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FOOD & ENVIRONMENT

Event

Baking resilience into the food system

VIDEO: Watch our conversation about the pandemic's effect on global food supplies and distribution, and how we might prevent future crises arising from climate change

Knowable Magazine

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Watch the replay of the event held March 24, 2021. (Transcript below.)

Empty grocery stores shelves. Shuttered restaurants. Milk spoiled and dumped. The pandemic served as an unscheduled stress test for the world's food systems, highlighting gaps, weak points, and strengths. How did food supply chains fare in different regions? What safety nets exist for those at risk of food insecurity? What are the benefits and drawbacks of local food-based systems versus global supply chains? How might other circumstances like drought or diminished crop yields affect how the population grows and consumes food? And, going forward, what can people and institutions do — from farmers to processors to governments — to build more resilient food supply chains in the face of threats from climate change and future pandemics?

Join us for a conversation with two leading experts on the world's food supply — what's working and what can be done to prepare for future shocks.

Speakers

Johan Swinnen, Director General, International Food Policy Research Institute (IFPRI)

Johan Swinnen is the director general of the International Food Policy Research Institute. He is involved in multiple groups and task forces working to develop sustainable agriculture and food systems and reduce food loss and waste, and he is a frequent adviser to institutions such as the World Bank and the Food and Agriculture Organization of the United Nations. Swinnen is a fellow of the Agricultural & Applied Economics Association, the European Association of Agricultural Economists, and a past president of the International Association of Agricultural Economists. He holds a PhD from Cornell University and was professor of economics and director of the LICOS Centre for Institutions and Economic Performance at Belgium's KU Leuven and senior research fellow at the Centre for European Policy Studies in Brussels.

Tim Benton, Research Director, Emerging Risks; Director, Energy, Environment and Resources Programme, Chatham House

Tim Benton leads the Energy, Environment and Resources program at the independent policy

institute Chatham House. He joined Chatham House in 2016 as a distinguished visiting fellow when he was dean of strategic research initiatives at the University of Leeds. From 2011 to 2016, Benton was the "champion" of the UK's Global Food Security program, a multi-agency partnership of groups including research councils and governmental institutions with an interest in the challenges around food. He has worked with UK governments, the EU and G20 and has been a global agenda steward of the World Economic Forum. Benton has published more than 150 academic papers, many tackling how systems respond to environmental change and is an author of the IPCC's *Special Report on Food, Land and Climate* (2019), and the *UK's Climate Change Risk Assessment.*

Moderator

Bob Holmes, Independent journalist

Bob Holmes is a frequent *Knowable* contributor and a science writer who has covered ecology, evolution, agriculture and sustainability for nearly three decades. He is also author of *Flavor: The Science of Our Most Neglected Sense* (W.W. Norton). He has a PhD in Ecology and Evolutionary Biology.

About

This event is part of Reset: The Science of Crisis & Recovery, an ongoing series of live events and science journalism exploring how the world is navigating the coronavirus pandemic, its consequences and the way forward.

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- RESILIENT FOOD SYSTEMS, RESILIENT CITIES: A High-Level Vulnerability Assessment of Toronto's Food System, Feeding Cities Group
- Food System Shock: The Insurance Impacts of Acute Disruption to Global Food Supply, Lloyd's (2015)
- Modelling the global economic consequences of a major African swine fever outbreak in China, *Nature*

Transcript

Bob Holmes: "Hello and welcome to 'Baking resilience into the food system,' brought to you by *Knowable Magazine* from Annual Reviews. This is the seventh in *Knowable's* Reset Series, conversations with experts about the pandemic, its consequences, and the way forward. I'm your moderator, Bob Holmes.

"We all remember those scary weeks last year early in the pandemic when we could no longer take a well-stocked grocery store for granted. Shortages of flour, pasta and other staples made us realize how fragile our food supply could be. Many workers faced another challenge too as layoffs left them short of funds to put food on the table.

"These twin challenges of supply and affordability aren't going away even when Covid-19 is just a memory. The world's food system faces an uncertain future of climate change, shortages and perhaps political instability. What should society learn from the pandemic to minimize the risks ahead?

"That question doesn't have a simple answer. Our modern food system emphasizes efficiency over resilience. That keeps food prices low but it comes at a cost. We saw one facet of that cost briefly last spring on our grocery shops. But efficiency exposes us to other risks too. American consumers eat Peruvian asparagus and Australian lamb, while Chinese eat American pork and Brazilian soy beans in a global carousel of food trade that tops a trillion dollars annually. That gives us a varied diet at a low price, but it amounts to a massive bet that the global trade system will always work smoothly.

"Vast monocultures of Russian wheat, American corn, Brazilian soy beans feed a worldwide market. But the lack of genetic diversity leaves crops vulnerable to disease. Heavy reliance on pesticides and chemical fertilizers keeps yields high but also brings environmental damage. We'll get into much of this today with two leading thinkers about food policy and food systems.

