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“Commentary: Progress in Understanding the Social Dimensions of Desalination”

Brian O’Neill & Joe Williams

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The past decade has seen a proliferation of desalination projects around the world, both large and small scale. This has occurred in a parallel movement with the exacerbation of drought conditions under climate change in regions of places like Spain, South Asia, the Middle East, North Africa, and the Western United States. As a result, not only has the technical-scientific literature on desalination expanded to include alternative energy strategies like solar powered reverse osmosis (Ahmed et al. 2019), but there has been much progress in understanding the social dimensions of desalination. Indeed, there is now growing recognition of the field of political ecology of desalination (Williams and Swyngedouw 2018) as an area of global socio-environmental scholarship concerned with the ways in which the deployment of this technology reflects and reinforces social processes of inequality, political power and economic flows, that has opened this topic for intellectual debate (Fragkou and Budds 2020; Williams 2022). Notably, this has developed as a critical perspective that complements the recent discussions of environmental harm caused by the desalination industry (see Jones et al. 2019; Lee and Jepson 2021) to provide a robust analysis of this complex socio-environmental and sociotechnical topic. The social and political dimensions of desalination is now a rich field of debate, including in this journal (McEvoy and Wilder 2012). In this short commentary, we reflect on the past decade of research to draw out the lineaments of this field of study for the future.

Desalination is a growing global topic because, firstly, it is an important emerging phenomenon that will shape water management in coming decades; and secondly, it has become something of an empirical crucible, drawing together and concentrating numerous issues around the politics of water and climate adaptation. Indeed, as McEvoy and Wilder (2012) pointed to over a decade ago, desalination is often deeply politically contentious in contexts where it is deployed but is also trans-scalar. By this we mean that desalination intersects transboundary water governance and geopolitics between different water uses, and emerges from complex assemblages of local and global actors, including financial actors, water companies, governments and technologies. The implications of desalination for the U.S.-Mexico border region between Arizona and Sonora has received a great deal of attention, where the debate has continued to rage about the feasibility, responsibility, ecological, financial, and social impacts of building a pipeline from Mexico to service the water network of the United States (Mumme et al. 2017). This transboundary aspect was notably extended with the work of geographer Joe Williams (2018), who made further linkages between the territories of Northern Mexico and Southern California. Williams (2018) showed how the turn to large-scale desalination was reconfiguring the relationships between public/private water and water sovereignty between states. More recently, sociologist Brian F. O’Neill and geographer Anne-Lise Boyer (2023) developed an historical analysis directly building off of McEvoy and Wilder’s analysis, such that we consistently see, through time, that the socio-ecological impacts and pitfalls of international water management tend towards uneven distribution of costs and benefits in terms of expense and energy-intensivity in particular. As Hirt et al. (2017) highlight, on top of shifting scarcity from the US energy sector to the Mexican one, there is a “troubling bilateral inequity inherent in a project that provides clean water to one country but leaves the wastes in another country”, since brine residues will be discharged back into the ocean in a region which is a biodiversity hotspot (e.g. marine priority sites protected by the Mexican federal government and wetlands protected under the international Ramsar

convention). Elsewhere, important contributions have shown how desalination intersects and transforms geopolitical and transboundary water politics in Singapore (Usher 2019), Spain (Swyngedouw 2013), and between Israel, Palestine and Jordan (Avarim et al. 2014; Katz 2021). All of these, as with the case of USA-Mexico, point to desalination becoming enrolled in (and often reinforcing) economic and political power imbalances, and uneven levels of development.

O'Neill and Boyer make a further useful point for future scholarship, that, with an historical perspective, it becomes possible to see how desalination is used to maintain a certain status quo, as Williams and Swyngedouw (2016) argued in the case of Spanish desalination. McEvoy and Wilder's use of the concept of path dependency, from institutional theory, is therefore continually instructive to the general dynamics of how desalination integrates itself into complex socio-technical systems:

an energy intensive, expensive technology with unintended side effects [and] the perception of 'limitless' water [that] undermines conservation efforts. And once built, fixed capital invested in a large infrastructure project creates a path dependency and reduces the flexibility of future generations to respond differently (2012: 355).

Such careful analyses are further useful as an antidote to the contemporary discussions around the Blue Economy. For, a major trend that we have observed is that amidst the rising popularity of a "Green New Deal" (e.g. O'Neill and Schneider 2022) a hugely successful notion in the water sector is "the blue economy." For example, the European Union (EU) Directorate General of Maritime Affairs and Fisheries recently published the EU Blue Economy Report, which outlines the need for increased desalting, because it is "poised to provide a solution to this impending crisis" of climate change.¹

Indeed, one of the contemporary trends that must continue in the social dimensions of desalination scholarship is its critical positioning towards equity considerations (O'Neill 2023 a;b; Whitely et al. 2008). What is notable in the literature thus far is that there have been cases of classical dispossession by appropriation, but also more subtle forms. On the one hand, in places in the Global South, already ravaged by a history of infrastructural neoliberalism, desalination denotes more of the same, a business-as-usual logic (Campero Bennett, and Arriagada 2023). Indeed, in contexts where there is no universal networked access to water supply, the implementation of desalination can further entrench water inequalities, particularly where desalination facilities are used to supply high-end customers while leaving low-income water users un-serviced. Such processes have been evidenced, for example, by Velásquez and Wachtendorf (2023), who show how the use of desalination on the island of San Andrés has created a dual water supply system that supplies tourist resorts and areas of higher real estate value with reliable water, leaving poorer parts of the island with poor quality and unreliable supply. However, as sociologist Brian F. O'Neill (2023 a;b) revealed, even normative notions like environmental justice, can be the subject of contention, being, co-opted into the logic of capital accumulation against community interests, needs, and desires. As such, desalination, when it is driven by a certain logic of capital returns, is profoundly asocial. At the same time, as such ground level investigations of the underlying political economy of desalination have only begun, more work is necessary.

