

MIKE LIVERMORE: Welcome to the *Free Range* podcast. I'm your host, Mike Livermore. This episode is sponsored by the Program in Law, Communities and the Environment at the University of Virginia School of Law. With me today is Holly Doremus, a professor of environmental law at Berkeley and the co-director of the Berkeley Institute for Parks, People, and Diversity. Holly's work is highly interdisciplinary. She has a PhD in plant physiology from Cornell University in addition to her JD. And she often works on discipline spanning teams that include researchers from the natural and social sciences. Hi, Holly. Thanks so much for joining me today.

HOLLY DOREMUS: Hi, Mike. Thanks for having me on.

MIKE LIVERMORE: So one theme that we return to fairly frequently on this podcast is the value of interdisciplinary work for environmental and sustainability issues. And that's obviously something that you focused on. Your original graduate work actually was in the life sciences before you switched to law school. So I thought maybe we could start with a little bit about how you made that transition from the sciences to law and how you see the transdisciplinary perspective that you have as shaping how you approach environmental law and policy as a scholar.

HOLLY DOREMUS: Sure, sure. So how I made the transition-- actually, one of the wonderful things about law, and it's still true, although possibly not as much as when I was getting into it. But one of the wonderful things is that you can do it later on. You don't have to decide when you're 12, or 16, or 20 that you're going to be a lawyer. And in fact, law schools, in my experience, tend to like people who have done other things, who have more-- have a background that doesn't indicate that they always wanted to be a lawyer. So I was able to take advantage of that.

And when I was finishing my PhD, I also did a year and a half as a postdoc in plant physiology, which is what I had been studying. But by the time I finished my PhD, it was clear to me that the science work I was doing was too removed from the problems that I thought were most interesting and important in the world. And I wanted to do something that I could see as mattering a little bit more. So that was the reason-- that was the main reason I wanted to go to law school. The other thing that was going on at the time was that when I got my PhD, I was doing plant biochemistry.

And at that time, molecular biology was really taking over. And it would have been, I think, very, very hard for me to get an academic job as a scientist.

MIKE LIVERMORE: Interesting. But obviously, you have that very substantial scientific background. How do you feel that's informed your, if at all-- maybe you left it behind, but I suspect not. How do you feel that that's informed your work as a scholar and someone engaged in law and policy?

HOLLY DOREMUS: Yeah, I think two things. I mean, one actually as a practical matter, it's made it much easier for me as a scholar to reach out to people in other fields. I think when I got started-- and actually, I should say, it really helped me get my job. When I was first hired at UC Davis, they were-- for reasons that I still don't quite understand, but they were convinced that they needed somebody with a natural science background to add to their environmental program. And I think maybe part of what was going on was that the ecology, biology, conservation biology work at Davis was really strong, and they wanted somebody who could talk to those folks.

And I think in the context of talking to people in-- especially in the natural sciences, it's much easier to just go introduce yourself and start talking if you can say, oh, yeah, I've got a PhD from an R1 University whose name you all know. It just gets you a little bit more credibility, I think, and that was very helpful. But it has-- from the beginning, from the time I was in law school and started writing law review papers and thinking about an academic career in law, my background in science has been really important to the problems I identify as the ones I want to work on and to the way that I see those problems.

So I think maybe I'm a little more sensitive than people without that background to the communication issues and to the hidden questions that may lie underneath this assumption that science will solve this. And I think we've gotten better over the-- gosh, I've been in the Academy for almost 30 years now. And we've gotten much better in general at seeing that science, in fact, is very uncertain, and it can hide a lot of value questions. But I think there still can be a tendency for people who are not scientifically trained to think that scientific answers are clear and that science should dictate the policy outcomes.

And there's still a rather, to me, disturbing tendency on the science side to see things that way. And that's part of what comes in interdisciplinary work, is that sharing perspectives can help people of all disciplines better understand what parts of a question they can answer and what questions they may not have thought to ask, that working with other people can help them ask and answer.

