

The Oxford Comment
Episode 88: Infrastructure, Public Policy, and the Anthropocene

Meghan Schaffer 00:05

According to the Oxford English Dictionary, the term "infrastructure," now used to describe the basic systems and services that are necessary for a country or an organization to run smoothly, originated as a military term in the 1920s. This means it has been in use for just over 100 years. However, its usage predates the "Anthropocene," the current epoch of geological time in which human activity has dominated the environment, climate, and ecology of our planet, causing many of the crises we currently face, and will face, in the future.

Meghan Schaffer 00:38

This is Meghan Schaffer with The Oxford Comment.

Meghan Schaffer 00:40

On today's episode, we're discussing the state of human infrastructure in the Anthropocene with a particular focus on how research can best be used to inform public policy.

Meghan Schaffer 00:50

For our first interview, we were joined by Oxford Open Infrastructure and Health co-Editor-in-Chief, Patrick Harris. Oxford Open Infrastructure and Health, or OOIH, for short, is a new transdisciplinary journal that provides an important link between human health and all forms of global infrastructure. It embraces complex perspectives, political controversy, and cutting edge theory when dealing with issues that challenge the balance between infrastructure and health, such as ecological devastation, climate justice, health, inequity, and more. Dr. Harris has been an investigator on competitive research funding and has 160 publications across his career, including 80 journal articles, and a recently published book, *Illuminating Policy for Health*.

Meghan Schaffer 01:36

Hi, Patrick, it's great to have you on the podcast. Would you mind introducing yourself?

Patrick Harris 01:42

Yes, so my name is Patrick Harris. I am an academic working in Australia, although I work internationally, as with the journal. I work for a university called the University of New South

Wales and I run a center called the Center for Health Equity Training, Research, and Evaluation.

Meghan Schaffer 02:00

Thank you so much. How has your background led to your vision for Oxford Open Infrastructure and Health?

Patrick Harris 02:07

So my colleague, Evelyne De Leeuw, and I had the idea for the for OOIH a couple of years ago. My, my background's really in, actually, both of our backgrounds are really in health, focusing on health and cities, with a particular policy focus on political science and understanding how cities are made from a political perspective. And my work really led me, for over the last decade, led me to look at what's called "land-use planning," or urban planning. And in, in that work, I came across this small, but then eventually very large thing called infrastructure, which was essentially quite unknown at the time to public health people. And we showed some work I did showed that infrastructure is a real issue for people who are working particularly around understanding cities, it's almost like infrastructure is that the main mechanism by which cities are made, you know, if you think about things like roads, or buildings or energy, water, all these things are what's called infrastructure.

Patrick Harris 03:23

But public health, which is my discipline, my, my background, even though we're interested in something called the determinants of health, which links health to what happens in society, we hadn't really made the back, back, the link back to infrastructure. So that, that, I'd made that link through some research I did, and then Evelyn and I got together and Evelyn's background's also in, she ran a journal called the Health, sorry, Health Promotion International. And we, we had this idea together that the infrastructure was the new major issue for public health. So she decided to contact Oxford University Press, and then we put in a proposal for the journal, which was accepted, and we're delighted to be in the place we are today.

Meghan Schaffer 04:09

You mentioned in a blog post co-written with co-Editor-in-Chief Evelyne De Leeuw that the outlet OOIH provides has never been more urgent. Can you elaborate on that urgency within the Anthropocene as it relates to infrastructure and health, and how OOIH is poised to meet it?

Patrick Harris 04:27

Yeah. So I mean, I think the urgency of climate change and the Anthropocene is not in doubt. See, yeah, you can see, well, in fact, at the moment, we've got a heatwave in spring and it's 36 degrees here in Australia today. And we've got fires raging around different parts of Australia, despite it being only spring. And you, in the northern hemisphere, has experienced terrible fires this summer. And really, you know, the problem with the Anthropocene is that it's here, you know, it's actually not, not the, this idea that there's, going to happen in the future. It's here. And clear patterns that have been predicted by science are being experienced as part of life now. And so what we, what we need to do is action, essentially. And infrastructure is part of that action. And the links to health from, from infrastructure and climate change are not are not, they're well known, but they're not really made concretely, and that's what we want the journal to do.

