

Step back from scientific hubris

Water research has fallen into a 'techno optimism' that tries to solve all problems despite not asking fundamental questions, according to Stephanie Pincetl of the University of California, Los Angeles. She talks to *Nature Sustainability* about the challenges facing the field and science writ large.

■ How would you characterize the theoretical development and conceptual advance in water studies research articles in recent years?

Water research studies seem to have fallen into two camps. Political ecologists, writing for sociology or geography journals, tend to be highly abstracted in their analysis, concentrating on power dynamics, institutional analysis and equity, while the sustainability and engineering disciplines focus on quantifying use, scarcity, trends and technology. The political ecologists seem often to be more concerned with advancing new theory and less focused on understanding the hydrology of water systems, as well as the complex dynamics of institutional water management, including important considerations such as funding, training of water engineers and developers, and understanding the complexity of socio-technical systems and path dependencies. Sustainability and engineering disciplines seem greatly more concerned with measurement of change, quantification of supply, behaviour and new technologies. Neither pose questions about sufficiency, the ways in which socio-technical systems might create scarcity, nor much about the impact of modernist thinking on how water is 'thought' about and managed in the twenty-first century. The water molecule is often managed in its distinct phases once it enters into human engineered systems as groundwater, surface water, waste water, return water, recycled water, recaptured water and more.

■ Would it be fair to say that technical sophistication, such as remote sensing, 'big data' and machine learning, is supplanting novel questions and understanding context in guiding research?

Technical sophistication has created a kind of autism in water research, overlooking historical developments and beliefs about supply and need, obscuring regional and specific diversity in water resources and hydrology, and has furthered a sense of hubris about humans' abilities to manipulate and reengineer planetary systems, specifically the water cycle as it is manifest in specific places. 'One size



fits all' seems to be the guiding principle across all places, and humans' ingenuity will solve all problems — take, for example, recycling water after it having been used in the oil and gas industry. Rather than asking fundamental questions such as how it is we use 'clean' water for oil and gas production then think it is okay to apply technology to clean it for more direct human use, we 'solve' the problem of contamination at the end of the pipe. All the while, we know that oil and gas operations contribute to greenhouse gas emissions, contaminate soils and create air pollution.

■ As a discipline, water studies has probably never been bigger or publishing more than it is right now, but do you feel that the field is meeting the needs of the planet and policymakers?

Technobabble, while attractive, is not policy friendly. Policymakers need approaches that can be implemented and that are understandable by the public, as well as themselves. However, such analyses may not be popular, as some of them address excess water use in urban areas by the wealthy, privatized water rights that are

exclusionary, and institutional change, such as making water a public good. Many places most probably have sufficient water, but modernist wasteful practices and private appropriation of water stand in the way of redistribution. Further, institutional frameworks that, for example, support private property rights in water, need to be reformed, an enormous political challenge for policymakers.

■ What kind of incentives, or disincentives, do you see driving water studies research? How can they be addressed?

We are still driven by techno optimism, and much of the research funding is guided by ideas of 'progress' that do not acknowledge local knowledge, appropriate technologies (except for 'developing' countries) and the path dependencies that have evolved with modernist infrastructure. Engineers are rewarded academically and by grants for 'new' technologies that can be stuck at the end of the pipe to remediate water problems, or discovering new ways to characterize water resources through modelling or remote sensing. Instead, it might be interesting to institute review panels made up of practitioners and environmental and social justice communities to review such proposed work for funding to assess its utility for people's daily lives. While it is important to advance the characterization of the resource, that work should be better integrated into policymaking on the ground.

■ Water studies is, of course, merely one narrow discipline; is science writ large suffering from these same issues, and are scientists being honest with themselves and each other about them?

Clearly the quantitative turn that occurred in many disciplines in the 1980s has become a dominant mindset, as though numbers that would create generalizable theory could genuinely be developed for everything. This has led to an impoverished intellectual context for asking questions and for developing approaches to address water issues. While there is a great deal of hand waving about collaborative work and interdisciplinary, transdisciplinary and now convergent research, in fact there are few places where

the disciplines have broken down. As 'grand' theory has become ever elusive, and the easiest generalizations have been made, science is becoming ever more specialized and experiments harder and harder to reproduce. Instead, there is a great need to understand difference and specificity, to

become far more grounded. Systems are complex, multifaceted and full of meaning, they cannot be understood narrowly; narrow research leads to tunnel vision and lack of comprehension about how things fit together to create a greater whole. There is a real need to step back from scientific

hubris and to reassess why we ask the questions we do.

Interview by Ryan Scarrow

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