Julie Kelso:

Hi, this is Julie Kelso, your host for this episode of the Making Waves podcast brought to you by the Society for Freshwater Science.

Julie Kelso:

Before we begin, I would just like to insert a disclaimer that all opinions I express here are my own and no one else's, especially not anyone I ever have, do, or will work for. And now that that's taken care of, I can share with you my interview with Sonny Jardine, professor of environmental and resource economics at the University of Washington, School of Marine and Environmental Affairs. I started my interview by asking sunny how she got started in the field of economics, specifically resource economics.

Sunny Jardine:

So in terms of how I got into economics, I did an undergraduate degree in environmental studies. At the time I was interested in where I was reading about how IMF policy was potentially contributing to deforestation in Costa Rica. So what was going on was that the IMF came in and the approach was to quit focusing on subsistence agriculture and start focusing on export crops. So larger scale production and things like fruits and ornamental flowers, which were different than the subsistence crops that people had been growing. So a lot of small scale farmers couldn't participate. They didn't have the resources to participate in these new markets and they were being pushed out off of their land and a lot of them were going to the forest marginal lands and deforesting in order to grow subsistence crops to support their families.

Sunny Jardine:

So there was a lot of qualitative information about this and I was really interested in looking at this point meditatively trying to measure these impacts, but it was really hard to tease out the impact of the IMF policy from this observational data. And more generally look at causal questions when all you have is observational data and there's so much going on in the world, right? So I started looking at who does this? Are there methods for doing this type of analysis? And it turned out that economist had been working for decades to build a toolkit to sort of address these types of questions.

Julie Kelso:

How would you describe what you do within the field of resource economics and maybe what are some of the types of research questions that you focus on?

Sunny Jardine:

In terms of what I do, well, I'm looking to answer two broad sets of questions. The first is, given that people have incentives and they operate in a world of constraints, whether it be government regulations and so on, what are going to be the outcomes for natural resources in the environment? Oftentimes people derive benefits from accessing and using natural resources in the environment. But on the other side, they don't typically pay the full cost of using the environment or natural resources. So because of that, it might lead to different outcomes. So I try to understand what are the outcomes that are going to emerge given the incentives and constraints that people face.

Julie Kelso:

So what would be an example of work you have done looking at incentives and their possible outcomes?

Sunny Jardine:

An example of that is, we've done some work looking at mangrove deforestation. In a lot of countries, people are getting some benefit from their mangroves, maybe they get firewood. But they can also use these forests and cut them down and put shrimp ponds in or oil palm. And they don't necessarily pay the full cost of those actions, protection from coastal storms that might protect an entire community. Or when they cut the mangroves down, they don't necessarily have to compensate fishermen who were getting higher catches because the mangrove root system provided nursery habitat for juvenile fishes.

Sunny Jardine:

So this sort of commonality and natural resource and environmental issues that people don't necessarily pay the full cost of their actions leads to unique outcomes. And I'm really interested in what those are. Then the next set of questions is really if we don't like those outcomes, what would be better and how to get there?

Julie Kelso:

So a concept I can grab onto from that example is nursery habitat for juvenile fishes. So do you ask questions like, what is the economic value of nursery habitat for juvenile fishes?

Sunny Jardine:

Yeah. So I'm not really directly involved with valuation work myself. There are large groups of people that believe that nature is being systematically undervalued. Right? And the question is, well, what are those values? So there's a lot of different methods that people have developed that could help us understand those values. It's really complicated to do this type of thing. If you think about juvenile fishes using wetlands or mangroves as nursery habitat, what is the value of that wetland? Well that depends on to what extent those juvenile fishes using that habitat feed into the population and become adult fishes and impact potentially commercial or recreational catches. A lot of times that link is really hard to make, right? We see fish here, but if that habitat wasn't there, would all of those juvenile fish die? Would they go somewhere else? Where would they be? Then if you could understand the extent to which maybe commercial catches or recreational catches go up, then trying to understand what are the values of those commercial and recreational catches.

Sunny Jardine:

Commercial catches is a little bit easier because there's market prices, but for recreational catches, people have high values for catching fish recreationally. But we never observe what those values are because oftentimes those fisheries are open access and so they're not paying. So we don't have that information based on them paying for the experience because they're not doing that. Then that's just probably one small component of the value of that wetland or the mangroves. Right? Because those fish might also be valuable outside of people that are using them directly. Maybe people are snorkeling or maybe they become food for birds that people like to go and birdwatch. So there's all these ecosystem services and these values we need to understand when we're deciding whether we should replace this wetland with something else or what we're losing when wetlands are being degraded and so on.

