PLEASE NOTE: This transcript has been auto-generated and has not been fully proofed by ISEOF. If you have any questions please reach out to us at info@thegreatsimplification.com.

[00:00:00] **Oliver Milman:** One in four bumblebee species in North America are now vulnerable to extinction. The Monarch bus migration to California is about 1% of what it was in the 1980s. You speak to entomologists and they're ref, they kind of go on these scientific field trips and they come back with nothing. They see nothing and it's kind of devastating to them.

[00:00:18] So you are losing a lot of beauty as well as utility in the world, I would say.

[00:00:27] **Nate Hagens:** Joining me today is journalist Oliver Millman to give an update on the state of global insect populations and what their declining numbers mean for humanity and the stability of the biosphere. Oliver is an environmental correspondent at The Guardian, and recently wrote his first book, the Insect Crisis, which tells the story of the silent collapse of worldwide insect populations and how this is threatening everything from the birds in our skies to the food on our plates.

[00:00:57] In this episode, he outlines the dire consequences for all of life over the coming decades, including humans. If insect biomass continues to. Decline at its current rate of one to 2% per year action at the macro level is the only way we'll truly be able to change this trend. But he and I discussed some of the ways that individuals and communities can support insect populations in local ecosystems as well.

[00:01:25] Longtime listeners will know that this topic is extremely important to me and not widely discussed in environmental media yet, even as someone who has long cared for the natural world. The more I learn about the role of

biodiversity and biocomplexity and stabilizing earth's natural functions, the more I see how drastically we overlook critical conversations like these about insects.

[00:01:51] With that, please welcome Oliver Millman. Oliver Millman. Welcome to the show. Good to be with you, Nate. I have invited you, because you are an environmental journalist, and one of the few science journalists who has encapsulated the situation with the global insect, crisis into a book, which was called The Insect Crisis.

[00:02:16] And for most people looking at what's going on in the world, insects probably aren't their biggest priority, despite their role in pollination, food webs, nutrients, cycling, whatever, but they are disappearing rapidly. And your book is an excellent, one-stop resource cataloging this decline and the rippling effects it has for the broader biosphere in human systems.

[00:02:41] So let's start with the basics. Oliver, what is the state of insect populations right now, and has anything shifted to your knowledge since your book came out in 2022?

[00:02:54] **Oliver Milman:** Yeah, so I mean, the picture is still not complete. I mean, there are about 2 billion insects for every human in the world. So if you think about those kind of numbers, that's kind of astonishing when you think about.

[00:03:06] Any kind of census of insects. It's not like counting people. it's a very different kind of challenge. So, the numbers we're talking about are enormous. Obviously we're talking about very small creatures that are found, most, densely in least populated parts of the world, the tropics and so on.

[00:03:25] So, getting exact numbers is never probably really gonna happen. But the snap we, even with that caveat, the snapshots we have are extremely

alarming. So over the last few years, there've been a number of studies coming out of, Europe, the us, Australia, some other places to, Costa Rica, that have shown, enormous drops in insect numbers, over rates of, you know, three quarters to 90% over the last few decades.

[00:03:57] the US for example, has lost the fifth of its butterflies, since the year 2000, which is. Incredible. and overall, when you're looking at this in a kind of globalized context, there's been estimates of kind of one to 2% a year of insects are going by biomass. And biomass is a term used when, to kind of measure the entirety of insect life.

[00:04:21] If you scrunch it up into a big ball and weighed it, that would be, its kind of biomass. We're losing about one to 2% of that a year, maybe a little bit more. so it's quite a kind of frightening, sort of decline. obviously that's kind of unsustainable in the long term without huge. Without huge ramifications.

[00:04:39] So 2

[00:04:39] **Nate Hagens:** billion insects for every human. that obviously, even as tiny as they are, that means they massively outweigh humans. If you had 2 billion insects compared to me or you, that would be a lot bigger than us. Yes.

[00:04:54] **Oliver Milman:** Yeah, that's right. About, I think about three quarters of all known animal species in the world are insects.

[00:05:00] So, their numbers are kind of truly astronomical. I mean, the, one of my favorite facts is that, we think about flies just, we don't really think about diversity of flies, for example. we just think they're annoying and they fly around. There's a species of assassin fly, which is a kind of a type of fly that spears, its frocus into the brains of its, victims and sucks out their brains.

[00:05:25] There's about 7,000 species just of that type of fly, very small subset of flies. That's more than the entire number of species of mammals in the world. So that's me and you. You know? Yeah. It's, yeah. Cows, dogs, bears, like all the mammals in the world, are a, are less in number than that one particular small section of the fly world.

[00:05:48] So when you think about it in those terms, that the numbers are kind of, kind of mind boggling. and because they are so large, I think that has held obscure, the crisis in the numbers because we always think that insects are around, to an annoying degree to us sometimes. we don't tend to think about them as being rare.

[00:06:06] We don't think about them as being in the say category as a. Orangutans or tigers or polar bears, it's just not, it is they kind of inhabit a completely different world in our minds. I have a bunch of follow-ups to

[00:06:20] **Nate Hagens:** what you just said, but one thing that just came to mind is, perceived scarcity correlates with what we value and appreciate.

[00:06:29] So megafauna are fewer, but we see them and we know how scarce they are, but yet we're losing insects which are incredibly important for the ecosystem functioning of the earth at one to 2% per year in biomass. So they're critically important. I mean, if we get down to the last 10% of them, the marginal impact of decline is extreme.

[00:06:54] **Oliver Milman:** Yeah, that's right. and I think one of our, you know, great qualities as humans is our empathy and our ability to connect to other things that we feel are like us and important to us. I mean, they might. It doesn't feel like there's much empathy and compassion going on in the world right now, but I think it is a very kinda human trait that we can tap into.

[00:07:16] and because of that, we do relate to other, certain, other species more than we do to others. So insects. one entomologist kind of said to me, they're kind of like in. Aliens on Earth. I mean, they look kind of otherworldly. They have these incredible abilities that are kind of unlike anything that we can do.

[00:07:34] I mean, they're so mysterious to us in many ways, and so therefore they seem slightly distant to us. Whereas, you know, a cuddly, kind of mammal with big, dough eyes is a kind of ideal to kind of trigger our kind of sympathy and empathy.

[00:07:50] **Nate Hagens:** What you're describing is neoteny, which is big eyes and floppy ears, and it's an evolutionary carryover of caring for our young.

[00:07:59] And if we see a baby fawn or a puppy or something, our heart goes out and we see a baby assassin fly. We don't get the same reaction. So, you know, what does this say about our evolution, our evolutionary relationship with insects? I mean, I don't think we ever loved insects 10,000, a hundred thousand years ago.

[00:08:19] They were everywhere. And maybe there was a respect, but there was also a fear because they could bite us or carry disease or whatever.

[00:08:27] **Oliver Milman:** Yeah, that's right. I mean, our relationship with them has obviously been a troubled one. If you think about the largest, one of the largest killers in the world, it's kind of malaria carried by mosquitoes.

[00:08:37] I mean, you, I've met through the process of writing this book, maybe the only people in the world who will defend mosquitoes and love mosquitoes, and they kind of point out, you know, mosquitoes are just trying to do their thing, feed their young with blood. the, these diseases that have hijacked them for their own purposes.

[00:08:56] but yeah, I mean it, we've had this kind of troubled. Relationship with insects. And I think that's, I think that's divorced us from their importance and given us a very distorted view of what is important and the animals that are important to us. from a purely selfish view, and this is very kinda human-centric view, 'cause obviously everything has an intrinsic value to it that isn't just, of our use.

[00:09:20] But you know, if the last southern white rhino were to die and there's only a couple left, that would be. A horrendous tragedy, it would be a crime because we would've committed that crime. But in terms of our day-to-day lives, it would have zero impact. If we were to lose just a small section of certain pollinators, we would be plunged into, you know, an existential crisis of starvation.