"Dr. Tim Benton is research director for emerging risks at Chatham House. Officially that's the Royal Institute of International Affairs, a think tank in the UK, although he's coming to us from his farmhouse in Yorkshire. Dr. Johan Swinnen is director general of the International Food Policy Research Institute, a research institute aimed at eliminating hunger and malnutrition worldwide. He's coming to us from Brussels. Welcome to both of you and thanks for being with us today.

"Before I begin, I want to remind everyone that we will have time later on in the hour to answer questions from you, the audience. At any time during our discussion, you can go to the Q&A box at the bottom of your screen and type in your questions. We'll get to as many as we can toward the end of the hour.

"So let's begin with some background. Tim, what do we mean when we talk about the global food system?"

Tim Benton: "Well, yeah, it's a good starting question, Bob. A food system is the entirety of production, transport, manufacturing, retailing, consumption and waste of food, and it includes obviously that pipeline from farm to fork, but it also includes the impacts on nutrition, health and well-being, it includes the impacts on farmer livelihoods, and it includes the impacts on the entirety of the outcomes from the way that we produce and consume food.

"And clearly at a global level there is a single system encompassing all of the agriculture in the world, but obviously at a local level what people eat is often determined by a whole range of local factors, so that there is in some sense an infinity of local food systems that are part of and integrated with the global food system, and almost no country will be divorced from the global drivers associated with some of the issues of trade, prices, availability and so on. So it's really about everything that we do to do with food and its impacts."

Bob Holmes: "And Jo, how well is it doing right now? Does the system work pretty well at the moment?"

Johan Swinnen: "Well, working well is always, it's a relative concept. But I think maybe we should start first, I think, with the saying that if we look back over the past 30 years, we really made a lot of progress in reducing hunger and malnutrition from over the last, let's say, up till five years ago really, in just 25 years. I mean if you look at the number of hungry people in the world, that has come down slowly as a percentage in the global population as well.

"But since the five years, I mean, what is really remarkable is that that trend has reversed. So since 2015 we have an increase in the number of hungry people in the world, the amount of malnourished people in the world. So these are at the edges of the extreme poverty level. If we're going to look at how many people can afford a healthy diet, so if you look at more the nutritional quality, then there's many more people who cannot afford that. So base, there is this so-called EAT–Lancet diet which is a set of, a food basket, which has been identified by scientists as being good nutritious food, and those estimates are 3 billion people on this planet cannot afford that healthy diet.

"And then of course if you look from food systems perspective as Tim already mentioned, at this point I mean the food system contributes quite a lot to our planetary boundaries. Thirty percent of the global energy consumption comes from the food system. About 20 percent, 25 percent of global gas, greenhouse gas emissions also comes from the food system.

"So at this point we are really not on track of going in the right direction, and all the numbers I gave was before Covid-19. So Covid-19 has really made the situation even much worse."

Bob Holmes: "OK. That leads into the next question really, which is that you can regard, in some sense Covid-19 is a stress test for the food system. The hope is that we can look at that and learn from it. Can you talk a little, maybe I'll go back to Tim for this one now in terms of what we might have learned from Covid, what worked well and what didn't?"

Tim Benton: "So if I can just address whether it's a stress test to the system. Yes, clearly we had with Covid the sudden shutdown on a global basis of a whole suite of food-related activities, particularly around hospitality in the Northern Hemisphere, and then people being locked away and then not being able to access jobs and so on, leading to food issues in the Southern Hemisphere. But it's a particular sort of stress test. And I think the thing I would say right at the outset is that climate change and associated environmental degradation is likely to throw many more sorts of stress tests at us over years to come, and there is some significant evidence that Covid itself was made more likely because of environmental change.

"We've all experienced floods and wildfires and storms and changing patterns of weather. The last really significant food price spikes of 2007, '08, '10, '11 had part of their roots in climate change impacts causing droughts, reducing the global supply of food. So in a sense this is an interesting stress test because it's a demand side shock rather than a supply side shock, but it's one of many that we will see in the future.

"And to answer your question directly, at one level for most kind of middle-class, rich-world consumers it created a minor blip in terms of not being able to go to supermarkets and reliably buy flour or pasta as you said right at the start. But it created a whole lot of ripple effects that I'm sure that we can get into on a global basis. Certainly the shutting down of hospitality in the Northern Hemisphere led to huge amounts of food waste, including culling livestock that would have ended up in restaurants, wasting, throwing away dairy products that would have gone into coffee shops, a complete lack of flexibility in being able to repurpose supply chains.