Patrick Harris 05:29

So both how infrastructure mitigates and also adapts, helps adapt to climate change are really crucial questions. And focusing in, as I was saying before, about what, what infrastructure is, and how it can help both mitigate the effects of climate change, for instance, you know, ceasing investment in unsustainable and damaging infrastructure like coal mining, that's a bit of a no brainer for the health of the planet. But, you know, there are questions about why is that disinvestment so slow, and we know that the investment in that kind of energy infrastructure is, is really poor, for, for, for health globally, because of climate change, but also locally for things like air quality, and poor air quality, and also a really challenging problem for people when they're working in the industries, is how do you decarbonize that industry, while also giving people jobs and meaningful jobs in, in future energy infrastructure that's more sustainable, and then thinking about things like adaptation.

Patrick Harris 06:30

So what kind of infrastructure is needed to support the future of our planet at a global and local level? So there's a really interesting, a good example of this is, a really interesting body called the Climate Overshoot Commission. And that commission's recently produced a report on how to reduce the risk of, basically, temperature overshoot, so going over 1.5 degrees, which is very likely to happen, and it talks about infrastructure-based actions, like, so, things like exploring solar radiation modification by cooling the planet by reflecting sunlight through clouds on us; also, even, you know, space-based infrastructure that modifies the, the radiation from the sun, and will keep the planets cool. Now these things are, are, almost sound crazy, but there, there really are options that are on the table and they're infrastructure options for for the, for the planet. But the problem is, is that the commission's asked for a moratorium on that action, because the evidence and the science is not yet clear enough to really proceed despite there, there's a political demand for that to proceed. And then, thinking locally, so why is it that things like electric vehicles are touted as, as the sort of sustainability savior for for cities?

Patrick Harris 07:44

So the challenge with cars is that, even EVs, is that we know that they create infrastructure, which is challenging about how cities run. So if you only run on cars, you're less likely to have a city that's, that's conducive for health and well-being, even though we need cars. But the fact that there's so much primacy put on on roads is not the answer. So the better infrastructure question is how to do different types of infrastructure that support how cities function? So just building roads tends to be about freight, really, so moving, moving freight around cities, not actually people. But then people use their cars if the road's there, which plugs up the road again, for instance. And what really needs to happen is we need better evidence about what different types of infrastructure options will work better for health, particularly in cities locally.

Meghan Schaffer 08:29

What are the components you look for when determining a publishable paper for OOIH?

Patrick Harris 08:35

Well, we're very open to different types of knowledge. So we see science as a solid, multifaceted exercise. So we want the best type of robust empirical data, but we also want good critical reflection about the state of knowledge in the field of infrastructure and health.

So many people don't realize that evidence gathering adheres to a set set of rules. So whether or not it's quantitative or qualitative, and what we need is, across both those types of journal articles, is a strong rationale for the work, deep engagement in previous scholarship if that exists, and it usually does exist, a clear articulation of methodology and methods, and that's all tied together with an excellent narrative or story.

Meghan Schaffer 09:21

In the journals guidelines, you state that OOIH encourages narrative pieces that may be more visual in essence. Can you elaborate on that as well as this interest in different approaches to the presentation of research?

Patrick Harris 09:35

Yeah, so again, thinking about my background as a passer really from public health. Public health research usually works on on the basis of words, right? So we, we write a report, we look at other people's papers and all those kinds of things. But if you're working in, in infrastructure, you might be a planner. So you might be someone who works visually on planning aspects of wherever city or a big piece of infrastructure that goes into a city, or you might be an architect that, who's designing a big building or something like that. And that means that we were interested in the idea that people would want to present their work not necessarily through the medium of words. And that would be things like drawing, things like photographs, those kinds of things that we know people use in their day-to-day work if they're planning a piece of infrastructure. And we thought that would be a really good opportunity with this channel to think differently about how, though we can get those types of people to present, to present their work differently.

Meghan Schaffer 10:41

One of the recurring elements in your work, and within the editorial board and journal's site, is a push for policy change. What's the best way that you've seen to go from published research to policy change?

