The Received Wisdom

Episode 29: British Politics, the CHIPS and Science Act, and Rethinking the Green Revolution ft. Glenn Stone

Teaser

Glenn Stone There's so much more going on here than just talking about India and talking about seeds and talking about wheat. It's really all about what makes agricultural systems grow. And this is a legend that reinforces that technophile vision of it, that the only way it can grow is through new technological innovation. Without technological innovation, if you stand in the way of it, you're endangering the planet, you're gonna be contributing to starvation.

Intro

Shobita 00:00:37 Hi Jack.
Jack 00:00:38 Good morning.
Shobita 00:00:40 I dare ask how are things going and on your side of the pond?
Jack 00:00:45 In the sort of six weeks since we last spoke, you'll be aware that a lot has happened in British politics and also sort of nothing has happened in that we still remain stuck in the same problems that have been bedeviling us for the last few years. Everything got a bit Shakespearean. Obviously the queen died. Everybody in the country then joined a queue to, in a very organized way, get their turn to nod at her coffin and we've had two new prime ministers so that was fun. We've had Liz Truss who is destined to become nothing more than a future pub quiz question. And now we have Rishi Sunak, the first person of color to become British Prime Minister, the loser of the previous competition who has become Prime Minister by default. One of many odd ways in which one can become Prime Minister in Britain is by default to surprising number of people do that. So it's been quite weird and yet sort of everything has changed and yet also nothing has changed.
Shobita 00:01:49 So what are the chances that Rishi Sunak is gonna last longer than Liz Truss?
Jack 00:01:54 Oh, I think he has to last long. I mean I genuinely don't know how anybody could have a tenure is short as Liz Truss. It was what sort of 45 days and the previous laughable tenure was just about a year and that was seen as embarrassing. I mean the one thing that the conservative party in Britain are exceptionally good at is regicide. So they are very good at killing their leaders when their leaders don't suit the interests of the party. It's just a bit of

a shame that in Britain for the last few years the interests of the conservative party have been the only topic of conversation and the national interest has been rather lower down the list of priorities.
Shobita 00:02:34 You know, it's interesting they say that whenever the situation in a company gets really, really bad, that's the only time that they hire women or people of color to run the joint is because, is because they, you know, they're both so desperate and also any problems they can just blame on the historically disadvantaged candidates.
Jack 00:03:00 Right and to have done both in such a short time is an interesting move. But this is why, you know, non-politicians will never understand what it's like to be a politician. Cause you would think, well I wouldn't want to be running the show at this time. But if you are a politician, you take your opportunities whenever they are presented. I mean at one point, remember Boris Johnson was gonna come back, less than six weeks after he'd been ousted and we were willing to forget the various reasons behind his ousting. So, you know, it all got very weird. So in terms of the country being a dumpster fire, which it obviously is, I think an interesting challenge for a new prime minister, it's thinking are you the guy that will save the party from electoral disaster? Cause the polls at the moment show a gigantic labor lead for the first time in decades.
Jack 00:03:48 Or are you the person that just has to try to stabilize things, and maybe there is some, you know, in the way that John Major did in the nineties knew that he was destined for electoral failure but actually sort of alright, you know, you steady the ship and you hold together your band of squabbling awful colleagues for a little bit longer. I mean Rishi Sunak is an interesting person, right? Especially for progressives to look at, to see the first person of color, the first Hindu in number 10 Downing Street with his family is an interesting moment. He is also, according to most estimates, twice as rich as the king. So in terms of what that means for his electoral prospects and for the symbolic, what that tells you about modern Britain, there are sort of some goods and bads and it's quite hard. A lot of paradox is in there. It's quite hard to sort of make sense of it.
Shobita 00:04:43 Yeah, I mean as a, as they see of Hindu dissent myself, I can't say that I have mixed feelings. I mean I really don't want to support him. But I'm curious, there are all of these responses around the world and in the US and in India and I'm sure elsewhere about what the meaning of his ascendancy is. But I'm wondering in the British context, what is the sense that you are getting of what that means in the country and also for the South Asian population there?
Jack 00:05:18 Yeah, well to the extent that most of the people in power, which includes not just his colleagues in the conservative party, but also the editors of a press that is still skewed towards the conservatives. Most of them would downplay how important race was as an issue in his election. Except in so much as to say this tells you about what a brilliant country it is to be in Britain and that anybody can become prime minister. Oh and also they would make the point that all labor leaders, there have been some occasional interim leaders who've been women, but all leaders pretty much have been been white men. All labor prime ministers have been white men. So they might, conservatives might comment on the fact that it's easier to succeed if you are a woman or a person of color in the Conservative party than in the party. And that tells you something about progressives and all the rest of it. But I think it's been notable that most of

the coverage I've seen focusing on the color of Rishi Sunak's skin has come from outside the UK. The question is one of policy and personality, if he were a labor politician, you would see a different tone of coverage.

Shobita 00:06:30 You know, of course race is one of the major fault lines in the United States and certainly that gets raised over and over again in the context of Rishi Sunak is his racial or ethnic background. Of course we did have Obama and now we have Kamala Harris at the top levels of government. Yeah, but I actually thought before Obama was elected that the first person of color president was likely to come from the Republican party actually for the same reasons that you just said, which is that people could then say, Oh look at how great we are. But there was certainly, I remember when Obama was elected, it's hilarious now, but the idea was, oh we solved racism. We, we have a look at Obama. It turns out the poor guy was just unleashing a lot more racism. So I, I hope that that fate does not befall you.

