The Great Simplification

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[00:00:00] **Jeremy Grantham:** Humans live with our nose absolutely pressed up to toxicity. We eat fruit and vegetables, in particular, covered in toxic pesticides designed to kill insects, plants, and fungus. Everything around us, carpets, et cetera, and the dental floss we use, everything is dripping. In toxins, the plastic, we wrap our food in, leeches, toxins into our food, so we have a special problem and it's showing up in our fertility

[00:00:33] **Nate Hagens:** today. I am pleased to introduce for a second conversation on the Great Simplification Jeremy Grantham. Them. Jeremy is perhaps best known for co-founding the investment and asset management company GMO in 1977, and for his widely read, read GMO quarterly newsletter, which has been ahead of its time for a long time on issues like climate change, resource depletion, phosphorus limits, and many other topics related to the biophysical systems that underpin human economies.

[00:01:07] Jeremy is also known as an active philanthropist, championing issues and causes. Related to the environment and for livable human futures. In this episode, we dive into the topic of toxicity and population, specifically how endocrine disrupting chemicals, impact human fertility. And what that could mean for the human population in the future.

[00:01:33] The findings Jeremy presents in today's episode, come from, his research that he funds, but also a new white paper he has out on toxicity and its threat to capitalism. What he said, in this conversation was largely new to me. many of us in the environmental field have been concerned about a growing population, and Jeremy is laying out a pretty good argument for a declining population in the not too distant future, due partially to lifestyle changes.

[00:02:10] And he's Increasingly due to drops in sperm count, testosterone, and the inability of humans and non humans to actually get pregnant and have offspring. I plan on having a round table on this topic. Shana Swan and I are doing an in person podcast next month to discuss this research. This is an important topic.

[00:02:36] really important. And I will, address it further in the future. But for now, please welcome Jeremy Grantham. Jeremy Grantham, welcome back to the show. Hi. I met with you briefly in, in New York. And, I'm going to, I'm going to put you on the spot and embarrass you. you, gave many talks during climate week on many issues and Jane Goodall came up to you and gave you a hug and thanked you for all your important work on behalf of the environment.

[00:03:10] I thought your response was, was precious. You just kind of blushed, but.

[00:03:15] **Jeremy Grantham:** But for

[00:03:18] **Nate Hagens:** people that know you, you have been a long time champion on behalf of the systemic environmental ecological systems, things going on in the world. And one thing, per our conversation, which you mentioned in our original podcast is toxicity.

[00:03:38] The impact of endocrine disrupting chemicals and chemical pollution on our society now and into the, future. specifically on human fertility, sperm count and the like. So you have, in the years since you've been on the podcast, been continuing to work on this topic. Toxic chemicals that mess with the hormone system of animals, including the human animal.

[00:04:05] can you describe, a broad overview of your recent, findings in these studies and what you're currently focused on?

[00:04:13] **Jeremy Grantham:** I've spent a big chunk of my life looking at neglected long term problems. And including the stock market. And I decided long ago that humans do that pretty well. We neglect pretty well every important long term issue.

[00:04:34] We simply don't do long term. I think a lot of people on your podcast make the point that pretty well every, living creature has developed over millions of years to develop. Okay. To survive, to, grab now, to be as ruthless as you have to be, and, they have not developed to worry about five or six generations into the future.

[00:05:04] I'm sure it was a tough process learning to put some aside for the winter, and eventually we did that, but I think that's about it. everything from the

stock market onwards, i. e. the trivial topics, we worry about now and not too much about the future. And, that was certainly true of climate change, which I started proselytizing on for 25 years ago.

[00:05:32] Very hard to get people to take it seriously. There was plenty of eye rolling, and only in the last 2 or 3 years did it begin to get serious traction. And compared to that, toxicity is remarkable. It is more dangerous, traveling faster, and utterly unrecognized by almost anybody. Even the people who can't miss the baby bust will write, you know, otherwise splendid books, The Empty Planet, or, That economist from LSE, good how, or something like this, on the economic effects of the population change.

[00:06:23] all of them forget to mention or don't know about toxicity. There was an important article three weeks ago in the New York Times about the problem with women, not having children. And, toxicity did not feature in the article or, the comments. quite remarkable. Foreign Affairs had a serious article, finally.

[00:06:51] but no one realizes the role that toxicity plays. Is already playing and will get to play possibly to ruin this effect in the next few decades.

[00:07:01] **Nate Hagens:** And yet, when we're at a conference with scientists working on this, everyone is apoplectic about the risk and they're like, this is so clear, the signal to noise is unequivocal.

[00:07:16] We have declining sperm count, probably declining testosterone levels, impacts on our behaviors, maybe links to autism, obesity and all the other things. So is it a, is it an information deficit between the scientists and the general public? Or, I mean, this is why I wanted you back on the show, because I agree with you.

[00:07:37] There's lots of constraints on the human, enterprise right now. Climate change being a big one, energy depletion, politics, geopolitics, but plastics isn't there. What, why is it? And then let's get into the details of what's going on.

[00:07:53] **Jeremy Grantham:** We have a remarkable ability not to dwell on unpleasant topics. And this one apparently takes the ticket because everybody avoids it.

[00:08:04] But it's had a lot of publicity. There is simply no legitimate excuse for having reached election day 2024 without realizing that this is an important issue. It is clearly existential and not existential in 200 years. Existential pretty soon. The leading, the cutting edge is South Korea. I would say that South Korea has moved so fast in the direction of fewer Children that it has passed the point of no return.

[00:08:38] I don't think there is even odds that it will survive as a viable economic stable society.

[00:08:48] **Nate Hagens:** Let me ask you a question based on my work, which you probably understand this stat as well as anyone. A barrel of oil, has around 1, 700 kilowatt hours worth of work potential and you and I working are 0.

[00:09:05] 6 So, in addition to the 5 billion human workers on the planet, the machines that power the world, powered by fossil hydrocarbons, are around 400 some billion worker equivalents. So, if there's that much of an energy subsidy, work, Subsidy from machines powered by fossil fuels. So what if population goes down 10 or 20 percent?

[00:09:30] The machines can make up for that shortfall. What are your thoughts on that?

[00:09:34] **Jeremy Grantham:** My thoughts are a bit like AI and intelligent cyborgs wandering around. They don't consume. They don't go into the supermarket. They don't buy product. And without product, capitalism, as currently configured, disintegrates. And, that's it.

[00:09:53] It's a pretty simple story. So, you can have lots of production, no consumption, and, I see. You have to retool everything.

[00:10:03] **Nate Hagens:** So, it's not the worker part that's, it's not the work that we're worried about, it's the consumption and the demand.

[00:10:11] **Jeremy Grantham:** I suspect that the work that we're going to be short of is looking after old, folk.

[00:10:17] That ratio is moving by the year. It's moving so fast, there's never been anything like it, particularly in China, Japan, South Korea, but China being the important one. The rate at which South Korea is having babies, at today's rate, if it didn't get any worse, it would mean you'd have eight grandparents, for every grandchild.

[00:10:44] Just think of the burden that represents. One grandchild attempting to help and look after eight grandparents. And they will all be old, you know, they'll all need help and there'll be no labor there

[00:10:58] **Nate Hagens:** to do it. So how is that even possible? Because I have four, well I used to have four grandparents. Oh, you mean one person would have four grandparents and then there would be another four grandparents that didn't have any grandchildren.

[00:11:10] **Jeremy Grantham:** If you like, that's right. On average, they have a half

[00:11:13] **Nate Hagens:** each. I got it. Got it. Wow. And, do you know what that number is like in the United States right now? Roughly? No, I

[00:11:21] **Jeremy Grantham:** don't. China, it's one for four.

[00:11:25] **Nate Hagens:** Okay.

[00:11:25] **Jeremy Grantham:** Which is already impossible. Society will disintegrate pretty darn fast. If you keep going at that rate, the other thing too, South Korea, it's not only came into this year with the lowest fertility rate in the world, but it declined at 6.

[00:11:43] 1 percent this year. I mean, it's just ridiculous. 6. 1 percent will halve your baby production in 12 years. In 24 years, it will quarter it. It is already half of what it was. So in 24 years at this rate, It will be a quarter of a half or an eighth of what they used to have, and with an eighth of the babies, you cannot have anything approaching the society that you had.

[00:12:14] You simply go out of business, and, not slowly. If it's not 24 years, then it's 36 years. You cannot decline at these rates.

[00:12:26] **Nate Hagens:** So how much, and I don't think there's a way to actually prove this, but what does your research, and scholarship on this suggest? How much of that is our volition and desire, to either do the act of having babies or consciously try to have a baby?

[00:12:44] And how much of it is these endocrine disrupting chemicals disrupting our hormone system and, reducing our sperm count in men? In South Korea and in the world.

[00:12:54] **Jeremy Grantham:** So let's assume for a second, there was no toxicity. There were no endocrine disruptors. There was just modern capitalism with all its incentives.

[00:13:07] It's been so successful at selling its image of high consumption, high success to women now, as well as men, that they want to have. The same life that the guys have. And if they get married, they can't do that. Their career suffers. They don't get paid as much. They have to do more work at home. It is simply not a level playing field.

[00:13:34] And in a chauvinistic. Society, like South Korea and Japan, you can really sympathize why they wouldn't want, why they wouldn't want to do it. And they don't. Just a word on Japan. Japan started counting babies in 1888. It has fewer babies today than it did in 1888. And it has fewer babies

[00:13:59] **Nate Hagens:** per year?

[00:13:59] **Jeremy Grantham:** Today we have fewer babies per year?