"The concentration of our food system into relatively large processing plants led to issues to do with exposure for workers, particularly meat packers and people like that, and in the Global South people not being able to get wages or being unable to get out of their house, not tend home gardens, has led to a whole a lot of food price issues and food insecurity. And clearly, the shutting down of largely aviation-based transport systems meant that if you take horticulture, for example, in Kenya, which is often a significant part of our winter food in Europe, the fact that there weren't any airplanes flying backwards and forwards carrying passengers, meant that there wasn't the air freight available to move fruit and vegetables from the Global South up to Europe, and many knock-on impacts were therefore felt in Kenya and South Africa and other places.

"So it worked moderately well. There were some initial worries about countries putting in place food price bans, export bans, food export bans, which made us all very worried to start off with, but we largely went through it. I wouldn't say that because we survived moderately well, this means that our food system gets a clean bill of health for next time."

Bob Holmes: "Jo, do you have anything to add to that? You come from a somewhat different perspective."

Johan Swinnen: "Yeah, I think Tim gave a very good overview already. Maybe instead of repeating some of the points that he made, let me maybe add a couple of additional points or a couple of other points, is that overall, I mean, I think one thing we've seen is the heterogeneity of the effects. It is, definitely, I mean as Tim very well explained, the demand side, so the incomes were affected much stronger than the supply side. I mean the provision of food particularly in the richer countries. In the poorer countries it was a bit more mixed. But we see that supply chains have been affected quite differently, for example, whether they were labor intensive or capital intensive or knowledge intensive, and that's an important point, I

think.

"I mean, I started my career studying the transition of the food systems in Eastern Europe and the former Soviet Union, Russia, et cetera, in the 1990s. And there you saw what was the most vulnerable ones were the capital-intensive system. And that was because it was a big shock on the capital side. Here you see it's really the labor side which had been affected mostly, and that means those who are depending on labor are most affected. And on the global level, those are the poor, because the poor cannot do Zoom conferences, they don't have land and investments and apartments and whatever. They have to rely on physical labor which has hurt them quite strongly.

"If you look at the food system, we see also quite different effects on ... So the parts of the foods which were mostly affected were obviously the services, OK, food services, restaurants, bars and et cetera. And what is interesting is that we've seen a lot of innovation. I also want to emphasize some of the positive things, I think. There's been a lot of creativity in the food systems and certainly on the private sector side, large companies reinventing or restructuring investor systems, but also I mean farmers' cooperatives, consumers' organizations, et cetera. And also on the public side for example, if you can't give school lunches because kids cannot come to school, how do you reorganize this thing? So there's a lot of innovation.

"I think there's also been, an important lesson is that some of the new technologies which are being introduced and the technology in a very broad sense, OK, also institutional innovations, have some of them which had been planned maybe for the next 15 years or so suddenly have been introduced in six months' time. Why? Because we had to. And I think that brings some important lessons also if you think further in terms of making our system more resilient that things can maybe go on a faster scale, on a bigger scale than we have thought that was possible so far."

Bob Holmes: "Which presumably is an encouraging thing to think about when we're facing possibly the need for big changes in the future."

Johan Swinnen: "I think so."

Bob Holmes: "Yeah. OK. To what extent would it help to be more reliant on local and regional food supplies? One of the things we saw for at least a little while during Covid was a loss of some international trade. As Tim mentioned, no longer being able to fly the fruit and

vegetables from Kenya to the UK. To what extent can we solve, can we remediate that by being more reliant locally? And is that the right way forward?"

Tim Benton: "Shall I take a stab at that?"

Bob Holmes: "Sure."

Tim Benton: "I do a lot of work on systemic risks and the way that an event in some part of the world can propagate through the global system and impact other parts of the world. And 2007, '08, '10, '11 food price spikes are good examples of that. And I think the systemic-risk framing highlights that in a relatively stable world with normal kind of events happening, trade is almost uniformly a positive thing in that where areas struggle to fulfill their needs, they can get them from other places.

"Where trade becomes more of a risk is when something serious goes wrong and the market has the potential to overreact. And in 2007, '08 and '10, '11, what happened was that we got effectively panic buying on the markets and then panicking by governments which fueled the panic buying on the markets and prices went up and spilled over from one market to another and ended up having a whole range of cascading impacts that led to global food price rises which were out of proportion to the impact in the first place.

"So to answer your question, Bob, clearly under some circumstances not relying on trade can lead to benefits, but under other circumstances not relying on trade leads to costs. And I think there is an open academic question as the world becomes more volatile from a climate impacts perspective, what is the right balance between embedding yourselves fully in a global market and then relying on trade to fulfill local needs versus resilience building at home, so that if something goes wrong with the global markets, you have some ability to fulfill some or all of your needs from a local perspective.

"So I don't think anybody would ever argue that countries should be self-sufficient and we should manage just local supply chains because that comes at too much of a cost. But perhaps the mantra of the last 20 or 30 years that the market solves all problems in a world where there is increasing environmental volatility is also a bit of a risk, and somehow we've got to get the balance right between building resilience and having some local redundancy in that in terms of local supply chains versus the risks that come from having a totally globally integrated system."