Jack 00:07:24 It's too depressing to go on about the UK. Um, so let's talk about the states. So you guys have got an election coming up, I mean an election in which science technology may play a rather marginal role because it is normally a sort of depoliticized area of policy. But also since we last spoke, the big US Science Act has passed through Congress and the coverage that, I mean maybe this is because I don't read the American press as much as I read reflections of it through the British and international press, but it sort of feels like science policy disguised as foreign policy in that what this means in terms of semiconductors, the war to beat China at its own game of producing silicon chips seems to be the lens through which that's been looked at. But is there more going on?

Shobita 00:08:13 Yeah, I think so and I actually do think that it is tied to the midterm elections and to Joe Biden's presidency in interesting ways. And I think it tells us a lot about how science policy tends to get framed. I would say if you look at the last couple of years of science and technology policy in the United States, there has been a lot of discussion about equity and justice and how do we make sure that people get access to covid tests and how do we make sure that the pulse oximeter and similar technologies are not biased, right? We've had all of these conversations and in fact we recently also had the White House Office of Science and Technology Policy release this blueprint for an AI bill of rights. And that Bill of rights is also about reducing algorithmic bias and things like that. But that's just a proclamation from the White House Office of Science and Technology Policy.

Shobita 00:09:16 There's in fact no teeth to it, but what did pass was this thing called the CHIPS and Science Act, which started its life uh, a while ago. There were different iterations. It was the four, the Future Act and there was the Endless Frontier Act and all of it was really inspired by 75 plus years after the creation of the National Science Foundation, let's revitalize it and think about it for the 21st century. And what it ended up into was actually not a massive influx in funds for the National Science Foundation, but in fact a piece of legislation that, you're right, it's about foreign policy but the way that it's being discussed in the United States is around jobs. It is being framed primarily as a jobs and also economic competitiveness issue. Yeah, we can compete against China and that's gonna make sure that everybody is gonna benefit economically.

Shobita 00:10:17 So this piece of legislation pours money into the semi-conductor industry and it also does create certain expectations of the National Science Foundation. But right now

those are unfunded mandates. There's a hope that they will get additional money through regular appropriations. But to me it's interesting that the prevailing way that we have historically thought about science and technology, which is jobs and economic competitiveness continues to be the primary way we think about it even though we are in the ranks I suppose having a more interesting and nuanced conversation about both the limitations and the possibilities of science and technology policy, none of that is really reflected in what's actually making it out or in the way that it's getting sold to people.

Jack 00:11:11 Absolutely. So the other way, looking back a bit further, that science policy has been constructed over the late 20th century, has obviously also been in terms of war, that it's the easiest way to get money for research and development has been to either talk up an enemy or to imagine an enemy as with the war on cancer and the rest of it, the construction of science policy in sort of martial terms. I mean it reminded me of a document that came out in 2005, The Rising Above the Gathering Storm document from the National Academies, I think it was, that was basically, you know, imagining the rise of China's economy but also China as a science superpower and the language of competition was through that. And if you are thinking about equity, it's almost impossible to fit equity into that sort of rhetoric, isn't it? If it's about in effect going to battle with competing, with bringing jobs back from another superpower, equity falls quite low down the list.

Shobita 00:12:15 Absolutely. The other thing I've been thinking about a lot is how, you know in my Patent Politics book I talk about the history of how we expanded patentability and a lot of that is also rooted in these foreign boogeymen and in that case it was Japan, it was, and it actually Europe comes in there too. Oh look, Europe is ahead of us on biotechnology. Japan is ahead of us on semiconductors. The only way that we can respond is through expanding patentability. And of course there was a lot of nonsense there. And so that gives me some pause when we think about the current situation and it makes me wonder why is it that we are able to be so urgent when it comes to matters of security, economic competitiveness, jobs, but we are unwilling to apply that same kind of urgency to questions of equity. Why is equity not seen as urgent?

Jack 00:13:16 You know, you mentioned the AI Bill of Rights putting equity right up there, maybe the framing of equity wasn't great and we've talked about the way that questions of AI and ethics and justice a lot on this podcast, but it all to me reflects a linear model that presumes that all you need to do is prime the pumps to just stuff in cash at one end of the system and then the good stuff, the jobs, the businesses will come out the other end, but also the issues, we can think about them later. We don't have to think about those as upstream issues. We can think about equity once we see how the implications of science technology are playing out in the real world. And it looks like this act is making even more concrete that exact linear model that we know is enacted through other forms of science policy. So yeah,

