise in temperature leads to a 17 percent decline in grain yield. When you realize that the meteorologists are talking about a rise potentially of up to several degrees Celsius during this century, you can begin to see how that might affect a world where the population is projected to increase almost as far as we can see into

the future.

When we look at the process of photosynthesis, which is the key to everything, of course, we see that as temperature rises from 68 degrees—this is average temperature during the growing season—to 95 degrees, yields are more or less flat. When we go from 95 to 104 degrees, yields begin to decline. If we go above 104 degrees, plants go into thermal shock, and nothing happens. They are just trying to survive. They are not producing, very little photosynthesis. We have right now a [drought](#) in California that everyone is thinking about and concerned about. What if we had a drought that covered most of the country, including parts of the Midwest and the Southern Plains? Then not only would we be in trouble, the world would be in trouble.

Agriculture as it exists today has evolved over an 11,000-year period of rather remarkable climate stability. Agriculture as it exists today is designed to maximize production with that climate system. But that climate system is no more. It is now changing. This is what makes food projections, decisions by farmers so much more difficult than at any time in the past.

So we have water shortages; we have climate change. We also have soil erosion. In this country we had the Dust Bowl period of the 1930s. Farmers had been plowing and over-plowing grassland in the Southern Great Plains, converting grassland into cropland, and at some point it began to dry out and it began to blow, and we had the Dust Bowl. It was a warning. This was in the 1930s. In response to it, we did, among other things, create the Soil Conservation Service. The [Soil Conservation Service](#) had an agent in every county in the United States. The work of that agent was to help farmers devise agricultural practices that would reduce soil erosion—for example, begin alternating strips of wheat and plowed land. You see these strips in fields. That is to control erosion. We planted trees in the Northern Plains, hundreds of thousands of them, designed to slow wind and reduce soil erosion.

So we responded, and we got the Dust Bowl under control. We have done a pretty good job since then of avoiding another [Dust Bowl](#). But in some places in the world there are huge new dust bowls forming now that dwarf the U.S. Dust Bowl of the 1930s. One is in Africa, south of the Sahara. There is a strip of land going across Africa with relatively low rainfall and a lot of cattle and goats. The African population is growing very fast, and the cattle and goat populations are growing at about the same pace. At some point they begin to overwhelm the capacity of the land to support the cattle. So we have, not one dust bowl, but a whole string of dust bowls now forming across Africa just below the Sahara, in what we call the Sahelian zone.

We are also seeing a huge dust bowl develop in northern and western China. To put this in perspective, the United States and China, which are comparable in size geographically, in terms of ability to produce crops and support feed cattle and so forth—the United States has about 100 million head of cows. China has about 100 million head of cows, mostly dairy in both cases, but a lot of beef cows too in the United States. But now we look at sheep and goats. The United States has 9 million sheep and goats. China has 282 million sheep and goats. This is what is creating the huge dust bowl in northern and western China. The same force is at work across the Sahelian zone of Africa. So we have two large areas of the world where we are losing grazing land at a rather rapid rate.

There is a fourth constraint that we see on efforts to expand world food production. I call it the glass ceiling. In raising grain yields, once you have eliminated the moisture constraints and the nutrient constraints so you can realize the full potential of the crop, you are faced with a limit that photosynthesis imposes. That is now beginning to kick in. If we look at rice yields in Japan, for example, they started rising a century ago. They continued up until about 1997. Then Japanese

farmers couldn't find anything they could do to keep rice yields going, so they plateaued—flat. China's rice yields are now just 4 percent below those of Japan. Unless Chinese farmers can produce more per acre than Japanese farmers, they are about to plateau as well.

So we have a large share of the world's rice harvest, for example, in two countries that account for a large part of the world's rice supply.

The glass ceiling, this ultimate limit on yields, can now be seen with grain in a number of countries. I mentioned Japan. France has not increased its wheat yields for the last 15 years. It seems likely that corn yields in the United States—and corn is by far the biggest grain crop in any country—corn yields in the United States are probably going to plateau shortly. So we have this glass ceiling on yields beginning to emerge as one of the newer constraints on efforts to expand food production.

So we have water shortages, climate change, soil erosion, and the glass ceiling to contend with. It is becoming more difficult to keep up with consumption. This is why world grain prices have doubled since 2007-2008. For us, a doubling of wheat prices really doesn't have much effect. When we buy a loaf of bread, it has maybe 15 cents' worth of wheat in it. If the price of wheat doubles, it's another 15 cents on a three-dollar loaf of bread. It's not very much. But if you live in New Delhi and you go to the market and buy wheat, bring it home and grind it into flour to make chapatis, if the world price of wheat doubles, the price of your chapatis doubles. It is the low-income people in the world who are going to be most affected by this.