**MIKE
LIVERMORE:** Yeah, that's a really-- it's a really, really nice way of saying that. It's just such a consistent issue in our public debates and our law, this tendency to scientize certain types of policy questions or kind of have a banner that says just do what the science says when, of course, science doesn't provide us with all of the answers to every kind of question that we might like. And it is such an important skill to be able to separate out those things. So of course, you do a lot of work in the area of biodiversity, and species, and conservation.

And this is a huge just area where ethics, and values, and morality, and science, and lots of different sciences conservation, biology, and ecology, and the like. All are kind of entangled together and on some of the biggest issues, like facing humanity and the planet today. So there's a really ripe area for us to talk about today. So maybe just as an entree into that, the Indigenous Species Act has been around, obviously, for a long time now, 50-plus years. And we live in a different context than when the ESA was originally put on paper.

And the big thing that is relevant is climate change and the impending extinction crisis. The ESA is really oriented towards this species-by-species approach. And the tools have been around for a long time. So I guess, just to get us started with this is how do you-- do you think that kind of broadly, we need big changes in our approach? What we've been doing for a while has been good. But do you think that it is moving forward, generally speaking, the right framework? Or do you do you see us at a juncture where we really need to start thinking big about what the goals of conservation are and how we ought to be achieving them and maybe making some big policy changes?

**HOLLY
DOREMUS:** Yeah, I definitely think we're at a place where we need-- not necessarily to change our goals, but to evaluate them, to look closely at them. And yeah, the ESA has now been a law for almost exactly 50 years. And everybody's aware that climate change makes the conservation problem much more difficult. But the conversations that I've been hearing and that have been asked to be part of are-- they tend to be really oriented around what should Congress do, what should the Fish and Wildlife Service and National Marine Fisheries Service, the agencies that implement the ESA do.

And I think those questions are too small. We may need legislative changes. We certainly still need some regulatory corrections of what happened in the Trump era. There's been some corrections. There need to be more. But I really think we need to step back and ask what is it we're trying to achieve in order to evaluate what we ought to do to get there. And I keep thinking about-- there's a phrase that has stuck in my mind since the 1980s when I was watching way too much late-night cable TV. And there used to be all these infomercials that were on.

And I remember one of them, it was supposed to be inspiring people to I think make a lot of money and flipping real estate or something like that. But the catchphrase was if you aim at nothing, you will surely hit it. And that strikes me as just exactly true. If you don't know what you're trying to achieve, there's no way you will achieve it, right? You'll get what you aimed at, which was nothing. And that's where we've been with the Endangered Species Act.

It's been unclear from the beginning what exactly-- what entities were protectable under the law, what entities we should be protecting, why we should be protecting them, exactly how much we should be-- how much effort and cost we should be willing to put into protecting them. And at the time in 1973, I think everybody assumed that those questions either weren't important or the answers were obvious and non-controversial. Actually, in 1973, ecologists knew that species were hard to define. But the act says, OK, list subspecies in the context of vertebrates, which are the things we apparently care the most about.

You can sometimes list distinct population segments. So that seemed to take some pressure off of exactly what is it we're trying to protect. And you mentioned that there were a couple of federal laws that preceded the Endangered Species Act. There were 1966 and 1969 versions. And they were really quite limited in their impact. They were-- just about what happened on federal lands. And they were pretty focused on direct impacts on species, things like hunting and fishing, overexploitation. And although the 1973 law goes a lot farther, I think a lot of people in the course of the legislative debates didn't recognize that or assumed that wasn't the case.

So it seemed like the species problem was kind of-- it was ambiguous but didn't really matter. We have figured it out. And people were not expecting, not anticipating the level of controversy that developed. And that developed pretty quickly, but climate change makes it even much worse. And so it becomes much more important to decide what is it we're trying to protect. Where do we want it to be? How-- what sort of risk tolerance do we have? What tools are we going to use for conservation? All of those questions become much more difficult and more obviously important in the climate-challenged world where conservative-- it's really hard to what proportion of species are at risk.