Shobita 00:14:10 And the assumption is also that if we fund it and the market has a crack at it, then most of these issues will come out in the wash. Right? That really it's not that big of a problem or if we really adhere to the concerns of the consumer, then don't worry these problems will mostly get solved. And even the construction of the notion of government stepping in when there's a market failure suggests that markets when successful will solve most of the problems even though there's not much evidence of that. In fact. Sort of related to this, I know you were

involved in this report for the Center for Data Ethics and Innovation in the UK government. Am I too hopeful to suggest that they're actually trying to be a little bit more proactive when it comes to concerns about self-driving cars?
Jack 00:15:05 I would be hopeful. I don't yet have reasons to be pessimistic about that. I mean this was a, a report on the title was Responsible Innovation for Self-Driving Vehicles and it was an engineer and I and a couple of the staffers for that center are advising the government's department for transport on what sort of principles, what sort of rules we might want to think about for self-driving vehicles. And I guess the hope was that we could raise some of these questions of ethics and politics at a stage where we could do something about them before we've got hundreds, thousands of these things shuttling around and we're working out who's dying and why. And and my hope is that the report will provide a useful input to legislation that comes early and next year. And the Center for Data Ethics and Innovation was itself a very recent creation of the British government, a sort of advisory body to pick up on questions of AI bias and, and digital rights and things like that.
Jack 00:16:05 And they've been a very interesting part of government to observe and to work with. The question is what happens next, especially given that all of the ministers that you think you're working with tend to up and leave and get fired and all the rest of it. Cause British politics, as previously discussed has been a sort of maelstrom of hilarity for the last few years. But it's been quite interesting thinking through some questions where engineering and values come together. Like the obvious first one was how safe does a self-driving car need to be in order to be trustworthy? What sort of standards should we aim for? Which isn't just an engineering question at all, it's a question of values and what sort of issues of privacy, what sort of rights should other road users have? How do the rules of the road need to change in order to accommodate these things? I mean some of the things that I was, I was thinking about on this, on the special episodes of podcast, I had a chance to help government write some rules on of that stuff. What happens to those God only knows, it's always a bit depressing when you do one of these reports for government and it doesn't cause a big backlash. You know, I'm trying to create some friction here so that we can have the discussion about the place of technology in our future society, but maybe it will change things. Who knows?
Shobita 1 00:17:27 I mean in fairness there have been some political distractions at the moment that might have….
Jack 00:17:32 Yes indeed
Shobita 00:17:33 Affected the response. So yeah. But one thing that I thought was really interesting was that this was a collaboration between you and an engineer, which I think is interesting because listeners might be excused if they suggest that we always often characterize ourselves as pushing the scientists and engineering community to think about these kinds of broader questions. But I think that the active involvement of an engineering colleague of yours suggests that of course there's more complexity in science and engineering communities on these matters around self-driving cars. But it sounds like this colleague of yours was very much on board with a lot of the things that were of concern for you as well.
Jack 00:18:19 Yeah, the more I've worked with engineers actually the more I've been able to have really productive discussions with them because to sort of caricature what engineering is, it's an encounter with the real world, right? Where if you do engineering in a sort of open-minded

way, you know that there are big questions of responsibility. You know that the real world is a complex place in which you have to deal with infrastructures that you know, you understand maybe where those infrastructures come from. You have to engage with users and understand how users might or might not be able to work the technologies that you design. And when it comes to artificial intelligence, we've heard so much from the computer science people, we've heard so much from that end of things. And we haven't heard very much from the engineers whose business it has been for decades to, for example, ensure the reliability of systems working with engineers who know all about safety and what it takes to make safe systems and safe systems of systems in which you involve users and bystanders and all the rest of it.
Jack 00:19:31 You know, were an AI engineer to meet an airplane safety assurance person, they would realize quite how little they know about the design of sociotechnical systems. So I found that process extremely interesting and there's a lot of common ground there. You know, it's all one of many discussions that the AI people are postponing. And that's because in most cases when you're thinking about a Twitter algorithm or a Netflix recommender, what's at stake is just not the same as what's at stake when you've got an AI in control of two tons of metal traveling at 70 miles an hour, which is a terrifying prospect if you're a safety engineer. And the AI people are just in effect saying, yeah, well we'll think about that when the time comes. So hopefully bringing some of these engineering questions and some of the social science/humanities questions upstream can lead to a better alternative
Shobita 00:20:21 At first I was gonna say this is because they've bumped up against regulatory systems for a long time, but it's not just that it's that they have experienced catastrophic failure on the regular, right. I mean I just think, you know, you mentioned the airplane engineers like just in the last few years we've had multiple crashes of Boeing 737 Max airplanes, which we've talked about on, on the podcast. And those are cases where the company had been trusted in all sorts of ways to self correct and they did not. And the government in fact had trusted them. And so those engineers that have been through those processes are often well aware of why we have those systems.
Jack 00:21:05 There are various sort of initiatives emerging around AI in which the engineers are starting to assert themselves in the discussion. We will see, I mean it's very, very clear though that the power still lies with the tech people, the data scientists who are making extraordinary claims about what the systems can do and any discussion about safety assurance and the rest of it is sort of seen as inconvenient and so it's hard to raise. But listen, we should introduce our guest for this episode. Do you wanna tell us who it is?
Shobita 00:21:34 Yeah, I mean as per usual it's very much along the lines of what we've just been talking about in terms of technological imagination. So we're speaking to Glenn Stone who just wrote a book that came out a few months ago called *The Agricultural Dilemma*. And it is basically a revised history of the Green Revolution. In the popular imagination we talk about the Green Revolution as saving all kinds of people in low and middle income countries and the Global South and how without the largest and the technical prowess of the West these people would have perished and how it transformed these countries for the better. And I don't wanna give too much away, but Stone talks about how that story is not at all as simple as we think it is and we really need to think differently about how we imagine the green revolution in our current stories around how we justify the humanitarian benefits of emerging technologies.