[00:09:46] So, There's a complete, there's a complete mismatch, I suppose, between what we value and what is actually valuable to us. So

[00:09:55] **Nate Hagens:** I want to get into the existential, impact, on insect decline. But let me ask one more meta question. When you mentioned the 7,000 species of assassin flies, when you were researching your book, and you came up with examples like that, did you have a newfound appreciation for the web of life and evolution and the majesty that brought us to this moment?

[00:10:19] **Oliver Milman:** Yeah, certainly. I mean, I've been an environmental journalist for quite some time now, and, in that role you are always kind of drawn to the kind of charismatic, flashy things you wanna be kind of paddling down the Amazon or going to the Arctic or, you know, diving at the grief, great Barrier Reef in Australia, looking at these kind of wonders of nature and looking at the big, kind of charismatic megafauna that, inhabit these kind of environments.

[00:10:44] But yeah, the more I spoke to scientists, the more I read on this, I mean, they truly are, as E.O Wilson said, the biologists, the little things that run

the world, they are the things that the keep life ticking over on earth, that we would be completely lost without. you know, we tend to think, as the quote goes, that we are the pilots of this, the world.

[00:11:06] We're not, we are the, we're the people at the back of the plane drinking a martini. It's the, it's the insects. They're the ones piloting this, this plane. and we should really remember that. And I think it was a kind of solidary lesson in, in writing this book. About their importance. I

[00:11:21] **Nate Hagens:** don't think we ever learned that to begin with, which is why I want you, to unpack what you found in your book.

[00:11:29] I, I don't think that's a thing that we've forgotten. I just think that there was always a kind of an ecologically empty planet of humans and, the technosphere and now it's full and it's having deleterious impacts on ecosystems and other species. And we are learning how important insects are to the whole thing.

[00:11:50] So, so let's dive into that. I think it's safe to say that most people don't exactly love insects, and most of us probably assume that even with the declines that you mentioned, one to 2% a year, there's still way more than enough insects, around. So should the average person care about the insect declines that you researched?

[00:12:12] And if so, why?

[00:12:14] **Oliver Milman:** Yeah, I mean, we should care for a number of reasons. We should care for ourselves and for everything around us really. I mean, animal popula, pollination of which insects are a major components of, I mean, that's responsible about a third of all the food we eat. you know, all the, pretty much all the fresh, vegetables, fruit, and so on.

[00:12:38] all of the things that you need in terms of nutrition. It comes from insects. I mean, even the stuff that, we like to eat as treats kind of comes from insects. I mean, I was, I learned through the book that, there's this ti this tiny species of Midge that, that fly into the cacao plant, that pollinate cacao and give us chocolate essentially.

[00:13:00] the tiny Midge died, dies out. We have no more chocolates if, the alfalfa given to cows that then produce dairy or give us ice cream. if they die out. we don't get that either. We don't get the spices that go into curries. We don't get, you know, apples, watermelons, all kinds of other things that we like to eat.

[00:13:22] so, there, there's a huge array of food, that is, at risk. If we lose insects. but that's not the only thing. It's the one that, you know, keeps scientists up at night because it's the most obvious, impact. But insects have just this incredible ecological role in terms of turning nutrients through soils, keeping our grasslands and forests, healthy.

[00:13:49] obviously pollinating plants and flowers that give us such vibrancy around, around us, ensuring those ecosystems keep going. Decomposing a lot of the really unglamorous work, decomposing waste. one entomologist said to me if, If it wasn't for insects, we'd be covered in a world full of, excrement with your dead Uncle Jeremy, floating on past because there'd be the, or lots of dead bodies.

[00:14:15] There'd be lots of, lots of human waste. and we'd have to be dealing with that rather insects. So, I mean, it's the stuff we love to see and enjoy and, eat. But it's also the really disgusting stuff we don't wanna think about. It's kind of both ends of the spectrum,

[00:14:34] **Nate Hagens:** but it's also their food for other species in the ecosystem.

[00:14:39] Yes.

[00:14:39] **Oliver Milman:** Yeah, that's right. So a lot of people say, what's the point of mosquitoes? let's get rid of them. I mean, mosquitoes. a really great food source for, lots of amphibians and birds. obviously lots of species of birds. A really good proportion of them are insect eating birds, and we are already seeing big declines in insect eating, bird numbers.

[00:15:03] Yeah. Being documented in Europe. France and Germany in particular, huge numbers of breeding peads of are have been lost millions in Canada in the last few years in Canada, even in the heart of the Amazon rainforest, when there's seemingly no other human intrusion into what's happening there.

[00:15:21] You seeing a declines in insect eating birds, and that's a really good fingerprint of evidence that, there just aren't enough insects around for them to eat

[00:15:29] **Nate Hagens:** well, if we're losing them at one to 2% in biomass per year, then obviously that has implications for the things that eat them. So let me just briefly ask you about that.

[00:15:42] we're losing insect biomass one to 2% at least per year. So that doesn't mean that. Insects are dying, because insects die all the time. They have very short lifespans. So that means that the total amount alive at any one time is declining one to 2%, versus last year. And then next year will be one, 2% less, et cetera.

[00:16:07] Which if you graph that 30 years from now, there's like nothing left. Or 40 years.

[00:16:13] **Oliver Milman:** That's right. And o obviously, that's a kind of broad estimate. So in some places that they'll be doing a bit better, some places they'll be doing worse. insects obviously got huge, ability to reproduce. So if you actually look at a graph of insect populations over just year to year, a kind of zigs up and down because they can reproduce in huge numbers and then they crash and they kind of come back.

[00:16:35] So. Getting a kind of signal from the noise in terms of what's happening, longer term with trends has been tricky. and also been hampered by the fact that scientists, because we just assumed insects will be around forever and in such huge numbers, never really counter them. I mean, if you are an entomologist, you, primary role up until fairly recently was going out and discovering cool new species and, documenting their behavior and working out how they interact with the environment around them and the ecological services they bring you weren't really thinking to can account them.

[00:17:10] And it's only in recent years that, scientists have been setting out traps to, to kind of catch these insect, to count them to see what the population numbers are. And, when they've been doing that, they've been finding these, incredible declines.

[00:17:25] **Nate Hagens:** So I had, Thomas Crower on the podcast, a couple months ago, and he talked about the critical importance of the web of life and diversity in nature.

[00:17:36] So I wonder if it's just the biomass, like the sheer, absolute number of insects versus the number of species and diversity of species and interrelationship between the species. That's also, important and maybe not discussed. did you look into that at all?

[00:17:58] **Oliver Milman:** Yeah, a bit. I mean, I think there's certainly a kind of an aspect of certain species being hit hardest by this, and being replaced by things that we consider to be, you know, inferior or less.

[00:18:12] Useful to us from a kind of selfish human perspective, because not all insects will do poorly in a world of with, you know, climate change and pesticide use and habitat loss and all the other kind of pressures that are on insects now. So, you know, s certain mosquitoes, the range of mosquitoes that carry malaria is kind of inching, away from the equator by about three miles a year.

[00:18:39] and they're rising in elevation too. cockroaches that are adapted. There's two species of main species of cockroaches that are adapted to human life. The American and German, species of cockroach. They'll do pretty well in this world. it's the bees and the butterflies and things that we really value.

[00:18:58] They're the ones that, that are suffering, you know, one in four. Be bumblebee species in, north America are, now vulnerable to extinction. I mean, we, the Monarch bus slave, migration to California is about 1% of what it was in the 1980s. I mean, we can see even our own lifetimes in our own short span of view that we have on this world that we're seeing fewer and fewer of these things.

[00:19:25] you speak to entomologists and they're kind of bereft. They kind of go on these scientific field trips and they come back with nothing. They see nothing and it's, it's kind of devastating to them. So were you losing a lot of beauty as well as utility in the world? I would say, I

[00:19:40] **Nate Hagens:** should point out, that during our soundcheck we were cracking jokes.