Bob Holmes: "OK. Jo, from the point of view especially of the Global South, would there be a different response to that?"

Johan Swinnen: "No, I think that the overall perspective I think is correct. I mean, it also has to do with diversification of your sourcing. I mean you don't want to depend … Even if you import, you don't want to depend on one particular place you import all your products from. And I think the point which Tim hinted at, another way of phrasing it in a way is that, well, it depends on what's the source and what's the location of the disturbances. If for example you have like what happened in 2008 and 2009 with the big price fluctuation on the world market, there the source of the fluctuation, of the price hike, was external, was kind of in the Internet, the world market, the international market.

"For example, if you have a drought inside the country, I mean that's very different, because then you have local problems and trade can really help to balance these local problems. So there you can kind of export your instability rather than importing it in the first case. And so you have to find I think the right balance there.

"I think in terms of also it's a good question how local versus regional versus global value chains or supply chains have functioned. I think the story there is very mixed. It's a nuanced conclusion. It is true as Tim said that initially a lot of these, I mean the planes were not flying, so you couldn't put the vegetables in the bulk space of the airplanes. At the same time, I think shipping for example has not been disturbed very much and local supply chains within the country have also been disturbed quite a bit, so it's very heterogeneous I think.

"The point is also if you're a country like India, for example, what does a local or a regional supply chain mean there because it's a continent in itself. Maybe one point on the — a lot of the issues there also deal with government intervention. Tim referred earlier on the export jurisdictions which have been imposed. I think what we've done from the international institutions side well this time, because we saw how bad the impact was in 2007, 2008, there's been an immediate reaction from the World Bank, OECD, FAO, IFPRI has also joined that, and with the number of reports and blog stories that — please do not block export because it's going to make things worse. So these things have mostly been stopped and reversed. So I think there we've done well I think in terms of responding."

Johan Swinnen: "But we think there's been a lot of interruptions in formal trade in Africa for example. And that of course makes you vulnerable as well. Thank you.

Bob Holmes: "OK. So it sounds like we learned something from the price shocks of a decade ago. Are there new lessons from Covid? Are there things going forward that you think will change permanently? Or is Covid really just, 'Oh, that was nasty. Now we can go back to normal?'"

Tim Benton: "Again, if I jump in first, I think, yeah, we have learned a lot, at least we have learned a lot theoretically and the amount that gets embedded into thinking, into action, I think is a question mark still.

"Certainly, following the systemic risks from Covid and the whole economy-wide impacts, there was a lot of talk about the need to build back better, build back greener, build back more resilience to cope with the increasing pressures that we'll face into the future. Lots of very positive talk. That at the moment is not turning into positive action. It is really more turning into let's build back to where we were as fast as possible because we need the people employed and we need the economic growth to recover as quickly as possible.

"I think with respect to food it has prompted, as Jo has said, it has prompted some significant changes in attitudes, it's prompted some significant advancement to technology, it has created a whole lot of thought processes around how to build more resilience into food systems. And as you said right at the top, Bob, our food system has largely been based for the last 20 or 30 years on increasing efficiency which is reflected in just-in-time supply chains, and the efficiency is about removing redundancy, removing diversity, centralization and making things as kind of efficient as possible in the supply chain pipeline.

"And all of those things are counterproductive from a resilience perspective where you want redundancy, you want some access to food stores, you want some diversity of sourcing, you want distributed networks and modularity not completely centralized, and you want flexibility and substitutability. All of those are an anathema to an efficient food system.

"So I think in the circles that I'm walking in, there is discussion about, well, how can we build resilience, which we've stripped out because it's too costly, how can we build it back in, in the most efficient way so we learn from this, we are prepared for the next whatever it is, impact supply-side shock, demand-side shock, pandemic or whatever it might be, but it doesn't lead to wholesale food price rises that will impact upon the poorest in society as well."

Bob Holmes: "That was going to be my next question actually, is how, if we want to change the

emphasis from strictly efficiency toward more robustness, more resiliency, what ... and I'll send this to Jo, to you next, but what do we need to change and how do we get there, particularly as Tim pointed out without having to face significantly higher food prices which would be a big problem for the world's poorest people?"

Johan Swinnen: "That's a difficult question."

Bob Holmes: "Yeah, solve the world. Yeah."

Johan Swinnen: "Exactly. Well, it's obviously that, and I think, I mean, we agree on this here in this call that it's a systemic problem. So it's not like you can tell a government or an international organization you have to switch from A to B on one particular point and then that solves the problem. So I think it's an issue at various levels. I mean, I think Tim's point where he says, well, we're not quite sure yet how much action is going to come out of this, I think that's a very good point and that's uncertain at this point. All we can do is try to work on making what the words that are there on the table now into action.

