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#364: The end of sustainability: Realism and resilience in managing our natural resources

VOICEOVER

This is *Up Close*, the research talk show from The University of Melbourne, Australia.

ERIC VAN BEMMEL

I'm Eric van Bommel; thanks for joining us. It's believed Charles Darwin once said it's not the strongest species that survive, nor the most intelligent, but the ones most responsive to change. But are humans, in a coming age of immense ecological uncertainty, ready to change? Our guest on this episode argues that goals toward environmental and resource sustainability are futile, that as we now find ourselves in the Anthropocene in which climate change, massive biodiversity loss and skyrocketing resource consumption are the order of the day, the very notion of maintaining a predictable, socioecological balance is doomed.

Sustainability has been the mantra in resources management for decades now and while a noble idea, it's increasingly unlikely to work in a world where everything is in flux. But if sustainability is not the approach we should take, what is? We are joined by environmental policy expert Robin Craig who is the William H Leary Professor of Law at The University of Utah and the author of very many papers on water rights, pollution, oceans and climate change adaptation. She's co-author with Melinda Benson of the upcoming book *The End of Sustainability: Resilience, Narrative and Climate Change in Environmental Governance*. Robin is in Melbourne as a guest of the Melbourne Law School's Centre for Resources, Energy and Environmental Law and we're grateful she could join us in the studio today.

Robin, welcome.

ROBIN CRAIG

Thank you, very nice to be here.

ERIC VAN BEMMEL

Now Robin, is sustainability becoming a dirty word?

ROBIN CRAIG

I don't think it's a dirty word. I think the goal with which it's set out was a noble one to, at our best, live within our environmental means to not use more resources that can be replaced in the time over which we're using them. The problem is, in a climate change era, figuring out what the sustainable use of any natural resource is getting more and more complicated and in particular in places like the United States where our legal sustainability goals are framed in terms of maximum use of the environment, it becomes very problematic as ecosystems are changing under your feet, so to speak.

ERIC VAN BEMMEL

That notion of sustainability goes back quite a few decades, doesn't it?

ROBIN CRAIG

Yes, it probably goes back a little earlier, but most people pin it to developments in 1987 and then in particular the 1992 Rio conference on the environment and the Rio Declaration, the other conventions that came out of that meeting in 1992.

ERIC VAN BEMMEL

It sort of emerges alongside consciousness of climate change.

ROBIN CRAIG

About the same time, yeah, sustainable development in particular was embraced far faster than the idea of climate change, I think, as a policy issue, but yeah, they did start coming into consciousness about the same time.

ERIC VAN BEMMEL

Can you pick apart the difference between sustainability and sustainable development?

ROBIN CRAIG

Yes. Sustainability is a broader concept in some ways that can be incorporated into a variety of environmental policies and management measures and, as I mentioned, in the United States actually into our law. What you mean by sustainability in any given context can change. For example, for our forests, timber that can be cut is usually managed on what's known as multiple use sustainable yield, so a lot of different uses going on in forests at the same time as timber cutting, trying to get the yield up as high as possible without losing the forest entirely, for example.

In our fisheries legislation in the United States, it's maximum sustainable yield, what's the most fish you can catch every year without losing the fishery. So depending on context, it would be fairly easy to frame sustainability as you get to take no more than what can be replaced in a given year. That would be a different way of looking at sustainability.

Sustainable development, on the other hand, is a full-on program that was developed through the United Nations, has been adopted in many countries, the sustainable development goals internationally, which are being renegotiated pretty much right now. What sustainable development aims to do is balance the use of the environment, economic development and social equity. It's trying to look at development in general in a much more environmentally benign and socially equitable fashion.

ERIC VAN BEMMEL

Is that mainly with a focus on developing countries?

ROBIN CRAIG

No, actually you can pursue sustainable developments or attempt to pursue sustainable developments in countries that are already fully developed. Countries that are fully developed tend to try and rebalance the environmental protection and the social equity issues, given that their economies are pretty much by definition doing alright, whereas developing countries may be trying to balance all three simultaneously.

ERIC VAN BEMMEL

You touch on social equity and the environment, I mean we're talking about these socioecological systems, I believe, as you call them.

ROBIN CRAIG

Correct.

ERIC VAN BEMMEL

What is that interface exactly, it's just humans exploiting resources or is it more complex than that?

ROBIN CRAIG

It's much more complex than that. No human society can exist without an environmental baseline. We all use natural resources, we all need water, we all need a certain amount of food production, other goods. There has to be an environmental baseline or back up for a society to exist and when you acknowledge your dependence on those environmental resources, those ecological resources, then you're acknowledging that your society does not exist independently of given ecosystems, natural processes that you need to survive. Socioecological systems is a way to try and capture that concept that a community, a state, a nation, cannot exist independently.