Patrick Harris 10:54

It's an interesting question, because a journal like ours has a particular niche within what's called the research to policy dynamic. So being Open Access helps. That makes the paper more accessible to everyone, including policymakers. But, anyway, regardless of that,

policymakers tend to be super busy. They're also pretty distracted and also driven by many demands that are quite different from academics and researchers. And often academics and researchers don't understand that. So the best way to get policymakers' attention is really about the content of something, is really to write a policy brief, which tends to be a few hundred words or a page of best, that gets to the point, that makes recommendations about what policies or actions are needed. And we have that policy brief as a particular type of article, or a particular type of publication, for the journal. But we also suggest that all submissions consider doing a policy brief, because it really helps distill that information for, for super busy, super distracted, and, often, you know, kind of, disinterested from the detail policymakers. And also, Evelyn and I, as Editors-in-Chiefs, our background's in, in political science, as I was saying before, so we have quite a good understanding of, of the dynamics of policymaking, and we can, we can help potential authors think about how to position their their work as best as possible to attract a policymaker to it.

Meghan Schaffer 12:22

A special issue revolving around AI is currently being developed. Can you talk more about that and let us know what you see as the perils and promotions of AI, specifically in regards to infrastructure and health?

Patrick Harris 12:35

Yeah, so one of our editorial board actually came up with the idea for, for the AI. So her name's Sarah Skenazy. So she's from, from, works for Google, actually. She's leading the special edition, and as part of that, has identified ways that AI can be useful, but also risks, as part of the call for articles. And the premise that, to answer your question, the premise of AI is AI is infrastructure, right? So it underpins current and future societies and by really supporting decisions that make those societies run. So, for instance, if you shop, AI can, when, when you shop, when you use your credit card, or, you know, the data about your shopping can be used by AI to predict what your preferences are, and use that data to make your lives easier, based on what it thinks you need. On a more societal level, AI can inform how a city is run, for instance, based on data about things like health services, transport, crime, schools, and what type of population fluctuations there are, and so on.

Patrick Harris 13:39

So, AI is potentially useful, and Sarah, and others who have input in a special edition together have focused on things like how AI can be used to work towards the achievement of the United Nations' Sustainable Development Goals, as well as other significant global objectives around climate change and global health. For instance, the Paris Agreement and the WHO's Triple Billions target. And that's things like enabling data discovery, generating insights from complex datasets, improving predictions, diagnosing, planning, and monitoring, accelerating scientific discovery, and also things like innovation, and translating innovation into using data, approximating simulations. And also, messaging and communication can be facilitated through AI.

Patrick Harris 14:24

However, AI also has lots of risks with it that we don't really know much about, and they're usually concerned with what we call equity. So in public health and other disciplines, equity is about who wins and who loses from something. So who benefits and who doesn't from AI? So for instance, how equitable and representative are AI algorithms so does AI perpetuate inequity for those who have less by over representing those who already have good access to goods and services, like people who are more able to buy certain things or more able to use certain types of technology or they preference over others? There's also historical perspective about the ethics and equity-focused research using AI and things like that. And, also, more actively, so how does AI actually empower its users, diverse stakeholders, and, and how do you do things like co-design with communities, so working with communities to understand problems that AI can actually then address? And then, finally, really, thinking about, you know, not everyone's literate in things like AI. And also that AI information might be misused as something which is to the detriment of people's people's health.

Meghan Schaffer 15:35

In conclusion, are there other timely topics you would like OOIH to address?

Patrick Harris 15:40

One of the benefits of the journal is that we are very urgent. So thinking about things like climate change is really important and crucial that we get good evidence, as I've talked about so far. And really the infrastructure connection links to public health through acting on making better infrastructure in the face of climate change is a really unknown, unknown

quantity, almost. And that's a space that I really think the journal could fill very quickly, because there's an urgency to it. One of the challenges is that the recent climate change agreements have been focusing on local action in response to climate change. But, often, local action is not connected up through to what happens at a bigger policy level, either, in somewhere like the States, you know, to, at a state level or a federal level. Same here in Australia, what happens locally, often doesn't get supported at a state or a federal level, despite needing that innovation, and that kind of local action around infrastructure is really important.