But a fairly conservative estimate these days is about 20%, even if we achieve the Paris goals for keeping temperatures to not too much change, which it seems quite unlikely we are going to do. So we've got as much as 20%, 25%, 30%, even up to 50% of some groups maybe at serious risk of extinction because of climate change. And there is just no way the ESA was not framed to protect that proportion of species.

MIKE
LIVERMORE: Yeah, no, it's really-- when I teach the Endangered Species Act, I kind of leave this for the end of the course-- of the section because-- and I go through the different parts of the act, and how it works, and so on. And then at the end, it's kind of like, and so there are a couple thousand species roughly that are protected under the act. And if we take the science seriously with respect to climate change, we're talking about many orders of magnitude, larger number of species that are at risk. It's just-- it's kind of like a staggering thing to contemplate.

And what would it mean to list all those species? And what would it mean to actually apply the requirements, as we currently understand them, of the act to all of those species? I mean, is that-- just for folks who aren't as maybe familiar with the mechanics, what do you envision would happen if we were to do that? Is it just that the system just breaks and we would, as a consequence, just have to come up with something new? Or how do you how do you see that actually playing out over the next handful of-- basically a handful of decades?

**HOLLY
DOREMUS:**

Yeah, what I envision is that it becomes politically untenable. And we've already seen some of that. As you know, but your listeners may not, the ESA has a safety valve, but it's very hard to invoke. So the ESA, by its terms, protects every endangered or threatened species. And actions that would be likely to jeopardize the continued existence of a listed species are prohibited. It is, however, possible. There's this thing called the God Squad that can say, it's OK to go ahead, even though we believe that this is going to jeopardize a listed species.

The God Squad is a group composed of cabinet level officials. And it has to determine-- in order to grant an exemption, it has to determine by a supermajority vote that the activity that would cause jeopardy and unacceptable risk to a listed species is important. It's of regional or national importance. It can't be accomplished without jeopardy. And everything's being done to reduce its impact as far as possible. Those are really high barriers, as you can imagine. And it hasn't even been invoked. It's so hard to invoke it. That hasn't even happened since the 1990s.

It's only once granted an exemption. That was for, I think, 11 logging sales, timber sales on national forests in the Pacific Northwest right at the transition between Bush 1 and Clinton, when the spotted-owl wars were most acute. And the God Squad voted that these sales could go ahead, even though they would likely jeopardize the spotted owl. And shortly after that, Clinton was elected. And his administration said, we don't think these sales are important. We're not going to do them. So that pathway, it's incredibly hard to invoke. It has a very high threshold for granting an exemption.

It's nowhere near enough to let the pressure off if many, many thousands of species need to be protected. And in fact, it's never been the only way out of the ESA protection difficulties. The first time-- when the God Squad was created, it was written into law after the Tellico Dam controversy. Which again, in case your listeners aren't familiar with that, Tellico Dam was a Tennessee Valley Authority project. The TVA was building a whole bunch of hydropower dams in the Southeast as part of its mission to electrify the rural region.

And it just kept building these dams, even when electricity was pretty available. The Tellico Dam was opposed by a coalition of environmental groups who were primarily interested in protecting one of the last free-flowing rivers in the area. And they went out, sent some biologists out there, and surveyed the river areas that would be dammed up and drown, turned into reservoir. And they found a new fish, a fish that had not been known there, and got it listed on the Endangered Species Act. It was called the snail darter. And it's a small but colorful fish. I've never seen one in real life, but the pictures of them make them look quite attractive.

And so then, these environmental advocates got the fish listed, and then they insisted that Tellico Dam-- that the construction be stopped. And the US Supreme Court, in its first look at the Endangered Species Act, in an opinion called *Tennessee Valley Authority versus Hill*, held that in fact the dam could not be finished, even though it was, I think, 90% complete. They really just had to close it at that point. And the Supreme Court said that would violate the Endangered Species Act because there was this listed fish that couldn't survive in reservoir conditions.

The administration took it to the God Squad. And the God Squad said, this reservoir is not important. It's not important enough to give an exemption for. And in fact, they did an economic analysis, and they decided the economic benefits of completing the dam, not of completely building it, but of just doing this last marginal piece were not justified by the economic benefits, which essentially were illusory. There was no benefit to constructing, to finishing this dam. So the God Squad said, no, we're not granting an exemption. Then the advocates of the Tellico Dam took it to Congress, and they got an exemption there.