ERIC VAN BEMMEL

It's a bit of a mouthful, but it's an important one.

ROBIN CRAIG

Yeah, it's an important mouthful, yes.

ERIC VAN BEMMEL

Indeed and also that there's intergenerational equity, I mean it's built into this notion, sustainability, that it's not just us, but future generations as well.

ROBIN CRAIG

Right and again I think that's much more developed in the sustainable development literature than it is in just bantering about the word sustainability. But yeah, the idea that you need to leave a planet to the next generation that gives them the full range of options that they might want to exercise.

ERIC VAN BEMMEL

So the management of human exploitation of the environment is assumed to be within human control under this sustainability model.

ROBIN CRAIG

Yes, well we all are in control of what humans can do with the environment.

ERIC VAN BEMMEL

That sounds logical, but I wonder if it's actually true.

ROBIN CRAIG

Well we might not be in control of how the environment responds and I think that's the critical distinction. Law can always tell humans what they can and cannot do, that's one of the primary functions of law. But whether law can successfully predict how the environment itself will respond to what humans are allowed to do is a different matter and it's that second half that becomes problematic.

ERIC VAN BEMMEL

Nevertheless, it tries to take into account the normal complex dynamics of ecosystems, natural variability in temperature and precipitation and things like that. I'm not talking about in an anthropocentric world, but just under so-called normal conditions up till now and key natural resource management approaches of

preservation and restoration, preserving ecosystems, whether it's water bodies or forests, are key to sustainability and restoring where there is damage, remediation where there's been degradation.

ROBIN CRAIG

That's an assumption of sustainability. Even without climate change, however, I think there's a real question as to whether all ecosystems could successfully absorb all of the changes they were subject to and how many of them can be successfully restored. So for a specific example, many places in the world, including in the United States, have been the victim of nutrient pollution, so excess nitrogen and phosphorus in aquatic systems.

ERIC VAN BEMMEL

From fertiliser?

ROBIN CRAIG

From fertiliser for the most part, yeah. Some of our nutrients can also come from coal fired power plants, air emission that gets into the water systems. But once you've got those excess nutrients in the water, the assumption is you can just take them out and the system will rebound to what it used to be, but that turns out not to be the case. So even under natural or non-climate change, shall we say - natural gets to be a problematic word - but even under non-climate change scenarios, the natural variability can't always cope with the stressors that humans put on it in a way that becomes restorable.

ERIC VAN BEMMEL

On Up Close we're speaking with environmental law professor, Robin Craig, about what's wrong with the notion of sustainability. I'm Eric van Bommel.

Robin, you write of the emerging realities of the Anthropocene. Let's get this out of the way; what is the Anthropocene?

ROBIN CRAIG

Alright, well it's the new age of humans. This is a serious geological consideration,

the official body that names new geological eras is considering this year whether the world as a whole has entered into a new geological era.

ERIC VAN BEMMEL

From 2016?

ROBIN CRAIG

Well that's when they're going to make the decision. Now when they decide to date the start of it is another issue. What it's designating is that most of the change that is occurring in the world is driven by human activity, that humans are the driving force in global systems.

ERIC VAN BEMMEL

We're talking about ecological systems, ecosystems?

ROBIN CRAIG

Ecosystems, carbon cycle systems, I mean carbon cycles on a variety of timeframes, some of them are millennial. Things like changing the ocean chemistry, changing the composition of the atmosphere, changing climate systems, so yes.

ERIC VAN BEMMEL

That global reach of our impact on the planet.

ROBIN CRAIG

Correct.

ERIC VAN BEMMEL

So what does it actually bring to us? What is the effect?

ROBIN CRAIG

The effect is that we are radically changing how systems from very small levels to very large levels are acting. The pace of the change they're experiencing on the geological time scales, it's the extinction rate that's a big factor that this age has been called perhaps the sixth extinction that the Earth has experienced. But it's not just loss of biodiversity that's important; we're changing atmospheric temperatures, we're changing weather systems, we're changing climate systems, we're changing ocean chemistry, we're changing ocean currents.

ERIC VAN BEMMEL

And we're changing change.

ROBIN CRAIG

And we're changing change and we're accelerating the normal pace of change throughout the world, that species obviously have the ability to adapt and evolve over time, but we're changing their habitat conditions so fast that really they're only choice is to move, that most species can't evolve fast enough to keep up with the changes in their world that they're experiencing. That has a lot of rebounding effects, that species are moving physically, they're changing altitudes, they're changing their ranges, they're interacting in ways they've never interacted before and our environments or ecosystems are getting fairly mixed up.