Patrick Harris 16:41

You know, you think about something like the heat, the heat island effect in cities, that's an infrastructure problem that usually defaults down to local communities or, or local levels of government. But how do we, how do we get that action happening at multiple levels is a really important question, I think that we'd like to answer. Another one is actually more of a policy focus. But I think one of the challenges we have at the moment is around, in policies, infrastructure policies, how the assumptions get put into practice? So AI is a good one, right? So what assumptions actually go into AI to make the predictions work or make the data, the big data sets work in the way that they do? Often, we don't really break down what those assumptions are.

Patrick Harris 17:23

So I was talking about road building before and coal mining, but that, the need for that type of infrastructure is based on a set of, of usually economically driven assumptions. And we don't really know much about how those assumptions support or get in the way of infrastructure for, for human health. And the last thing I wanted to say is we're really keen on getting really strong, empirical pieces, through the, through the journal. We've been setting up the journal, really, through, with our editorial boards, through a lot of sort of setting the scene pieces, and we've also published a few reviews. But we're really keen on on getting some really strong data-driven pieces from around the world, really to start building the case for, for how infrastructure really works and interacts with human health, in the ways that I've discussed.

Meghan Schaffer 17:46

Thank you so much for joining us today and for sharing more on Oxford Open Infrastructure and Health.

Patrick Harris 18:20

I just wanted to say a big thank you to you guys. And thank you to Oxford University Press for, for being so supportive of us, of the journal. I'd also like to thank our editorial board. And we look forward to, to hearing from people around the world who want to make submissions to the journal. Thanks.

Meghan Schaffer 18:41

Our next guest is Jonathan Pickering, co-author of *The Politics of the Anthropocene*, the winner of the 2019 Clay Morgan Award Committee for Best Book in Environmental Political Theory. We spoke with him about how the shift from the Holocene to the Anthropocene has affected our core infrastructure systems and how good governance can help us mitigate the many challenges we'll face in the future.

Meghan Schaffer 19:03

Hi, Jonathan, thank you so much for joining us today. Would you mind introducing yourself and your scholarship?

Jonathan Pickering 19:09

Sure. Thanks very much, Meghan. Thanks for the invitation to join the show. So I'm Associate Professor at the Canberra School of Politics, Economics, and Society at the University of Canberra in Australia. And my work mainly encompasses questions of democracy and justice in global environmental governance. And, more recently, looking at environmental governance at the at the national level as well before teaching in international relations. A few years ago, I did a postdoc at the Center for Deliberative Democracy and Global Governance, also at the University of Canberra, and there, I was working with John Dryzek, who is the founder of the center, and we were working on a project on deliberating in the Anthropocene and so this is how I was first exposure to the Anthropocene and some of the debates around it came about. And in 2019, it was we published a book with OUP on the politics of the Anthropocene.

Meghan Schaffer 19:09

How do we define the Anthropocene? What differentiates the Anthropocene from the Holocene and what conditions facilitated the emergence of a new geological epoch?

Jonathan Pickering 20:26

Well, to clarify what the Anthropocene means, it helps to start with the geological epoch that were still officially in now known as the Holocene. So this epoch began round 11,700 years ago at the end of the last ice age. And, for most of the Holocene, this climate has been relatively stable, and in that, in turn, provided for relatively favorable conditions for the emergence of large-scale agriculture, subsequently cities, industrialization, and so on. But, of course, that brought with it a growing range of environmental impacts, impacts on the geology of the planet as well. And 20 or so years ago, the scientists Paul Crutzen and Eugene Stoermer proposed that humans had altered the planet to such an extent that we've now left the Holocene and ended an epoch known as the Anthropocene. Some, some people pronounce it Anthropocene, of course, and John and I had various debates about about that, but we agreed to disagree on the basis of, you know, like the song, "you say tomato, I say tomato."

Jonathan Pickering 21:34

So, anyway, in geological terms, the Anthropocene is still a proposal and to become a formal epoch, it'd need to be endorsed by the International Commission on Stratigraphy. And if that happens, then it'll put us into this geologic timescale. And there's division within the geological community about whether it makes sense to recognize a new epoch, and even amongst those who consider that the Anthropocene should be declared, there are questions about when it began. And this is, to a large extent, a tussle over what factors have been driving the Anthropocene. Is it colonialism? Is it capitalism, industrialization, and so on? So a working group that's part of the International Commission of Stratigraphy has been looking into this issue of the, when the Anthropocene started, and it argued that the mid-20th century is the most plausible starting point. And this is because the post-World War II period marks the beginning of what's known as the Great Acceleration.