"On the other hand, I think what you see is that there is much more openness to think about the number of things than it was two years ago before the pandemic. And openness on a number of issues. I think the issue of resilience is clearly something where people kind of thought about, but I mean in terms of priorities, in terms of focus it's very different now, I think.

"As I said already, I think there's been a number of innovations which have been introduced, basically social innovations, institutional, organization innovation, technological innovations, and some of them I think will stay for the next eight or 15 years. These are short-term investment but will have long-term effects. I mean if you see the ... even in certainly middle-income countries but even in developing countries, the investments in digital technologies, even e-commerce taking off, is quite significant and much more than you would have anticipated.

"And then on the ... there are two important ... a number of important summits coming, major international political summits, including the Food Systems Summit of the United Nations. So what we really need to try is to use the momentum, the political momentum also at this point to carry it into these summits and to push for significant changes there, and not changes which will end by the end of the summit. I mean, the weekend or the Monday, but which will

last, take us forward in the next decade. I can go in details if you want but I'll stop."

Bob Holmes: "We will come back to that, yeah. Let me just pause for a moment to remind the audience to by all means submit questions. We've got some coming in now, but down at the bottom of your page there's a Q&A box. Please type in your questions. We'll get to as many of them as we can in about 15, 20 minutes.

"Looking at the screen here, one thing that's worth mentioning is we're three middle-aged white men from wealthy countries. What other perspectives, what are we missing because of that? What other perspectives do we need to make sure that we raise awareness on? Jo, do you want to start that one?"

Johan Swinnen: "Yeah. I didn't invite us, OK? Actually, I had a discussion this morning with my human resource manager because there is a proposal on the table as part of the CGIAR system, which is the Consultative Group on International Agriculture Research, where my institute is part of, and it's basically it's a diversity panel commitment where one would no longer participate in panels which would be, for example, only white men. So if I would have signed up to that yesterday, I wouldn't have been able to participate today.

"That aside, yes, obviously. I mean, one of the issues which we haven't mentioned yet but which was on my notebook here definitely it's, I mean, the most vulnerable people in the world certainly from a food security perspective and a nutrition perspective have been hit most heavily. So that includes often women in developing countries, youth also. If we think about to the future, I mean, these are really very important social groups we have to focus on in terms of our building back better and in the number of the systemic and the structural constraints that they're facing going forward.

And for sure. I mean, if there would be somebody from a developing country which would be younger female here, she would most likely emphasize some of the specific things that they're facing which we not always do."

Bob Holmes: "That sounds almost more like an economic support issue than an agricultural system issue. Is that putting the finger in the right place or are there agricultural system parts of that, ways that the agricultural system itself, the food system, needs to change to support people like that?

Johan Swinnen: "Yeah. I think obviously, I mean, we should think about there's a whole bunch of things related to that. Although if you think about the production side for example, access to rights of land, rights to water, rights to basic inputs, these things are really ... they're very often gender-biased. It's very difficult often for young people to get these things. I mean, even in the European Union, for example, I mean young farmers are complaining all the time they can't get access to some of the quotas which are imposed on their production system.

"If you think on the demand side, clearly things like social safety nets, instruments, et cetera, the nutrition programs, et cetera, they are ... I mean our nutrition specialists have made this point very strongly that if you set up eight programs or new social safety net programs to address some of these from, you really need to have a gender focus and a focus on the weakest and a focus on nutrition to make them."

Bob Holmes: "OK. Yeah. Tim?"

Tim Benton: "Yeah, yeah. So pondering your question, and I fully agree with Jo's answers there. But there is another demographic which is kind of the future generation which is clearly not represented by us old men. And I think part of the issue about the transformation of the food system and where I would disagree with Johan is that our food system is doing shockingly badly at driving up malnutrition and driving up environmental impact. And when I say malnutrition, I don't just mean caloric insecurity and micronutrient deficiency, but we have focused on creating a food system that is delivering lots of calories cheaply to many parts of the world but is making nutrition very expensive, and at the same time we're putting costs on the environment.

"And Jo's point about 3 billion people not being able to afford a healthy and sustainably produced diet. Is that because the food is too cheap? I would argue no, because food is so cheap because we are providing an environmental subsidy. We need to internalize those external costs of food production. But we need also to recognize that people are not making enough income to afford a healthy diet that is produced in a way that is protecting the planet. And my worry about future generations is that we are very much creating a food system now that is making next generations' marginalized people much more vulnerable because we're driving climate change, we're driving biodiversity loss, we're driving pollution, and at the same time we're encouraging people to eat diets rich in calories that are making them ill with non-communicable diseases.

"And we can see on a global basis that obesity is related to Covid mortality. Obesity is not because people are lazy and fat and eating the wrong thing. Obesity comes because we've created a food system that encourages people to eat more and more calories on a global basis.