We are seeing the emergence of something entirely new—at least for me entirely new, and I have been involved with these issues for more than half a century—and that is families beginning to plan foodless days. On Sunday night they will get together and say, "We simply can't eat every day." It used to be that eating once a day was kind of the floor, but now some families cannot afford to eat every day, so they decide on Sunday that on Wednesday and Saturday they won't eat. We are seeing this in countries like Nigeria, Peru, India, Pakistan. The concept of foodless days is new and disturbing. But that is where we are today.

What do we do? One of the things that I think we need to do is to think about how to raise water productivity. We have been focusing on land productivity for a long, long time. We know what it is to raise yield per acre. We don't even have a term for water productivity—grain per ton of water used or 1,000 tons of water used or what have you. I would point out that it takes 1,000 tons of water to produce one ton of grain. Water is an important part of the resource mix in thinking about future food security. We need an indicator of water productivity. We don't have one now—just as we have an indicator for land productivity, tons per hectare, bushels per acre, whatever.

We also need to rethink our grain reserve requirements. For most of the last half of the last century, into this century, we thought that at the end of the year we should have about 70 days of consumption in carryover stocks. This was the measure of the security issue—70 days of consumption in the bin when the crop year ended. That's so in case you have a really poor harvest, you will have something to fall back on.

But that standard was set before climate change became an issue. I think today we need to raise that 70 days of consumption to 110 days of consumption, because with climate change there is going to be much more variability. We don't know when it will come and where it will hit the hardest. We know right now that California is in one of the most serious droughts on record. The good news is that California doesn't produce a lot of our grain. They produce some rice, but not a lot of food staples. They produce a lot of the things we like to eat in the way particularly of fruits and vegetables

and so forth.

We need a mobilization, one not unlike the mobilization for World War II. We didn't prepare for World War II, and then suddenly we were at war. We weren't ready. [Roosevelt](#) banned the sale of automobiles. The reason he did that was because he wanted the automobile companies to start producing planes and tanks and other equipment for the war. I remember seeing the film footage of what had been an automobile plant in Michigan turning out B-19s or one of the large bombers. They were literally coming off the assembly line just as cars once had.

That was an example of how we mobilized for World War II. We need to begin to thinking about how we mobilize in the face of climate change, in the face of water shortages, in the face of continuing population growth of about 80 million a year. We have to think about how to stabilize population. We can't keep growing indefinitely on a finite planet. At some point it could become unmanageable. The key to stabilizing population is basically eradicating poverty. We think about providing family planning services, and that's obviously important, reproductive health care for women and so forth. But we have to eradicate poverty if we want people to think about reducing family size. That is one of the big challenges.

So raise water productivity, increase our grain reserve carryovers, cut carbon emissions so we can stabilize climate, and stabilize population. Those, I think, are the keys.

With that, I would be happy to respond to any questions. I would like to introduce my colleague Janet Larsen, who is our director of research. If I can't answer your questions, Janet can.

Questions

QUESTION: I'm Don Simmons.

In 1970 or thereabouts, the projected population of the world in the year 2050 was to be about 12 billion. Now the projection for 2050, I think, is around 9.5 billion. That's the last thing I saw. So there has been some improvement, if we can call it that, in the projection for 2050, I think due to the increasing living standards that many in the world have enjoyed. People have fewer babies when life is better for them.

Does that principle offer some good news for our future from today that would offset some of what you have described?

LESTER BROWN: It does. There are large areas of the world today where population has come to a halt—Western Europe, Eastern Europe, Japan. China is getting close to stabilizing its population. Interestingly, we are left with one of the higher population growth rates in the world, certainly among the industrial countries. We and the Canadians are not slowing population growth in the way that other industrial countries have.

The population issue is a big challenge. The rising affluence one is also, particularly when we move far enough up the food chain that it begins to adversely affect our health individually, as well as put additional pressure on the planet's land and water resources.

QUESTION: My name is George, from City College of New York.

This might be a controversial topic for another whole discussion, but I was curious what you think the role of GMOs, genetically modified organisms, might be, how it might play into these dynamics.

LESTER BROWN: I'll respond quickly and let Janet respond. She has thought more about some of these things than I have.

Genetic modification is not something that I would rule out, period, because I think it can make important contributions.