Finally, as investigations into the social dynamics of desalination have found purchase in spanning territorial boundaries, and inequalities, thus paralleling the literatures in environmental and water justice, a third research avenue has developed around finance. This trajectory was most notably set off by geographers Alex Loftus and Hug March (2016), where they revealed the global character of an English desalination project, but also by economic geographers Michael Pryke and John Allen (2019). In this work, we learned how deeply tied to the financial sector infrastructure has become, as

¹ https://oceans-and-fisheries.ec.europa.eu/system/files/2022-05/2022-blue-economy-report_en.pdf

they traced revenue streams that were negotiated to pay high dividends, but in turn create fees related to the underwriting of securities, often by transnational banks. They argue in their evaluation of the Carlsbad desalination plant in California that everything from the valuation of operational cash flows to future value streams, “feed into expected returns” (1331). As the regulatory process for the plant began to reach an end, a host of international investors came on board in the USA, but also Malaysia, the UK, and the Netherlands (see also, O’Neill 2020). In this sense, desalination should be understood not only as a site of technological innovation, but of financial innovation that is being used by a variety of actors to drive processes of financialization, commercialization, commodification and privatization in the water sector.

In sum, the global research paradigm on the social dimensions of desalination has now begun to codify, despite its variability in theory, methods, and geographical access points. Furthermore, building on the work of McEvoy and Wilder, there continue to be avenues in path dependency research, on environmental (in)justices, on the dynamics of power between local communities and financial actors, and in the political and regulatory processes that enable the production of water from the sea. At the same time, we do not doubt that desalination technology has a role to play for societies facing difficult water challenges who are left with few other options. Technophobia cannot be the response. But the manner in which technology is deployed is important (e.g., McEvoy 2015). Desalination should be used in a way that prioritizes universal, fair, affordable and sustainable access to water that improves human-environment relations. But, this is the important point, desalination should not prioritize already privileged or high-end water users at the expense of others; nor should it be used as a way of extracting value from water customers for the benefit of shareholders. Unfortunately, we see both of these happening in too many cases, which continues to be evidenced in the literature. In essence, it will be important that desalination is not used as a way of driving endless economic growth in ecologically destructive and socially unjust ways.

With that said, the directions for future research have begun to clarify. First, one of the greatest strengths of the global political ecology of desalination research is its variability and flexibility. This openness, both methodologically and epistemologically, should be maintained. Second, while flexibility in this research field is essential, so is conversing with more generalist bodies of scholarship. To date, this largely has been in relation to the literatures in human geography as the theoretical foundation for many scholars. However, the wide-ranging theoretical inspirations, from Deleuzian assemblage theory to Jason Moore’s World-ecology have spanned interests in geography, sociology, and cultural anthropology, which have made the research emerging in this area more robust and rigorous, not less-so. Third, a continued focus on the potential maladaptive aspects of desalination is warranted (Barnett and O’Neill 2010). This includes critical analyses of the water-energy nexus (Yoon et al. 2018)) and related socio-environmental impacts of various energy sources (e.g., fossil fuels, as well as nuclear, solar, and other alternative energy sources). Fourth, the role of communities has, importantly, not been understood as passive receivers of desalination (e.g., Patel 2023), which has truly set apart the political ecology of desalination from the normative desalination literature that seeks to boil down community concerns to a series of neat public perception variables. To this end, the critical scholarship always needs to stay attentive and keep the industry literature in view to be able to assess progress in the field, but also combat its sometimes-uncritical worldview. Fifth, while much of the critical and political ecology literature has focused on seawater desalination, recent research has begun to work through the implications of inland desalination and other types of alternative water. The same reverse osmosis technologies (and the companies that develop them and financial mechanisms that fund them) are used in a wide range of industrial processes utilizing different types of feedwater. And recent work has explored the connections between desalination and wastewater reuse, which also uses similar technology (see Williams et al. 2023). The growing heterogeneity of the desalination and wastewater industry will provide fruitful avenues for critical research to explore the burgeoning social

and political processes that these technologies intersect. Sixth, and relatedly, the role of finance has been a clear undercurrent in the literature and there is room for significant development here. A useful question to ask moving forward might be: how do financial models imply on the decisions and rationale to move forward, or not, with certain projects, especially when so many desalination programs are public-private partnerships? Here, scholars of desalination have something quite unique to offer the larger literature on financialization: a robust discussion of project finance should be in order. At the same time, we do not suggest exhaustive econometric accounts of financialization, but rather much work remains to be done to unpack the origins and logic of the model of project finance, as a particular approach to public private partnerships and how it fits into wider ideologies of capitalism. Finally, the interest in finance should also galvanize an interest in historical research. As O'Neill (2020; 2023; O'Neill and Boyer 2023) and Low (2020) have shown, desalination is not a new technology per se, but one that has continued to evolve in various ways over time. There remains much room for scholars to unpack this history, especially in non-western contexts, to develop a more complete accounting of the global reach of desalination. At the same time, we realize these are just some of the possible future directions. Our hope is that the epistemological, theoretical, and methodological flexibility of this area of research will remain a strong point continuing its rigor, as well as the already robust collegiality among scholars in this interesting, and still nascent field.

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