Interview

Shobita 00:22:43 Hi Glen, it's wonderful to have you on The Received Wisdom podcast. I'm really excited about your new book. I think it zooms out to look at a lot of technical questions, questions about GMOs and industrialized agriculture in terms of a historical perspective, which I think is so, so important, especially for those of us who are often hyper focused on a particular technology or particular science. But I thought maybe we would start from your perspective, big picture, what are the things we've got wrong when we think about agriculture, food, hunger, why are we in a bad place and what got us here do you think?
Glenn 00:23:21 Well first let me say it's my pleasure to be on and I'm also excited about my new book <laugh>.
Shobita 00:23:27 Oh I understand that feeling
Glenn 00:23:29 <laugh>. I think one of the things that the book tries to get across is the idea that the first step in solving a problem is to understand what your problem really is. And when I started thinking out what I wanted to do in this book, I kept coming back to the fact that I've been told ever since I was a little kid that the world is overpopulated and the world has been told that ever since 1798 with Robert Malthus saying, Well if you wanna know why there's hunger and poverty and depravity in the world, you just look at the fact that there's never gonna be enough food. And I've spent a lot of time thinking about this and I think we've basically gotten that one backwards all along. And I'm not the first person to say this, but there's long been plenty enough food in the world to feed people many times over.
Glenn 00:24:15 I think the real problem is that we have been wrecking many parts of our economic systems and our environment and public health by overproducing. It's a rather iconoclastic thing to come to, especially for somebody who grew up in the sixties where I was used to images of famine in Bihar and grew up listening to Paul Ehrlich on the Tonight Show talking about how there's never gonna be enough food for everybody and so on and so forth. So it's a strange conclusion to come to, but after studying food and agriculture for the last 30 years, that's where I've arrived. So I think long story short, the first thing that we have to do is understand what our problem is. We've been getting it backwards all along, that there are very powerful forces that make industrial agricultural systems overproduce and cause enormous problems along the way.
Jack 00:25:06 We hear a lot from activists saying, Oh, the problem isn't how much food the planet produces, but where it goes, it's a distributional problem rather than a production problem to sort of challenge a a, maybe a scientific engineering focus on yield, I mean, how do you relate to those sorts of activists and how do you position your scholarship within that debate? Does it contribute? Does it challenge some of what they're saying?
Glenn 00:25:31 The first thing I should say is I agree with some of those activists' claims, but I try to come at them from a more grounded standpoint. And my approach to this has been going way back based on empirical research on agricultural systems. And so sometimes I find myself being impatient with some of the activists because they're too quick to already have their conclusions before they even start to look into things. I try to do this as a scientist and oddly enough I end up sometimes at the same place that some of the activists do, but I'm coming at it

hopefully from a more scientific standpoint. But the whole argument that we've got a distributional problem, the first thing I'd say about that is that it, it's slightly misleading ‘cause it makes it sound like the problem is in our distribution systems like our trains and our granaries and our shops and those sorts of things.

Glenn 00:26:23 And there is a distributional problem, but it's not because the distributional mechanisms. Um, it's because of the way poverty works. And I would remind listeners that a Amartya Sen is not really an activist and he's the only one who's ever won a Nobel Prize for research on why there is hunger in the world. He makes a very powerful case, well a Nobel Laureate-winning case that it has to do with what societies decide about who's entitled to what. And I think that when societies decide that people are entitled to food, they get the food, but when they don't, they tend not to.

Shobita 00:27:03 When you say, how do we know how poverty works or how do we know that there's overproduction happening, what is the kind of evidence, how do you go about knowing that? How do you go about creating that evidentiary basis?

Glenn 00:27:17 Well, first you've got the sort of tricky conceptual thing of what is over production really. And there's no one answer to that. But I, in the book, what I try to do is say, well the first part of overproduction is that, is enough stuff being produced to feed people? And that is and has been the case for a long time. Agriculture has been growing significantly faster than population ever since 1798 when Robert Malthus has said it's impossible for that to happen. Okay, so there's always too much stuff being produced, but so what makes it too much? It's over what, And the way I look at that is to say, well if you're producing more stuff than people really need to eat in a way that's causing harms, then in a sense that is overproduction. And the sorts of harms that we cause with our industrial agriculture overproduction are quite varied.

Glenn 00:28:14 And some of them have to do with environment. And I've got a whole thing in my book about fertilizer, which people seem to think is wonderful stuff that feeds the planet, but it's in many ways not wonderful at all. Uh, only one of the things I pointed out in my book that only 17% of the nitrogen fertilizer that gets put on crops in North America ends up in our bodies as food. 83% of it goes into the environment as pollution. So the, the amount we're producing is causing environmental harm without a doubt. It causes economic harm in many ways. And one of the things I talk about in the book is that these industrial agricultural technologies are always heavily supported by the public purse and we tend to think of them and that we sort of tend to fetishize them that, oh this, this is a high yielding crop as if it's got some sort of inherent productive power in it.