So that's always been the alternative way to go. And I'm convinced that if the number of ESA controversies conflicts goes up by orders of magnitude, which it's likely to do as climate-threatened species more and more reach the list, congressional intervention is going to become more and more common.

MIKE LIVERMORE: Yeah, that's really interesting. Because then, you're moving out of a system that, for all of its limitations, the administrative process, there's a certain amount of rationality, and there are standards. And it's not merely about the play of political power. And then moving that into Congress, which the Tellico Dam story is a good example of, where a pretty thorough process says, this is stupid, we should not be doing this. There's no economic benefit. But then Congress kind of decides to go ahead anyway. So yeah, so just kind of returning to the point you made a few minutes ago, that when the ESA or the contemporary ESA was adopted, we were able to fudge a lot of the hard questions.

Exactly what we're trying to protect, a little bit more concreteness about the goals. Of course, there are goals in the ESA, but they're very abstract. Any discussion of risk tolerance, right? Because, I mean, the way the ESA is typically interpreted as almost a zero risk framework, although that's not in practice how anything can work. But it's hard not to fudge these questions. Because if you don't fudge them, you have to address them, and you have to build some political consensus in it.

It does seem-- I don't know, certainly with environmental issues and maybe with the Endangered Species Act, in particular, or conservation in particular, it just strikes me as very, very difficult to achieve any kind of consensus about these hard questions about, what do we actually care about? What we should be protecting? So yeah, what are your thoughts on that? If it's true that climate change is really going to force us, which I think strikes me as absolutely right, to think in serious ways about updating our conservation approach, how do we even start to have a conversation that would allow us to build some kind of consensus around these pretty contested, pretty difficult questions?

HOLLY DOREMUS: Yeah, that's the \$64,000-- \$64 million question. And I don't that I have a good answer, but I do have one that gives me some hope. Right now, I would not send those questions to Congress, which I think is dysfunctional. And honestly, it's more and more performative, right? And I think we need a serious conversation about these questions, not a set of competing performances. I wouldn't send it to the administrative agencies either for a couple of reasons. One, we've had an environmental law for decades now, this problem of whipsawing with different administrations.

And that means that administrative-based changes don't have any staying power, which may be good or bad depending what you think of the administration. But it's almost like in many of these circumstances, I see a kind of assumption that whatever your opponents did must have been wrong. And so the agencies spend all their time undoing what was done by the last administration and then trying as fast as they can to get something in place. So that's not the way to go.

In addition, I think the US Supreme Court with its heightened hostility to creative administrative action, which we can see obviously in the *West Virginia versus EPA Clean Air Act* decision, makes it even less likely that an administrative approach will help us. So I think in the end, we're going to need to go to Congress, but that's absolutely not the way to start. And maybe this is self-serving, but I actually think academia is the place we need to start because academics can talk about problems in different ways than politicians do. A lot of academics have been attacked for talking about climate change in various ways. And that's certainly is a risk to any academic conversation these days.

But I have tenure, and most of my academic friends have tenure as well. And that's important, actually. That means that even if people object to what you say, as they might well, your job is not at risk, not at direct risk because of what you're saying in the public sphere. The other thing about academia that I think is really desirable here is that you mentioned the need for interdisciplinary work, cross-disciplinary, multidisciplinary, whatever word you want to use in the context of environmental problems. I think that's absolutely right. And I think that's really needed here.

And academia-- in the time that I've been a professor, academia has gotten much more friendly to that kind of multidisciplinary work. And so there are a lot of academics that know other people, right? There are a lot of connections that cross those kinds of boundaries. And I think that's essential. Crossing those boundaries is really needed in the context of the discussion I want to have, the discussion about what are our conservation goals and where are we as pro-conservation folks, I'm clearly in that camp, where are we willing to give? Where can we give without sacrificing the fundamental goals?