[00:19:46] you and I just. I know this story, I've been following it 'cause I was a big fan of E.O Wilson. You obviously have become quite fluent in this, so we've kind

of already grieved for the gut punch, that some of our viewers might be experiencing, hearing this. but I do think very few people really are aware of this situation given climate and all the other things that, that people discuss.

[00:20:16] So did, I mean, you're an environmental journalist. Did your own opinion, or relationship with insects change, during and after you wrote the book?

[00:20:25] **Oliver Milman:** Yeah, I think so. I think I gained a new appreciation for how important they are. also just. Kind of how wildly diverse they are. The incredible things they can do.

[00:20:37] I mean, they are amazing creatures in their own right. I mean, we kind of tend to view them as pests or, we've, harnessed them in, some limited respects when you think about honeybees and how we are now increasingly rely upon them for pollination. Honey bees are now trucked across the US for, various crops.

[00:20:58] So we've harnessed some of them. and see the rest of 'em as kind of useless. But in fact they are amazing. I mean, they really are. Their, the abilities that they have and their tenacity as well are the fact they've been around for kind of 400 million years. They were around before dinosaurs.

[00:21:17] They've survived kind of five mass extinctions, somehow navigating that, to be still, essentially we are living on an insects world. I mean, we're not, we've been around in a blink of an eye compared to these guys. And, you know, we should have a certain degree of, humility about that because, you know, even in this crisis, if you were a betting man, I think, you would probably think that.

[00:21:44] We would maybe die out before they do 'cause they will survive in some form or another, just not, maybe the form that is, is conducive for human survival. Since the book

[00:21:55] **Nate Hagens:** came out, the insect crisis, three years ago, what kind of reactions have you seen and have you seen people's attitude shift at all, in the last few years?

[00:22:06] **Oliver Milman:** Yeah, I think so. I think it's been slow going. It's been a bit of a slog. I mean, I think it's, the timing hasn't really helped. if you think about the last five years, I was writing this in the midst of the COVID pandemic, so obviously mines were elsewhere then. it's not like matters have really improved since then in terms Well, mines are gonna

[00:22:25] **Nate Hagens:** be elsewhere for the foreseeable future, unfortunately.

[00:22:28] Yes,

[00:22:28] **Oliver Milman:** they are. Yeah. there's always, we seem to be lurching from one other huge crisis to another. we don't think, and

[00:22:36] **Nate Hagens:** meanwhile we lose insects one to 2% a year.

[00:22:40] **Oliver Milman:** yeah. It's this kind of ticking time bomb underneath us. And then, and if you think about the kind of the lack of action on climate change, for example, which is much more documented, far more mainstream in our lives, far more understood.

[00:22:55] You can see that, even with that, we've kind of lagged in our response to it. so it's good to kind of corralling. Action for insects seems like a bit of a stretch. but despite that, you are seeing kind of more awareness of that. You're seeing the kind of good grassroots action around people who wanna take action locally in their own backyards, with others in their community to, to help insects.

[00:23:24] If you love marlet butterflies, you, you can plant milkweed, you can plant native plants and so on in your yard for all kinds of insects. And we're seeing

more and more of that people coming a bit more aware of their surroundings and how they. How they directly affect, insects and on, on a, on a more governmental level, I think there's still a kind of lack of policy, but you are seeing, you're seeing action from, entities such as European Union, countries such as Germany, a bit less so in the us but certainly there's kind of action on thinking about what kind of chemicals we're using, how we using our farmland, how we using our habitats, that kind of thing.

[00:24:06] And insects might not be the kind of number one reason for doing that, but certainly there's, I think, an awareness and a reckoning that, we need to be treating. The world a little bit better, a little bit more sustainably if we are gonna, if we're gonna be able to, you know, host even more people, even more humans in the world going forward.

[00:24:26] Because at the moment we're kind of reaching at a kind of crunch point where we're losing pollinators and the soils that produce our food or where we have, or while we have more people. So something has to give at some point, and I think there is an understanding of that.

[00:24:41] **Nate Hagens:** Give me a rough, overview of the categories of the primary driver, that we either know for sure or we're reasonably confident for the loss of insects and has, have these categories changed in the recent decade?

[00:24:57] **Oliver Milman:** Yeah, sure. So, I mean, there are a number. you could probably have three main buckets. One of them would be habitat loss. So we've deforested a large portion of the earth. We've got rid a lot of the kind of grasslands and kind of wildly meadows that look to us to be unproductive, but obviously a huge trove of insect life.

[00:25:20] we've, the second major thing we've done is spray a large. Portion of our land with, chemicals, pesticides. So, people tend to think about, you know,

urbanization as being the big impact on the environment. You know, you go out into space and you see that cities and highways are actually quite a small fraction of the world.

[00:25:42] It's farmland. I mean, we've farmed, you know, over half of the world's, surface area that is free of ice. I mean, we've kind of turned it into pasture for cows and and crop plant. And much of that is completely, strafed by chemicals that kill off, insects. And the third thing is, of course, is climate change.

[00:26:05] Ratchet up the temperatures. we've knocked the seasons off kilter. So insects obviously, rely on this kind of clockwork of arrivals of springtime, signals for, to go out and breed to, to eat, to pollinate or, and we've completely messed up that timetable. so you're seeing impacts from all of these things as well as other impacts such as light pollution.

[00:26:32] If you're a firefly, for example, you need dark skies and they're just fewer and fewer dark skies now for you to flash and find a mate. So. There are all kinds of things, but I'd say those are the main three.

[00:26:44] **Nate Hagens:** But it's not just light pollution is disrupting you, finding a mate. It also disrupts your flight patterns and you run into things and end up sleeping where you shouldn't and things like that.

[00:26:56] **Oliver Milman:** Yeah. Yeah. It's, I mean, it's completely, it completely goes against the hardwired, expectations that you would have as a insect over 400 million years, that there is day and there is night, and, you know, that not just affects, fireflies, it affects moths. Famously, the LED lights that we have, are kind of even worse for them because it, they have, they exist in a different color spectrum that, insects don't deal well with.

[00:27:23] So yeah, it's having all kinds of impacts. Did

[00:27:27] **Nate Hagens:** you discover that any, insects, what would it be? Families or, You know, broad categories of insects are particularly sensitive to climate.

[00:27:37] **Oliver Milman:** Yeah. So bumblebees for example, I mean, they're wear wearing a big winter coat, aren't they? all year round. some are obviously adapted, are found in kind of hotter climates and others.

[00:27:47] Wait,

[00:27:48] **Nate Hagens:** what do the bumblebees do? Where I live in northern Minnesota In the winter.

[00:27:53] **Oliver Milman:** Yeah. They kind of hunker down. they kind of go into a kind of, kind of dormant state. Okay. so they, yeah, they, obviously, there are different bubble bees in different parts of the world, but they're adapted to those parts of the world, so you start moving the temperature up even a few degrees and they're in trouble.

[00:28:12] and it can happen to habitat too. So I went as part of the book, I went to Central Mexico to see where the mono butterflies migrate to over winter. And the, they, they roost in this, it's called roosting, like they're chickens, but they roost in these particular types of fur trees. They're found in the kind of mountain of central Mexico area, and they come down from, you know, the US Canada to do that.

[00:28:36] And, but because of climate change, the habitable range of these fir trees is moving up and up the mountain to the point that they're being pushed off the top of the mountains. They can't exist there anymore. So no more fur trees means no more monarch butterfly migration. No more butter. Monarch butterfly Migration means much, very huge declines in number of monarch butterflies we have.

[00:28:59] so you ha, you, you see this kind of knock on effect, of habitat as well as, the ability to forage for food. the sheer temperature itself. There's all kinds of, there's all kinds of impacts that climate change has, has on insects. And researchers recently have been saying, this is now the number one thing.

[00:29:19] It used to be habitat loss. it's now climate change. Climate change is the big beast in this world now.