ERIC VAN BEMMEL

Because we're talking about socioecological systems here, on the socio side, on human society side, what changes are we experiencing?

ROBIN CRAIG

A good example would be the California drought, or drought all over the world. Australia has had a few whoppers as well, but the droughts are becoming longer, more severe, more frequent. Can all of them be pegged precisely to climate change? No, the climate science isn't good enough, but the general trends certainly are indicative and that decreases water supplies in a lot of places in the world; the projections for water supply are pretty severe for certain places, in both the United States and Australia.

On the other hand, it's not all bad for everyone. Canada and Russia are projected to be climate change winners in a lot of senses, that they will actually be able to grow more food and get more water. So water availability is one of the big changes that's directly relevant to human society worldwide that the Intergovernmental Panel on Climate Change, the IPCC, has underscored in pretty much every report its written on climate change impacts on society. So that's a big one. Food production is another big one; what can grow where, how much you can produce, what your access to marine resources will be. That's also changing on people.

ERIC VAN BEMMEL

So with this Anthropocene in mind, what are the critics of sustainability saying?

ROBIN CRAIG

Well I probably fall in that camp. Sustainability is based fundamentally on an assumption that we understand what's happening with natural resources, with ecosystems. I like to use marine fishing as my example of why sustainability as a management goal isn't working anymore. We know that fish stocks are migrating; they're migrating toward the poles. That's been documented in every ocean for a variety of species.

ERIC VAN BEMMEL

To find cooler waters?

ROBIN CRAIG

To find cooler waters, yeah, the oceans are warming, currents are changing which changes plankton and food webs as well; they're on the move. We know that marine species are interacting in ways that they've never interacted before. We know as well with ocean acidification, which is what happens to the pH of oceans when they absorb carbon dioxide, which they've been doing a lot of since the industrial revolution, that that changes the pH. The impacts in the wild on shell-forming organisms have now been observed, so we know in ocean acidification hotspots, that a lot of the phytoplankton in particular that form shells are being damaged.

Of particular concern at the United States end of the world is the Arctic ice is melting and predictions of an ice-free Arctic summer are anywhere from the summer coming up to more toward the end of the century, but somewhere in the foreseeable future,

which means that there's nothing to stop species from the Atlantic intermingling with species from the Pacific. What all that adds up to, in my mind, if you're looking just at fisheries, we have no idea what a sustainable harvest of fish stocks are.

ERIC VAN BEMMEL

No more baseline.

ROBIN CRAIG

No more baseline, we have no more baseline, we don't know how they're behaving, how they're behaving will continue to change with everything else.

ERIC VAN BEMMEL

We don't know where they'll be.

ROBIN CRAIG

We don't know where they'll be, we don't know whose jurisdiction they'll be under and so trying to predict, leaving sustainable development aside for a second, but just if your management goal is a sustainable harvest and with fish, I would say meaning whatever you take this year, the fish species will be replaced for the next year, we have no idea what that is.

ERIC VAN BEMMEL

And we're unlikely to.

ROBIN CRAIG

And we're unlikely to. I mean studies will certainly get better, there's a lot more monitoring of species moving than there has within the past, but we don't know and we won't know the full impact of those ever-changing new species' interactions for a long time, if ever.

ERIC VAN BEMMEL

Similarly, baselines for rainfall, snowfall, that kind of thing?

ROBIN CRAIG

All changing. All changing. If you've got a water management system that's very dependent on reservoirs and dams, in the United States a lot of the times we base our management decisions on what's happened over the last 20 or 50 years. The American South West is proving that's not a reliable predictor of what's going to happen in the future, so very difficult times to be trying to predict management of, particularly, renewable resources.

ERIC VAN BEMMEL

Yet there are continued invocations of sustainability in international talks, development goals, policy discussions as well as all over the place in popular media and marketing. Why is that?

ROBIN CRAIG

Because it was such a triumph to get a change to sustainability thinking and sustainable development in the first place.

ERIC VAN BEMMEL

It succeeded wonderfully.

ROBIN CRAIG

Well I don't know that it succeeded in reality, but in terms of changing the rhetoric of exploitation, it certainly has gotten into the rhetoric across the world. There are a lot of people who are reluctant to let go of that.

ERIC VAN BEMMEL

I'm Eric van Bommel. Environmental legal scholar, Professor Robin Craig is our

guest on Up Close and we're discussing alternatives to what she regards as the failed doctrine of sustainability in how we manage the natural environment.