That's a conversation-- and I think going back to 1973, that conversation was not transdisciplinary. I think there was some input from biologists into the framing of the law. There wasn't a conversation-- a broader conversation about, well, exactly why and what does that mean? The ESA, as you mentioned at the beginning, Mike, it states these goals at a really high level of generality and abstraction. It says that our goal is to conserve endangered and threatened species and the ecosystems upon which they depend because careless action has led to extinction and threats of extinction.

And the species that are at risk are of aesthetic, ecological, educational, historical, recreational, and scientific value to the nation and its people. So there was this forward-looking idea. And there was-- at least as I look at that list, there was a non-economic focus. That's the one thing that was conspicuously of value, of various species that's left out of the list. But there was really no talk about, well, what do we mean by aesthetic value? And where would we draw the line between entities in order to preserve aesthetic value?

And that is not a question that natural scientists can answer. They can tell us a lot about the aesthetics, but they can't tell us where to draw the line. And same thing for historic and educational, all these other values. So I think we need to involve different kinds of natural scientists, taxonomists, ecologists, conservation biologists, educators, philosophers, people who think about different kinds of value, people who look at recreation, all of those sorts of things. And we need to think about, are there values that are missing from that list that we really think ought to be there?

And I think there is one, conspicuously, that we would include today if we were framing this law. And that's cultural value, which perhaps you could say is subsumed in historical, and aesthetic, and so forth. But I think we would want to call out the value to different cultural groups, such as Native American tribes, and make sure that that gets considered. So I think where I would like to see us start at this point is for academics-- one of the other cool things about academia is that it's self-organizing and pluralistic in the sense that a lot of different people can be working on the same problem from a lot of different angles.

And I think people should be putting together groups of cross-disciplinary, multidisciplinary folks who are good at talking across these boundaries and are prepared to think in ways that may be uncomfortable. And seeing what emerges, is there a consensus around what we ought to protect, and where, and through what tools, and to what extent? Or are there competing approaches? And then that kind of conversation can perhaps-- in my optimistic vision of the world, if that kind of conversation comes to something approaching consensus, then that can be taken to the political realm.

And I think there's an example-- what I think about as example is the Joint Ocean Commission efforts. Are you familiar with that?

MIKE It's not something I follow all that closely.

LIVERMORE:

HOLLY So back in the early 2000s, the Pew Charitable Trusts, which had done a lot of work on ocean conservation
DOREMUS: problems and was very interested in them, they put together a multidisciplinary, heavily academic, although it also involved some politicians, group to think about the future of US ocean policy, which they saw correctly, in my view, as lagging and as insufficiently articulated. And they came out-- that group came out with a report that got a ton of attention. And then the government convened a blue-ribbon commission. And the two of those commissions sort of worked together to think about what should be the future of ocean law in the US.

And that-- I mean, this is not entirely an optimistic story, although it's pretty optimistic one. That led to the Obama administration's putting together these regional ocean management councils. And it led pretty directly, I think, to the acceptance, in the policy realm, of the idea that ocean management had to be done across some institutional boundaries and across activity boundaries in a way that it hadn't been. And so I think we need some kind of-- that we need that kind of a process, starting in academia, proceeding, I think, to academic political cross-boundary institutions. Then hopefully proceeding to agency efforts, executive branch efforts and maybe to congressional work.

MIKE Yeah, I mean, it's a really interesting vision. It's a really interesting idea about how these kind of processes can
LIVERMORE: unfold. Just to throw out a few thoughts that arise. So obviously, when we're thinking about something as big as the Endangered Species Act and conservation writ large, as you know, it's a highly values-laden set of issues. So there's some context where we can turn over-- not turn over necessarily, but that are highly technical where technical expertise is going to have a lot to contribute. And there might even be just technically right or wrong answers.

Whereas with something like conservation, there's just irreducibly a ton of questions that are moral, that are values questions, that are about balancing, competing concerns, and the like. So I could certainly see how an academic conversation, a conversation amongst experts, can lay out what the values choices are, clarify what the scientific state of affairs are, and are at least our current knowledge about the scientific set of affairs. Again, clarify what the values that are implicated and get all that on the table to a certain extent. And that does seem like a great role for academics and in the discourse.