[00:29:25] **Nate Hagens:** So let me ask you this, Oliver, clearly. Climate change is a global phenomenon. And you live in London, I'm in Minnesota, and if we drive a car, these emissions go into the global commons of the atmosphere.

[00:29:42] So climate change is gonna affect the whole world, but in various degrees. but insects, could a certain area of, say the state of Minnesota or Wisconsin or, the United Kingdom, could they do something specifically to support the, the rebuilding of the insect biomass with habitat loss and with, removal of insecticides and pesticides?

[00:30:12] And would that. Significantly offset some of the negative impacts of climate. For instance, I or said differently, can we have local and regional responses to this crisis, even though it is a global crisis?

[00:30:27] **Oliver Milman:** Yeah, I think we can, and I think it's important to emphasize that because there's a sense to avoid, just a sense of hopelessness about this, that the idea that we're nihilistic, kind of wandering into this disaster.

[00:30:40] I think we need to realize that there are things we can do. I think climate change is obviously a big problem to tackle that requires kind of global cooperation, which we need to do for a number of reasons, including this one. but yeah, there's certainly lots of things that, Governments, you know, states, cities, even individuals can do to help insect populations. And yeah, it's, there's certainly

a, lot that is being done around connecting habitats together so that insects aren't left in these kind of maroons, isolated pockets where they can't, breed and proliferate.

[00:31:18] there's certainly action taking place on which pesticides can be used. neonicotinoids are the, some of the most harmful class of pesticides, and they've been largely banned in Europe now, which is good. I mean, the, these are. Incredible, incredibly pervasive insecticides that in the US are kind of used all over the place.

[00:31:40] They seep into soils, into water. They get, they've been found in, you know, cabbage and baby food. They've been found in birds. They, and they get everywhere. and they're very effective at, essentially turning off the brains of, of insects. so there are things that can be done to ameliorate this, but I think one of the worrying aspects of this is that some of the major declines have been found in places that you would call pristine.

[00:32:06] So two of the biggest studies to come out in recent years, one was from Nature Reserves in Germany, where they found about, three quarters of insects by biomass disappeared since the late 1980s. And the other one was in the rainforest of Puerto Rico, which the only rainforests in US territory.

[00:32:26] And, there was a study by a, entomologist from upstate New York who went there in the 1970s, found that there were just insects everywhere. And these traps, these set up, these sticky plates just covered in them, just insects all over the place. He went back a couple of years ago and he could barely find any.

[00:32:45] It was, you know, like they just. Just been kidnapped or something. And this is in a pristine area of rainforest. No human habitation there, there's no farming nearby. So it wasn't habitat loss or pesticides that caused that? no. he could only conclude it was kind of climate change that was the big impact.

[00:33:05] Which is kind of scary 'cause you know, we can only do so much can we, with, habitat protection. we need to get on top of the climate problem. And that's true for a number of reasons. And, insects are just wanna.

[00:33:20] **Nate Hagens:** So I've heard of those two, I've read those two reports, the Puerto Rico and the Germany one.

[00:33:25] In contrast, are there any species of insects whose numbers are growing or thriving, in today's environment? You mentioned cockroaches before or any other evidence or stories.

[00:33:37] **Oliver Milman:** Yeah, cockroaches are doing quite well. Mosquitoes, certain mosquitoes are doing well. certainly their, Hazel area is increasing, ticks.

[00:33:48] I mean, ticks are arachnids, in the Spider family, so they're not insects. They have eight legs rather than, rather than six. But, you know, when people think about things, they're doing well. ticks are up there too.

[00:34:01] **Nate Hagens:** So ticks and mosquitoes are pathogen, carrying insects and they're increasing their numbers, which means that they're gonna increase their impact on humans.

[00:34:10] **Oliver Milman:** That's right. Yeah. I've just been writing a story recently about how there's a spread of a particular tick called the Lone Star Tick in the United States that's moving from the kind of southeast, up north up as far as Maine. And it, carries a number of diseases, one of them being this, this particularly bizarre condition where it makes people who are bitten by it, allergic to meat.

[00:34:35] so yeah, I've heard of that. So, I mean, there's all kinds of weird and wonderful things that are happening out there as we alter the world. I mean, it's

kinda one of these incredible consequences, isn't it? When we started Industrial Revolution and started burning fossil fuels to power our lives and spread electricity and fly around the world, no one was thinking

[00:34:57] **Nate Hagens:** about bumblebees then.

[00:34:58] **Oliver Milman:** No. They was thinking about bumblebees, no one's thinking about anybody to become allergic to meat or their homes going underwater or all of these other things. Well,

[00:35:07] **Nate Hagens:** this is the thing with this podcast and these ideas is there are second and third and n order effects that we don't think about.

[00:35:15] And I suspect that there will be huge second and third order effects from insects when certain insects vanish or ecologically vanish. from a population standpoint, there are big changes that happen as a result of that. how much of your research looked at those sorts of questions?

[00:35:33] **Oliver Milman:** Oh yeah, for sure.

[00:35:34] I mean, we're already seeing this as well. there's been research looking at how crop yields are gonna decline. the world will be facing more than a million extra deaths a year because of the lacking nutrition from. from foods that are not being pollinated 'cause of heart disease and other conditions you'll get from that.

[00:35:52] we're already seeing in the United States, and Canada. Crop yields for things like, apples, cherries and blueberries are already dropping. So we already, we're already seeing declines in the amount of food that, can be generated, because of a decline in pollination. So this isn't now a kind of theoretical thing.

[00:36:16] So, let's talk

[00:36:17] **Nate Hagens:** about, pollination. First of all, for some viewers of this program, even myself, my initial reaction when you said that, and you've mentioned it a couple times, is can't, AI or drones take over pollination like some Black Mirror episode?

[00:36:36] **Oliver Milman:** Yeah. I mean that's, it's tempting, isn't it?

[00:36:38] 'cause we like to think about technology as being a kind of solution for everything, and then we can just flick a switch and make this problem go away. Unfortunately be, I mean, bees have been around for about 130 million years. so they're very good at what they do. They've had a long time to get very good at what they do, and there's lots of them.

[00:36:56] So even though we're there, we're trying to kill off doing our best to kill off the things that are keeping us alive. They, there are still lots of them and they're very good at what they do, and so therefore replacing them in any way is next to impossible. If you speak to any entomologist, they're pretty clear on that.

[00:37:14] There are programs that are. happening Harvard University in the Netherlands where they're building robotic bees that, can mimic the flight of bees. they're very impressive. if you look at these, demonstrations of these robotic bees, they're also, like you mentioned before, drones.

[00:37:34] there's been trialed in upstate New York when an apple orchard, they had a kind of helicopter type drone to try and. Try and do that and you know, we can to a certain extent do that, but the volume of pollination required is so much that it, it is, you can't replicate bees on that kind of scale.

[00:37:55] **Nate Hagens:** No. You, I mean, first of all, the energy and complexity required for that, would be astronomical. And secondly, boy, we're just losing the

humanity, and the web of life and, the life ethic, that has existed on this planet. If we replace pollination with little AI drones and things.

[00:38:20] I mean, that's a qualitative opinion of mine. but it is hard for me to imagine that in all the places and all the ecosystem functions that technology could even replace 1% of that. Yeah.

[00:38:34] **Oliver Milman:** Yeah, I mean there's huge kind of, I mean, there's the kind of practical question, isn't there? But there's also a kind of moral question and a question of aesthetics of what we want from our world and what we want in our surroundings.

[00:38:47] and you know, when you go to places that have been invigorate, reinvigorated with wild flowers and allowed nature back in, and you kind of realize what it used to be like and how we've forgotten in many ways, what the world was like with abundant insects. It's kind of like a light, it feels alive.

[00:39:06] It's not deadened, it's not, sterile. it's sterile. It's aile. Yeah. it's a kind of, it's a very vibrant, humming, beautiful place. And I think, I don't wanna live in a world with robots and no animals and no nature and no beauty and color. I wanna live in a world with all of those things.