"I work in some of the poorest communities in the Global South, and the aspirational diet for some of those people is to be able to afford fried chicken or McDonald's and have a sugar-sweetened beverage, and it's not to have a diet that is healthy and life-enhancing and so on.

"So part of the challenge for the future is not just building resilience in. It is making sure that we can encourage the system to produce the foods to supply nutrition in a way that is sustainably produced, it doesn't drive climate change, doesn't drive biodiversity loss, and that we find the ways of creating the livelihoods in a global economy for people to be able to afford the full cost of production."

"So I think there are many people who are not being heard in this debate, and it's not just the global itself but future generations as well."

Bob Holmes: "OK. Interesting question just came in from one of the audience. And we've been talking about building a more resilient system. On the one hand you can tell when the system is resilient, the next time a big shock comes along and you see if you did better. But are there any indicators we can look at in the meantime? Or do we just have to … How would we know that we're doing a good job and making a more resilient system before the next shock comes? Is there a way to tell ahead of time?"

Tim Benton: "So if I kick off on that, one of the interesting things from the global financial crisis of 2007-08 was that in some jurisdictions particularly and in the UK there were new regulations put on financial institutions to make sure that they had sufficient cash resources to see out another global emergency. And the way they managed that was to undertake a stress test in the formal sense. And a stress test in the formal sense is effectively to run through a scenario of disruption and say, will we be able to cope with prices disappearing or debt increasing or people defaulting, or whatever it might be?

"And I think I'm a fan of doing that from a country-by-country basis, and I've certainly worked with some major retailers within Europe to effectively present them with a list of your year from hell, 2022, it could have this drought interrupting this food supply from this place, and then new emerging diseases and more locusts in Kenya and some insurgency somewhere else,

and what would happen if, and a really nice example of a scenario that we could use as a stress test.

"What would happen with global supply chains if this tanker that's blocking the Suez Canal today stayed there for a month or sank or something like that and all of our global supply routed from China into Europe had to go through around the south of Africa, doubling the transit times, halving the food supply into Europe? How would we cope in a European situation with that sort of thing?

"So I think we can do rather than just wait for the next event, I think we can war-game the next event through scenarios, exercises. Whether that will force people to act, that would require some regulatory framework to force people to act as with the banks, but certainly from a private company perspective it's a very valuable thing to do, I think."

Bob Holmes: "And Jo, are people doing that? Are you guys doing that right now?"

Johan Swinnen: "Yeah, I think we are. We have a whole series of models which we were developing already, have been developing. More so it's a combination of global models and national models which we are linking with each other. And increasingly we are also integrating the ecological side if you want and now also the health side. So we're working together with the London School on that and with a variety of institutions. So I think we will. We are making progress, and we will be making a much better situation to deal with that.

"This is more on the indicator side if you want. And we're also working with FAO to develop a number of indicators. I think if you think about resilience, it's really three things you've got to think about. One is the best way of being resilient is not have a shock. So basically preventing shock, for example, by climate mitigation, making sure that the temperature does not rise is much better than trying to deal with it later on. The second one, so also for that, I mean, the indicators are important of course. For example, when locust infections are going to come or droughts, et cetera.

"Then the second one is that the information to absorb the shock when it comes, sorry, to anticipate the shock and prepare for it. And then the third one is really to absorb it, to better be prepared and better able to withstand it. And that has to do with a whole bunch of factors. It's on the poor people that you can sustain their liquidity, their income if you want. On the production side liquidity is, usually financial aspects are a big thing. They are insurance. But

also general, I mean education and things. If people have better skills, they can deal better with shocks in the longer run.

Bob Holmes: "OK. I see we're getting quite a lot of questions from the audience, basically I think wondering what individuals can do. And one of the things that comes up a lot is growing your own local food, having backyard hens, having backyard gardens. Is that a significant ... potentially a significant contributor to a more resilient system? Or is that really sort of a minor ... Can that only ever be a minor contributor? And maybe, yeah, let's go with that first. Let's see."

Tim Benton: "Shall I start off? In the UK, we've been in exactly this situation with Covid and Brexit, and lots of people thinking about, "Well, what should we do if Brexit and falls apart?" And we've had a whole range of preparers who have stocked their larders and bought in three years' supply of flour and could turn their garden into allotments and so on.

"And clearly from an individual perspective that's certainly possible to meet some of your food needs and to have a full larder or full food cupboards. But it is quite elitist framing and slightly a kind of, well, a privileged position to be able to do that because for many people in the world they can't because they don't have the cash resources and they can't store food or they can't access somewhere. So on a global basis I think that is a relatively small contributor.

"I think on a personal basis what would be more productive to do from a resilience perspective, I don't think where I sit in an international affairs institute, I don't think governments are prepared for the scale of issues that we are going to face in future, from climate-related interruptions to the way we do things. And part of what individuals can do is to effectively lobby their local decision makers, their governments, vote on it, create a politicization of the need to tackle climate change in a more directive way because it's not an individual-level thing that will give us resilience. It is government action, creating the situations for the market, the incentives for the market to cope with these issues and lead to the climate, the mitigation of the risks as Jo said.