So there's a need to create ecological governance goals by some standard other than sustainability. Robin, you argue for resilience. What is resilience?

ROBIN CRAIG

Well I actually argue for resilience thinking, which is a particular theory within the concept of resilience. Resilience in general refers to the ability of a system to absorb disturbance and maintain some level of structure and function. Most people when they hear the term resilience think in terms of engineering resilience, which is the structural ability to bounce back, which is the way the term is commonly used, which is why I emphasise that I'm thinking in terms of resilience thinking, which emphasises ecological resilience which is a much more dynamic concept. The ecosystem may not be precisely identical at all times, but it's still maintaining structure and function, but also ecological resilience allows for the possibility that you can cross ecological thresholds if the disturbance is too great or at the wrong moment in an ecological adaptive cycle, push that ecosystem into a different state of being.

ERIC VAN BEMMEL

So it acknowledges a lack of baseline?

ROBIN CRAIG

Not lack of baseline precisely, but acknowledges that ecosystems are always dynamic, they've always been dynamic, that we were wrong to think of them as steady-state entities from the get go. They can be more or less able to cope with stressors imposed on them and that failure to recognise that means that we will increasingly get in the future that the exact same management decision in maybe the exact same ecosystem will have different management results if other things are going on at larger time scales, at larger system levels or lower system levels that put this particular system we're interested in, in a particular fragile moment.

ERIC VAN BEMMEL

So compared to a sustainability approach, resilience thinking in natural resources management is sort of management with its eyes open?

ROBIN CRAIG

Management with its eyes open, management with humility is the way I like to put it. As I said, sustainability requires that you have a fair amount of knowledge about the limits of variability within the system you're working with, whereas resilience thinking opens the door to acknowledging the variability can be much more extreme than you think and that transformation is in fact part of what ecosystems do.

ERIC VAN BEMMEL

So resilience thinking sort of informs management theory, but what about a resilient system, a resilient socioecological system? What does it look like? What characterises it?

ROBIN CRAIG

Well okay, an important part of resilience thinking also is that it's not a normative goal, it's a description of a property and as many people are fond of pointing out, a horrific dictatorship can be extremely resilient as a system. Part of what interests me on the law part is not just what is a resilient socioecological system, but what are we actually normatively aiming for in promoting that resilience. Again, a resilient socioecological system would be one that can take some disturbances, say a drought and at one extreme, not collapse, that's clearly not a resilient system, but be able to absorb that drought and maintain an ability to function. Whether it's an ability to function exactly as it was before the drought or whether it's an ability to function differently, but still function well and still be basically the same community, that's kind of what we're looking for.

ERIC VAN BEMMEL

Also an ability to adapt, I suppose.

ROBIN CRAIG

Right. Well I'll give you an example from the United States. Straddling the border of Oregon in California is the Klamath Basin. Like many large water systems in the United States, it's got some pretty heavy duty hydroelectric dams on the system, which led to three species of fish in the system being listed under our federal *Endangered Species Act* because they were suffering from low flows, changes in water chemistry. The bad aspect of resilience of that system, the inability to deal with

reduced flows and then it got hit with a drought as well, was evident in the fact that irrigators and farmers wanted to keep taking the same amount of water they'd always taken.

In a drought regime that would have threatened the continued existence, possibly, but that was the best prediction of at least one and possibly all three of those species of fish, the non-resilient response was to dig in their heels and fight in court, but that eventually led to a much more resilience-type response of negotiation and working out a new community-based agreement on how to better implement water management and water supply in the Basin to handle drought and species and the need to grow crops and the need to have water for people all at the same time.

Now unfortunately that agreement has stalled because it requires some federal money to remove a couple of the dams; that was one of the things that would have made the agreement possible, but it's an example of how a non-resilient social response can be transformed into a more resilient way of thinking about the system.

ERIC VAN BEMMEL

Are there any other good examples of where resilience thinking is happening on the ground?

ROBIN CRAIG

It's happening a lot in trying to open up space for species to adapt for themselves. A big project in the United States is the Yellowstone to Yukon project, trying to create corridors so that mammals in particular, but all species, have room to migrate without having to figure out how to cross an interstate, either in the United States and Canada, without becoming trapped in isolated places. It's not prescriptive in the normal sense that you think of wildlife management; nobody is saying this is what the end result will look like, but it's opening up literally physical space. The wildlife that needs to move can form its own new and hopefully resilient communities, adding some resilience and ability to adapt for those species without the overlay of a prescriptive result. Nobody's quite sure what might happen, but hopefully would be better than keeping all of these species in isolated pockets in habitats that are no longer going to work for them.