[00:39:29] And I think we are enriched as humans and our planet is enriched with, them around.

[00:39:36] **Nate Hagens:** Do you think that you and I are, weird, in that regard? 'cause I share your sentiment a hundred percent. Are we the minority or are we actually the majority?

[00:39:45] **Oliver Milman:** I think on a certain level we are the majority. I think people like the idea of nature and being in nature.

[00:39:53] I think though. As humans, we like to control things. We like things to be ordered and tidy. We like to cut our lawns very closely. We don't like too much mess, messy kind of vegetation and plants around us, those horrible, creepy crawlies. We don't want around us either. So we use chemicals to get rid of them.

[00:40:13] We, we like things in its place. And I think maybe, I think a lot of people like nature and abstract, a national park. they maybe not so keen on nature being right up in their face.

[00:40:24] **Nate Hagens:** So it's fear and control versus humility and the web of life?

[00:40:29] **Oliver Milman:** I think so. Yeah. I think so. I think we, I mean, you hear these stories all the time from people who work in national parks about how people go to national parks and complain that they've, you know, the steps weren't quite even or that were animals there or they weren't animals there like.

[00:40:45] we kind of, I think a lot of us treat the world like it's a kind of stage that is there to perform for us. rather than, us being part of a kind of slightly coa chaotic but wonderful wave of life that's, we are just part of. We're not separate from, we're not a bubble that's separate from nature.

[00:41:04] We are part of nature and I think, I think it's good to kind of bear that in mind.

[00:41:09] **Nate Hagens:** So. You are a journalist. You spent a lot of time, researching your book, and by the way, as an aside, I hope that what you and others like you do will continue in the future because it, I would hate for AI to write, a sterile version of your book where you didn't get to go see the Monarch, trees in Mexico and some of the other things you witnessed.

[00:41:36] do you have any thoughts on that?

[00:41:37] **Oliver Milman:** Yeah. Well, I mean, it's a live issue in journalism as it is in other industries. is AI in its role, whether it's gonna be a tool that we can use, or is it gonna be something that completely replaces this also? yeah. that is a kind of a live topic

[00:41:53] **Nate Hagens:** because the humanity in you comes out in your writing and in your comments on this conversation.

[00:42:00] **Oliver Milman:** Oh, that's very kind of you. Thank you. yeah, I think there, there has to be the humanity in there. I mean, there is, you could collate all the studies that are done on this. There is lots of information now, more and more work is coming out on insect decline and their importance to us, far more so than when I started this kind of, in 2020, there wasn't as much research around.

[00:42:20] So you can collate that in a very cold way, but it's important to explain why it's important, why all of this is important. Why does it matter to us? What, you know, what do we lose when we lose insects beyond a certain percentage of our crops? I mean, we lose. We lose art, we lose, you know, we lose so much.

[00:42:41] why do we lose art? Because nature inspires art. Oh, okay. Nature provides art. Right? you know, animals are the subject of art. I feel that, are natural. Surrounds are the things that inspire us and give us creativity. You know, there's been lots of work being done to show that people who. Look at nature, are surrounded by nature.

[00:43:07] healthy nature is better for their mental health. It's better for their physical health. It's better for their creativity. They can think more freely, think more positively about things. I mean, there's the, I mean, I feel that we lose so much when we degrade nature and we push it to the margins and, Yeah. So

[00:43:24] **Nate Hagens:** we later in this conversation are gonna talk about solutions and responses. but let's, let's hit the darkest part of our conversation right now. if things don't turn around, we continue to grow. We continue to, extract and use more energy. The global economy grows, the global south picks up and reaches, higher consumption levels.

[00:43:51] Business as usual continues for coming decades, which for other reasons, I don't think is likely, but let's just assume that's the case. Please spell out for us what the worst case scenarios might be from the perspective of the insect kingdom and the things that you've researched.

[00:44:09] **Oliver Milman:** Well, we'll see.

[00:44:10] Continue to see big declines. we won't see all insects disappear because as we discussed earlier, there are some winners as well as losers in this. But the things we will lose will be critically important for our own survival on this planet. I mean, if, I spoke to a number of entomologists who, about what would happen if all insects disappeared and they kinda say, well, we'd starve to death within a few months.

[00:44:35] I mean, it would be, yeah, it would be a, I think that's obvious. Very grim situation. Yeah. I mean, but not even before that point. we've seen around the world stresses, social stresses, political and even military stresses around resources, right? Whether we are thinking about oil, water, land, the kind of things that we feel we need in order to survive.

[00:45:00] And I think if you start getting pressures on the food system, pressures on crops, that where they can grow, how they can be grown, I think you're gonna start seeing those kind of geopolitical stresses, social, you know, frictions long before we just completely run out of food. So we'll see more conflict, we'll see parts of the world, particularly in the developing world, where this, you know,

small scale farmers who are producing mainly for themselves and their families, they're gonna be completely pushed out.

[00:45:34] Suffer the worst be because of loss of pollinators. Because of loss of pollinators. Yeah. and then the poorest in society will lose out because the price of fruits and vegetables and other foods rely on pollination will go up. So you'll see, you know, chocolate and raspberries and strawberries and all kinds of things become luxury, like extreme luxury foods that only the wealthy can afford.

[00:46:03] I mean, that's something that you could easily see happening. What percent

[00:46:07] **Nate Hagens:** of our food, either in dollar value or in calories or in weight, or any, anything that, you know, what percentage of the total amount of food, directly or indirectly comes from pollinators?

[00:46:20] **Oliver Milman:** the value of food is being estimated about half a trillion dollars a year, and it's about a third of the world's food crops rely on pollination.

[00:46:28] So if you think about apple's cranberries. Almonds, broccoli, blueberries, cherries. There are things that are wind pollinated. So you know, rice, wheat, things like that. So, you know, you'd still have some of these staples, oats and so on. But all of the, a lot of the kind of brightly colored fruits and vegetables you'd lose without insects.

[00:46:52] and those are the key things when you think about nutrition. So therefore, you start losing those, you start getting those estimates of, you know, more than a million extra deaths a year because of a lack of nutrition.

[00:47:06] **Nate Hagens:** So you're actually explicitly suggesting that insect, the insect crisis is a national security issue.

[00:47:17] I say that because I had an ecologist talking about national security, a few weeks ago, rod Schoonover. But what you're saying is if food stuffs become either unavailable or unaffordable, this has geopolitical and security and, migration and inequality and poverty, implications

[00:47:40] **Oliver Milman:** for sure.

[00:47:40] Yeah. I mean, we're already seeing conflicts now where water is a key aspect or certain fuels. I mean, you know, you could easily see that happening with food to the land that's, farmable the land that's available to, to be farmed, with the availability of pollinators. I mean, even now, the current moment the US produces the amount of food it does by essentially, artificially keeping up honeybee numbers.

[00:48:12] they have to battle huge amounts of disease. define artificially well, we manage honeybees ourselves, right? We have honey, beekeepers that artificially keep their numbers up higher than they would be, and to, and propagate them to the levels needed to pollinate the amount of crop we need them to.

[00:48:32] So these h honeybees are taken on a kind of tour around the country all year to, to pollinate. And they lose huge numbers of bees to disease because there's lack of, like, vegetation for them, to forage, because of, you know, weather conditions because of yeah, pesticide use and all kinds of things.

[00:48:54] And they have to kind of keep trying to find ways to keep those losses down or keep, getting more bees. So we already very reliant on honeybees. A lot of work is done, like an endless kind of amount of work is done to try and, stem their losses so that we don't have, shortages of food.

[00:49:16] So, you know, any kind of single disease that wipes out a huge number of honeybees, for example, would be disastrous. That's that one species. And do

honeybees only, produce honey? So, honeybees are the only bees. I mean, there are many types of bee, but the honeybees are the ones we tend to think about, aren't they?

[00:49:37] 'cause they're the ones that produce honey. Bumblebees do produce honey, but apparently it's absolutely disgusting to eat. But it's,

[00:49:44] **Nate Hagens:** Honey is the product, but the real product is the service, which is they're going to all different kinds of flowers and pollinating.