Jonathan Pickering 22:41

And this is a period involving a really, a step change in global production and consumption. We had the Industrial Revolution, of course, beginning earlier, but we really see a dramatic uptick in industrialization, technological change, economic growth, particularly in the West,

initially, but then spreading to other parts of the world. And this corresponding rise in the extraction of natural resources and all the environmental pollution associated with industrialization brought with it a range of problems, not just sort of local level pollution, but increasingly, environmental impacts at a planetary scale; climate change, large-scale deforestation, biodiversity loss, and so on. And these changes are becoming evident in the geological record itself, but they've also destabilized the planet's life-support systems. And in doing so they're putting the well being of humans and countless other species at risk.

Jonathan Pickering 23:48

So in the book that John Dryzek and I wrote, our argument ultimately didn't hinge exactly on when the Anthropocene began, or even whether the term got the seal of approval from the geological community. But in any case, the idea has taken on a life of its own in many areas of the social sciences and humanities; as you can imagine, there's also a robust debate about the term, a number of critiques and we address some of these in the book. But for us, the fundamental issue was that the planet is now entering unknown territory, and our political institutions need to find a way of coming to terms with this.

Meghan Schaffer 24:26

In which practices or ways of thinking from the Holocene are we still engaged, and why is this problematic?

Jonathan Pickering 24:33

Well, many of the practices that we might consider relics of the Holocene are what might be commonly called unsustainable practices, say burning fossil fuels, bulldozing rainforests, polluting oceans, rivers, and so on. Essentially, exploiting the planet without regard to what effects will happen for the planet's life-support systems. And there's a fairly basic way in which those practices are problematic, and that we're undermining the conditions that we, as humans and non-human world, need to flourish. But in the book, we go a step further in our diagnosis of the problem, and we trace many of these unsustainable practices back to the role of dominant institutions that emerged during the Holocene. And these institutions remain stuck in what we call "pathological path dependencies."

Jonathan Pickering 25:27

So one example of this might be, say, markets that generate profits by ignoring or externalizing their environmental impacts. Or, another example might be, governments that rely on resource extraction to maintain their authority. So these path dependencies decouple human institutions from the Earth system, the Earth's life-support systems, and so on, by repressing information about the condition of the planet, prioritizing their economic concerns, short-term self-interest, and so on. And as a result, these institutions aren't capable of dealing with accelerating rate of ecological degradation, but continue to worsen.

Jonathan Pickering 26:12

So these path dependencies are partly a product of institutional inertia. So institutions take a long time to build, and they're often very resistant to change. But there are other kinds of entanglements and these path dependencies are reinforced by certain underlying ideas and discourses, you know, the idea that we can sustain economic growth indefinitely on a planet with finite resources. But the path dependencies, importantly, are also connected with the physical systems that institutions are entangled with. And these physical systems, infrastructure, being an example of this, can often take a long time to build, as well, and also can take a long time to change in response to changing conditions.

Meghan Schaffer 27:07

How might our transition into a new epoch affect core infrastructure systems, such as transportation, energy, and water supply? And how might this transition affect systems of social and economic infrastructure?

Jonathan Pickering 27:21

The Anthropocene is already having major effects on many different types of infrastructure. So often, when we think about infrastructure, it's the physical infrastructure that comes to mind; things like transport, energy, water supply systems, as you mentioned. But could say there are other kinds of infrastructure as well, including nature-based infrastructure, social infrastructure, and these are discussed, amongst other things, in the most recent Assessment Report of the Intergovernmental Panel on Climate Change. So nature-based infrastructure might include things like urban trees, parks, wetlands, and so on, while social infrastructure, in a broad sense, you know, includes things like the institutions that underpin how our society is functioning, social welfare systems, health, education, and the like. And all of these types of infrastructure are increasingly at risk from the instability

associated with the Anthropocene. Now, climate change is only one facet of the Anthropocene, maybe it's the one that might first come to mind for people. It's also the area that I'm more familiar with, so I might just give a few examples from, from this area.