Julie Kelso:

So rather than valuation of resources, it sounds like you more often assume the value is known and are looking at systems to assess the costs and benefits of, say, wetland restoration?

Sunny Jardine:

Yeah. In terms of wetland conservation, I've done some work on wetland conservation in barrier island systems on the east coast of the United States. There we acknowledge that these values exist. We can find some of them in the literature. So we have a sense of what we're losing as a society when wetlands are degraded by, for example, barrier islands rolling over. So given that we know that we're losing something that's valuable and there's people out there that are measuring those values, I sort of step in and I say, Well, what should we do about this?" Should we be restoring? At what rate when? So knowing these values is one part of a bigger question of what should we be doing?

Julie Kelso:

Well, what I'm just wondering is when you're evaluating these options of what we should do to preserve barrier islands, they're disappearing, right? Is that accurate?

Sunny Jardine:

Well, that's not necessarily how an economist would think of it. So something that unifies most of the field is this idea that we want to be in a situation where we're getting the most value out of the system that we can. And it's possible that the most value out of the system, it's just to let it do what it's going to do, let the barrier islands rollover and disappear and the wetlands also disappear. That's potentially the best option for society because restoration is really, really costly and we don't want to invest in those restoration projects. But it's also possible that the costs of restoration are more than paid for by the benefits in the increased ecosystem services that we're going to get out of restoring. So that's really an empirical question. It's a question that we want to bring science to, to understand what should we do in this situation, how do we get the most value out of this system, the highest net benefits. When you consider the value of the ecosystem services that might be increased, but also all of the costs associated with restoration.

Julie Kelso:

So the question of to restore or not to restore depending on the cost and what the community values.

Sunny Jardine:

Typically we take a pretty broad perspective on this. And so one of the ecosystem services from wetlands in marsh area for instance, is the carbon. Not the peat layer that they have. So the stock, but also the flow of the sequestration that happens over time. When we think about valuing that we think about how storing carbon reduces climate change and reduces the cost or damages from climate change that could potentially happen globally. And so the value from that system of having carbon there would be the avoided damages from climate change that could be happening around the globe and that would be a value that we might want to invest in. So you could take a more narrow perspective, but economists tend to take a broader perspective on these things.

Julie Kelso:

Okay. Let's say I am a policymaker in the Chesapeake Bay region and I want to create economic incentives or disincentives to reduce nutrient pollution in the Chesapeake Bay. What should I ask the economist I am working with? What will they need to know?

Sunny Jardine:

Right. So economists, really, will frame their goals in terms of net benefits. And so less nutrients wouldn't necessarily be an economic goal, but you would think about getting greater value out of the system and there's going to be greater value when there are less nutrients. Let's say there are a lot of different ecosystem services and it's possible that restoration in your small part of the world is going to impact people around the globe that care about maybe the species diversity that comes out of your restoration project. If you want to consider the total economic value of a restoration action, it does make sense to consider all the values that are being generated.

Sunny Jardine:

Some policymakers might have more of a narrow set of stakeholders that they actually care about. Maybe just people within the US. So you could limit it that way. Although that would just be sort of you imposing a limit on this. Economists would really look at it in terms of the net benefits being generated. But again, there's potentially so many net benefits and it would be hard to include all of them. What's really nice is if you can include one and it's large enough that it tells you, okay, we need to stop all this nutrient runoff. So in our mangrove paper, all we looked at was carbon and mangroves. And just looking at that one ecosystem service, we said we should stop deforesting mangroves at such rapid rates.

Julie Kelso:

So when looking at something like carbon sequestration at a global scale, I imagine you get to work with people from many different disciplines, including scientists. So what is it like working with scientists at these large scales in human and natural coupled systems?

Sunny Jardine:

Yeah, well, you know, I really enjoy working with ecologist because I think economists ... a lot of the work I do is in this world, coupled human natural systems, right? Where you have humans operating in these systems and they're interacting with the resource or the environment and they're getting feedback from that natural system that affect their behavior and then their behavioral changes then go on to affect the natural resource of the environment.