[00:49:51] **Oliver Milman:** Yeah, that's right.

[00:49:52] the real service they provide, I mean, it used to be if you're a beekeeper that you make your money through honey, but now it's selling pollination services to farmers. Yeah. So the biggest event of that type is the almond pollination that happens in California. Yeah. Central Valley, California start of each year, and essentially about 90% of all the managed honeybee hides in America are put onto trucks and taken to Central Valley to pollinate almonds.

[00:50:17] And it's about 80% of the world's almonds are, created in this one area of California. And it's, it's an incredible thing to see all these honeybees and the pollination services have become so valuable as the honeybee numbers have become stressed. The demands for more almonds have grown that they, that it's lucrative for, it can be lucrative for beekeepers, but it's also spawned all these other industries, bee brokers who connect the, the beekeepers to the almond growers, the farmers.

[00:50:53] And then there are thieves. I've written previously about how there are bee bandits now in California, people who go around and steal honey bee hives to sell them on because they're so valuable now. So there's a, there's deca, there's

dedicated bee detective, in, in central, the Central Valley of California who goes around, solving bee crimes.

[00:51:13] So yeah, it's what a species, and I'm not talking about bees. Yeah, I know the things we do. but this is the world we're in now. And so any loss of that system collapses for any reason. I mean, we are in, we're in enormous trouble.

[00:51:29] **Nate Hagens:** So I, Don't know the answer to this, which is why I'm gonna ask you.

[00:51:34] I read something a few months ago that, 5G or some signals might disrupt, honeybees and other flight patterns. Is that a urban myth or is there some truth

[00:51:46] **Oliver Milman:** to that? I spoken just to a couple of entomologists about that, and they said there's no. Evidence that is a major problem, but I think it's one that will be researched more.

[00:51:55] I don't think it's been researched for it yet.

[00:51:56] **Nate Hagens:** Yeah. There's like 20 people in the world that are tasked with cataloging all the things. We're maybe not 20. But you know, my point is this is not something that's right in the heart of our industrial, metabolism, questions of research. but it should be.

[00:52:13] So thank you for your book. so what are some countries or organizations trying to do to mitigate or substitute for the effect of these large insect losses, ongoing insect losses?

[00:52:27] **Oliver Milman:** there've been some initiatives in Germany. Germany's decided to kind of overhaul its farming practices to be more kind of insect and nature friendly, use less pesticides, have farmland.

[00:52:40] That's broken up a bit. One of the big problems with monocultural farming is that you have the huge fields. There's no vegetation at the edges for insects. So. They're trying to do something about that you had kind of urban, urban efforts as well to kind of bring back green spaces. plant native plants reinvigorate, certain areas that into kind of wildflower meadows.

[00:53:07] You see that in Detroit. You've seen that in the Netherlands. You've seen that all kinds of places. in New York City where I am now, there's a kind of a program for green roost where you put, you know, vegetation on certain roos, which is great because you can give her a kind of oasis for insects in, in urban areas.

[00:53:26] **Nate Hagens:** Okay, so this is a real dumb question, but New York City as a percentage of the area of New York State is tiny. So ultimately, I mean, this is gonna sound extreme, but who cares if there's no insects in New York City, but there's tons of insects in New York State. That's okay.

[00:53:43] **Oliver Milman:** Right? Yeah. I mean, you, I think you're right in that you've touched on the problem is farmland, and it's got to the point that, You speak to some entomologists and they say, well, we're finding more diversity of insects in cities than we are in the countryside. What, why would that be? Because people have backyards in the cities with a variety of plants that insects can, feed upon. And the countryside is all monoculture. The countryside is all monoculture.

[00:54:12] It's soybeans, it's wheat, it's, you know, corn is a huge one. so yeah, you have these huge monocultures, that have very little refuge for insects, even at the margins. So you're seeing them being wiped out in places where you think they should be abundant. I mean, obviously that's not the case in, you know, natural parks or protected wildernesses.

[00:54:37] You, you have still have insects there, but you see a lot of diversity in cities because, you know. counterintuitively, they actually have more of what insects need. So this brings up

[00:54:52] **Nate Hagens:** a question. I forget the details. There are seven fisheries in the world's, oceans, and six of them are severely to extremely overfished.

[00:55:05] But there was some research showing that if you left a fishery alone, that in seven years it would largely recover to a stable level. Leaving aside climate change and acidification for the moment is there a corollary with insects? Like do we have success examples where if the habitat loss and the pesticides are removed, that there's a quick rebound and a, thriving?

[00:55:31] **Oliver Milman:** Yeah, we do. I mean, there've been some examples of this in the UK in terms of nature reserves where they've, seen some improvements. One entomologist said to me, it's a bit like, it's a bit like we're, there's a log in the water and we're putting a foot on the log, and that's what's kind of happening to insect populations right now.

[00:55:51] If we remove our foot, the log will kind of bounce back up. and that's because insects, as we discussed before, have huge reproductive abilities. They are adaptive to a point. They've survived these mass extinctions because they are, you know, very nimble and they can adapt to a certain extent.

[00:56:09] So I think we can find a path. That they can survive on. but it's gonna take a lot of work for us to be able to reverse some of these declines. So let's

[00:56:23] **Nate Hagens:** talk about that work either locally, regionally, nationally or globally. Are there any policies or initiatives that are specifically trying to reverse the decline in insect populations?

[00:56:33] **Oliver Milman:** Yes. So there's the bans on these OID pesticides in European Union, is

[00:56:39] **Nate Hagens:** it only Europe or is it anywhere else in like Asia or elsewhere that's trying to do that? It's

[00:56:43] **Oliver Milman:** kind of mainly Europe that's kind of taking the lead on this. Unfortunately there's kind of was, moose in the US for these pesticides to be in national parks.

[00:56:52] but Donald Trump rolled that. We're now we're just banning national parks, right? Yeah, exactly. Yeah. Allowing plastics and all sorts. it's great.

[00:57:01] **Nate Hagens:** But how, by the way, how, sorry to interrupt, but how soon will we see possible results from the banning of Neos in Europe and wouldn't that be a clarion call for the rest of the world's countries?

[00:57:13] **Oliver Milman:** Yeah, it should be pretty soon. I think the kind of work is underway at the moment to try and kind of ascertain that because it takes a while to kind of work out what the baseline is and what any kind of improvement could be. But certainly that should be a, that should be visible fairly soon and hopefully, others, countries can, can jump on board with that.

[00:57:32] You're seeing certainly some action around light pollution. Some countries and cities are looking to act on light pollution 'cause they realize that it could actually save money as well as some. As well as helping insects out. So there is, there's some work going on that. there's this kind of citizen effort around No mo may, I dunno if you've heard about that, where this idea Oh no Mo May, yeah, I've heard about that.

[00:57:56] So that's a kind of, something that's taken hold in some places in the US now where people just leave their lawn alone, for the month of May or longer if they like, just to allow the grass to grow, to allow insect life back in just to, to, let life kind of loose a bit in their garden rather than manicur it.

[00:58:17] **Nate Hagens:** Is that largely, for show or do you think that legitimately, has

[00:58:23] **Oliver Milman:** an impact? Yeah, it does have an impact. I mean, obviously on the global scale, you not cutting your lawn is not gonna reverse the, the insect crisis. But I mean, you know, collective action is what it's gonna. It's gonna take for us to, to do this.

[00:58:40] And, yeah, people can do their own part and especially it helps people understand that they're not hopeless and in this, that they can do something better. I

[00:58:50] **Nate Hagens:** would think that if there was a city with 10,000 people and a few people didn't mow their lawns, it, there would be a tiny impact. But if hundreds of people in that city didn't mow their lawns, then there's just the, aggregate supporting, ecological substrate to have higher insect, hatches and then the next year more and all that.

[00:59:13] Do you have any insights in that?