[00:14:02] Fewer babies per year than the year they started keeping records, even though the population of Japan has tripled. Okay, part two. Fifty years ago, they had two million babies. Ten years ago, they had a million babies. Last year, they had 700, 000 babies. This year, They declined at 5%, less than South Korea, at 5%, which doubles or halves every 14 years.

[00:14:31] So in 28 years, they will have a quarter of 700, 000 or 170, 000. 170, 000 babies in 24 years, down from 2 million 50 years ago. That's how fast it's going on.

People don't seem to worry because They're happy to lump in increasing armies of 60 to 90 year old Japanese and South Koreans. So mellows the data.

[00:15:03] That it hides the real trouble for about 20 years.

[00:15:06] **Nate Hagens:** This is something that really snuck up on or is sneaking up on the environmental narrative. I mean, Paul Ehrlich in 1969 wrote the population bomb, this wasn't on his radar, and it's a sounds like what you're describing is 50 years on, this is more like a population implosion in the other direction due to, at least in part, maybe largely from endocrine disrupting chemicals and some of the cultural, you know, reasons you mentioned.

[00:15:37] **Jeremy Grantham:** I'm sorry. It's a complicated issue and full of paradoxes, but basically looking back, toxicity is a rounding error. It's overwhelmingly choice. Buying into the capitalist image, wanting equality, higher education, etc. It's a pain having children. It's an inconvenient. Now, in the long run, it's a great pleasure, but in the short run, it's a real pain in the bottom.

[00:16:05] **Nate Hagens:** But what if we, do have a Great Depression, or, by my lingo, a Great Simplification, where the capitalist pulse, based on hydrocarbon inputs, wanes and declines. Wouldn't this dynamic reverse then? And we would want to have more children because it's the economic equivalent of, child mortality is we want to springboard in the other direction.

[00:16:34] **Jeremy Grantham:** I mean, it is conceivable and I hope quite possible that we will change the culture in the long run. If in the short to intermediate term we get poor, we will have fewer children. It is clear that income plays the crushingly largest role, today and looking backwards. in the choice. The things that you really need when you have children, you know, housing and health and education have all gone up way above the average rate of inflation.

[00:17:08] The fact that televisions are a bargain does not really help you when you're, having children. It's just brutally expensive. Also, the culture has shifted to make it worse. The, modern, certainly modern middle class and rich, have incredibly high standards for looking after their children.

[00:17:31] They nurture them at every turn. They don't leave them too much on their own. They feed them exciting activities, sporting and intellectual. And they fret about whether they are going to be amongst the most competitive, desirable, highly educated, et cetera, specimens on the planet. It's a very stressful, full time activity and We see it around us every day if we look for it.

[00:18:00] So you have not only much more expensive, but much more time consuming, much more stressful, much more competitive process. The few children you have, you want to be all at the top of the class at Harvard, basically.

[00:18:14] **Nate Hagens:** So let me ask you this, Jeremy, in the same way that if you, observed the, median and mean income in the United States, you might get very different answers.

[00:18:29] I think median is 50, 000 and mean is 70, 000 or something like that. When you look at population and total fertility rates in the world, I think half of the world population lives in countries. that the total fertility rate is under 2. 1 or the replacement rate. But the global North is most of that population.

[00:18:53] Whereas Africa, has a much higher, total fertility rate. So is the story that you're saying a global one or is it, confined mostly to the rich industrialized countries?

[00:19:08] **Jeremy Grantham:** The cutting edge is the rich industrialized countries plus China. But everybody is moving in the same direction. And in fact, technically, Africa is losing babies faster than anywhere else.

[00:19:20] It's just from a much higher base. But in the last 45 years, they have dropped 2. 1 babies. Per woman. If they do that in the next 45 years, and my guess is they will and it may be 35 or 40, they will be at 2. 1. So all we have really is a 30 year window, say, where there is a reasonably generous, excess of, Babies in Africa, the population of babies in the world is dropping 1.2 million a year.

[00:19:54] Over the last 10 years, we peaked at 142 million babies a year. We're down to 130, and that minus 1.2 a year contains within it, plus 400,000 in Africa. So the rest of the world, which includes a few poor countries over 2.1. The rest of the

world is falling at 1. 6 million a year. Obviously, from 130 million, you can't keep that up too long.

[00:20:22] But even Africa, in 30 years, will be no material help to the global baby situation. But for 30 years, they are an interesting potential. Now, the irony, one of many ironies here, is that in 20 years, You will easily notice, even if you're not trying to look, that there will be competition for immigrants.

[00:20:47] Immigrants, I am. Immigrants, yes. People, a lot of countries will be so desperate that they will be competing for immigrants.

[00:20:55] **Nate Hagens:** On that note, your staff was kind enough to send me a draft of a paper you're writing on this topic. And I pulled out a quote, if I could read it to you and then maybe you could unpack it.

[00:21:07] it is worth noting here that in 20 years or less, many other countries will be competing for immigrants, which is what you just said, in the countries with the most inverted population pyramid, soon to be three or four grandparents per worker, as countries hit a fertility rate of one, smarter youngsters will emigrate to less bad countries in a self reinforcing process that will surely cause some governments to try and forbid emigration.

[00:21:33] What an irony this is in the face of today's growing political resistance to immigration. So this is quite a statement, Jeremy. can you unpack that a little more? First of all,

[00:21:44] **Jeremy Grantham:** let me say, I don't think there's any material chance that is going to be wrong. It's moving so fast. Let's just take Japan.

[00:21:53] They are beginning to increase their rate of immigrants. In the countryside, Which, as you know, is getting to be denuded by the year, there are nevertheless lots of old family businesses, you know, the 17th generation, the 12th generation of the greatest paper makers in the world, or the greatest sake makers in the world, they have a simple choice everywhere, they will close down and dishonor their 12 ancestors, they will Or, they will bring in four or five Filipinos or Indonesians.

[00:22:26] The 37 people left in the village may hate that, but they're not the ones with the jobs. The guys with the businesses, who owe a debt to their ancestors, they're the ones making the decision, and they are making it, increasingly, to bring in immigrants. It is, in the last resort, better than closing shop, and it's happening very fast.

[00:22:47] The same in, South Korea and other places.

[00:22:51] **Nate Hagens:** Well, what you just described, if you're right, could be a microcosm for many things in our world in the next couple decades.

[00:22:58] **Jeremy Grantham:** Yes. And let me just say, in passing, because I'm a nerd, I can't resist these things, Japan is, very interesting in that. Even though it's shedding people for years now, aggregate population, the population of Tokyo, the biggest city in the world, is still rising as is Osaka.

[00:23:20] So, when the country folk go into Tokyo, their productivity rises. So, Japan is a very interesting case where the productivity is hung in remarkably well. They don't get enough credit. Despite a chronic lack of babies and a chronic decline in the population. And just for the record, their population of 20 year olds entering the workforce is half of what it was at the peak.

[00:23:45] If America was down 15%, we would be freaking out. They have managed to halve their entry force into their workforce. and they still maintain a reasonably stable, effective, reasonably productive society. It's quite amazing.

[00:24:02] **Nate Hagens:** And they have reasonably healthy older people there, which is kind of not the case in our country as much.

[00:24:09] **Jeremy Grantham:** And they're beginning to work a bit longer, which is going to be essential everywhere. And we simply. The bottom line is, it's not about lockboxes and social security set aside. Every, everything you give to pensioners comes out of this year's GDP pie. There's nothing. You can't move income across time. You can't take nursing, skill, and move it two years into the future or take it from the past.

[00:24:38] It's what you have this year, and the pie is simply going to be divided more for the non productive old and less for the productive young. And that's all you have to say about it.

[00:24:52] **Nate Hagens:** Nothing

[00:24:52] **Jeremy Grantham:** can

[00:24:52] **Nate Hagens:** change that. And that's gonna, on top of all the other risks we face, that's gonna happen to some degree globally, is your prediction.

[00:25:01] **Jeremy Grantham:** It absolutely is my prediction. We have no experience with population bust, with the possible exception of the Black Death. We have no economic experience with managing downwards. And now, everywhere, it's beginning to seep in. into economies. Everyone is learning how to deal or trying to learn how to deal with declining growth rates.

[00:25:27] America is currently very pleased with its productivity. What it's really saying is they're doing less badly than the Europeans. By our own standards, Our productivity is way down. It is steadily declined. No, it has irregularly, but the trend has been pretty obviously downwards for 50 years.

[00:25:49] When I arrived in the 60s, productivity here was 3%, workforce increase was one and a half, GDP was four and a half, whoopee, practically Japanese. Now, the population increase in the next 20 years will be essentially nothing from internal purposes and unknowable few. Basis points from immigration and productivity has winded its way down from three to about one and a half, so we will be aspiring to about one and a half percent growth, not the old three or so.

[00:26:26] that the OECD and the Boies all predicted as recently as 20 years ago.

[00:26:31] **Nate Hagens:** You're predicting this not due to oil depletion or leaving the stability of the Holocene on a route to a 2C world, or lack of mineral availability, or international trade agreements. You're just predicting this based on fertility decline and population decline in our economies.

[00:26:52] **Jeremy Grantham:** Yes. And of course, if you add pressure from resources beginning to hit boundaries of availability, it makes it worse. If you add climate change damage, by the way, last year was really the first year where global climate damage amounted to something that mattered to global GDP. In developing countries, it is arguably worse.

[00:27:18] Over half a percent moving towards 1 percent of GDP and on a global basis, not far short of half a percent hit last year, and it is not on average getting less. So this is not an easy environment. to solve the problems that we're talking about.

