

Review Forum: Reading Natalie Koch's, *Arid empire: The entangled fates of Arizona and Arabia*. London, Verso (2022). 208 pp; index ISBN 9781839763694, \$26.95.

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1. Defining and Colonizing the Desert (Andrew Curley, University of Arizona, USA)

Deserts are almost always defined by outsiders. To the desert dweller, the desert isn't a barren wasteland (Kuletz, 1998; Voyles, 2015), it's home. It's the intruder that defines the desert as a desert. To this degree, the desert is imagined as a site of profound transformation, as a place that can be remade and defined for some greater purpose, a purpose understood through ideology, some unattainable utopia around which a society organizes itself to accomplish. Natalie Koch's book, *Arid Empire* (2022), highlights some of the colonial and imperial uses of the idea of deserts. She shows how they are places for militarization, land grabs, agricultural extension work, and diplomacy.

The book begins with a vision of the desert, a vision made by outsiders. It's a spectacular, future-oriented city – a civilization emerging from the desert. Koch explains that the image was from the archives of *Arizona Highways*, a magazine owned by Arizona's Department of Transportation that's meant to promote tourism throughout the state. The magazine no longer produces grand visions for the state, but Koch happened upon a futuristic portrayal of Phoenix in a 1975 edition of the magazine. It's the cover of the book with a vision of a light rail moving from a sleek urbanizing core surrounded by monoculture agriculture (**Fig. 1**). This image was created in 1975, but we know desert visions persist. It could be used for our current projections of human colonies on Mars in the not-too-distant future.

In the case of Koch's book, the desert is where new high modernist schemes are practiced, where temperate agriculture is made possible in a hostile environment through science, investment, and infrastructure. As Koch (2022, p. 4) writes, "In this story of arid empire, the very idea of 'desert' itself becomes a resource". With empire, deserts are entwined. The subtitle of the book makes this linkage immediately - Arizona and Arabia have "entangled fates." It is about how two places that are connected and continue to influence one another. Like all good desert narratives, the book begins with a story of camels. In this case, camels that were imported to the U.S. in the 19th century to assist imperial exploration in the western claims of the United States, including Arizona. Jefferson Davis, an enslaver, senator, and imperialist, was interested in mapping the western states to

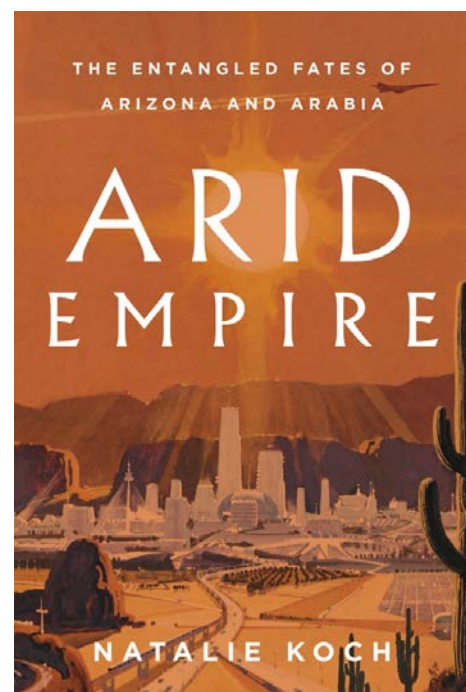


Figure 1. Cover of *Arid Empire*. Source: Koch, 2022.

expand slavery. In 1855, as Secretary of War, he convinced Congress to buy the camels from North Africa (Koch, 2022, p. 5). The camels are an ecological intrusion, an animal colonizer in the desert.

Empire, science, and environmental change were entangled. The example of the camel is one of the first instances of Arabia and Arizona's entwinement. Later, dates become a source of knowledge exchange in a bizarre example of Oman paying Arizona researchers millions of dollars to tell Omani growers something about dates, a crop cultivated in Oman for centuries (Koch, 2022, p. 26). Koch asks how this is possible. This is where the book's use of historical geography demonstrates the method's power in explanation. To understand colonial cross-pollination, we need a historical accounting of the relevant institutions, in this case the University of Arizona, its Arid Lands program, and agriculture and extension work. Land grant agricultural science was founded on colonial land theft and Indigenous displacement (Nash, 2019). The book demonstrates how Arizona agricultural institutions are tied to U.S. development approaches abroad.