[00:59:14] **Oliver Milman:** Yeah, I think so. I think it's, it's one of those things that's a cultural change as much than I think because we're so used to front yards looking a certain way. you know, there's a kind of public shaming of those, especially people who live in HOAs in the US about, you know, what you're meant to have.

[00:59:33] in your front yard. But if there's a kind of cultural change about letting nature back into our lives a bit, not overly managing things, then I think that can really have a snowballing effect. 'cause more and more people can see that, see the benefits of it and jump on board. One entomologist said to me, we need more of an inaction plan, rather an action plan.

[00:59:51] if we just, Let things slide a bit, let things get a little bit untidy and scruffy, insects would, really thrive in that situation.

[01:00:01] **Nate Hagens:** So, do you have any other suggestions for individuals who, like you and I, Appreciate insects as part of the web of life that are creatures that co-evolved with us over, millions of years and before us, for hundreds of millions of years other than NoMo Lawn, what are other, suggestions for individuals to get involved, in supporting or, reversing the, decline in global insect biomass?

[01:00:32] **Oliver Milman:** Sure. I mean, there's lots of things you can do. I mean, if you have a yard, don't rake the leaves as much. have followed this kind of three by three system where you pick three native plants species for each, for each growing season, spring, summer, and, or, fall and plant them so that the insects have, food and habitat throughout the year. what is the raking leaves thing? What does that do? So, lots of leaf litter is used by insects as kind of habitat, as food, refuge, from predators and so on. So by kind of having a completely clean and, you know, scrubbed lawn, with nothing but short grass, you, you kind of removing a lot the kind of habitat, the insects kind of, rely on.

[01:01:18] I mean, insects like the things that we consider to be untidy, leaves everywhere, rotting logs, things like that. so if we kind of get over our aversion to that a little bit, that would actually be helpful.

[01:01:29] **Nate Hagens:** Let me ask you this, Oliver, what did you, in, after you wrote this book, you have you, I think you had a big spread in the New York Times, if I recall.

[01:01:38] did you ever go and speak to like kindergartners or grade schoolers about this?

[01:01:44] **Oliver Milman:** I didn't personally know. I've spoken to my own kids about this, who are at that. At that age, and I've spoken to Entomologists who said there is that kind of cultural aversion to, insects whereby they will speak to kindergartners about insects and the kids love them.

[01:02:02] They think they're cool, but once they get to kind of high school, they think they're disgusting. So at some point we've kind of taught kids that insects are terrible. So there's obviously a, I dunno if there's a natural revulsion to the, I think there's a natural fear of being bitten or something.

[01:02:20] But there, there is a natural

[01:02:21] **Nate Hagens:** fear. This isn't like, well you should google, cats and cucumbers. If you put a cucumber behind a cat and it turns around it, like evolutionarily thinks it's a snake or something. Right. And I think spiders who are, which are not insects 'cause they have eight legs. They might care, they might, black widow could kill you or something like that.

[01:02:44] But now the story has changed and we have to. in any case, with the leaf litter and the mowing, the lawns and the three, planting of native plants, the very first step is to widen our lens and appreciate the importance of insects writ large to a viable planetary future. That's the first step.

[01:03:05] **Oliver Milman:** Yeah. I, in entirely is, I think there's lots of positives you can look at too, with insects. I mean, we can focus a lot on the negatives of them, but I mean, if you just think about their incredible abilities, the how cool they look, I mean, there's some beautiful photography of insects now that people can look up.

[01:03:23] I mean, they, if you get closeups of insects, they actually look really amazing. and scary. They look really scary. and scary. Yeah. Yeah. But I mean, if you're a little kid. Cool and scary is often quite interesting.

[01:03:38] **Nate Hagens:** I don't think I've shared this story, on camera before, but, t 20 years ago, yeah.

[01:03:46] I'll make it very brief. I used to work on Wall Street and when I was managing money for my clients, I was afraid of losing money for my clients, like emotionally afraid. And I hired this neurolinguistic programmer to get over my fear and he said, let's take something small that you're afraid of.

[01:04:05] And I said, spiders. so what he had me do is little by little, get less afraid of spiders to the point where I could touch one. Pet it, and it, since then, it's worked. I've be, I've overcome my fear, not completely, but mostly of spiders just from shifting my relationship and my behaviors with them.

[01:04:27] But I think we do need a cultural value shift, not only of insects, but the entire web of life.

[01:04:36] **Oliver Milman:** Yeah, I think you're right. and we had to kind of avoid this kind of negative feedback spiral whereby nature becomes more remote to us as it recedes from our life because we're wiping it out. And so therefore it becomes more distant in our minds, in our, what we expect and what we value.

[01:04:56] And I think we have to avoid that by, by, you know, embracing nature, having it around us rather than pushing it to one side.

[01:05:04] **Nate Hagens:** So getting back to the what people can do, I'm just. Hypothesizing that if you live in a town and you're the only one who's doing the NoMo May and these other things, it's a statement, but it's a little lonely and boring.

[01:05:21] And I'm just wondering if you could get five or seven friends together and say, here's what we're gonna do in Topeka, Kansas or wherever. on behalf of making a better ecosystem for insects, thriving. Even if we can't impact climate change and what's coming, we can do this and therefore it becomes a social thing.

[01:05:43] have you encountered anything like that or not?

[01:05:46] **Oliver Milman:** Yeah, there are lots of local groups and there's obviously it's much easier now to organize with, with some Facebook and other. Platforms, you can actually, you can find a community wherever you are. I think that, is concerned about this kind of thing, wants something to do.

[01:06:02] I mean, there's certainly groups I've spoken to that, have members who are just generally concerned about the environment. They're generally concerned about the loss of species, about climate change, and they see insects or the renewal of habitats to bring more insects back as a kind of something they can do.

[01:06:24] 'cause they can't cut us emissions in half themselves, but they can do something about the insects in their local community, in a kind of small way. So I feel it's a all, it's a kind of a pathway I think for some people to feel they're doing something. If not everything.

[01:06:43] **Nate Hagens:** So in your book, you include quite a few stories of insects, that you thought were super cool or had interesting abilities.

[01:06:51] Could, can you share a couple of those, of the favorites before I move into the closing questions?

[01:06:57] **Oliver Milman:** yeah, for sure. I mean, bees are incredible. Honeybees, they've been found to understand the concept of zero. They can add a subtract numbers. They've some what? How

[01:07:11] **Nate Hagens:** would, how?

[01:07:13] **Oliver Milman:** Yes. Well, they, their researchers have put, things in front of, honeybees and seen that they can g gruten together and understand, additional and subtraction.

[01:07:24] They can also detect landmines, bumblebees. They've, they gave them kind of rewards and made them be able to play soccer in order to get rewards. they, they'll give up sleep to care for their hives, young bumblebees. they can, researchers sometimes just think they can remember good and bad experiences and we're hell bent on going to Mars.

[01:07:50] Right. Exactly. So, kind of hints a kind of a form of kind of consciousness that, you know, it's obviously not like our consciousness, but the idea that they're just these brainless. Things buzzing around. I think we need to challenge that idea. cockroaches are kind of wonderfully disgusting. they can survive for two weeks after having their heads chopped off.

[01:08:15] which is impressive. I mean, whatever you think about them, that's impressive.

[01:08:20] **Nate Hagens:** Yeah, they're pretty amazing. Yeah. Incredible. Yeah. So, cool. what

[01:08:24] **Oliver Milman:** other stories? oh goodness. I mean, a dragonfly, they did this test that they, where they saw how dragon flies could stay upright in the same position, flying position in winds that would, take down a helicopter.

[01:08:43] So they're a, they're able to do things that are machinery cards. Essentially, even though we tried to replicate them with robots, I mean, we, you know, the best Blackhawk helicopter is not as, is not as adept at flying as a dragonfly. And I think, that's another good thing to remember.