JANET LARSEN: When you look at the research with genetic modification, very little of the so-called crop improvement has gone to improved crop yields. We have been able to do things like integrate drought resistance. In U.S. fields some of the most commonly genetically modified crops are, of course, our soybeans and our corn. Those have been genetically modified to withstand applications of [Roundup](#) herbicides on them—kill the weeds, but not kill the crop.

It doesn't directly raise yields. Instead, it means that our food supply is increasingly covered with more herbicides, the glyphosate herbicides that scientists are studying now to see what that will do to our health. We don't know. So when we look at genetic modification, we see that it is not bringing us huge yield gains, but it is bringing us more chemical contamination on our food supply.

Then there are some novel genetically modified crops, like the apple that was just improved, not to make us be able to grow more apples or withstand drought, but to produce apples that don't brown when you cut them and they sit out.

There are a lot of questions that come up when you look at genetic modification, but so far it hasn't proven to be the big savior for feeding more people.

LESTER BROWN: Just to underline that point that Janet made, I do not know of a single example where genetic modification has raised crop yields. It has all had to do with resistance to insecticides and pesticides and so forth. So the contribution of genetic modification to raising crop yields and land productivity, so far as I can tell, is zero.

QUESTION: Ron Berenbeim.

I would be interested in your thoughts about, I guess for lack of a better word, industrial farming. When we think of farming and we think of the Dust Bowl and we think of the issues you described, we think of farmers who get up early in the morning and plant their crops and harvest them and everything else. But a huge percentage—I don't really know how much—is produced industrially, for better or for worse. I would like your thoughts on the impact of that fact.

LESTER BROWN: The economic impact of industrial farming is likely lower-cost food. Industrial farming is sort of a difficult concept to define. So much of what we do now depends on industrial inputs. I won't go into detail on that.

Janet, I'm going to let you respond to this. You have been thinking a lot about it.

JANET LARSEN: I think if we didn't have industrial farming, we wouldn't have 7 billion people on the planet today. The United States is the world's agricultural superpower in terms of what we produce to feed ourselves, our animals, and then what we produce to feed the world. That has come because we have had large, vast monoculture crops and incredible efficiency of production. Part of that is because of the industrialization of farming. Part of that is because we have an amazing agriculture endowment in this country, with the state of Iowa, for instance, producing more corn than all of Canada, more grain than all of Canada, while producing about as many soybeans as China—just Iowa. That's what industrial farming can do. It can feed a lot of people fast.

But then when you look at the full picture, you say, what does that do to biodiversity? What does it do when you disrupt the nutrient cycle so that we no longer have the mixed farms where you have big fields of crops, but you also have your cows or your pigs or your chickens? You have their waste. You can put it on the fields, and it's a real asset. When you break up that cycle and you grow your pigs or your chickens and your cows in large feeding operations off the farm, then that waste is a huge liability. It's very dangerous. Then we have to synthetically develop fertilizers to put on our fields because we don't have that. It creates water pollution. It creates air pollution.

So we have gained a lot with industrial farming, but I think there are a lot of questions we have to be asking about how we are farming and figure out if that's the way we really want to feed the future.

QUESTION: Susan Gitelson.

Let's address the problem of wasting food. For example, in this country there are more and more food banks and other organizations that gather food that has been prepared in restaurants and, in the past, has been thrown away, and now it can be recycled to be used by poor people or whatever. How can such programs to reduce or eliminate waste help the situation?

LESTER BROWN: One of the things that I have always wondered about is why in restaurants there is just one size meal. There are a few exceptions, but not many. Whether you weigh 200 pounds or 110 pounds, you get that same plate of food. Obviously our needs for food, for calories and protein vary a lot. But we have never really focused on that. I would be happy if we had two sizes, the larger one and one somewhat smaller. That would probably reduce substantially the amount of food. If you look in a restaurant, there is a lot of food that gets carried back. That's the waste that you are talking about.

JANET LARSEN: It's a great question. I think it is estimated that about 40 percent of all the food that is produced is wasted. A good share of that happens on the farm with things that can't be harvested fast enough, if there is not the right market at the right time. But a lot of that also happens in restaurants. It happens in our homes.

I think when we look at the big food picture and you say, okay, if we are going to try to feed everyone, and feed everyone sustainably, where do we have the buffers? I see food waste as a huge buffer. If we can solve the food waste problem and make sure that all of the calories that we are growing end up being nutritious calories and making their way to the people who need them, we will go a long way.

Another big buffer, as Lester talked about before, is biofuels. We don't need to be turning food into fuel for our cars.