I think the tricky part is settling those questions, to come up with any kind of resolution. There might be proposals and so on. But it seems that that's the kind of thing that ultimately we have to kick to a political process. Well, in any case, because the politicians will just want to redo it anyway. Whatever settlement the academics come to, Congress will just have its own-- members of Congress will have their own take. So is that how you see the process working out, as kind of clarifying the stakes, clarifying the trade-offs and the like, and then ultimately the politicians do their thing?

But although that still leaves us with the difficult problem of how we reach that compromise. Even in an idealized Congress, could we reach anything like it? Certainly, not a consensus, that's hard to imagine, but a compromise. And as you said, the Congress that we have now just doesn't seem to be able to decide or make compromises about anything. So yeah, so I'm just curious about how you imagine addressing this problem of settling at some level and arriving at some resolution about these really, really hard value questions.

**HOLLY
DOREMUS:**

Yeah, I'm not positive we can do that at all. But I do think we need to try, and it's worth a try. And one way to think about it perhaps is that actually, we seem to have and have had, since the 1970s, a strong political consensus in the US that conserving the biological world is something that's worth doing. And I actually haven't seen any really recent surveys on this. And I'm a bit worried about it because our politics have gotten so polarized. And conservation-- biological conservation has not historically been a single-party issue, although the means of approaching it have been different.

But that may be changing. And we do need a way to get beyond polarization. And part of my answer is that I'm going to kick that to the people who are trying to improve our political process from the ground up. But I also do think we have a consensus that conservation is worth doing. We need that consensus to be-- we need it to be more specific about what that means in order to have something that we can implement in a climate-challenged world. And one of the things that I think this academic process, that I'd like to see kick off, can do is that it can help take the pulse of that political consensus a little bit better.

We can understand more about what people value in the biological world, what informs their idea that we should do conservation in general. We don't just have to say, OK, we're going to make a list of all the values that we think species serve, and that will make everything protectable. We can talk to people. And that's something academics can do. This is one of the reasons we need to engage social scientists, is to understand how people in the political community see these issues, what do they see as important to protect and why. And also, if the conversation is broad enough, we can help clarify what the benefits are of conservation, what should people be seeing as the benefits.

We can have, I think, a kind of back and forth about that. That's never happened. And this also brings up the ways that we see conservation may be changing. Certainly, the ways that experts see it are changing. The problem, as it's described by conservation biologists and ecologists, is changing the solutions that we see. But also, there's this completely different conversation about rights of nature that's going on. And that actually is not something that was part of the 1973 discussion, at least not directly. It's a very utilitarian list.

We have a list of all the ways that species are valuable to the people of the nation. We didn't concede and haven't ever quite conceded that maybe the natural world, the non-human world has a right to exist that we should steward, that we have obligations not to disturb too much. I think that's sort of always been in the background of the ESA, but it's not been specifically called out. And I was reading something recently that more young people are now seeing-- if you ask them about conservation, they're invoking things like the rights of nature to exist.

And if so, that's something that ought to be more clearly part of this, which is all I keep rambling on in this conversation. But I think that does get to your question about how does this help us in the political context. Yes, in the end, these are political questions. And I think in the 1970s, we really glossed over that and tried to put experts in charge in a way that would keep us out of the political realm. I think a lot of people, including me, have been and are still reluctant to put things too much in the political realm because we see the politics as so dysfunctional and as so favoring narrow special interests, that we really worry about what happens.

I don't think-- given the stress that climate change is putting on the system, I don't think we can avoid it anymore. And so the best we can do, I think, those of us who really care about conservation, is to try to more clearly articulate our reasons for that, our values and to see what resonates with the public as a way to change the political calculus.

**MIKE
LIVERMORE:** So we've been talking about the goals of conservation, which are in some ways, this is the big, big, big question. But there are other big questions that are also on the table, that we would presumably be wanting to think about if we're thinking broadly about really trying to respond to the changing nature of the world and how we're going to do conservation. So for example, like the tools, we have a very specific set of tools that we use under the ESA, governing what the federal government is or is not allowed to do in the face of a listed species, requirements that have to do with individuals, regular private actors out there.