ERIC VAN BEMMEL

That would be the sustainability approach, would it?

ROBIN CRAIG

Well the sustainability approach would assume the historic range is here and therefore we should be trying to ensure that the population can exist where it always historically has. That's a lot of what was actually written into our *Endangered Species Act*, is trying to restore troubled species' populations in their historic range. As several people have pointed out, that may just no longer be possible, so better to think in terms of letting them go where they can survive.

ERIC VAN BEMMEL

How can we be sure that these resilient thinking models are actually doing what they intended? Can they be audited? Is there sort of a platform for that?

ROBIN CRAIG

In certain circumstances, yes. So I was part of a grant group that was looking at how resilient various water systems in the United States actually are. It's possible to assess where an individual system is and you've always got to ask resilient to what, so we were asking resilient to climate change. For some of the systems we studied, we could fairly easily conclude no they've flipped states, they've crossed thresholds, they're probably not coming back. For some of them, we could say, well it's kind of teetering if you did X, Y and Z, it would probably help it be resilient to climate change at least for a while. That's the problem with climate change, you can usually only predict for a while. So yeah, there's that kind of monitoring.

But if you're talking in terms of monitoring an intervention, one thing to think about is assisted migration for species, so that's very definitely human intervention, very deliberately setting up a test population somewhere where you think it's going to be able to survive. A lot of questions about whether that's a good thing to do, but you can certainly monitor with something like that whether the species survived in its translocated habitat. You can monitor things like what did it do to everything else that was there, did it become an invasive species, is it barely surviving, did it wipe out some species that we didn't think about that it ended up competing with.

ERIC VAN BEMMEL

So many variables.

ROBIN CRAIG

Yeah, so many variables. But I think given some of the deep uncertainties, other management measures, like if you're talking about forest thinning or fire prevention, it's going to be very hard to know whether the management measure helped or not, just because what you would measure is also changing at the same time.

ERIC VAN BEMMEL

What will resilience thinking demand of ordinary people?

ROBIN CRAIG

Oh I think what resilience thinking demands of ordinary people in the Anthropocene is that we think very hard about our own consumption patterns. At least in the United States we've had regimes, whether it be land use regimes or natural resource regimes, that have been geared toward allowing the maximum use possible, trying to skirt avoiding collapsing whatever the resource was that we're working with. In terms of consumption, we're really going to have to start thinking in terms of what's the least I can get by with, what's the smallest footprint I can live with to stay within safe boundaries, as safe as we can predict under a changing regime.

You can already see this in some consumer products. There's a great deal done with water accounting now in the United States and looking at the water price of various consumer products. Levi's has come up with a low water gene line, but it's a different way of thinking about what it is you're buying on a day-to-day basis. Another very touchy subject is food choices. If you're eating a lot of beef, you're making a different resilience decision than if you're a vegetarian. So like I said, at the individual level, I think that's the most important thing, that people be aware that their individual choices do in fact matter.

ERIC VAN BEMMEL

So Robin, finally, can we assume then that moving away from sustainability thinking to resilience thinking in governance is not admitting defeat?

ROBIN CRAIG

I don't think it is. I actually think that continuing to not acknowledge some of the deep uncertainties, to not take the more cautious pathway may end up condemning us to the worst of all possible futures. Whereas if you are taking a resilience thinking approach and are conscious that, to use a popular analogy, you're trying to make

your footprint on the world as small as possible, you're actually empowering yourself and society as a whole to leave options open for the future. I think that's what we should be trying very hard to do, is make sure we have as many option for as long as possible into the future.

ERIC VAN BEMMEL

Robin, we'll have to leave it there. Thanks very much for being on Up Close.

ROBIN CRAIG

Alright, thank you very much. It's been nice to be here.

ERIC VAN BEMMEL

I've been speaking with environment and natural resources legal expert, Robin Craig, who is William H Leary Professor of Law at The University of Utah. Professor Craig is co-author with Melinda Benson of the upcoming book, *The End of Sustainability: Resilience, Narrative and Climate Change in Environmental Governance*. You'll find links and more details on the Up Close website, together with a full transcript of this and all our other programs.

Up Close is a production of The University of Melbourne, Australia, created by Eric van Bemmел and Kelvin Param. This episode was recorded on 23 February 2016 and was produced by me, Eric van Bemmел, with audio engineering by Gavin Nebauer. Thanks for listening, I hope you can join us again soon.

VOICEOVER

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