[00:27:35] **Nate Hagens:** I have so many questions. So just on the, leaving the, magnitude of productivity and GDP aside, does this potentially create a brain drain of talented young people in, countries that are struggling with population and have, like you said, a disproportionately, high older population that they move to the less bad countries and then this creates a spiral effect.

[00:28:01] **Jeremy Grantham:** If you have a country like Japan with an incredibly high, strong social contract, my guess is it will help a lot. They will feel that it's dishonorable to emigrate because their country is in trouble. If you have an ordinary country with a squeeze, Hungary, Italy, Spain, China, when you're looking at a, particularly 20 years from now, you're looking at a horrific burden of looking after your three or four grandparents single handedly.

[00:28:34] why wouldn't? An attractive, well educated, recently minted engineer, et cetera. Why wouldn't they go to the more promising countries that are less bad? Humans are pretty interested in their own well being. I think it's an irresistible urge to move, and I think they would. And they will. And as they do, it's self reinforcing.

[00:29:01] The less bad countries become better, the worst countries become worse, until Hungary will, as Ukraine does today, will forbid young people, in Ukraine's case, young men, from leaving. How can they not? Unless you want to stand by and watch your local culture, economy, society disintegrate. How can you not try and protect Europe?

[00:29:28] And the other thing is They've spent a lot of money educating their doctors and engineers. Are they not owed, in a sense, at least repayment for that?

[00:29:38] **Nate Hagens:** Coming from you, this is quite profound, because you're not a chicken little sort of person, But I don't hear this at the environmental conferences, that I go to or the energy resource, convenings.

[00:29:58] I, what, impact does this have on, on GDP then?

[00:30:08] **Jeremy Grantham:** By the way, I recommend the Lancet. They have been ahead of the curve on everything. Interaction of climate change on medical problems, toxicity and medical problems. And all the interactions and consequences. And they, once again, are the least bad, the most advanced commentary on, on, on these topics.

[00:30:29] **Nate Hagens:** What about the environmental movement of which you and I are card carrying members? This flies in the face of some of the narratives that we need to have reduced population to have reduced pressure on ecosystems. Yes. I mean, doesn't, isn't this a good news for the environment?

[00:30:46] **Jeremy Grantham:** I kind of preface all these conversations by saying.

[00:30:49] This is a super complicated issue full of paradoxes and so on. But I don't think we have any material chance of reaching sustainable living happily ever after stage without ending up with two to 3 billion people. So we've got to get there. What are the chances if we backed up to 1960 where the average Mother was having four children.

[00:31:18] Average woman was having four children. What are the chances of us deciding, whoops, we're growing too fast? Club of Rome is correct. We have to downsize the population. What is the chance that democracies would do that? The answer is nil, of course. They would freak out. They would take to the streets instantly.

[00:31:38] **Nate Hagens:** But the inverse is not nil. The inverse is, we have a declining fertility crisis upon us. Go out and have babies, to help your country. That is not a nil response, right? I'm not sure what that means, Nate. Well, if there was a public, like there is in Sweden, I think they give, they, they give stipends to go on vacations to have sex because they realize that there's a fertility decline.

[00:32:06] I, I showed those ads as a joke in my class to make fun of it, but I wonder if that's coming. Do it for your country. Of

[00:32:14] **Jeremy Grantham:** course it's coming.

[00:32:15] **Nate Hagens:** Yeah.

[00:32:16] **Jeremy Grantham:** And, you could make a list for your class of 200 different tricks that the hungry is. And South Korea's and Sweden's have already played. And one can say with a pretty clear conscience, if ever a bag of 200 tricks had failed, this is it.

[00:32:32] Really? They have been unbelievably unsuccessful.

[00:32:36] **Nate Hagens:** Oh, I didn't know that. So South Korea has been aware of this and trying to combat it with marketing and communication and tricks.

[00:32:43] **Jeremy Grantham:** South Korea will be spending this year, Probably about as much of their GDP as any country on the planet to stimulate, baby production.

[00:32:53] Sweden has, tried notably, and occasionally you get a 5 year, 10 year pickup, and then it starts to drop again. France has been very successful, but still, it's decently below 2. 1, and for the last 5 years has been falling again. A few countries have had a modest success for a modest number of years, but in general, they have failed badly.

[00:33:18] And surprisingly.

[00:33:19] **Nate Hagens:** Okay. So, what we've been talking about is the momentum of the total fertility on the planet that has been happening. And you've been evidencing this and describing it. but what about now? Let's set this aside for the moment and we'll come back to it. What about on top of what you just discussed?

[00:33:42] the reduction in sperm count that seems to be ongoing and possibly accelerating, and the impact on male. Is there any impact on female endocrine

reproductive system from chemicals? What role does toxicity have on the story that you just laid out?

[00:34:00] **Jeremy Grantham:** The big issue, which we're wending slowly through, is that without toxicity, we have a serious problem, because women are choosing not to have children.

[00:34:14] and looking backwards, we believe toxicity has not played that big a role. However, in recent years, we do believe toxicity is finally beginning to bite. And it's biting in two ways. Endocrine disruption, messing with your hormones, clearly reduces your sex drive, point one. And point two, clearly interferes with your ability to have children easily.

[00:34:46] **Nate Hagens:** So on the point one, do we know how it reduces your sex drive?

[00:34:51] **Jeremy Grantham:** Hormones are basically your sex drive and you screw around with them. It is very easy to like

[00:35:00] **Nate Hagens:** changing my, 28 year old self, although I'm a man, into my 58 year old self, overnight with endocrine disrupting chemicals, that sort of impact on your drive.

[00:35:12] as an example.

[00:35:13] **Jeremy Grantham:** Yes, and they, you know, you can test this with mice and rats and so on. But my, the, my favorite horror story, it happens to be one of the few peer reviewed articles on this topic. In Japan, 8, 000 young people between 20 and 40 or 20 and 50. and they, among many questions they asked, How many of you have had no sex of any kind, unquote, in the last 12 months?

[00:35:41] 45 percent of the men and approximately 45 percent of the women, but 55 percent of the young men between 20 and 29, to which one can only say, Holy cow,

[00:35:53] **Nate Hagens:** 55 percent of 20 to 29 year olds in Japan had not had men

[00:36:00] **Jeremy Grantham:** had no sex of any kind for 12 months. It could be contributed to by massive increases over the last 40 years and in their parents, by the way, these are epigenetic effects that pass through to your Children.

[00:36:18] And it's just been accumulating at a dreadful rate for, really, for the best part of a hundred years, but massively since World War II.

[00:36:28] **Nate Hagens:** So this has been the sleeping, ticking, population implosion that's been happening for a long time. We were, we're now just becoming aware of it. So you were saying, Setting aside the desire, like the economic reasons why women don't want to have children, we talked about that earlier, and now on the endocrine disrupting toxicity side, number one is, it changes your hormones to want to have sex and want to have children, and then two, it actually limits your ability to have children, which is what, the sperm count drop?

[00:37:02] **Jeremy Grantham:** Yes, and, the sperm count drop is about the future. In the past I reckon, back in hunter gatherer days, we probably had 140 units and by the time they start to academically measure these things in 1972, it's down to about 100. Today it's 30. 100

[00:37:25] **Nate Hagens:** units of what?

[00:37:28] **Jeremy Grantham:** Of, sperm per milliliter.

[00:37:31] **Nate Hagens:** Okay.

[00:37:32] **Jeremy Grantham:** It's a lot.

[00:37:33] You know, we produce massive quantities. Like 50 million sperm,

[00:37:39] **Nate Hagens:** right? Right, right.

[00:37:41] **Jeremy Grantham:** But they have to run an obstacle course, which is fairly prodigious. And it has never been that trivial for many people to have children at the drop of a hat. The more you have, the easier it is. The other thing that comes down with the sperm count, which I believe has come down from probably 140, It's a quarter of what it was.

[00:38:05] First of all, we were over engineered, Nate. So, I like to say, like a good Victorian bridge, you know, they didn't know quite the breaking stress, so they made them really, strong. And they still stand today. We don't need that much. We don't need 140 units until you get to 50. It's completely academic.

[00:38:26] So it's only in the last 15, 20 years it began to have any effect at all. But in the last 15, 20 years, we have quickly gone from almost no couples having a problem, a few technical problems, 15%

[00:38:46] Of all young couples needing help according to the World Health Organization. However, they didn't say, because they're not looking for political trouble, they didn't say, and this has kind of sprung out of the ground in the last 15 20 years. In other words, it's moving very fast. And of course it's moving very fast.

[00:39:05] Our sperm count is dropping at 2. 6 percent a year. According to Shana and, Levine.

[00:39:13] **Nate Hagens:** Okay, so that 15 percent is of couples that, separate from the first part of this conversation, these are couples that actually want to have sex and want to have children. And are having trouble. And are having trouble.

[00:39:26] And

[00:39:26] **Jeremy Grantham:** people who wanted to have children before, basically, Got them. And now 15 percent do not. But with the sperm count down to a quarter and still falling at technically an accelerating rate, the decline rate this century is 2. 6. The decline rate in the 30 years of the last century was about 1. 5 or 1.

[00:39:52] 6. So we're actually declining at an accelerating rate, at a rate 2. 6 that will halve your sperm count in 26 years. Now, so in 26 years, the median will be down to 15, 17, 18 units, maybe 20. At that level, it won't be 15%, it may be 50. We have no way of calculating this, but it stands to reason that this is going to be a power law, doesn't it?

[00:40:29] That you can easily stand a drop from your hunter gatherer levels. You can take some increased trouble now, but as you get towards chronic deficiency, You rapidly approach zero ability to have unassisted babies.

[00:40:50] **Nate Hagens:** So have you seen the movie Children of Men?