There are lots of other programs that we have that receive different levels of funding that promote some conservation end. So do you think there are-- even if we all agreed about very, very broadly what the goals were of conservation, it would still be lots, and lots, and lots of hard questions about how do we achieve those goals. So what do you think are some of the interesting questions at that level that we ought to be thinking about, again, as we're responding to this new world that we find ourselves in?

**HOLLY
DOREMUS:** Yeah, that's a terrific question and one to which you might hear a lot of different answers. I think, again, this is actually quite closely tied to what are our goals, which in the end, what that comes down to is, what do we want the world to look like in the future? What do we want to include that's outside our direct control? And I think it's really important that you mentioned that there are other laws and programs other than the Endangered Species Act that we ought to be putting into the service of our conservation goals.

One question that's come up under the ESA is, what do we do about species that are going to have to change where they're living? Climate change is really scrambling habitats all across the world. Temperatures are changing. Precipitation patterns are changing. What other species do are changing. So if flowers are coming up earlier, blooming earlier than birds and insects that use those plants and those flowers have to respond in different ways. So there's this great scrambling that's going on.

One thing that people have been talking about for 15, 20 years or so but that hasn't been happening in the policy arena much is what's called assisted migration. That's where people deliberately move species from one place to another. The idea being that the habitat conditions are becoming unsuitable where the species currently is. And there may be places where habitat is available or could be made available to them in the future. And one species that's talked about in this-- there are a lot of different species people talk about this way. But one is the pika, which is a mountain-dwelling species that is quite sensitive to heat stress.

So as places become warmer, the temperature goes up sort of up the mountain so that the pikas can move up the mountains they live on to find temperatures-- at least in some places, to find temperatures and conditions that are suitable. And that actually isn't a bad way to adapt because mountaintops are some of the places that are actually least affected by human development, among other things. But there's a real problem when the pika gets to the top of the mountain.

MIKE Yeah, you run at the mountain at some point.

LIVERMORE:

HOLLY You do. And you can't fly. So then there's a question, well, if the top of the mountain is no longer suitable or no longer big enough suitable area, what do we do? Should people physically move these pikas to, say, mountains further north where they might be able to persist? And that is a technical question. Will it work? What confidence do we have that it will work? How do we make the new habitat suitable? And what do we do about the species that are already there that the pika might interfere with?

But it's also very much a values question. Is it up to us? And this is a question that I think we've been really unwilling to tackle because it's so difficult to answer to what extent should we be permanently the gardeners of the entire world?

MIKE Yup.

LIVERMORE:

HOLLY And that's what moving species across the map is, at least if we have to keep doing it. Another place where this is coming up today is Isle Royale, which is a national park. It's an island. And there have been, in my lifetime, moose and wolves on that island. But it's a small island for both of those species. And the wolves have nearly disappeared or had nearly disappeared. Until a few years ago, the National Park Service brought some new ones in.

MIKE Brought some over, yeah.

LIVERMORE:

HOLLY
DOREMUS:

Yup. But given the size of the habitat, it's quite likely that if we want to have wolves on Isle Royale, we'll have to keep importing them periodically. And again, that's the question of how much should the world be humanity's garden, and who gets to decide what that garden looks like? And it's also-- it's not just-- it's a values question, but it's also an economic question because it's really expensive to move critters around. And those sorts of questions are going to come up more and more. And the Fish and Wildlife Service has just issued a proposed rule that says that the Endangered Species Act gives them the authority to do assisted migration where necessary to save an endangered species.

But that the way they would do it is through use of the experimental species, the experimental populations provision, which has always been understood to allow releasing, reintroducing species to their historic range. And that's how we have a gray wolf population in Yellowstone, is that in the 1990s, we released some wolves there. And they've been able to establish a population. But the Interior Department now says they can do that outside the historic range of the species. I don't think it's universally agreed that, in fact, they do have that authority.

