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The Water-Energy Nexus with Alida Cantor

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Alida Cantor

Welcome to PDXPLORES, a Portland State research podcast featuring scholarship, innovations, and discoveries, pushing the boundaries of knowledge, practice, and what is possible for the benefit of our communities and the world.

My name is Alida Cantor and I'm an assistant professor in PSU's Department of Geography. My research focuses on politics, power, and decision making and environmental justice, particularly around water resources. So I study how decisions are made around water and other natural resources, who benefits, and who loses out, and who gets access to what resources.

I'm really interested in how legal systems and social power impact resource management, and especially how resource management can be more sustainable and equitable. My most recent research focuses on the water energy nexus. \

The idea of the water energy nexus encourages us to think about water and energy as connected rather than separate. A lot of times when we think about water and how it's used, we're not thinking about energy, and when we think about energy, we're not thinking about water. So when you turn on the lights, you aren't thinking about how much water you're using. When you run your tap, you don't usually think about how much energy it takes. But in reality, they're very connected.

For example, mining and fossil fuel extraction are energy activities that can use a lot of water and can also result in water pollution. Hydropower dams make electricity while also having a huge influence on water and river systems. And from the other side, activities like moving water, pumping groundwater, and water treatment, all use a lot of energy.

My research is looking at new infrastructures and strategies that are being proposed to address energy and water systems under a changing climate. First of all, there's clearly a pressing need to address climate change. We need clean energy sources, we need to decarbonize our energy systems, climate change impacts water resources in many ways as well.

So some energy transitions involve switching energy sources to cleaner less carbon intensive sources like wind and solar. But one tricky part about this is that those sources can be more variable than fossil fuels. The wind doesn't always blow. The sun only shines during the day. So energy transitions also involve storage infrastructure. Batteries are one kind of storage infrastructure

that you might have heard of, they can be at a small scale like in your phone or your car or your house, but they're also building big utility scale battery storage.

And there's other forms of storage as well, such as pumped hydropower energy storage. So this involves building reservoirs where water gets pumped up high when there's extra renewable energy then released to make hydropower energy when there's higher demand for energy.

Thinking through the lens of the water energy nexus helps us realize that a lot of the proposed infrastructures and strategies for energy transitions and decarbonization, including storage, also have water impacts. For example, electric vehicles are a major part of energy transitions and they typically use lithium ion batteries. That lithium has to come from somewhere, and it's typically mined. It can come from South America, Australia. More recently, there's been growing proposals for lithium mines in Nevada in the United States.

These mines can have impacts on water quality, land and wildlife. The proposed mining sites in Nevada have been really controversial, in part because they impacted sacred indigenous sites. So renewable e energy transitions that rely on increasing mining can have serious environmental justice and community impacts.

Pumped hydropower storage can also have community impacts depending on where it's located. For example, there's a local plan for pumped hydropower energy storage in Washington state near the Columbia River. This plan has generated a lot of opposition from the Yakima Nation and other tribes and environmental organizations that are standing in solidarity with the Yakima nation. The project would negatively impact sacred places which hold important cultural values to the Yakima people. So then the question becomes, is this really green energy? If decarbonization is happening in ways that unfairly burden indigenous communities, is it really green or is it an extension of colonialism?

Our new research project, Hydro Social Dynamics and Environmental Justice in Water Energy Transitions, looks at these questions of how communities are impacted by and how they react to water energy projects that are intended to mitigate or adapt to climate change. We're studying how communities, policy actors, and project proponents and developers imagine hydro social change and environmental justice in relation to these infrastructures for water energy transitions, and we're looking at specifically how environmental justice is framed, claimed, and operationalized by groups including public, natural

resource agencies, courts, environmental groups, community organizations, tribal governments, and other actors involved in the governance of these climate transitions and water energy transitions.

The hydro social cycle is an idea that social scientists have introduced to help us think about the relationship between water and society. From this perspective, water isn't just the substance that we know as H₂O water is H₂O, but it's also a whole complex system that includes infrastructure, technology, law, politics, and social power.

So we're looking at four different case studies for this research. We want to understand how different people imagine these water energy nexus projects, how the projects could change hydro social relationships, how they bring up environmental justice issues, and then how those issues are addressed or. So our case studies include looking at proposed lithium mining projects in Nevada and Oregon in the McDermott Lithium Zone, which you might have heard of as Thacker Pass. We're also looking at proposed lithium brine extraction at the Salton Sea in California, which has been proposed as a cleaner, greener alternative to mining, but still has some issues that are being brought up by the communities. We're also looking at a proposed, pumped hydropower energy storage facility in Goldendale Washington along the Columbia. And we're looking at a proposed desalination plant in California that was actually rejected by permitting authorities a few years ago, specifically on environmental justice grounds.

So in each of these cases, we're particularly interested in the perspectives and experiences of frontline communities, which means the people who are most impacted by the development of the project, and most likely to experience environmental inequality in particular disadvantaged communities and indigenous communities.

We're also trying to understand perspectives from policy makers, including local government officials and employees of regional and state government agencies, and also project proponents including developers, investment investors, and organizations that are involved in promoting the projects.

To address these questions, we're primarily employing qualitative research methods. Qualitative methods are great for understanding different perspectives and narratives in an in depth, meaningful way. Our data will involve documents such as news articles, media, legal documents, court cases, reports, and things like that. In depth interviews with key stakeholders from different perspectives,

and also participant observation, like attending community meetings, tours, activities, and so on.

Our methods will also involve community engagement through online forums. We'll be using a little bit of Q methodology, which is a kind of qualitative, quantitative hybrid survey technique, and we'll be doing comparative policy analysis.

So we're combining all of these methods and applying them to those different case studies in order to understand hydro social transformations and in the, and the environmental justice issues related to water, energy, nexus, infrastructure, and extraction activities.

We want to make sure our findings are relevant, thoughtful, and reflect community experiences. One way we're doing this is by convening an indigenous advisory board for this project. It's made up of experts from indigenous communities who will guide the research and help make sure it's beneficial for the communities we're studying. I think it's also really important for this work to be policy relevant and to inform climate, climate adaptation and water energy transitions. Our plan is to publish and share a policy relevant white paper with community generated recommendations for more sustainable water energy nexus transitions.

And of course, the research also has scientific relevance, so we'll be publishing our findings in academic journals, and we'll be using the results to develop teaching materials as well.

In the longer term, we're really trying to transform scholarship and understanding of the water energy nexus. We're taking a critical lens that's grounded in particular places to study water, energy transitions and infrastructure and what they mean for frontline community experiences.

Instead of focusing on a single type of infrastructure, we're putting different types of projects in conversation with one another, which helps understand more generalizable what's going on with the transformations involved in decarbonization. And then the research really has social relevance since we're increasingly seeing climate adaptation efforts that are focused on water energy infrastructures like the ones we're studying here, and often these projects and infrastructures do raise a variety of water environmental justice concerns.

I mean, I think overall it's just really important to understand that some of these green clean technologies can have really serious community impacts for the

local communities nearby. And that's what this research has really intended to look at and to shed light on as these local community impacts and hopefully to make it better, right, like I would really like this research to inform doing energy transitions better so that they're not impacting local communities in quite such negative ways.

My name is Alida Cantor and my research focuses on how we can manage water and other natural resources more sustainably and equitably.