[00:40:53] **Jeremy Grantham:** Yes,

[00:40:53] **Nate Hagens:** of course. Is, this the sort of future that you're envisioning potentially?

[00:40:58] **Jeremy Grantham:** No, it's not going to be abrupt like that. And, it's not going to be inexplicable like that, we are going to understand exactly what's going on, as we can do now, we're going to see it working through at different rates through more or less every country, as we can do now, we will obviously take technical, responses, our ability to do better and more frequent IVF techniques, fertility clinics, et cetera, will become, I suspect, a very big deal.

[00:41:38] And, so we will not kind of go out on that level, without a struggle, but we will go out in my opinion, unless we do two pretty straightforward, easily understood things. Detoxify the environment and detoxify the world. Capitalism. It may be difficult politically, but it is very easy. You have to ban all seriously toxic industrial chemicals and toxic plastics.

[00:42:13] Not difficult. We lived quite well without most of these. And you have to find substitutes that are acceptable. You have to find bio derived materials, even if you engineer microbes and bacteria to take it out of the air. I am sure that will happen in the time we have available. You can do it. Now, whether we'll do it or not is another matter, and how quickly we do it is the ballgame.

[00:42:43] But this is not like climate. Climate is a global, we're all in it together. One, Guy's bad behavior is everyone's bad behavior, but toxicity is local. The guys who behave well will have healthier lives and will live longer. The guys that behave badly because they're capitalist, hyper capitalist that won't give an inch, they will have less healthy lives and they will live shorter.

[00:43:08] **Nate Hagens:** I now have so many questions. So I will give you my word, I'm going to ask them one at a time. So as you know, Shana is a friend of mine. I spoke with her recently and asked her, what is her new thinking around fertility and toxicity in the last few months? And her answer was one world. One Health. In other words, the number of species that are being affected by fertility drop is roughly 2 percent a year, which tracks humanity's problem.

[00:43:35] And there's no significant difference in geography. So if humans are impacted this way, Jeremy, What about every living thing on the planet? how's their fertility impacted? Do we have any thoughts or knowledge or research on

[00:43:49] **Jeremy Grantham:** this? yeah. Sadly, we do. I have to reluctantly confess that having dealt with these kind of semi painful factors for my entire life, they never got to me.

[00:44:05] It's only in the last couple of years I begin to be periodically somewhat disturbed by our complete disregard. And also the speed at which the damage is increasing and the problems are moving. But if we take insects, it turns out that humans and insects are particularly sensitive. Insects, just because biologically that's the way they're made, the slightest little trace of a nicotinoid in the water system and they die by the millions.

[00:44:35] Humans, because although we may be fairly rugged, we uniquely amongst species live with our nose absolutely pressed up to toxicity. We eat fruit and vegetables in particular covered in, toxic pesticides designed to kill insects, plants, and fungus. Hardly surprising it would do a job on us and actually the great majority of them dripping in P.

[00:45:00] Fasti. The, chemicals that never go away in, in nature, and everything around us, carpets and et cetera, and the dental floss we use, everything is dripping in toxins, the plastic we wrap our food in, leeches, toxins into our food in case we need it anymore. So we have a special problem and it's showing up in our fertility.

[00:45:28] Insects are particularly sensitive and it's showing up in their fertility and they have lots of other problems. Dividing up the nature into little patches, little islands is a killer for them and other animal life and so on. And climate change will

also do that. Pose a bigger problem to them than it does to us, but insects play a particular role, and my colleague Jamie and I spent three hours with EO Wilson not that long before he died, and it was a, I must say, a wonderful experience, but all the insect experts completely believe that without insects, We run a risk of the whole of nature losing the plot of just disintegrating and leaving no material chance of survival for humans.

[00:46:20] The problem is they couldn't prove it. It's infinitely complex and they never had any money. And, but they all profoundly believed it as he

[00:46:29] **Nate Hagens:** did. That's the problem with a lot of the issues that we're discussing on this podcast and in your research is by the time we can absolutely prove it without a doubt, it'll be too late to mitigate it and change it.

[00:46:40] And it's game over, as you said. So let me ask you this. So Shauna, believes that much of the endocrine disrupting chemical problem that causes the infertility crisis and the hormones. is from plasticizers like phthalates that make things soft, and pliable. But when you were on this show last year, you suggested it could be more from agricultural chemical residues in our food.

[00:47:05] Have you two placed a friendly wager on that? And is there any new information either way?

[00:47:10] **Jeremy Grantham:** And by the way, there is. probably a third group I understand who, think that PFAS play a very big role. And, I'm somewhat sympathetic, to all three groups. However, I base mine on a couple of small, terribly insufficient studies.

[00:47:32] And insufficiency wreaks havoc with academics, less so with me. I try and just look at the data for what it is. These two studies were done by Harvard and Mass General, which has a reasonable claim on being the best hospital in America. And they were small studies, and they were done quite recently, 10, 15 years ago.

[00:47:55] And in study one, they got, a few hundred, that's all, a few hundred, I think 800 men. And for six months, They self reported on the toxins they had on their fruit and vegetables. At the end of the six month window, the sperm count of the worst eating quarter was half of the least bad quarter. None of them had fully

organic, which I wish, much harder to do, by the way, but I wish they had because they might have been 50 percent higher than that.

[00:48:30] But in any case, two to one. The following year, or I think actually two years later, they did a very similar study looking at women who presented themselves to the fertility clinic, and it really wasn't many, maybe 120. They self reported on the toxicity of the food, fruit and veggies they ate, and the best quartile, the least bad quartile, had I think it's 67 percent quote successful live births, the worst quartile 37, and in all cases the quartile order was the one you would expect, and the same for the guys.

[00:49:08] That is shockingly powerful data, and when you think of what these damn chemicals are, and when you look at them individually, you have to say, why wouldn't they be lethal? Pregnant women are imbibing these pesticides, these killers. Why would it not have that effect? So I am inclined to believe it's logical that they would have an effect.

[00:49:36] I have been taught by people like Shana that the sensitivity in the womb is many multiples, sometimes hundreds of times higher More than when we're rough and tough outside the womb. It's exactly the result I would expect. And it's the result these two little studies show. The fact we live in a world where they can't afford to study the most important things in life, it seems is, a separate topic.

[00:50:03] **Nate Hagens:** Well, it's, so, I mean, I can't remember the numbers, but I'm guessing you do, in, in your draft paper on toxicity and the future, I think you referenced that there's 250, 000 different. chemical compounds that are potentially toxic and like hardly any of them have been tested for risks to humans, let alone the combinatory when you have multiple chemicals in the same formula is, it along that, those lines?

[00:50:34] **Jeremy Grantham:** Absolutely. As far as we know, they've tested none in combination, but for example, all we know is that Roundup is much more toxic than glyphosate.

[00:50:43] **Nate Hagens:** I thought Roundup was glyphosate.

[00:50:46] **Jeremy Grantham:** No, absolutely not. Roundup has the active ingredient, the official active ingredient is glyphosate, but it has additives, mixes, and so on, which are, several of them, Ferociously toxic.

[00:51:01] And the net effect is Roundup in total is much more dangerous than glyphosate on its own. That is absolutely typical. And the EPA does not require you to test Roundup in total. It requires you to test glyphosate, the quote, active ingredient. The fact that other Additives, also happen to be toxic and active, is not required for testing.

[00:51:28] **Nate Hagens:** Is toxicity a threat to capitalism itself?

[00:51:34] **Jeremy Grantham:** In fact, I am thinking, I think I had that title. We changed the title at the last minute, and I sent you a rough draft, and, my title is increasing toxicity and the threat to capitalism, and, And life itself. But, of course it's a threat to capitalism.

[00:51:58] For capitalism to prosper, you need 2. 1 children, and you need them to be healthy, ideally, well educated, and hard charging, and ambitious. And we do some of those things. But not all of them. But my, argument in the paper and from now on in life is that you not only have to detoxify the planet, which is theoretically easy, but you have to detoxify capitalism, which is going to take generations and will never be easy.

[00:52:34] And by that I mean, you have to end up With the culture, capitalism or whatever, recognizing that we live on a finite planet, we can't have wasteful growth or massive growth in anything for extended periods of time, that is simple math, and that we have certain commons without which we fail. We must have plentiful, clean, fresh water, non toxic.

[00:53:03] We've got to have non toxic air that doesn't also warm our environment and kill us off that way. We've got to have clean soil that is full of bacteria, full of life of all kinds, which guarantee higher quality food, more nutritious and absolutely non toxic. Regenerative ag will do that. And of course, in the end, we need it to be sustainable.

[00:53:32] I don't think it's on the cutting edge. Like toxicity is, although they overlap a bit, but I think, we have to save ourselves on toxicity first, and look after some of these second derivative problems as we can.

[00:53:49] **Nate Hagens:** So you come from, you famously come from a financial analysis background. Let me ask you a very financial bottom line question.

[00:53:58] in the coming decades and beyond, can you envision corporate balance sheet, That evidence is that we can have healthy bottom lines on a sick, depleted planet. I mean, at what point is there an inflection and awareness from the business sector on these issues out of their own necessity for survival of, profits?

[00:54:23] I mean, how soon do toxicity and climate start to impact the bottom line of corporations?

[00:54:29] **Jeremy Grantham:** Of course, they're impacting the bottom line now, where it's costing us hundreds of billions on a global basis, both, climate change and toxicity already. It's ruining our health, and the health costs are mounting at a ferocious rate.