Then the third would be meat production, since meat production is so very grain-intensive and thus water-intensive and land-intensive.

I think when you have those three things, that's someplace where we may have some leeway in solving the food problems.

LESTER BROWN: One interesting effect of what we are calling industrial farming is that when you mechanically harvest, you lose a certain amount of grain or soybeans or whatever it is you are harvesting. One of the things that has happened on the Eastern Shore of Maryland, which is a migratory route for geese, is that because of the amount of soybeans and corn that is grown and harvested mechanically, there is a lot left in the fields. So the migratory geese that used to go down

to the Southeastern United States don't have to anymore. They can camp out in Maryland, if they want, on the Eastern Shore, because there is a lot of soybeans and corn that they can consume.

So our agricultural practices have actually altered the migratory patterns and distances of geese in the United States. I don't know if this is good or bad. I guess for the geese, they don't have to fly as far, and so it's probably good. But it is an example of how agricultural practices can alter natural systems, sometimes in major ways.

QUESTION: Len Maniace.

We were just talking about industrial farming. What about the opposite, the emphasis in a lot of places on local farming? Is that good, bad, or doesn't make any difference?

LESTER BROWN: It's just another expansion. We are seeing this now, where it is not really farmers anymore; it's agribusiness firms that are doing this. They are acquiring land, either buying it or leasing it, and farming on a scale that we have not seen before. In the United States, agriculture has mostly been a family farm sort of thing. That is now beginning to change, and we see agribusiness firms buying land and moving toward highly mechanized agriculture. There are a lot of questions here. Some are social questions. We are losing rural populations because of this. Our rural population is shrinking. Historically it has been kind of a stabilizing force or presence in our society.

I don't know exactly how to even think about some of these things. You have economics. You have the social effects. You have the environmental effects. We don't have good analyses now that incorporate all these things into a single model, if you will.

Janet, do you want to add anything? Now you know why Janet is our director of research at the Earth Policy Institute.

JANET LARSEN: On the idea of localization, I think it is very popular, particularly among young people, to think about going into farming and serving a farmers' market. It is very hard to buy land now. Prices are very high. It's hard to get into. Yet in some communities we are seeing gluts of farmers' markets. I think there are now 8,000 farmers' markets nationwide, and it has been going up and up and up. Every community, I think, has people that want to be able to eat locally. People like to look their farmers in the eye and figure out how they are growing their food.

I think it can be an important trend. It's something definitely to watch. If you go to Iowa, the agricultural superpower, you will find food deserts. People can't get fruits and vegetables. They are surrounded by farmland, but they are realizing they can't eat local. Some of the big food suppliers—Walmart, for instance, which is the number-one organic provider, I believe, in the country—are trying to figure out their supply chain patterns. For a while, everything had to be shipped through Nebraska, even if it was just produced down the road from the person who wanted to buy it.

So I think we need to think about supply chains. Now, if you look nationwide, there are new food policy councils that are starting up in communities. Very small communities and large, major cities are starting to have food policy councils working with the city councils, saying, how are our kids getting fed in schools? How are our supermarkets getting food? What are we growing here? What could we grow here? It is a big movement, and I think we are going to see a lot more from it. It's an exciting place to get involved, I think.

QUESTION: Nathan Dee.

In terms of those buffers, like cutting waste and biofuels and just a diet shift, consuming less meat, is there evidence that indicates that those are actually more promising than current scientific advancements going on? Could those actually be enough or will we always need that just enormous, from-the-ground-up, everyone is participating in this?

JANET LARSEN: That is a really good question. Can changes at the consumer level outpace or be enough compared with big changes going on in agriculture research and development? I think consumer changes can be enormously powerful. Thinking of Lester's example of Indians eating an average of 400 pounds of grain a year compared with in the United States, where per-person grain use is about 1,600 pounds of grain, because so much of that is going to meat. Certainly if we all moved down the food chain and begin eating less meat, we would need a lot less grain. Maybe some of that grain land could be put into other, more nutritious crops. It could do a lot.

In the United States we have actually passed peak meat. Meat consumption has been falling since 2007. For a while, people wondered if it was just the [economic recession](#) that was getting people to eat less meat, but it has actually continued to fall. I think we are seeing a big dietary shift—movements like the [Meatless Monday](#) movement, people deciding one day a week that maybe they will eat vegetarian, young people not eating as much meat.

If you look at the graph of meat consumption, it's kind of interesting, because it goes up and then it goes down a lot. Chicken used to be something you ate Sunday night with your family, and it was a big deal. Now we can eat it three times a day. I think we are starting to scale back.