Glenn 00:29:09 And none of these technologies are that productive on their own. They've all been heavily subsidized by the government. So there's economic harm that comes about from it. There is another form of economic harm is that we've had this long tradition in the US of overproducing grain and dumping it on the third world and that causes economic harm to farmers in the global south. And then there's also public health harm that so many of the things that we do by way of producing more agriculture product than we could ever eat harms our health. It makes the food system come up with new ways of delivering more and more calories and makes us obese and it creates methicillin resistant deco, sorry, or mea, which kills people. And so anyway, it's overproduction because much more agriculture product is coming off of

farms than we could ever eat. And it hurts the environments, it hurts economies and it hurts our health.
Jack 00:30:09 That story of overproduction being the problem, you say in the book that your book is sort of heretical in various ways and one of the heresies that you bring forth is your challenge to the story of the Green Revolution. So if we are talking about science and agriculture, that's the story that a lot of us would jump to as the sort of 20th century. And we might tell a version of it that something like, you know, over the second half of the 20th century, massive increases in agricultural production saved millions if not a billion lives in the global South through the Nobel winning efforts. I'm trying to rile you up as much as possible <laugh>, um, the the Nobel winning efforts of Western scientists. So how much of that story is true? Why do we keep telling ourselves that story and what is your version of it?
Glenn 00:30:58 Well, I spend enough time studying the details of the Green Revolution over the last few years that I was already riled up without you riling me <laugh>. Um, I honestly think that if people take a look at the numbers that have been hiding in plain sight about the Green Revolution, they will be riled up as well. First, I should be clear that strictly speaking, the Green Revolution has to do with what they call semi dwarf crops. Two of them, wheat and rice, that were called high yielding crops that spread throughout parts of Asia in the late sixties. But particularly India. I mean India always has been the, the sort of the ground zero for the Green Revolution. It is the place that supposedly had terrible famines going on until the Green Revolution wheat, especially, showed up and the hero of the story always is the breeder Norman Borlaugh and the number of lives saved is frequently cited as 1 billion.
Glenn 00:31:57 And it's a story that gets told and retold for a bunch of reasons. One of them is what's a great story? You know, we don't have that many good stories in agriculture and this story has got several villains. There's overpopulation and there's uh, the agricultural establishment, the stick in the muds that Borlaugh had to convince, turn to modern ways that traditional farmers, the peasants are sort of a villain here because they're so stagnant. Borlaugh always used the word stagnant when he talked about traditional agriculture and he felt these people had to be shocked. He actually used the word shock, had to be shocked into adopting modern methods or else everybody's going to starve. So it's got villains, it's got a hero. Norman Borlaugh himself, the handsome square jaw-ed, no nonsense farm boy from Iowa who brushed aside all of the obstacles and it has an uplifting ending, a billion lives saved and uh, productivity increased and some people actually see as another benefit of the Green Revolution that it meant that more farmers could get off their farms cause they were so productive and they could go into the city and work in a factory.
Glenn 00:33:03 Whether that's a good thing or not, you should ask those people that had to leave their farms to go to the factory. But anyway, one of the reasons this story keeps getting retold is that it valorizes the idea that agricultural growth comes from technological innovation. I mean, how else would it come? And this is a great example of that and the closer you look at it, the more you find that almost everything about that myth that I just summarized is just empirically false. India was relying heavily on grain imports from the US but it wasn't because it was incapable of producing enough grain, it was because those were decisions that the new Indian state made that they were going to focus on developing heavy industry instead of the villages probably would've taken a different course had Mahatma Gandhi not been killed, but he

wanted the new state to focus more on rural India, but Nehru focused on building heavy industry.

Glenn 00:34:00 And when the US, which had a terrible grain surplus problem, said, Well, we'd like to dump some of our grain on you basically for free in this program called PL 480. India said, Sure that fits with it. India was actually exporting some agricultural products. The other part of the Green Revolution myth that's just empirically false is that India was getting ready to go off of a Malthusian cliff. Actually India, just before the Green Revolution wheats showed up. India had just gone through a really rare two year drought because of an El Niño event. And they had actually made it through the two year drought without Green Revolution seeds, without any large scale famine. There had been headlines in the west claiming that Bihar was suffering from a famine. And Bihar, which is a poor state in, in northern India, actually was having a really tough time.

Glenn 00:35:01 But the data now showed that there was no large scale famine that occurred in Bihar then. And then the drought ended and the rains returned right around the same time that the first Green Revolution crop was coming in. So it's completely unclear what lives were saved if there was no large scale famine during the drought. And then the Green Revolution seeds came along with the rains. But the really shocking thing that I found was that there are pretty good agricultural statistics that the Indian State has been collecting for years and anybody who's interested can go online and download these and take a look at the trends in food production. Now if you just look at wheat, which is the main Green Revolution crop in India, it's true that starting in 1968, which is the first Green Revolution wheat crop yields went up and overall productivity went up in wheat.

Glenn 00:36:01 But wheat was only the third major food crop in India. It wasn't the be all and end all of the Indian food system. And India wasn't specifically short on wheat, according to the legend, it was short on food. So if instead of just looking at wheat, you chart out the trends of food grain production. Now we're talking about rice and we're talking about millet and sorghum and pulses and minor grains. If you look at those trends, you find that food grain production was growing at a pretty steady clip before the Green Revolution came along. And after the Green Revolution seeds were adopted, it kept growing at exactly the same clip. Actually it slowed down a little tiny bit. So what the chart shows is that the overall pattern of growth of food grains in India was not increased at all by the Green Revolution. And the statistics have been hiding in plain sight that showed this. So you talk about heretical, this is a completely heretical conclusion, but I challenge anybody to take a look at my chart and tell me how the numbers don't support the conclusion that the Green Revolution did not speed up food growth at all. Food grain production was growing and it kept growing. It's unclear that the Green Revolution, in other words, produced any more food that would've been produced otherwise.