Jonathan Pickering 28:38

So one of the biggest dangers of climate change is a risk that the Earth could reach dangerous tipping points, say, where warming reaches a point where major glaciers melt, you end up with sea levels rising, potentially several meters. And the extreme large areas of major cities could be submerged, Mumbai, Manhattan, areas of the Mekong Delta, and so on. Some small island states, like Tuvalu in the Pacific. And, of course, any infrastructure in those areas that's submerged will cease to function. But the problem extends much further.

Jonathan Pickering 29:17

So even before sea level rise gets much worse, and, you know, even in areas that are much higher, climate change is already putting stress on infrastructure, and this stress will only continue to build. So, for example, many bridges, railways, and buildings aren't designed to cope with higher temperatures. And infrastructure can also be hard hit by the disasters like fires, floods, cyclones that are expected to increase in intensity or frequency as a result of climate change. So in my home country of Australia, you had a huge bushfires in 2019, 20, and they not only wiped out huge areas of bushland, killed billions of animals, dozens of people, devastated thousands of homes, but they also hit transport, infrastructure, caused blackouts where energy infrastructure was hit.

Jonathan Pickering 30:22

And different infrastructure systems are interlinked. So, damage to one sector can have knock-on effects. You know, you might have flooding that disrupts energy networks, which then in turn disrupts transportation systems, healthcare systems, and so on. And, so far, I've mainly talked about the impacts of climate change on infrastructure, but it's also the case that physical infrastructure itself has been a major driver of climate change. And we see, if we think about the fossil fuels we burn to generate electricity, manufacture things, and so on, transport, and the enormous amount of physical infrastructure that we've built will also leave traces on the geological record, particularly for all the concrete we've made; apparently, it's the most abundant human-created material on the planet.

Jonathan Pickering 31:17

And, ultimately, so we need to be concerned about what impact climate change, other Anthropocene problems will have on infrastructure, how infrastructure is contributing to climate change, but one final point that's perhaps worth making is that when we're thinking about these, these impacts, we're ultimately not just concerned about the infrastructure for its own sake, right? The infrastructure is there for a purpose, and, ultimately, we need to be thinking about how these impacts on infrastructure affects people's ability to live decent lives.

Jonathan Pickering 31:56

So I've already mentioned how low-lying areas will be more heavily affected by sea level rise, but a common thread worldwide is that, by and large, the poorest and most vulnerable will be hardest hit by the impacts of climate change. So this may be because they have limited or unreliable access to the infrastructure that they need to meet their basic needs, you know, electricity, running water, and so on. Or when disasters hit, they may be hit harder because the infrastructure fails on them. And there was a tragic example, earlier this year, where there was heavy flooding in rainfall and flooding in Libya. And this led to the collapse of two dams, which in turn flooded, flooded the city of Derna, killing thousands of people. And extreme rainfall events like this are made more likely by, by climate change. Dams are designed to handle rainfall up to a point, but it seems that, in this case, there were a range of failures and they took place against the backdrop of conflict, corruption, and government neglect. So infrastructure is an important contributor to the problems we face in the Anthropocene, and, accordingly, we need to rethink how infrastructure is designed and, and governed so that we're in a better position to ensure that infrastructure serves the purposes that support people's lives.

Meghan Schaffer 33:32

What should define good governance in the Anthropocene, and what, if any, steps might we've already taken towards achieving this?

Jonathan Pickering 33:40

Well, given the instability associated with the Anthropocene, it's a little hard to say that any one single model of good governance is going to work out for situations. But we do make a

broader argument, which is that good governance in the Anthropocene requires institutions to cultivate a quality that we call "ecological reflexivity." And reflexivity combines three main elements. The first is a capacity, on the part of institutions, to recognize their impact on social and ecological systems, and to listen to feedback from those systems. Second, institutions need to critically reflect on their core values in the light of this feedback, and in the light of their experiences. And then, thirdly, to give effect to that rethinking, institutions need to respond by transforming their values and practices. So the idea is, it's centered around a recognition of environmental impact and ability to critically reflect, but, importantly, an ability to act on that reflection. Well, how do we create reflexive institutions?