Sunny Jardine:

So economists working in this area, I think I've done a pretty good job at understanding how to characterize dynamics of human resource use in response to environmental change. But it's the ecologists that are really focused on the nuances of how the environment is changing and the complexity in that environmental system. So getting new ideas from talking to ecologists is always a lot of fun.

Julie Kelso:

Awesome. Well, can you tell us about a project you're working on right now with ecologists?

Sunny Jardine:

One of the projects we're working on right now is a recreational, essentially, open access lake fisheries landscape in Northern Wisconsin. Where there's all these lakes, they're clustered pretty closely together and people from all of the state or even outside of the state come and fish here recreationally. All you need is a license, but there's no limit on effort. In these systems you have homeowners around the lakes that are forming associations and they're investing in stocking fish into the lakes and [DNR 00:15:19] is also stocking. And so you have all these stakeholder groups and we're really interested in, I am

interested in, the economics of investing in these systems. I'm really learning a lot about stocking from the ecologist.

Sunny Jardine:

One of the things that people have raised is it's very possible that stocking really doesn't do much to increase abundance. This might be just a perceptions thing. People might believe that stocking leads to more fish, but the empirical evidence for that, at least in a lot of systems, is pretty scarce and not convincingly showing that stocking does impact abundant. For a lot of different reasons because the fish, I'm learning now, are sort of optimized for living in this hatchery environment and really not that successful in a wild environmental setting. So it might be that there's just really high mortality and all of these other things. And I'm also learning that stocking has potentially genetic impact.

Julie Kelso:

Are there any data gaps that you feel scientists should be working on more? Are you ever just raising your fist? Like, why don't they know this?

Sunny Jardine:

Well, yes, but it's easy to say that as an outsider. One of the things that would be great to have is good information on abundance and in a lot of systems that are probably overstudied because we know about abundance, like salmon, there's good data. But in most systems I would say there's just really not good data on fish abundance. In Northern Wisconsin, there's thousands of wakes and annual abundance information at each of those lakes I think would be fantastic. I would love to live in a world where that existed. But I do realize the constraints on arriving at those population estimates and how costly those are from my conversations with the colleges.

Sunny Jardine:

But abundance and also effort, it'd be great to have both of those key variables. If you think about coupled human natural systems, I mean those are the two key variables, right? The resource and the humans and in a lot of places we don't have good information about either of those two components of the system, especially when it comes to recreational fishing. Commercial fishing, we're pretty good at understanding effort, but with recreational fisheries it's not the case.

Julie Kelso:

Well, that's interesting. Do you think there's any low hanging fruit to obtain effort data for recreational fisheries? I'm just thinking of advances in technology like social media.

Sunny Jardine:

I think that in the future that type of data is going to be better provided. One of the things that we thought about for measuring effort in the system was looking at satellite data. Are there good aerial photographs or satellite data where we can actually count boats on a lake for instance. For some lakes there are. The frequency with which this data are generated are ... it was pretty low. So I think that in the future there's going to be better coverage and higher frequency as it becomes cheaper and cheaper.

Sunny Jardine:

In terms of social media, yeah. There's a lot of people that have wanted to use app data as a metric for understanding resource use. The problem with that, that isn't going to go away, I think it's just that this is a non random sample, right? People volunteer to go on these apps. And it might be only certain types of people that do this and they might be only reporting certain types of activities. Maybe successes or reported more than failures in terms of catching something. I think that all of that great volume of data that's being generated in terms of social media hasn't really been of huge value yet.

Julie Kelso:

So last question, just what keeps you up at night or what excites you about resource environmental economics?

Sunny Jardine:

Yeah, I mean, I didn't start out as an economist, but I really have come to appreciate the field. A part of that I think is appreciating limitations of the field that you're working in. But the one thing I really like about economics is that it gives a really structured framework for looking at policy, right? Should we be doing this or should we be doing that? Should be we be investing or should we not be investing, in restoration, for example. So that is something that really excites me, is that we can actually think about these in a systematic way, in a way that uses data and have answers and be able to provide some guidance for how we use our natural resources.

Julie Kelso:

Well, we at Making Waves and the Society for Freshwater Science would like to thank Sunny for her time and fresh perspective on the work economists do in resource management and the interesting questions economists and ecologists can answer when they work together. And with that, this is Julie Kelso-