"So it's not something that we as individuals can do, but by making our voice heard, we can help change market conditions and we can help the politicians see that there are votes to be won in making our system better rather than votes to be lost, which is the way many governments around the world see in making our systems better."

Bob Holmes: "Jo?"

Johan Swinnen: "Yeah. I think the distinction between when you think about the distinction between whether you want to regulate that or whether you want to have people do that, it's a different thing and it's an important difference. If people feel more comfortable producing their own food in their garden, I mean why should we stop them? There is, I mean, no problem at all, I would say. Generally I think there is the best system in the world this way of the mixture of these things. You have global supply chains, local, regional and homegrown food. Why not? And so basically you pick the best of both how it works out.

"Of course if you're going to steer that as a government by saying we're only going to go for this particular supply chain system, that is a different matter I think, because then you are really into ... I mean there is a very important need for the government to regulate a number of these things. Don't misunderstand me. But steering this supply chain over that one, I mean, that may be much more ... I mean lead to less favorable outcomes than just allowing these things to exist next to each other and to complement each other.

"But I do think going forward that there is a very important role both for the private sector and the public sector in this whole space. And if you think you want to transform food systems, well, 90 percent of the actors in the food systems are private actors. So these are individual consumers, households, consumer organizations, and of course the large multinationals, the small, all the farmers, et cetera. So they have a really important role to play, also choice a bit.

"And I think there's a role for important policy changes and there's an important role for behavioral changes for consumers themselves. And if you just look at the standards, the private standards that large companies such as large retailers, large food companies introduce, that's often under the pressure from consumers without government's intervention. And of course government intervention can be complementary to that, et cetera. So there's a lot of space there for different actors to have an important impact going forward."

Bob Holmes: "Yeah. OK. Here's an interesting observation from the audience too, that we've talked about how the food system is a major part of greenhouse gas contributions, et cetera. We're trying to reduce the greenhouse gas footprint of food. At the same time we're saying a global food import-export network is an important part of a resilient future. And to some extent those seem contradictory. Is there a way forward to maintain robust global movement of food, particularly perishable food, in a way that causes less, a smaller footprint? Why don't

we have Jo handle that one first?"

Johan Swinnen: "Yeah. I think, and that's ... Well, if you look at transport cost, there is indeed an immediate conflict between these two. I mean a lot of the footprint is not from the transport cost, it comes from the production system, the use of land clearing, of forest, et cetera. So there, there is the link between the localization of the production or trade in general, if you want, and the greenhouse gas input is much less obvious. That also means that we have to ... I mean, but that doesn't mean that — of course these transport costs are real and they do impose greenhouse gas emissions obviously. But I think it's really important to look at this from this broader perspective and the ...

"It's a really big issue going forward. The climate relationship and the food system, I mean, and the ... See, one of the problems is also that it is sometimes hard to identify the immediate link between those, which is easier in some other sectors, some of the energy sectors, some of the, for example, in transport systems, et cetera. And that makes it hard to do it. But we will have to deal with it. There's no way out. We really have to get this climate imprint down going forward."

Bob Holmes: "Tim?"

Tim Benton: "So if I can add to that, I mean there was a famous study from about 2010 which showed that if your standard American household ate chicken one day instead of beef in a weekly kind of food pattern, that would save more greenhouse gases than if they produced everything in their back garden. So that reinforces what Jo was saying around the relative contributions of production to transport in determining greenhouse gas footprints and sustainability.

"I would like to follow that up by highlighting the fact that actually dietary choice has a much bigger impact on your overall environmental footprint than the place where something is produced. So eating something with a low footprint. So for example a portion of tofu would have 1/25th the greenhouse gas footprint and 1/75th the land footprint as the same portion of beef. And certainly if you want to eat a sustainable diet, it's not about local production, it's about choosing the right sort of products farmed in the right sort of way.

"And I think we can't get out of the global trade for making our food system globally land-use optimum through comparative advantage and resilient in terms of being able to ship things

around if you have a local perturbation. But as I said right at the start, it's the right balance of in your garden, local, regional and global that I think we are struggling to find at the moment. But in the long run, we do have to deal with these issues, and that does imply some degree of dietary change, which does imply a whole range of other incentives as well as the need to build resilience.

"It requires us to think about the overall costs of producing a kilo of *x* versus a kilo of *y* and what they do for livelihoods, what they do for people's health, and what they do for the environment, and make sure that those, the cost of that food good reflects all of those issues."

Bob Holmes: "OK. Another question from a listener. Thinking about what individuals can do to push things in a better direction says, if we're to lobby our governments for change, where do we look for information about specifically what to ask for? Are there good references, good starting points to find for people who want more specifics about what to be pushing from the government?"