[00:54:46] and as I say, the terrific thing, the one advantage about toxicity is that it's local, and if we If the EU or Denmark or China one day really start to move fast and ban all the toxins, they will very quickly get the benefit of better health and better lives. I say in the paper would you notice no doubt that if you go back, 35 years or 70 years, the Swedes live two years longer than the Americans, they live a healthier outdoors outdoorsy life.

[00:55:24] But today it's six years and, As I semi joke, my estate is willing to bet anybody by 2050 it will be eight or longer, because we are diverging, and we will diverge rapidly. If we defend every toxin because we make a lot of money, as we do with, say, nicotinoids, banned almost everywhere in the world, but not banned in America, and a teaspoon of which will kill, you know, literally millions of bees, we will pay a very high price, but at least we'll be able to see it.

[00:55:59] So I think Grantham Foundation should get behind the best people so that they can set an even better example. Whatever barriers they have, let us think about how do we get over those barriers. This is not the case in climate change,

you have to go for the aggregate problem. But in toxicity, I think you should go for the best example.

[00:56:19] Because the best example will break the intellectual bank, won't it? If they're living 12 years longer and their health budget, this is capitalism, if their health budget and government and politics has fallen to half ours and falling fast, that is awfully attractive. And that may, in the end, move us in time.

[00:56:41] **Nate Hagens:** Except in the United States, over 20 percent of our GDP is health care. So, both health care, worsening health outcomes and worsening climate disasters on, in a society with surplus are actually good for GDP, yes? Yeah,

[00:57:00] **Jeremy Grantham:** and America has, is really dominated by, hypercapitalism and, we, we have a near monopoly of the super aggressive, fast moving, infinitely rich organizations.

[00:57:18] And we have far and away amongst the, amongst the free rich economies, far and away the greatest influence of corporations in government and particularly in the regulatory bodies, which basically they tend to control. So those institutions designed to, help, agriculture behave itself now help, Major agricultural companies make the most money, and some of it is inadvertent, but some of it is not.

[00:57:55] Some of it is blatant influence, and if we move very slowly, we will pay the price. An environmentalist might say, okay, big deal. So you want to behave badly on toxicity, you'll tend to die off. They want to behave better, they'll do better. Now China is very interesting, obviously very big and very different.

[00:58:19] China came quite slowly to certain issues, including general pollution. And including climate change. They were not quick. I once wrote a quarterly letter jokingly addressed to them, but when they picked it up, like a lot of things, they move at China speed and they flash past everybody until today where they make, you know, 80 percent of this, 90 percent of that, on and on it goes.

[00:58:48] 50 percent of every EV made today is being made in China, and there's a great variety, and there's a lot of technology. They are no longer copying us. They are leading the way in a lot of these new technologies now. I think within five

years, probably, is my guess, since they're full of scientists in their top levels, they will realize the critical significance of toxicity and population problems.

[00:59:17] And they will act. And we will see them pretty soon burning, slashing and burning through toxic chemicals and plastics, banning them here and banning them there in a way we can't even, fantasize about. And when they do, unlike climate change, Where they move at the aggregate speed of the whole world, however fast they move, they put in more solar panels last year than America has ever put in, as the richest country in the world, but in this case, they won't move at the average speed, they'll move at the speed of their solar panels.

[00:59:56] individual progress, and they will move incredibly fast, I guess, and their health and longevity will improve incredibly fast.

[01:00:07] **Nate Hagens:** So this is existential, the toxicity crisis to the world. It is a global issue. It is a global commons, but as you're saying, toxicity might be changed locally in the country that it's relevant, but isn't it possible?

[01:00:25] Are you hopeful that toxicity, endocrine disrupting, chemicals, chemical pollution, the drop in testosterone, the drop in sperm count, the change in hormones, all of that could finally be a nonpartisan, bipartisan wake up call because Republicans, who, dismiss climate change sure enough to care about testosterone and sperm count and having children, I would imagine.

[01:00:52] So is there hope that this could be. A bipartisan issue that gets traction.

[01:00:58] **Jeremy Grantham:** Yes, there are a lot of promising signs. The right wing seem to be quite upset with the fact they're getting poisoned. And I can't say I blame them. So this does have more community of interest. It's also much more personal, isn't it?

[01:01:13] Toxic, cancer, sperm count, the masculinity of your male offspring. These are very personal, right, left wing issues for any parent and so on. And I suspect it will get traction And will escalate very rapidly. I am certainly hoping so. I'd love to get back to the paradox that in the end, we need to get our population down, we wouldn't have chosen to do that, but by some miraculous unintended consequence, which is toxic environment and toxic Antinatal capitalism.

[01:01:56] We are getting there. And, now the problem is we seem to be having too much of a good thing. We're dropping so fast in countries like South Korea and Japan that if it spreads, we will find it very difficult to stabilize these countries and China being, of course, the co equal largest country in the world is a prime example.

[01:02:20] You can't Imagine the stress they will have because they not only have four grandparents per grandchild, 1. 0 fertility, but they have a chronic shortage of fertile women because of the one child policy. Exactly the 20 to 40 year olds are the one child group, and they are tilted 15 percent to men. So, everyone has a problem with fertility, everyone around them, but they only have a regular shortage of fertile women.

[01:02:51] China has a special Chinese induced shortage of fertile women times a miserable fertility rate. It's double jeopardy. So, they will be aging, inverting the pyramid faster than anyone on the planet, possibly.

[01:03:08] **Nate Hagens:** I know that you and other philanthropists are helping Shauna Swan get this message out and is the message gaining traction?

[01:03:17] Given the speed and danger

[01:03:19] **Jeremy Grantham:** of the problem, it is shocking how slowly it's moving. I am guessing that China will pick it up because they have many more scientists in them, in their structure of politics, of government, than we do, than almost any Western country. And they have a history of doing that in climate change.

[01:03:41] And that, that could change everything. But at the moment, it's creeping along like a snail. And it is a cause, it is a cause of considerable stress because, you know, I've spent my life trying to promote, neglected problems, but there's never been one like this, where it's much the most serious, much the fastest moving, and much the most disregarded.

[01:04:03] It seems impossible. I gave a talk to the Boston Security Analyst Society, and separately the New York Security Analyst Society, in which I, among other things, introduced the question of toxicity and population problems. And they

practically fell asleep, to which my response was, okay. So, 50 percent reduction in sperm count in 50 years doesn't get your attention.

[01:04:27] Would 100 percent reduction in 100 years do it?

[01:04:30] **Nate Hagens:** It might not, though, because that's not, their job depends on their quarterly bonus or their yearly bonus.

[01:04:36] **Jeremy Grantham:** You'd think, however, they might have a passing interest in the well being of their own children and grandchildren. This is no longer requiring It's requiring you to worry about your distant descendants.

[01:04:47] It's requiring you to worry about your children and grandchildren. It's become immediate. They will have bad health. A lot of us have had bad health because we live too close to a toxic chemical plant or something. These have huge consequences. And as Shana and others will have told you, the epigenetic effect of many of these Endocrine disruptors means that your children pay a price and quite probably your grandchildren.

[01:05:15] It's certainly the case in studies on other animals.

[01:05:18] **Nate Hagens:** So, Sean is now working on determining if sperm count decline can be remedied at the household level, by cleaning out identifiable, endocrine disrupting chemicals, EDCs in kitchens, closets, garages, medicine cabinets, and the like. food and food.

[01:05:36] And I understand the philanthropy. from your network is, helping with that, project. Have you heard about how this is going and, what are you hoping that research will discover?

[01:05:48] **Jeremy Grantham:** No, I haven't. I don't want to speak for them yet. It's still preliminary, but I know they're good people. I know it's a sensible topic.

[01:05:59] and that's what our foundation is meant to be funding.

[01:06:01] **Nate Hagens:** Well, she's had, she has a movie coming out next year and ahead of that movie, I'm going to do a podcast with her on the findings. Yeah.

[01:06:08] **Jeremy Grantham:** I also have plenty of issues that haven't come up yet. And, one of them that the average viewer will not realize is that one of the interesting characteristics of a sperm count is that it can be measured in a way almost none of these things can be measured.

[01:06:27] And secondly, It is about the most accurate predictor of future general health and longevity. We are not prepared to say that it is definitively the best predictor, but it may be, and it's one of the best.

[01:06:43] **Nate Hagens:** Wait, if you, so if you determine, if you measure a man's sperm count, that itself is a predictor of their future health.

[01:06:52] **Jeremy Grantham:** I am not saying that. Okay. And that may be the case, but. I suspect it will not be. What I am saying is if you have two societies, Denmark with 20 percent higher sperm count, it will have significantly higher health and longevity. In other words, a reflection of the society and the stress put upon it.

[01:07:12] Whether it applies at the individual level, I don't know. It may.

[01:07:15] **Nate Hagens:** You mentioned cancer earlier, in, in passing, but beyond fertility, does messing with these endocrine disrupting chemicals affect human health in other ways that, that we haven't discussed?

[01:07:28] **Jeremy Grantham:** We know that chemicals in general have a lot to do with, being overweight and all the problems that go with that.

[01:07:37] Parkinson's appears to be correlated with the use of pesticides and one or two notorious, chemicals, which I'm forgetting the three initials, darn it, but they go back to the 1920s. H. Y.

[01:07:55] **Nate Hagens:** K. Isn't this amazing that there's just so many human technological inventions that solve problems that came from prior human technological inventions?

[01:08:05] H.

[01:08:06] **Jeremy Grantham:** Y. K. Yes. Someone said how, could we possibly deal without them? And I said, you're kidding yourself. The, year before we introduced, toxic, pesticides, we lost about a third of our crop. And last year, we lost about a third of our crop. All that has happened, if you look at the last sweep of history, is that you use more and more expensive chemicals that the typical farmer can't afford, and, you still lose a chunk of the crop because, among other things, the pests become immune to your expensive pesticides, and you have to use more at more cost.