Koch shows us how both diplomacy and dreams, two chapters that deal with public imaginations about the desert, make deserts in our minds and in practice a function of empire building. In the chapter "Diplomacy," Koch shows how Saudi princes, experts, and other foreign dignitaries made their way to the U.S. in the 1950s, at the height of development discourse, the rise of the non-aligned movement, and a specter of Soviet expansionism used to justify new kinds of colonial intrusions. The material transformations for both the U.S. and Saudi Arabia is less consequential than the exchange of ideas and mutually beneficial calls toward modernization that served elite interests in both countries and "marked out Arizona's special place in the production of America's arid empire" (2022, p. 86.) It's a time when the U.S. edged out British and French interests for access to Saudi oil.

Anthropologist Gökçe Günel (2019) tells a similar story in her book, *Spaceship in the Desert*. Günel documents the transformation in envisioning an "zero-carbon eco-city" to, more vaguely, "a city of possibilities" in Abu Dhabi (Günel, 2019, p. 9). The term *spaceship* for spaceship in the desert does a lot of work in capturing outside cultural understandings of the place. It comes from a descriptor of her site of one of her research sites: a future-oriented energy research campus that contains spaceship (i.e., future-oriented) aesthetics, work, ideology, and cultural practice. "Spaceship in the desert" isn't the name indigenous governing officials gave the project; they called it "Masdar" for "source," which had to do with a vision for renewable energy production. It was an American exchange student who, in a blog post, gave the research facility its new identity – and almost entirely accidentally at that (Günel, 2019, p. 22). "Spaceship" is thus the cultural product of a colonial society. It is tied to a premise that the conditions for life will be undermined in a home location and a new place for life to continue must be found. It divorces humans from the planet where the future of humans is only imagined away from Earth. This is the story Koch also tells in the chapter "Dreams," when researchers from the University of Arizona and other private investors build "Biosphere 2" just north of Tucson, seeking to demonstrate how people can create new self-contained ecosystems on other worlds – again extending the colonial analogy.

In a recent special issue in the *American Indian Culture and Research Journal*, editors David Shorter and Kim TallBear (2021) challenge the metaphors of "discovery" and "contact" in space research – specifically the search for extra-terrestrial life. These metaphors extend to most of space science, revealing the colonial heritage of space science. Spaceship in the desert is an imposition of colonial ideology onto a desert people's homeland, an ontological reworking of the place as in need of improvement based on advances in civilization brought by the civilizing actors – in the case of spaceship in the desert, a naïve American doing renewable technology missionary work. In the case of Koch's inquiry into the desert, the desert is both a site of intervention and a laboratory.

As Koch writes, the desert serves many functions in the minds of the colonialists. It's a place of colonization, of ecological reworking, and technological progress. The desert being both bereft of life and a place where civilization might advance is contradictory, but it's the emptiness that allows for new beginnings. In this way, the spaceship analogy isn't far off. The desert is often used as a site of field-testing colonization, to make sure the space rover can handle the foreign terrain of Mars' landscape (Tabor, 2019).

2. Making Arid Empire at the University of Arizona (Robert Lee, University of Cambridge, UK)

"The US colonization of North America," Natalie Koch (2022, p. 10) writes, "was built on the idea that land and resources are wealth." Although this idea is not new or controversial, it bears repeating as a fact whose consequences remain easily obscured. *Arid Empire* aims to reveal how U.S. colonization operated—and continues to operate—on the ground in southwestern North America. The book adds a valuable piece to a larger puzzle about the making of the settler colonial present, one that draws our attention to the critical role played by universities in reshaping deserts.

Koch begins with a refreshingly frank personal reflection on the invisibility of "arid empire," conceived here as the product of a process of expropriating desert spaces and investing them with new narratives. Intellectually, she has long known that the U.S. became the resource-rich nation it is today by dispossessing Native nations. But this is not what she saw growing up in Arizona, where popular images of the desert submerged the violence of conquest. This autoethnographic observation prompts a search for the power networks that have transformed Indigenous Arizona into a settler homeland.