But even if they do, that still leaves the really tough questions of, when should they do it? For what species and to where? And how should those decisions be taken? And those are the kinds of things that we're more and more going to have to address. There's also the question of how we protect the habitat that's not currently occupied by species that are listed. And that has, as I'm sure you know, led to the Supreme Court case, the *Weyerhaeuser* case, about the dusky gopher frog, where the court said, well, the ESA actually does not allow you to protect what's not habitat, which may mean what's not currently occupiable by the species, which makes it tough to have habitat that species can move into.

And to me, what that means is we're going to have to work more beyond the boundaries of the Endangered Species Act, to use our land acquisition authorities, for example, or to use the lands that the government federal state already owns to allow, or in some cases, perhaps facilitate the movement of species. One of the things that I think is going to be really difficult and that I think land managers understandably resist is that for me, it's important that in some cases, we don't deliberately do the gardening, that we allow what remains of nature.

There's no part of nature that we don't have effects on these days on the Earth. But those effects are more or less direct. I think it's important that some large areas be protected but not intensively managed, so that what remains of nature can find its own way, its own path to what is going to be the future. But that's really scary, right? That means letting some things go.

MIKE
LIVERMORE:

Yup, that's what exactly what that means. If you're not going to manage it, you don't get a say anymore in what happens. So the final kind of quick set of questions-- of course, none of these are easy or quick. But the final set of issues that I wanted to just get your thoughts on while I have you is, again, thinking big picture about the Endangered Species Act, there's been a huge amount of controversy about the kind of distributional fairness effects of the act. The ESA imposes a lot of obligations on private actors.

And if you find-- if a species that's on your property gets listed, tough luck for you, right? That's real bad news. And it just imposes very serious costs on some. Others get away. I don't have any endangered species on my land, so I don't have to worry about it. And so-- and that's a big source of tension. It's a tension between urban and rural folks. It's a tension between some folks who have to worry about this and others who get to enjoy the benefits of species being around.

So are there any big changes that you would at least put on the table, not necessarily endorse full-throatedly, but that you think are legitimate ways of thinking about some of these distributional or fairness questions that we've kind of skirted up to this point?

HOLLY
DOREMUS: Yeah, I do think that needs to be more on the table. And my thinking about this has changed a bit. And it definitely changes as the ESA protects more and more things, and that's more and more difficult to do. I used to think that land ownership-- well, I do think land ownership comes with some obligations. And one of those obligations could be to provide for some minimal level of a natural world, either on your land or by joining together with others. I think at this point, it's true that the people in the past got away with really destroying a lot of nature.

And we shouldn't countenance that today. But we also should recognize when the distribution of costs and benefits is really uneven and when people can't help it, which there is kind of this lottery of nature that who's got endangered species around them. And I think it does need to be-- we need to-- one of the things we need to think about is exactly what are the obligations of the government, the public to pay for the conservation that it wants. And I don't think there are easy answers. I don't think we should always necessarily do that. But I definitely think that should be on the table.

The other thing that I think this brings up is that there-- in the US historically, we've rejected government-based long-term planning everywhere, except at the very local government level. And I think that needs to change because right now, if a limited amount of habitat destruction can happen in the range of a particular species, what happens is the first person to ask to do that gets it. And that's--

MIKE
LIVERMORE: It's a race.

HOLLY
DOREMUS: --totally inequitable.

MIKE
LIVERMORE: Yeah, it's a race. You don't want that. That's the last thing you want.

HOLLY
DOREMUS: Right.

MIKE
LIVERMORE: OK, well, I mean, these are heady issues. They're difficult. They're super contested. They are political. They're scientific. But they're also super interesting. So it's been a really, really fascinating conversation, Holly. Thanks for all the work that you've done on these issues over the years. And yeah, it's been a real pleasure to have you on the podcast.

HOLLY
DOREMUS: It's been a fun conversation. Thank you.

MIKE
LIVERMORE: And listeners, if you enjoyed this episode, let us know. You can give us like, a rating, subscribe to the podcast, and follow us on social media. It'd be great to hear from you. Till next time.