[01:08:44] or several at more cost. And if you give up now, you lose your whole crop. So, this has not been satisfactory, but if you give up completely, and you go to regen ag, which we will, everybody will be regen ag if we survive a hundred years from now. We will be sustainable and the food will be much more nutritious and totally non toxic and the soil will be rich and that is the consequence.

[01:09:13] If you have rich soil, well nurtured, you will have much more nutritious food. They have found in some cases that the nutrition of various mass produced Vegetables and so on. It's down to like a quarter of what it was in, in many of the nutrients that you would.

[01:09:30] **Nate Hagens:** So, so the calories are still there, but the micronutrients are missing.

[01:09:33] **Jeremy Grantham:** And indeed the calories often go up because as the balance of, ingredients tilts towards carbohydrates and so on, you're getting in the end more sugar.

[01:09:46] **Nate Hagens:** So is there evidence on endocrine disrupting chemicals, on intellectual and emotional development, impulse control, human intelligence, things like that?

[01:09:55] **Jeremy Grantham:** Being an academic comes with certain disadvantages. You have to be a whole lot more careful. A financial analyst is kind of trained to look at the data, recognize that you'll make mistakes, do the best you possibly can with the data. And that's what I try and do.

[01:10:12] **Nate Hagens:** That's why you're a, that's why you're a very important guest for this podcast.

[01:10:15] Because I

[01:10:16] **Jeremy Grantham:** had no trouble extrapolating backwards in the sperm count and a few years ago, extrapolating forward. I took Haggai Levine, the co, the coboss of the main study, of the meta study, and I took his expression that the growth rate was not slowing. If at anything it was accelerating. And I said, okay.

[01:10:36] Then clearly for the seven missing years, we should take the same average rate of the past. Which was just under 2%. And then as it turned out, it was 2. 7 because it had accelerated. Academics can't do stuff like that. They won't do stuff like that. So they can be years behind Making a reasonable best guess.

[01:11:02] And if you're slightly, if you're pretty careful, your best guess is highly likely to be accurate. For example, we extrapolated backwards to World War II from 1972 when the academic study started. And we said, tell you what, It will go back at half the rate that it has been going on. But just remember between 1945 and 72, everybody smoked, endocrine disruptor.

[01:11:27] Everyone was surrounded by DDT, vicious endocrine disruptor, and everyone was surrounded by terrible smoke and smog in London, which is terrible in every way, including endocrine disruption. So we knew it was terrible, but we took it back at half the average rate, and frankly, it has to be better than no guess at all.

[01:11:47] If someone said it was actually every bit as high, that would be very unsurprising. But the fact that it would be nothing is impossible. So,

[01:11:57] **Nate Hagens:** who's in charge of this? Like, who's responsibility, or who will champion this if Is this still an information deficit problem, or is there a

[01:12:07] **Jeremy Grantham:** chronic information deficit problem?

[01:12:09] And I'm proud to say Grantham Foundation has played some role in sponsoring not one, but seven organizations whose job description in various fields

is, propagating information, including, you know, One call spun that is trying to gather all the information on mycorrhizal organisms in the soil, loosely speaking, mushrooms and related stuff that we begin to understand, do so much in spreading resources and communicating and so on.

[01:12:41] We are talking as we sit about the need for just such an organization or two to deal with toxicity. And I have no doubt. With any luck, three people will call in to tell us after this, that such an organization exists, which is fine, but it has been hiding its light under a bushel because we haven't found them.

[01:13:02] **Nate Hagens:** So if you were the toxicity czar of the next administration, how would you even begin to structure and think about, this challenge with a long term plan? What would be some of the broad arcs of what you would look into and what, things you would start?

[01:13:20] **Jeremy Grantham:** I'm inclined to say, Nate, that's over my pay grade.

[01:13:24] I can imagine what everyone's

[01:13:26] **Nate Hagens:** pay grade.

[01:13:27] **Jeremy Grantham:** If I was an emperor of China, I would get a hit squad of 10 or 20 or 50 important scientists. And give them six months to come up with a list of the worst 20 percent of all pesticides and industrial chemicals that should be phased out within the next year or two.

[01:13:53] So

[01:13:53] **Nate Hagens:** it's a power law right, right there. we get rid of 80 percent of the damage with just 20 percent of the chemicals, plus or minus, maybe.

[01:14:01] **Jeremy Grantham:** Yes. Yes. Let me just say, by the way, that there are 10, 000 chemicals used in cosmetics and related. bodily stuff. And, in the EU, they have banned 1400, which if they banned the worst 1400, might be a pretty darn important contribution.

[01:14:21] Canada, I believe, has banned about 450, which is pretty cheesy. And America has banned 11, not 1100, 11.

[01:14:30] **Nate Hagens:** Well, if 450 is cheesy, what is 11?

[01:14:33] **Jeremy Grantham:** Suicidal would be strong, but, near suicidal would be pretty accurate. I mean, it is going to increase our ill health, lower our life expectancy, with something approaching absolute certainty.

[01:14:48] **Nate Hagens:** So this is also, I mean, this is a risk to life on the planet, but this is super existential and urgent. And now for the United States of America, toxicity, endocrine disrupting chemicals almost sound like an antidote to overshoot to me with a giant speed bump in the near term that we have to navigate.

[01:15:10] It's just a different flavor of great simplification. So let me ask you this. Is it top down scientists and emperors and politicians that are going to become aware of the risks to society and do things, in partnership with corporations? Hard for me to imagine that. Or is it individuals that, in, you know, thinking about themselves, their kids, their grandkids, life on earth, is it going to be a political awakening and movement that.

[01:15:42] hell no EDCs go sort of thing or some combination or how do you visualize, an awakening in consciousness about the threat of toxicity to our future?

[01:15:53] **Jeremy Grantham:** What I'm looking for. Is a few countries or regions will set such a good example, will get such a good payoff, that will be the thin end of the wedge, and that will happen, and in the end it will be successful, the question is always, as with climate change, the speed and the damage that is done, and one has to remember the biggest pain to, escaping from toxicity and population stress, It's climate change.

[01:16:23] And the biggest stress to climate change is toxicity and the shock to the economic system. And that's one I have to spend a sentence on. Wait

[01:16:30] **Nate Hagens:** a minute, the biggest threat to climate change is toxicity?

[01:16:34] **Jeremy Grantham:** Yes, because if toxicity stresses the population the way it will, and that in turn stresses economic growth, We will very quickly and easily feel poor.

[01:16:48] We have just seen in the last few years how easy it is to make the average voter feel disappointed and feel poor and feel that they really don't want to spend that much money on climate change because they can't afford it, that climate change is 50 years from now and I'm having trouble feeding myself and my children now.

[01:17:10] And so if you feel poor, you don't have the money. to do a proper job on climate change, and by the way, when you finish the trillions of dollars, the hundred trillion dollars that it, that would be a real bargain to detoxify the industrial system. You are faced with the need to extricate a two and a half trillion tons of excess CO2 that if you do not take out, the oceans continue to rise and the climate slowly gets worse.

[01:17:39] And if you mean for the climate to get rapidly better, you have to extricate that CO2. It's a dead weight. You don't get to drive a sexy electric car. You don't get healthier. you just have to take it out of the air and it's a lot of money and if you are feeling poor because your number of workers has imploded like japan or south korea and your number of old fogies has exploded, like japan and south korea then you won't feel you can afford the necessary action to move fast enough on climate change and it may get out of control and tipping point start so you can see how closely these two stress factors I relate it.

[01:18:24] **Nate Hagens:** I do see that, although I've been using different language to describe it, but let me ask you this, what are your thoughts on the degrowth movement? Those that care about the environment and, inequality and want the world to consciously degrow, our consumption and our GDP, ultimately for, a healthier environment.

[01:18:48] **Jeremy Grantham:** I completely sympathize with them. One has to admit, though, it falls into the category of urging people to be better people, to be kinder and wiser and nicer and more logical and look further into the future. Our results in the past, typically on this have been that you get one or two or 3 percent of the people who are responsive.

[01:19:13] And, in Japan, you might get three times that, but, it's not typical. And, we are. Over millions of years bred to be pretty darn selfish and struggle for ourselves and our family and that's it. So, I suspect that is a very big ask and I notice that some of the best climate people refuse to talk about

[01:19:39] **Nate Hagens:** I know that you, understand and agree with what I'm about to say, but I just want to point it out.

[01:19:46] Most of these things that you're predicting, it's assuming that everything else stays equal, which it may not, the wars and the financial situation and politics. So assuming that everything else stays constant, that trend is something that you predict. Yes, exactly.

[01:20:04] **Jeremy Grantham:** and there's. I see I'm managing to knock off most of my points here on my crib sheet.

[01:20:12] but, one of them is an interesting tidbit about China and the one child policy. When we were back in the 1960s and 70s, the Club of Rome and related people made the case That we couldn't afford to grow indefinitely at that kind of warp drive, which was, you know, three or four percent a year, and, that we would very quickly, et cetera, et cetera.

[01:20:43] Just for the record, they were remarkably accurate in almost every way, but one, and that is, they said, the growing population would bring us to our knees. Now, just as a average mathematician, I can guarantee you that had it continued, it would of course Brought us to our knees, but it in fact changed, and I can tell you how many people back in 1960 or 70, predicted that the population would rise to a peak, in 1961, of, 2 percent growth a year on the planet, in population, and would then start to decline, and, would then start to plummet, and that is nobody.

[01:21:28] I do not think it was an available insight that was so unexpected and so out of the range of what people were thinking about.