The question is where to look. Koch's answer brings readers on a kaleidoscopic journey through agriculture, diplomacy, scientific research, and techno-modernism, all cultivated in Arizona in the last 150 years and tied, via a range of imports and exports, to Arabia. The stories she tells are an edifying mix of the obscure and topical. I imagine few scholars of the American Southwest are familiar with the U.S. army's quixotic attempt to deploy camels in the nineteenth century. Many, I am sure, have seen more recent news reports about thirsty Saudi-owned alfalfa farms in Arizona that never mention, as Koch points out, the water that Americans complain about being grabbed by the Saudis was seized from Indigenous nations. Koch drives home the irony of U.S. experts from Arizona charging the Omani government to teach them how to cultivate date palms that Americans imported from the Middle East, where they have been grown for thousands of years. From *Dune* to Biosphere 2, Koch shows how the Arizona desert was not just taken but laden with fantasies of colonial control.

What holds these eclectic stories together? One vital thread running through them is an insistence that if you want to understand U.S. colonialism in Arizona, then you must reckon with the history of the University of Arizona (UA). I *would* say that. I am a historian of the American West who has studied land-grant universities like UA as major beneficiaries of ill-gotten Native land, via the Morrill Act of 1862, which nationalized the land-grant college system in the United States. That predisposes me to pick out this particular thread through what is in fact a much more multilayered work. That being said, I am participating in this forum because of my background, not despite it. My work on land-grant universities has brought me across paths with Koch and others thinking about UA's colonial legacies.

Insofar as *Arid Empire* could be said to have a main character, the UA is a strong candidate. It appears across chapters, intersecting with themes ranging from farm policy to space travel. Not long after the university's founding with financial support provided by stolen Native land, UA started running experiments with date palms, helping to make the plant synonymous with broader efforts to transform Arizona's economic prospects as a settler state. By the 1920s, the school had observatories that would later position it within space research asking how to transform inhospitable environments. During the early years

of the Cold War, UA researchers championed arid land studies as a tool to fight communism. In the second half of the twentieth century, they incubated desalination and solar energy research through UA's Environmental Research Laboratory. In the 1990s, UA launched the disastrous Biosphere 2 project, which imagined promoting human settlement on other worlds, and now hosts an Omani irrigation exhibit. Along the way, UA researchers learned from experiences in the Middle East and, in turn, became exporters of modern expertise about how to control and capitalize desert spaces. Their work provided fodder for many of the stories now told about what desert landscapes can and should be.

Read as an episodic account of UA as an agent of empire, Koch's study joins a growing body of scholarship situating universities within the settler colonial present. In the last ten years, there has been an upswing in interest in examining how colleges have aided and/or profited from imperial projects, slavery, and Indigenous dispossession. In the coming years, it is easy to imagine *Arid Empire* being assigned to students alongside Craig Wilder's *Ebony and Ivy* (2013), la paperson's *A Third University is Possible* (2017), and Sharon Stein's *Unsettling the University* (2022).

More specifically, *Arid Empire* joins scholarship busting myths about land-grant colleges as cost-free levers of democratization and economic growth. Such stories made a habit of conveniently leaving out any mention of the violence that enabled endowment-building federal land grants, a habit that Margaret Nash (2019, p. 466) (borrowing from Pierre Bourdieu and Jean-Claude Passeron) has dubbed "genesis amnesia." It is the kind of erasure that makes it possible for one to be simultaneously aware of colonialism in general and blind to its local manifestations. Readers would gain especially from perusing *Arid Empire* alongside the recently released University of Arizona Land-Grant Project (Rogers, 2023). While that project, with its focus on colonial origins, is typical of the emerging genre of critical land-grant college studies, Koch is not content to stay in the past. *Arid Empire* urges readers to see land-grant universities as more than simply recipients of endowments, and to grasp how they have and continue to function as vectors for U.S. empire building in North America and beyond.

University-cultivated expertise is critical to the stories *Arid Empire* tells. Koch calls it a "resource of sorts—expertise—that could be extracted, sought after, controlled" as she guides readers through efforts by the likes of Frank A. Gulley, UA's first professor, to turn Arizona into a mecca for date palm cultivation, and Carl N. Hodges, the headline-grabbing lead at UA's Environmental Research Laboratory, dream to use desalination as a strategy to turn deserts into gardens (Koch, 2022, p. 26). If the practical success of these efforts was limited, their marketing was transformative. UA research helped build faith in techno-futurism and turned expertise about the mastery of arid environments into a marketable commodity.