Jonathan Pickering 34:55

There are a couple of different aspects of this. One is about the nuts and bolts of institutional design, if you like. And the other is a broader political question about what kinds of forces or drivers could trigger the kinds of reflective practices that we need. So in terms of the questions of institutional design, it might sound like reflexive institutions need to be as flexible as possible so that they can change tack as needed if ecological conditions change. But the thing is that if institutions are going to protect human and non human well being over the long-term, they also need to have a certain amount of stability. And in the book, we describe an institution that can balance this mix of flexibility and stability as a "living framework." So this term you might recall, the idea of a living document that evolves over time, but it also suggests the idea of a framework for living, so a framework for flourishing under unstable conditions. Contrast this with many of today's institutions that are so unresponsive to ecological conditions that they're perhaps better understood as "zombie frameworks."

Jonathan Pickering 36:12

As for the second, I mentioned about where triggers for reflexivity may come from, could be a range of sources. It could be scientists, activists, media, leaders in government or business, and the like. But we argue that democracy has a critical part to play. One reason for this is in a democratic society, people on the frontlines of environmental change have more of a voice, and more of an opportunity, to send early warnings to leaders, policymakers, about the threats that they're facing. So democracy is a vital element. But we also need to think about dismantling barriers to reflexive governance.

Jonathan Pickering 36:56

So they could include things like vested interests that successful in distracting the attention of leaders from progressive reforms, so perhaps reforms to, you know, campaign donations, lobbying, and so on, maybe reform of concentrated media ownership that ends up serving as a mouthpiece for business as usual. But as for the second half of your question, which was about what steps have been taken so far, I'm a bit hesitant to say that we can find many examples of living frameworks in practice. There are examples across history of indigenous societies that have lived sustainably for thousands of years. But we can still find hints of reflexivity in some existing institutions.

Jonathan Pickering 37:52

And at the international level, where most of my work is focused, there are a handful of examples of successful efforts to solve global environmental problems. And perhaps the, the poster child for this is the regime for restoring, protecting the ozone layer. As the climate change itself, some would say that, well, the Paris Agreement shows some signs of reflexivity in the way it encourages countries to regularly review and update their commitments on climate change. This is a controversial one because, of course, we haven't managed to get the world on track to meet the Paris temperature goals of two degrees warming, let alone 1.5 degrees. But we have managed to bend the emissions curve compared to where it was heading under a business-as-usual situation. So, arguably, the Paris framework and the associated efforts of countries, cities, communities, and businesses, and so on, have had some effect. It's just that we still have a long way to go.

Meghan Schaffer 39:03

How might such governance better position us to effectively mitigate what challenges our infrastructure systems may face in the Anthropocene?

Jonathan Pickering 39:12

If we think back to the idea of pathological path dependencies mentioned earlier, well, infrastructure itself is often tangled up in these past dependencies. Physical infrastructure, like highway systems, electricity systems, and so on, take a long time to build, will take a long time to reconfigure, and, often, you have large bureaucracies built around this infrastructure that can also be quite resistant to change. So there's this double challenge of breaking out of these old path dependencies, constructing new forms of infrastructure

governance that are both durable and flexible, as well. So, in other words, we need to transform our physical infrastructure, but, at the same time, we also need to transform the institutions or the social infrastructure around it. And, as I mentioned, as well, there's another twin challenge, which is that we need to reconfigure our infrastructure to make it better able to handle the impact of the Anthropocene, but we also need to ensure that it is reconfigured so that it doesn't contribute to the environmental degradation associated with the Anthropocene.

Jonathan Pickering 40:22

Now, I might say a little bit about the energy infrastructure sector, which is something that I've been thinking about recently, as I've been working on a project about the rollout of solar and wind energy in rural Australia. And reflexivity in this context requires rethinking how we produce energy and what effects it has on the planet. Now, a fairly minimal amount of rethinking might get you to the point that, well, we need our electricity systems to transition away from fossil fuels to renewable sources. But then, a next step is okay, we need to do this in such a way as to minimize other adverse effects.