[01:21:36] **Nate Hagens:** And that is what happened is, we peaked at in 1961, the global growth rate in humans. Yeah. Yeah. 2. 1%. Then drifted

[01:21:43] **Jeremy Grantham:** down, but continued to grow rapidly.

[01:21:45] **Nate Hagens:** Right.

[01:21:46] **Jeremy Grantham:** and until in a few decades, it will start to decline.

[01:21:51] It's already in babies, as I told you, declined for 10 years. Yeah. We peaked 10 years ago and it's. Dropping, you might say, like a rock. anyway, how many countries had enough gumption to say, of course, they're right. We can't have perpetual growth. We can't keep on growing people. My old favorite thing, 3, 000 years of the Egyptian empire at 1 percent growth.

[01:22:17] And trust me, you have nine trillion times as many people. One lousy percent a year, for three thousand years, multiplies you by nine trillion, and now you can check it on your iPhone. When I first said that, you could not. Okay? Nine trillion times, guys, for just as long as the Egyptian empire was more or less in its full glory.

[01:22:38] It is a pretty simple, straightforward, you can't do it.

[01:22:42] **Nate Hagens:** So, Are you advocating for young people today, to have more children or you think it's a good thing that overall people are having fewer children, for our U. S. listeners and, beyond?

[01:22:55] **Jeremy Grantham:** We've got to get the population down. We're lucky, miraculously lucky it's going to go down.

[01:23:01] The only risk is that it goes down here and there so fast that they disintegrate within the population. Very disturbing effects on, global peace, perhaps, and so on and so forth. Russia is a particular problem in that its population is imploding and emigrating, et cetera, et cetera. China's a particular problem also.

[01:23:21] They will be really stressed at this rate in, in, in as little as 30, 40, 50 years, they will be in real stress.

[01:23:28] **Nate Hagens:** So, To be clear, you're more worried about baby depletion than you are about oil depletion.

[01:23:34] **Jeremy Grantham:** I am worried that baby depletion will become so rapid in certain areas that very quickly those countries will cease to be functional.

[01:23:46] And as I said, I think South Korea has probably gone one step too far because there's one issue we haven't really talked about, and that is what a scientist would call inertia, that when you get a cultural system, it can be very hard to change. When my wife and I and everyone we knew were deciding to have children, We didn't decide to have children.

[01:24:07] We just did it because that's what families did. You had a couple and then you sat down and decided whether you would have a third or a fourth. That's how it worked.

[01:24:16] **Nate Hagens:** Did you say earlier that the average woman, not the average, or no, you said the average mother Had four children, like 50 or 60 years ago.

[01:24:25] **Jeremy Grantham:** No, I actually misspoke and corrected myself. The average woman had four children. For every woman who didn't have any, there was someone who had five.

[01:24:33] **Nate Hagens:** Right. Wow. And that number now is.

[01:24:39] **Jeremy Grantham:** the global number today. I think it's technically 2. 3 and it peaked almost twice as high at four and a bit and dropping rapidly.

[01:24:53] **Nate Hagens:** I mean, I read your paper and I talked to you about this in the past, but this conversation has really changed my thinking on some of these issues. you're doing a lot, Jeremy, on all your different initiatives, climate, especially, endocrine disrupting, toxicity, all, the things. You're a oasis in the wilderness with, elite people that were captains of industry and finance or your background, and your means, which I know you're, contributing a lot to these, efforts.

[01:25:30] Give us your umbrella pitch. To other humans in positions of privilege, about the stakes of our times and their potential role in it.

[01:25:39] **Jeremy Grantham:** Yeah, because we've been around for a long time, and we've made a lot of progress, and it's only now that we are actually faced with, not bullshit, serious. Existential risks and unfortunately they've come as a package because of the massive growth of china they went from five percent to fifty percent of iron ore and coal and lots of important things, we begun to hit the boundaries of bountiful resources and i was pretty clear over ten years ago with the we had run out of the.

[01:26:17] Cheaper forever, plentiful supply, and we're going to be stressed. And then we have climate change moving quite fast, where anyone can see that the damage increment from year to year, particularly of flooding. By the way, severe flooding was always going to be the most dependable feature. I'm happy to say we've been writing about that for 20 years.

[01:26:37] It was always going to be the number one, ahead of, droughts, ahead of forest fires. And it has been, it's been, it's shockingly, painfully, Because

[01:26:48] **Nate Hagens:** warmer air holds more water moisture and concentrate. Because it's 5

[01:26:52] **Jeremy Grantham:** percent more water vapor in the air, it guarantees heavier downpours. Yeah. So it doesn't guarantee there'll be more hurricanes, but it guarantees that they will have more water.

[01:27:01] And if they stall like they did in North Korea, Carolina, then it's hell on wheels, in a way, and once in Houston, where it will drop, you know, 10 inches for three days in a row, and, it will flood anywhere, whatever the configuration.

[01:27:16] **Nate Hagens:** What I'm doing with this work is, the first thing is to educate and communicate our meta crisis, in a scientifically tethered, apolitical, even non prescriptive way, so people understand how these things fit together.

[01:27:31] And now we're, including endocrine disrupting. pollution in that story. The second category is all the interventions of bend, not break for society. And one of those, I'm calling it for now, the 1500, which is to change the consciousness or values or have an awakening of some of the 1500 most influential people in the world, even 5 percent of them to devote not only their financial capital, but their

networks, their skills, their creativity, their inventiveness towards solving these issues.

[01:28:07] So I was just asking you to

[01:28:10] **Jeremy Grantham:** Well, that was a good kick.

[01:28:13] because That is such an important issue, and at the Grantham Foundation, it's our job number one, you know, can we help fat cats understand that, their experience with technology, their resources, their network, as you say, that they could make a difference.

[01:28:34] The average guy has a very hard time making a difference, but They have an easy time if they choose, and they should choose because this threatens immediately, it threatens their children, it threatens their grandchildren, and it's already destabilizing the world. You may not realize this, but the growth rate of the planet has slowed down, the economic growth rate.

[01:29:00] The growth rate in Europe has slowed down so that it's limping along at 1%. Down from three and the U. S. is bragging here and there and the economist is bragging on our behalf that we look sensational, we only look sensational by comparison with poor old Europe and elsewhere, we are way down from where we used to be and a big component of that are these problems, mainly a decrease in the supply of workers, increase in medical costs, and so on, and, It will continue to get worse and toxicity moving faster and more threateningly.

[01:29:42] They really need to get behind them because a dozen really influential rich people could change the outcome, could save years, just as the oil companies did. By their brilliant propaganda have cost us 10 or 20 years on climate change. We need some rich, brilliant people to save us 10 or 20 years on toxicity.

[01:30:06] And toxicity is easy in comparison because it's local. So all we have to do is get behind one or two countries and really make a brilliant example. And maybe China. We'll do that if we're really lucky, and we'll move at China's speed and make it clear to everybody how important it is and how successful it can be.

[01:30:27] You know, it may be on climate change that we will get paid for our good work. It is certain that we will get paid for our good work on toxicity. That is trivial.

[01:30:38] **Nate Hagens:** What

[01:30:38] **Jeremy Grantham:** do

[01:30:38] **Nate Hagens:** you mean by get paid?

[01:30:40] **Jeremy Grantham:** You'll get healthier, you'll live longer, everything will improve, and it will be quick. You don't have to wait 20 years.

[01:30:49] Yes, you are suffering from your last 20 years worth of imbibing toxins, but you will start to get healthier immediately. Clean up the air, take out the particulate matter, clean up the food, clean up your environment in the home. Get rid of your, gas stoves and so on, and you will instantly improve your health.

[01:31:09] **Nate Hagens:** Is the toxicity issue, similar to the ExxonMobil, public oil companies in that there will be, public benefit? to cleaning up, but there will be a corporate interest antagonistically opposing these things like DuPont or, some other corporations whose business it is to create these chemical compounds.

[01:31:35] Is that going to be another big hurdle with lobbyists and, all that?

[01:31:39] **Jeremy Grantham:** Yeah. Yeah. I mean, that's how it works. That's how the. Capitalist system works. Milton Friedman explained to everybody that we had no responsibility towards the social well being, no responsibility, therefore, to our grandchildren, only responsibility to our shareholders to maximize, short and intermediate term profits.

[01:32:01] In other words, We had a responsibility to become sociopaths as corporations because that's what a sociopath does, they have no interest in anybody but themselves, that's a sociopath, so these corporations are sociopathic and everyone has bought into Milton Friedman and if you did altruistic expenditures, you're quite likely to get sued by your stockholders.

[01:32:24] Has a corporation ever had a very profitable product that they volunteered was dangerous to the long term and took off the market? I don't think so.

[01:32:31] **Nate Hagens:** The only answer is different institutions or better prices, where the prices of the pollution and the social costs that right now we're putting on the commons and the future generations is included in, the prices that consumers pay and corporations, include.

[01:32:48] Yes?

[01:32:49] **Jeremy Grantham:** Well, there's one great advantage about climate change, and that is the technology has been so brilliant that often the replacement, far from being expensive, is simply better. I think in toxicity, you simply have to ban them. They're not going to do it voluntarily, but Europe has shown Yes, you can ban nicotinoids, we don't, but most countries in the world do, and my attitude is, okay dudes, you don't want to ban them, pay the price.

[01:33:20] If they ban them in Europe and Denmark and China, they will live longer, and you will not, that's your choice. In the end, it doesn't make that much significance. It makes a lot of significance to the locals, and therefore the locals should get their act together and make sure That they are not the worst country on the planet because we are set to be the worst country on the planet at the moment, perhaps fighting it out with North Korea on these kind of issues.