So consumer changes can be big. Agriculture research and development—they have taglines that say they are trying to feed the world, but they are trying to make profits. They are coming up with things that are going to help their bottom line.

Will there be a big breakthrough in agriculture science? I think there has been amazing work done in increasing the efficiency of crops. A lot of that, though, is not the genetic modification we were talking about earlier. It was all conventional breeding. We have done a lot. But now people are looking back at ancient grains. Maybe we don't need a world food economy just based on wheat, rice, and corn, but maybe we can get wisdom from the past. Instead of a big scientific advancement, we can look back and find out what other things we might be able to eat, especially in our changing climate. What can grow well in a drought or in areas where there is going to be flooding? Maybe we will need to look backwards instead of just looking forwards.

LESTER BROWN: Janet, you did a graph on meat consumption in the United States. It peaked in—was it 2007?

JANET LARSEN: 2007, yes.

LESTER BROWN: And it has dropped how many percent by 2013?

JANET LARSEN: Seven percent maybe.

LESTER BROWN: So about 1 percent a year or something like that.

JANET LARSEN: Total meat consumption, I think, peaked in 2004 and per-capita meat consumption peaked in 2007, I believe. If you want to double check the numbers, we have an [article](#) on earthpolicy.org called "Peak Meat." You can see the graphs there.

QUESTION: Thank you both. You mentioned food deserts. An example of that was in Baltimore. There was a lot of reporting about the food deserts that existed in Baltimore because of areas where the [conflict](#) was taking place.

But if you look at that on a worldwide basis, the idea of conflict as opposed to peace, what are the opportunities for dealing with these issues, again playing off of the title of your book, *Full Planet, Empty Plates*? Does distribution become part of a peacemaking process around the world?

LESTER BROWN: We actually can back up a bit and look at water and the competition for access to water resources for irrigation. That is where I think you can see the conflicts or the potential conflicts beginning to unfold. We see it in this country in competition between cities and farmers for irrigation water, particularly in the Southwest, where water is in fairly tight supply and almost all the water is spoken for.

The other places in the world where water is becoming an issue is in the Arab Middle East. In every country in that region, water for irrigation peaked and then grain peaked some years later. Now the grain production in those countries—this would be Syria, Iraq, Yemen, one or two others—as a group, their grain production is declining because their irrigation water supply is declining. That's one of the things we need to be concerned about.

The conflicts may show up in the competition for water before they actually show up in the competition for access to food supplies.

QUESTION: Gary Nickerson, with the Sierra Club.

My question is a little bit different. We hear a lot about organic food these days, and the yields in organic food are close to the yields in non-organic food crops. Is this just a sideshow that is not really important or is there any importance in the whole issue about organic foods?

JANET LARSEN: It is a very good question. There are a couple of studies that came out just recently looking at the yields. I guess that is the big thing. Industrial ag [agriculture] says organics can never compete; they can't feed everyone. I think, particularly, that might be true with the major staples of the food supply, the wheat and the rice and the corn. Right now they are not being grown organically at enough scale for us to really know. In fact, companies that make processed organic products, like organic crackers or organic granola bars, are often having trouble getting a good supply. I think farmers are seeing that as a big market.

I think we are going to see a big growth in the organic area in this country just because of consumer demand. It's huge. In a mixed farm plot where you are growing vegetables and lots of other things and you are doing that organically, the yields do seem to be very good. That is more labor-intensive. That is a more costly kind of farming. To go fully organic, I don't know if we would be able to be—right now less than 2 percent of the American population is involved with farming. In my parents' generation, everybody knew a farmer, but now very few of us farm. To go more organic would probably need more farmers, I would guess.

LESTER BROWN: One final point. I want to thank the [Sierra Club](#) for all the work in closing coal plants in the United States.

As you may or may not know, several years ago we had about 500 coal plants in the United States. Sierra Club's [Beyond Coal](#) campaign has been at the heart of efforts to close. We now have, I think, 370 left. The Sierra Club goal is to close every one of them by 2030. That will affect CO2 levels,

climate, and food security.

Thank you very much.

JOANNE MYERS: Thank you, Lester. Thank you, Janet.

Audio

"We are in transition today from an age of surpluses to an age of scarcity," says Lester Brown. The reasons are manifold: population growth; climate change; water scarcity; a substantial part of the U.S. grain harvest being used for fuel; increased demands because of rising affluence; and a glass ceiling for crop yields.

Video Clips

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