Jack 00:37:30 So I'm fascinated to hear when the book comes out and lands and your contribution to the debate, and I'm fascinated to hear what the response is from the scientists who have become so used to the simple version of the Green Revolution story that we were both discussing. I mean,

Glenn 00:37:46 Well people are gonna be hopping mad, um,

Shobita 00:37:49 Because it isn't just about the Green Revolution, right? And you talk about this in the book, but the, the myth making of the Green Revolution is what enables the 20th

century and 21st century approach to agriculture. It's what legitimates, you know, increased fertilizer production and in the 21st century or late 20th, early 21st century, it enables GMOs essentially, right? I mean it's constantly invoked in the debate around GMOs that is, as you were saying earlier, right? You need this technology in order to feed the world. And we did this so well in the Green Revolution and now we can do it better with GMOs.

Glenn 00:38:26 Exactly. It's the ultimate neo-Malthusian myth. First we had to remember that Malthus himself didn't think that you needed to come up with new technologies to feed people. He didn't even believe in contraception. He believed that starvation was just evident. They're always gonna be poor folks and it's because they can't keep their zippers up. And that's just life. The neo-Malthusians say, well, population does tend to outgrow food production then there was one way and only one way to solve that. And that's the technological innovation. And so you're exactly right, this serves as the ultimate neo-Malthusian myth and it is cited over and over again and is explicitly cited when genetically modified crops came along. And people talked about the gene revolution being a successor to the Green Revolution. People are gonna be very annoyed at my analysis of this because there's so much more going on here than just talking about India and talking about seeds and talking about wheat. It's really all about what makes agricultural systems grow. And this is a legend that reinforces that technophile vision of it, that the only way it can grow is through new technological innovation by, to quote Norman Borlaugh here, courageous and skillful scientists, he seem to be talking about himself. And furthermore, without technological innovation, if you stand in the way of it, you're endangering the planet, you're gonna be contributing to starvation.

Jack 00:39:57 Can I ask you, Glenn, about different sorts of science and different sorts of innovation and how they might play into your analysis? So I'm talking to you from Britain where as you know, we've had a very different experience of GMOs and a very different debate about GMOs. And as part of that, and I have been working a lot with the scientists who've been involved, who had a role in that debate. And one of the interesting things that's happened seemingly is a sort of pluralizing of the scientific contribution to the debate about the future of agriculture with some scientists saying, you know, there's still a strong role for science and innovation, but it might be very different sorts of science and innovation. It might be knowledge about agro ecology and it might be conventional forms of plant breeding and and other things. And the issue that we had with GMOs has at least brought some of those things back onto the, to the table. Do you see a place for multiple sorts of knowledge and innovation or is it that actually western scientists are the problem here?

Glenn 00:41:00 One thing that's worth noting is that there have been some real divides within this scientific community about the need for different kinds of innovation. I think that's what you were touching on. But if you scratch the surface in a lot of biology departments, and this is certainly true in the US and it may be true in the UK as well, if you scratch the surface, you'll find some pretty deep differences of opinion specifically between the molecular biologists and the people who are more ecologically oriented. And there tends to be a pretty firm belief among molecular biologists that in general technological innovation and especially all the things that can be done with biotechnology are essential and there are ways to solve the problems and so on and so forth. And there tends to be a view among the more ecologically oriented

scientists, the people that look at the larger systems and look at things, uh, more more complex with more variables in them.

Glenn 00:41:55 It tends to be more of a skeptical view of that and say, well, um, some of these technologies can solve isolated problems but not larger scale problems. And furthermore, it's not unusual to solve a problem now and have the problem only return in a worse form later, later. So this has been one of the findings with BT crops. I mean with genetic modified crops, you basically have got two technologies, and this has been one of the major disappointments of it, that if you go back to the early days of plant genetic modification in the mid-1980s, imaginations are running wild that we would be able to solve an incredible number of problems with this sort of technology. And then you fast forward ahead to now and you find that 88% of all of the planted acres in the world with genetically modified crops have got herbicide resistance, which is astonishing.

Glenn 00:42:49 And there's only one other major technology, which is BT, which provides a form of insect resistance. And some of those 88% of the acres have got both technologies and some have just got herbicide resistance. But the BT technology has solved some isolated problems. And in a few places around the world it's been quite a success. The, um, US state of Arizona springs to mind where the BT cotton there has actually led to the eradication of a really major cotton pest there. But in a lot of other places, in fact, in most places around the world, BT crops have been a qualified success and there have been a lot of places where they have been a short term success, but a long term failure. And I've done a lot of work in India on this, and we published a paper recently in *Nature Plants* in which I co-authored this with, I think was India's top cotton entomologists.

Glenn 00:43:45 And it showed that there were indeed some gains to be made in the fight against cotton pests in the early days of BT Cotton in India, Bt cotton in India was released and started to be planted in 2002. And it was adopted slowly at first and then it just spread like wildfire. And for a few years there, there were reductions in pest attacks and in pesticide use, but everything turned around a few years later and the data now show that cotton farmers in India are spending more on insecticides than before they'd ever heard of BT. And this is a sort of thing that people in the entomology world had been saying was, was gonna come about all along. So the world of science tends to be split on these things and I think in the long run, the the more ecologically oriented people and the entomologists and the weed scientists and those people are ended up sort of proving right about their skepticism.