Jonathan Pickering 41:07

So you need to think about, say, supporting workers at coal-fired power plants who might be out of a job, but also about minimizing the environmental impacts of extracting the minerals needed to build renewable infrastructure. At a more fundamental level, though, reflexivity might require rethinking what kinds of purpose infrastructure should serve in our lives and how it should be governed. So if, ultimately, our energy systems are still fueling economic growth for its own sake without making people's lives better in some meaningful way, maybe we should think about what we do with our energy and whether it's possible to scale back our energy demand, so that it's focused more on those more meaningful purposes.

Jonathan Pickering 41:56

And this wouldn't make the task of switching to clean energy sources less urgent, but it would make it easier and cheaper. And, similarly, if we're thinking about overhauling our energy infrastructure, we need to be thinking about opportunities to make it fairer and more democratic. So many households, in Australia and elsewhere, are now generating their own energy on their rooftops via solar panels. And so, for many people, the idea of

being less dependent on large energy companies is quite empowering. But this shift places other pressures on our electricity systems, least, you know, how is the electricity system going to handle the influx of large amounts of solar energy, but only at certain times of the day?

Jonathan Pickering 42:43

And there are major investments needed to transform the grid to handle this, this shift? Many people, so particular people, say, renting their accommodation, can't afford to put panels on their own houses, and they're in less of a position to reap the benefits of the energy transition. And they're often having to pay disproportionately for the costs of transforming the grid. So there's a lot of questions there about how energy infrastructure is designed and governed, so that the services that it provides are more accessible and more equitable for different communities.

Jonathan Pickering 43:30

Perhaps just one other example. So in many parts of Australia, particularly in rural areas, there's a lot happening to construct new solar and wind farms. These are typically built and operated by large companies, and often these companies will provide some benefits to communities. There will be some jobs during the construction phase, they might, say, sponsor new facilities for communities and so on. But there's very little support in place for rural communities to set up their own energy cooperatives or the like. And these sorts of forms often have a much greater degree of social acceptance. And they give communities a greater say in, in decision-making. So there are other ways in which we can think about how energy infrastructure could be governed, that could be more empowering, and overcome some of the opposition that we're seeing in many areas to the dramatic shift in infrastructure in rural areas.

Jonathan Pickering 44:38

Infrastructure is a highly complex area, and I don't claim to be an expert on the technical aspects myself, so, you know, it's vital that you have engineers, other experts involved in how it's designed and governed. But at the same time, it's not just an engineering problem, or even an economic problem, right, how we should reconfigure infrastructure in the Anthropocene. It's just as much a social and political problem, so we need to pay close attention to the political opportunities for change, barriers to change, and we need to have

democratic debates about the future of infrastructure. And this is where, say, social scientists have a role to play in forming these debates.

Jonathan Pickering 45:23

And, perhaps, the last point I'd make is that, well, I've mentioned that governing infrastructure in the Anthropocene is going to be a challenging undertaking. But I don't want to suggest that it's impossible. So, you know, some of the steps mentioned, say, a good public transport systems or community energy groups, and so on, are already in place in many parts of the world, so it's a matter of seeing how some of these ideas could be adapted to different social contexts, how barriers to their adoption could be lifted, and so on. So we may be entering unknown territory in the Anthropocene, but that doesn't mean we're inevitably going to end up being lost. We just need to find a way forward, collectively and democratically.

Meghan Schaffer 46:11

Thank you again for joining us and sharing your insight.

Jonathan Pickering 46:14

Thanks very much. Been a pleasure.

Meghan Schaffer 46:18

We want to thank our guests, Patrick Harris and Jonathan Pickering, for speaking with us about infrastructure and public policy in the age of the Anthropocene. Please check out our show notes on the OUPblog for a recommended reading list exploring just a few of the ideas discussed today.

Meghan Schaffer 46:34

New episodes of The Oxford Comment will premiere on the last Tuesday of each month. Be sure to follow Oxford Academic on Facebook, Twitter, SoundCloud, and YouTube, to stay up to date on upcoming podcast episodes. While you're at it, please do subscribe to The Oxford Comment wherever you regularly listen to podcasts, including Apple, Google, and Spotify.

Meghan Schaffer 46:55

Lastly, we want to thank the crew of The Oxford Comment for their assistance on today's episode. Episode 88 was produced by Steven Filippi, Ed Aymar, and me, Megan Schaffer. Thank you for listening.