[01:33:44] **Nate Hagens:** That was my next question. it just seems to me that on a maturity wisdom in service of the greater good, ranking that we're a couple years junior to our senior high school colleagues in Europe. Why is it that on these things, on these important issues, the United States is so near the bottom of the class?

[01:34:09] **Jeremy Grantham:** I think we have a particular pernicious form of capitalism, which gives immediate feedback. Very efficient. it's a very efficient form of capitalism. But it absolutely does not allow for recognition of the commons, recognition of long term well being. It's the price you pay for being efficient. You make more money, you make it faster, and you pay a longer term price.

[01:34:37] And you know that I hero worship, Professor Hicks. And, one of the reasons, he was the most important British economist after Keynes. and. The reason I admire him so much is basically because of this simple definition of a profit. A profit is what you have left over at the end of the year, having protected, Everything that you started with and, anything you produced, et cetera, et cetera, minus the cost to what you started with, which means if you use resources, you have to reckon what's the cost of replacing copper.

[01:35:20] Basically, you can't. What's the cost of replacing oil? Basically, you can't. What? What is the cost of detoxifying? The environment that you just toxified with your PFAS. It is many multiples of the profits that you claimed. We if we wanted to go back and make our environment and our lives as clean and with the same equivalent resources as we had, we have not made any money for at least the last few decades we are running at a fairly substantial loss and what is happening is we society will bear the loss and they the corporations are making the short term profits.

[01:36:07] **Nate Hagens:** Well, and other species and generations will bear the cost. Absolutely.

[01:36:10] **Jeremy Grantham:** This is not a conversation where we spent much time on the environment, but, you may know that as far as we can tell, most species, animals, insects are down 50 to 70 percent in sheer biomass, the weight of all the elephants, the weight of all the flying insects, they are not only down.

[01:36:33] But just like our sperm count, if anything, the rate of decline seems to be still accelerating.

[01:36:39] **Nate Hagens:** So let me understand this. let's set aside for the moment that we know that there is a bill to be paid because of our prior actions. But I'm hearing from you in our prior conversation that you are a believer in capitalism for the longer term, but it's a kinder, gentler, more holistic capitalism that has wider boundaries, different values and better prices, that include the negatives in addition to the positives.

[01:37:13] Is that a fair summation?

[01:37:15] **Jeremy Grantham:** I'm not sure. FDR used to talk about the need for a policeman at the corner of Broad and Wall, that, you needed rules and regulations for the stock market, you needed rules and regulations for capitalism. Capitalism, I've always liked to say, does a million things better than a, central government can do.

[01:37:38] It's so infinitely complicated. Although, With AI and billions, trillions of times improvements in, in quant skills, you just might be able to regulate in the future, but in any case, in the past, only capitalism could deal with the complexity of pricing, the cost of materials, etc. Even though they totally ignored second and third order effects, they totally ignored, the, finite nature of the resources they were using up.

[01:38:14] But, I do think the key is the policeman on the corner of Wall and Broad. You need regulations. Capitalism is not designed to look after the commons. There is no mechanism at all. It's not that they're trying and failing. It's not on their agenda. They're not even raising the issue. If you want to look after our long term well being, it has to be a central government.

[01:38:42] They can leave everything else alone with my blessing. If only they look after water, soil, and air. air, and 2. 1 babies. And the 2. 1 babies, I would not have said 10 years ago. Now I realize that is a part of the commons. You can decide not to have children, but if there are no workers, society will collapse around you.

[01:39:08] **Nate Hagens:** So in addition to water, soil, healthy ecosystems, you believe that 2. 1 children is part of the commons?

[01:39:17] **Jeremy Grantham:** If you do not. If you fall below 2. 1, you just phase fairly rapidly out of business. That is simple math. Every generation gets smaller until it disappears. There is absolutely no substitute for 2.

[01:39:30] **Nate Hagens:** 1. So, either way, it would be like a thermostat.

[01:39:32] If we're at 1. 1 or 3. 1, you, think there's got to be some policy 2.

[01:39:40] **Jeremy Grantham:** 1. At 3. 1, you end up like my ancient Egyptian example with Right. Thank you. Millions of miles of bodies on top of each other

and, at 1. 1, you go out of business in a stunningly few number of generations, partly because we have no experience at managing downwards.

[01:40:01] How do you manage a strip of 20 stores and 5 are shuttered? I mean, for the other 15, it's hell on wheels. It's like managing Detroit. How do you close down parts of the railroad system? Parts of the grid? Parts of this? Parts of that? Whole towns in Japan? This is a problem we have no experience at, getting to in Japan maybe, and we know is many times more difficult.

[01:40:30] Managing for growth is a piece of cake, isn't it? You can let capitalism just get on with it. But, managing backwards. is a threat, to everything, including, as I say, critically, our willingness to address climate change, which is expensive.

[01:40:47] **Nate Hagens:** So we need to continue to grow and burn some carbon in order to have the brainpower and stability to address the carbon crisis?

[01:40:56] **Jeremy Grantham:** No, I don't know. I think if we pushed ahead rapidly, we will very quickly have, renewable energy. That is the least of our problems. It is going to be much harder to, to detoxify capitalism so that it becomes a kindler, as you say, a gentler variant. and I think you can only really do that by, government fiat.

[01:41:22] And you can only get government fiat by a fairly massive level of support from the general public. And it has to be fairly massive because The super powerful companies and financial elite can so punch beyond their numbers, and they have disproportionate influence, so you have to outnumber them, outvote them, and outvote them.

[01:41:45] And make sure we start to have governments that are prepared to reasonably look after the long term future, and they do a much better job, let's face it, in Scandinavia, in Holland, in, in most of Europe.

[01:41:58] **Nate Hagens:** Well, I'm, certainly hopeful that Shauna's work, and your work, will raise awareness to the general population of the importance, of a bipartisan nonpartisan response to the danger from endocrine disrupting and other chemical pollution.

[01:42:17] I asked you on your first episode here about a year ago, the magic wand question and other typical questions in our first interview. Is there anything major that's changed in your thinking or your advice, to listeners in, the past year?

[01:42:32] **Jeremy Grantham:** It has been a fairly unpleasant year, I have to admit, because the perception of the speed of the damage in climate change was so impressive.

[01:42:45] And, the recognition of the tipping points in climate change and how they could get beyond our control at any minute, like the, the AMOC or the, whatever they call that, what we used to call the meridional

[01:43:07] **Nate Hagens:** overturning circulation. Yeah.

[01:43:10] **Jeremy Grantham:** it could happen anytime with disastrous consequences from which we cannot go back.

[01:43:16] At the same time, we've been struggling with toxicity, realizing. On everything we turned over, that it was a bigger problem, moving faster, and possibly even more neglected than we thought, approaching zero interest. You know, I asked a question in my paper that you had that, and what is the corporate response to this giant, rapidly moving problem?

[01:43:43] I think the answer is no. They have no response. It's not on their agenda. They're not talking about it at board meetings. It's a complete non issue. In my opinion. I might be amazed to find that is wrong. I would certainly hope it's wrong, but I'm pretty damn confident that it's not.

[01:43:56] **Nate Hagens:** Is your, nerd like qualities act as a anesthesia to the magnitude of all this stuff?

[01:44:04] Because this is pretty frickin heavy, what you're discussing. it often does. Does it? Okay.

[01:44:11] **Jeremy Grantham:** Yeah. And, getting out in the most amazing autumn, Fall of all time, isn't it? We've just had amazing and 60 days of perfect weather in

Massachusetts. Let it be said that climate change is not entirely without its local benefits on occasion, and we just had it.

[01:44:37] And walking in the woods, I must say, or clipping briars or clearing your brain, I mean, I'm playing a good game of tennis. You can feel pretty darn cheerful, and I do, and I have a great family and these good things, but do I worry more for the well being of society and America than I did a year ago.

[01:45:00] Yes, I do.

[01:45:01] **Nate Hagens:** I do too. I know you are so busy and so committed to helping on all these things. So, our viewers probably just see this little glimpse of you, but for a long time, you've been a champion for these, overlooked risks, especially with earth's environment. So thank you for that, Jeremy.

[01:45:21] And do you have any closing words, for our viewers today?

[01:45:24] **Jeremy Grantham:** I would just reiterate what you brought up, and that is, if by some miracle, one or two super rich, smart, reasonable people wander into this zone of yours and see this and other podcasts of yours, that they realize that they can make a difference, that it doesn't necessarily need that big a push to move some of these agenda items.

[01:45:56] Well, some of these technologies and for God's sake, jump on board because if you don't soon, it might be too late.

[01:46:03] **Nate Hagens:** Thank you, sir. We, we shall speak again and, I'm hoping that the paper that your staff sent me will be available in the next six weeks or so to put online and share with others, because then we'll, book in that with this, podcast and people can read it and share it.

[01:46:19] **Jeremy Grantham:** We'll try and do it in the next couple of weeks, actually.

[01:46:22] **Nate Hagens:** Thank you so much, Jeremy.

[01:46:24] **Jeremy Grantham:** No, it's a pleasure. You're welcome. Bye bye.

[01:46:26] **Nate Hagens:** If you enjoyed or learned from this episode of The Great Simplification, please follow us on your favorite podcast platform. You can also visit thegreatsimplification. com for references and show notes from today's conversation.

[01:46:41] And to connect with fellow listeners of this podcast, check out our Discord channel. This show is hosted by me, Nate Hagens, edited by No Troublemakers Media, and produced by Misty Stinnett, Leslie Batlutz, Brady Hyan, and Lizzie Sirianni.