Shobita 00:44:44 I actually wanna pick up kind of right there, I mean in the story that you just told about GMO's generally, but BT specifically, it's a story of over time the limitations of this technology or the harms actually become clear. The earlier story you were telling about fertilizer, it sort of masks the fact that there are environmental harms and public health harms and economic harms, and yet the ideas about, I mean GMOs are only slightly different, but these myths persist, right? It's very difficult for us to dislodge the idea that these are all good things, necessary things that these technologies overwhelmingly benefit us. And I'm just wondering from your vantage point of sort of looking at multiple technological inputs in the history of agriculture, what's the work that gets done? How is it that we tend to keep believing in the potential benefits and yet we not only forget the harms, we forget the ongoing harms, we forget

the harms that happened yesterday. There's some intentionality in that forgetting, and I'm just wondering what's behind that socially and politically that allows us to keep forgetting?
Glenn 00:45:58 I think there is an enormous industry in making people forget these days. <laugh> A tremendous amount of rhetorical power and money and media resources have to go into it now to reinforce these notions that these technologies are there because they're beneficial and they keep us alive. With a lot of the earlier rounds of technological change on farms, there wasn't a whole lot of rhetoric associated with it. When hybrid crops came along, there was a certain amount of encouraging farmers to grow them, but you didn't have to convince the public that hybrid corn was a good thing. You get the farmers to grow it and, and they'll, they'll grow it. And the same thing with fertilizer. When, uh, you know, we started to have a boom in fixed nitrogen fertilizer in the fifties and sixties, you get the farmers to adopt it and they'll adopt it and they'll start growing crop with it.
Glenn 00:46:52 You don't really have to tell a story to the public. But that's changed in the last few decades for a couple of reasons. One reason is that we have had some technologies where the public has really required a lot of convincing. The public has been skeptical of it. The surging use of pesticides has led a lot of people in the public and a lot of scientists to question the overall benefits of the pesticide revolution. And as we were talking about a minute ago, GMOs have brought about a certain amount of skepticism. So you've had some technologies that have come along that have encountered public skepticism and this has led the whole world of industrial agriculture to have to spend more time convincing people that these technologies are needed. So something else has been going on as well the past few decades, which is this surge in the alternative agriculture movements around the world.
Glenn 00:47:48 And these take different forms in different places. In the US we oftentimes call these people neo-agrarians. And in parts of Latin America, they talk about Cosmovision. And in parts of the world there's this various organizations that under the umbrella of the Via Campesina and in Europe there are new changes in agriculture going on that some people and sociology buffs might recognize the work here of Jan Douwe van der Ploeg, they talk about something called, uh, new peasantries. But the point of this is that in various forms around the world, there are lots and lots of farmers that are pulling back from hyper-industrialized agriculture and they've got a pretty big following. You know, the, there's this huge bloom in farmers' markets. So the bottom line here is that new technologies have come along that have required the public to be more convinced, more persuaded, and the public and farmers alike have been moving more in a direction of questioning sort of hyper industrial agriculture.
Glenn 00:48:54 So all this leads to an enormous amount of money being spent trying to convince people that these technologies are good, that they're necessary. The biotech industry in, in 2000 for instance, formed an organization called the CBI, that Council for Biotechnology information, which was organized specifically because the Europeans showed skepticism about GMOs and it was explicitly a rhetorical organization or a propaganda organization, if you will. And their starting budget was a quarter billion dollars. That was just to start. And they haven't, we didn't know how much money they spent since then, but there's no doubt that that one organization itself has absorbed billions of dollars from the biotech industry just to convince people that these technologies are new. So it's a long winded answer to a very important question about why is all this convincing going on and why is it so important right now?

Jack 00:49:52 Can I ask you a methodological question, Glen? Cause I'm really interested in, in your background as an anthropologist, and anthropologists we associate with hyper-local work and often with bringing a spotlight to particular communities or issues that would otherwise be invisible. And yet a lot of the discussion that you've been talking about and a lot of the discussion that you'd like to get involved with is a global one involving massive international systems, multinational corporations. So how do you as a researcher with interest in anthropology, sort of bridge the difference in scales there do local work that has global significance?

Glenn 00:50:34 Well, my first major research project was on a group of farmers in central Nigeria called the Kofyar that my mentor and collaborator Bob Netting had started studying back in the 1960s. And when he started studying them, we didn't even talk about intensive sustainable agriculture. People weren't using the word sustainable. He just looked at this group of farmers and he found that a, these people were living on pretty high population densities, their part of Nigeria, was quite crowded, and b, they were actually feeding themselves surprisingly well and c, they were doing it with simple local technology. And so he was fascinated by this because it seemed to fly in the face of our general neo-Malthusian understandings that, you know, the only way to feed crowded populations is with new technology. And furthermore, we tend to think of the African small farmers as the ones who were the most in need of this, the most backward and so on and so forth.