[01:09:03] I'm sure

[01:09:03] **Nate Hagens:** the militaries have tested and based some of their, yeah. Flying machines based on insects. for sure. Yeah. They,

[01:09:12] **Oliver Milman:** I think they look at the insect world all the time for kind of ways to improve their own technology. So,

[01:09:19] **Nate Hagens:** I don't know how often you watch the, podcast. I, know that, you know, Nick Haddad, was on the show before, but I ask, my guests some closing questions.

[01:09:30] Do you have any personal advice to listeners, not on insects per se, but at this time of global change and anxiety and what's happening to our environment and everything? do you have any personal advice?

[01:09:43] **Oliver Milman:** Yeah, I mean, I mean, it's hard, isn't it? I mean, what I probably shouldn't say this as a journalist, but I have turned notifications, news notifications off my phone when I was away and actually helped my anxiety levels a lot.

[01:09:56] I mean, having, being informed is one thing, and I think we need to be informed, but being bombarded into a state of kind of helplessness, I think is unhelpful. Going outside, enjoying nature, being connected. Being part of a community, seeing people face to face, run through a screen, or just remotely is just, you know, messages on a social media site.

[01:10:20] I mean, I think that's really important. This kind of local connection can really kind of make the world feel a better, kind of better place. And so, you know, there's a loneliness epidemic, and that's kind of quite obvious if you look at all the things happening in the world. and I think taking that time just to connect with those around you, check in that they're okay, I think is really important.

[01:10:45] Particularly now, how do you personally,

[01:10:49] **Nate Hagens:** Navigate the knowledge that you have of not only insects, but the slow unraveling and shrinking of the natural world. And then you go out in the UK or in the US with your kids and your family to enjoy nature, but knowing what's happening, how do you process that?

[01:11:10] I ask personally because I struggle with that myself.

[01:11:14] **Oliver Milman:** I do struggle with it. I think having young kids actually does help you bring you back to something else because their needs are very immediate. So often in my work, I'm thinking about big time scales, big issues. You know, global events, long timeframes, that kind of thing.

[01:11:31] and immediately I, when I finish work, I'm confronted by immediate problem of a Lego set that needs to be put together or, you know, some kind of very immediate crisis. Living in the moment I think is good, in certain aspects for this, again, we don't want, we wanna be aware of what's happening around the world and where things are heading, but enjoying the moment.

[01:11:53] I mean, I think I, I let for a long time myself, particularly during the pandemic, the days pass by without finding much joy in them or finding, enjoying the moment. Always thinking about, oh, okay, things will be better in a month, things will be better next year. Things will, you know, if only this was solved, then this will be better.

[01:12:13] and you can spend your life doing that because. In our lifetimes, things won't be perfect. We'll be better in a, even better, in a significant way, but you can make things better in a little way or a way that's meaningful to you. So to find those moments, I think is important. And to find the joy in the world is important too.

[01:12:32] **Nate Hagens:** You have young kids, do they, are they aware of and care about insects more than the average young kid?

[01:12:40] **Oliver Milman:** my son doesn't know. He's terrified of beetles and ants. my daughter's a much more outdoorsy girl. she loves insects and all animals. Yeah. But there's certainly an appreciation for the natural world, an understanding of what we're doing to it.

[01:13:01] and a desire that, you know, why do people throw trash around? why do we do this? why do we use cars so much? I mean, they question things that a lot of adults wouldn't question. So, yeah, that's always refreshing to me. What do you care most about in the world, Oliver? I mean, it's a really trite response for my kids.

[01:13:20] I guess my wife, my family. That's what I care about most in the world. But I suppose I care about, I care about, this planet. I mean, I mean, it's, again, it sounds kind of trite, but, I've always been slightly unmoved by space exploration, this desire to colonize Mars. We live on the best planet that we know of that may have ever existed.

[01:13:49] and, it's so cool. There's so many wonderful places in this planet that, we, need, we should cherish and we, we should take better care of. And, I think hopefully we don't let ideas of moving to Mars. Overwhelm that

[01:14:12] **Nate Hagens:** if you, had a magic wand and there was no personal recourse to your decision on what to do with it, what is one thing you would do to improve human and planetary futures?

[01:14:22] **Oliver Milman:** I think in terms of the planet, I mean the destruction of nature, no matter what happens with AI or anything else, is the primary threat. I mean, we are losing species. Extinction rates are up to about a thousand times above what they were. pre-industrial rev revolution. We are heating up the planet at a crazy rate.

[01:14:48] We're losing rainforests, we're losing soils. The things we grow our food in, I mean, we're trashing the home in which we live. and that can only go on for so long before we, suffer really serious consequences. So I'd, yeah, I'd just stop us trashing our own home. What would be the.

[01:15:10] **Nate Hagens:** The direct request there to stop us trashing our own home.

[01:15:15] **Oliver Milman:** Oh. What would be the direct request? move to clean forms of energy cycle. More walk, more drive less. If we're driving electric cars, stop over fishing, stop deforestation, vary our diets a bit so we're not chopping down the world's, forests for cattle, you know, stop dumping plastic everywhere.

[01:15:37] Maybe lose, use less plastic in general. I mean, there's all kinds of things that we can do to be a bit kinder to the work. So

[01:15:46] **Nate Hagens:** what are you working on now in other book or writing articles or what, are you still on this topic or what is something you're real curious about?

[01:15:53] **Oliver Milman:** Yeah, I mean, it's, endlessly fascinating because the, beat covers everything from, you know, Tesla cars to bumblebees to.

[01:16:03] You know, pollution in the Gulf of Mexico or Gulf America, whatever you like to call it. So yeah, there's always something to do. no, no book another, no other book is kind of forthcoming. it's a huge ask. It's a huge, consuming thing. And I like kind of flitting between other topics at the moment.

[01:16:23] So, yeah, that's what I'm kind of focused on at the moment.

[01:16:25] **Nate Hagens:** If you were to come back, on this show six months from now, or a year from now, what is one topic that is relevant to human planetary futures that you are particularly nerdy or passionate about that you would be willing to take a deep dive on?

[01:16:42] **Oliver Milman:** Ooh, that's a great question. I'm really interested in the, at the moment, the de-extinction movement. So there's, I covered recently the efforts to bring back the American chestnut tree, which was kind of mostly wiped out by a blight. and this, these efforts by these tech pro funded companies to resurrect woolly mammoths dire wolves, the dodo and so on.

[01:17:04] But they're not really dire wolves. No. They're gray wolves with, you know, a few jeans edited and yeah, bit of Shay gray wolves. So yeah, that, that whole world really interests me because it's a kind of. Are we serious about protecting biodiversity, ecological functions of the, of that saving species, protecting species, or do we see the world as a kind of theme park?

[01:17:30] A kind of zoo where we want certain things here and there, and that's cool to get a picture of. And we, you know, that's a really interest, interesting question to me, about how we see the world and how important we see nature. Do

[01:17:43] **Nate Hagens:** you have any closing thoughts or words of, wisdom, for our viewers on the topic of, the insect crisis, which was your most recent book?

[01:17:54] **Oliver Milman:** Yeah. I would ask people to go out and maybe look at insects a little bit differently, to maybe not be, to notice the bee resting on the flower. to appreciate the. Appreciate the butterfly going past. be kind of enthralled by a Beatle thinking, even though it looks like just like a little black thing.

[01:18:15] There's 300,000 species of them and how amazing that is and, what it took for the world to get to that point and what they do for us. maybe just look at the world a little bit differently. let things grow a bit. And see what comes in. Thank

[01:18:31] **Nate Hagens:** you Oliver Millman for your, research, your writing, and your humanity.

[01:18:36] I, I appreciated, this and, to be continued, my friend. Thanks so much, Nate. Really good to be with you. If you enjoyed or learned from this episode of The Great Simplification, please follow us on your favorite podcast platform. You can also visit The Great Simplification dot com for references and show notes from today's conversation.

[01:18:59] 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 Balu, Brady Hayan, and Lizzie Siri.