Johan Swinnen: "Shall I start, Tim? I'm sure you have a lot of variety. Probably read the Benton's thesis he wrote on this. Actually we have a report. We have a global food policy report coming out every year. The previous one was focused on inclusion, so more on, a very strong focus on poverty reduction, bringing all the weak agents if you wanted, the weak social groups into the system and grow forward. This year's is going to be more on resilience and on sustainability. And this one will come out in a month. So we'll have a launching... Definitely invite you to come there because a lot of these issues will be discussed here. But already now there's a lot of material out on a variety of social media, et cetera, as well."

Bob Holmes: "Cool. OK. I should just interject here for the audience, we can try and get some of these references on our website, on the page that follows up on this discussion. Tim?"

Tim Benton: "Yeah. As Jo mentioned, we recently published a report at Chatham House which you can easily google which is called "Biodiversity Loss and Food Systems" or something like that, which is an easy read aimed for a general audience about the relationship between food and biodiversity, but it also applies to food and land and food and climate, much of the messages.

"I think from a more political basis, and it's funny I've just come off a 'Future of UK Agriculture' call and where we're talking about policy. One of the things that we can increasingly ask is that

governments integrate and align their policy around ensuring that food is healthy, and what I mean by that is it is nutritious, it is not full of calories, it is not contributing to ill health in the longer term through non-communicable diseases. So food is nutritious and healthy, food is sustainably produced, and food is created in a way that is safe for people and the planet.

"And in the UK context, we have policies that are around health which are completely divorced from policies that are around agricultural land use which are completely divorced from policies that are around trade which are completely divorced from policies that are around climate emissions and dealing with climate change. And if we are going to deliver a system that works for us all, that mitigates the risks from environmental degradation, that fulfills the needs for livelihoods and creates access to healthy diets. We need all parts of government to work together to drive the system in the right direction rather than having a trade department pushing farmers to do one thing, health completely unrelated to food consumption which is the kind of primary driver of ill health on a global basis, and agricultural policy divorced from environmental policy.

"The challenge for us is to articulate to government that they should do better to make this fundamental system for all of our well-being work well, and that means that they get their act together. Having been a dean in a big university, governments are much, much more siloed into sectoral areas than any faculty organization within a big university is ever siloed. And the challenge of doing interdisciplinary work in the university is well known. The challenge of doing cross-sectoral on the whole of government policymaking is almost impossible, and I can't think of any example where that is happening.

"And just take the UK at the moment. We're hosting the Climate Change Conference of the Parties, the COP, this year. We are saying good things about climate leadership. And then one part of government says, 'Oh, it'll be a good idea to open a new coal mine.' And just that policy incoherence that different parts of government do their own thing in different ways, and that leads to a system that doesn't work because it's not incentivized holistically, that for me is the big challenge."

Bob Holmes: "OK. Jo, do you have any last few things, anything you want to add to that? We're just about out of time."

Johan Swinnen: "I know, I see Bob. Actually let me add just a point that because we have this discussion about the white men on the panel here that IFPRI has a very diverse set of

researchers, we're based all over the world, and our global food policy report where I referred you to is written, large parts are written by a very diverse, both in terms of gender and regional balance, et cetera, who have contributed to the report and who their voices are heard or said or made to the report."

Bob Holmes: "OK. Great. Well, thanks much. I think we're going to have to wrap up because I know Tim has another session going in about five minutes and he needs a moment to take a sip of water.

"Let me just note that there are a bunch of questions, a bunch of subjects that we never really had a chance to talk about, like the role of GM technology, indoor agriculture, greenhouses, vertical farming kinds of things, some of which are discussed at least briefly in an article on the subject which is on the *Knowable* website.

"But at this point I think we've come to the end of our time. I'd like to thank everybody for joining this event. For the audience, if this has been a good experience for you, please consider providing a donation to *Knowable* so we can meet our mission to make high-quality science coverage freely accessible to all. You can do this at knowablemagazine.org.

"And thanks also to the Alfred P. Sloan Foundation, Gordon and Betty Moore Foundation for their wonderful support of *Knowable Magazine*, and of course special thanks to Johan Swinnen and Tim Benton for participating in this fascinating discussion.

"This conversation will be posted on the *Knowable* website where it will be free to view and to share. Just look for the Reset Collection. Additional resources including links to articles and some of the reports that they mentioned will also be there.

"I'd like to remind you that this is a series of conversations. On April 19th we'll be discussing the effects of the pandemic on the developing child, and in May we'll look at keys to successful aging and also fighting Covid and other ills with Fitbit. And the best way to keep up with these discussions and everything *Knowable* is to sign up for the weekly newsletter which you can do on the website, knowablemagazine.org. That's all from me. Thanks again for joining us."

Editor's note: An earlier version of this page misspelled Johan Swinnen's first name. It has been corrected.

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