Glenn 00:51:38 So at, his research initially was quite locally focused. He wasn't interested in larger issues of sustainability and so on, and he started doing very good work on them. Then he and I worked together on them along with my wife, Priscilla Stone, for a number of years. And we were looking at, so what makes this system work and what does it tell us about what people have been misunderstanding all along? And one of the things that we did is we looked at them very, talk about local work. You know, you do ethnography as an anthropologist, you live there in the village with them and you actually measure, so who's putting in how much time into what and what are they actually producing? And so you have to develop that really strong empirical basis for saying, look, this is how the system works, these are the inputs going into it, these are the outputs, this is the efficiency, so on and so forth.

Glenn 00:52:26 And you end up finding out that farmers like this can be extremely productive without relying heavily on external technology and external subsidy. So that then feeds into larger debates because when people talk about these neo-Malthusian myths we're talking about a little while ago, that's sort of a global discussion. They're saying the only way to feed the world in 2050 is with new innovation and so on. And so you then have to turn back to these local studies and say, well, um, I'm not sure that's true. In fact, I think in some of these cases, the the innovations that came along just tended to get farmers more into debt. So at the end of the day, I am am somebody, in the case of this book, I'm writing about global long term patterns and what's wrong with agriculture, but I think it's important to base it very much on these local studies of people like the coffee are

Jack 00:53:21 To tell people in the fact that another world is possible, which is is something that a lot of us in science and technology studies are trying to do a lot. But I guess the trouble with that is that people might say, Well, yeah, okay, it works for them. Could their alternative be scaled up or is it about just saying that the problems are not the problems you think you have.

Glenn 00:53:41 This small scale, what I call intensive sustainable agricultural systems vary a lot around the world. And so the solutions that have been working for the Kofyar would be in many ways different than what's happening with, uh, a corn farmer in Mexico or a rice farmer in Korea and and so on and so forth. But they do have important commonalities where you can say, Well, something that's working for the Kofyar that might take a different form of these other farmers is also quite important. One of the most important commonalities that I stress in the book is that for these smallholder systems to work, it is essential for them to have some engagement with the market and being able to sell some crops and have some cash. But equally important or maybe more important is to be able to keep one foot out of the market and to have some sort of a self-controlled resource space and not have to depend on money to get all the labor and all the seed and all of the fertilizer and all the equipment and so on and so forth.

Glenn 00:54:43 And so the Kofyar, we studied them gradually moving into the market economy and there was no way you would ever call them subsistence farmers. When we studied them, they were selling dams and sorghum and millet and peanuts to feed Nigerian cities, but at the same time, they had a very active system of locally mobilized labor groups, so they didn't have to go out and buy their labor. And they also used some bought fertilizer, but they also kept animals to help produce the manure fertilizer that they needed. And if you look around the world, you'll find the same when you've got intensive smallholder systems that are sustainable, you'll find this over and over again. That's a key to it is this balance of being able to keep one foot out of the market. And so we talk about scaling these systems up, I'm not sure it's a matter of taking a system like the Kofyar on trying to scale it up. It's more a matter of saying what are the key features that make this system productive and economically sustainable, and how do those other features appear in other systems around the world.

Shobita 00:55:50 I think that's so interesting. I mean, a lot of my current work is on this push towards inclusive innovation. One of my, I guess, discomforts with that is that while there's a lot of talk about inclusion and bringing marginalized communities of all kinds and even respecting the innovation from these communities, I think that you've almost failed before you've begun because you can only imagine a market-oriented approach. So I think that what you were just saying about kind of saying, all right, you know, there's this characteristic that you've noticed, which is having both a market orientation and a space for a non-market orientation is perhaps one of the ways to actually achieve inclusion in a fundamental way.

Glenn 00:56:36 Yeah, I think you've got a lot of people out there that see the world pretty simplistically in terms of the market saying, Well, these farmers, farmers, that equates with poverty. And the trick is to get them to use these new innovations, which means buying them. And then the story usually goes and then they'll start making more money, and then they can become more heavily capitalized and so on. Meanwhile, you've got a lot of activists that have got just a visceral distrust of the market, and they think that any time you're engaging in sort of capitalist relations, and any time that you're monetizing more and more parts of your system, it's bad. And so conceptually, it's at the level of like a, a bumper sticker debate, you know, market good, market bad. And to me, what has become increasingly clear is that it's balance is good <laugh>, and both of those views that market good market bad, can be very destructive. You have to look at how can these people maintain some sort of a self-controlled resource base and

a self-controlled labor base and a, a non-monetized component to their farm economy, which will help them buffer like, you know, fluctuations in price and that sort of stuff. So it's, it's a balance that's really critical, I think.
Shobita 00:57:55 Well, I think that was quite beautifully said. Now it's probably a good place
Jack 00:57:58 To, I was gonna say, it's a a great place to, to conclude and yes, I mean, it's a fascinating book, Glen, and I'm, as I said, particularly fascinated to see what sort of reception it gets and how it breaks the strangleholds that are sort of a techno-Int optimistic vision has on the debate about the future of agriculture. So it'll be fascinating to see when it lands. And thank you for joining us. Well,
Glenn 00:58:22 The pleasure has been entirely mine.

Outro

Shobita The Received Wisdom podcast is edited by Edward Waisanen and produced with help from the Shapiro Design Lab at the University of Michigan. We would love it if you would subscribe and rate us on your favorite podcasting platforms. You can also find all the recordings and transcripts and links to the books, articles and other stuff we discuss in this episode at our website, thereceivedwisdom.org. That's thereceivedwisdom, one word, dot org. Talk to you soon!