Where that commodity came to market is perhaps the book's most striking feature, especially when approached as a contribution to critical education studies, which tends to be siloed nationally. By stressing links between Arizona and Arabia, Koch breaks away from that tendency, showing why it is critical to think transnationally about the colonial legacies of national institutions with global footprints. *Arid Empire* underscores that the expansion and maintenance of U.S. empire in Arizona matters not just for understanding the living history of the United States, but for appreciating the consequences of U.S. empire in the world. The U.S., Koch shows, has been at work transforming desert spaces in the American Southwest for 150 years. Along the way, its experts at UA started exporting lessons learned to fill their coffers and influence deserts in Arabia. If *Arid Empire* can be faulted, it is for leaving the reader wanting to know about how US settler colonial expertise is affecting other parts of the arid world. But it could just as easily be credited for prompting the question.

3. Arid Empire and the Historian's Eye (Michele Sollai, Swiss National Science Foundation, Switzerland)

Natalie Koch's *Arid Empire* can be hardly contained within strict disciplinary boundaries. Besides the obvious significance of the book for political geographers, the richness of its sources and its masterful historical narrative are very likely to catch the historian's eye. They certainly did catch mine, to the extent that – to quote the felicitous metaphor at the heart of the book – I could not but read *Arid Empire* through its “double exposure” with historiography. In this review forum, I will outline some of the main insights that can be drawn from this perspective.

In *Arid Empire*, the “fates” of Arizona and Arabia are “entangled” by a common history of development, modernization, and resource extraction, a history which is best encapsulated by the recurrent trope of “making the desert bloom.” As various historical works have shown in several contexts this blooming involved exploitation, erasure, and dispossession (Dant, 2017; Davis, 2007; Lehmann, 2022; Obertreis, 2017). *Arid Empire*'s further contribution towards unearthing the imperialist dimension of development is all the more important given the persistence of such “blooming desert” narrative nowadays, as recently demonstrated in more than one statement by European Union (EU) Commission President Ursula von der Leyen (EU in Israel, 2023; European Commission, 2023).

On a more analytical level, *Arid Empire* shares and further defines several points which have characterized the global turn in the historiography of imperialism, development, and modernization. Especially over the past twenty years, historians have highlighted how the evolution of development in the “Global South” was informed largely by transnational, intra- and trans-imperial flows of knowledge and resources (Barth and Cvetkovski, 2015; Harwood, 2018; Robins, 2021). *Arid Empire* partakes fully in this wave of scholarly work, showing how the circulation of human and non-human actors, materials and technologies, as well as knowledge and practices between Arizona and the Arabian Peninsula, constituted a defining trait of the modern history of these two regions.

Koch aptly reconstructs how models and systems of expertise developed in (and often for) the arid U.S. Southwest were mobilized and exported for the “creation of arid empire” (2022, p. 26) in Arab countries such as Oman, Saudi Arabia, and the United Arab Emirates. In this sense, *Arid Empire* adds an important and little-known case study to the vast history of the imperial projections of U.S. development knowledge and templates during (but also before) the Cold War (Lagendijk, 2019; Phillips, 1999). On the basis of socio-economic and racial analogies between Native Americans or Afro-Americans “at home” and non-White populations overseas, development projects at the domestic level often became “laboratories” for the elaboration of U.S. foreign development policy (Tropp, 2018; Zimmerman, 2010). In a similar vein, Koch emphasizes environmental and climatic analogies as an additional motive adduced by “US agents of empire” (Koch, 2022, p. 43) to promote the transfer of expertise and technologies from Arizonan to Arabian “desert laboratories.”

Still, such transfers did not flow exclusively in one direction and often entailed complex networks of exchange. They impacted economic and political dynamics abroad but also had domestic repercussions. As shown in Chapter 2, the development of the date palm sector in Arizona was made possible by the introduction (and appropriation) of Omani date palm varieties and their associated cultivation techniques. As illustrated in Chapter 3, the transfer of Arizonan expertise to Saudi Arabia in view of the development of commercial farming since the 1940s stands in direct connection with the recent, much debated massive purchase of farmland in Arizona by the Saudi multinational firm Almarai. Albeit entrenched in deeply asymmetrical imperial dynamics, the flows of knowledge, people, plants, animals, and technologies between Arizona and Arabia are thus revealed in their complex historical character.

Hence, through the historical exploration of the entanglements between Arizonan and Arabian desert laboratories, *Arid Empire* offers new tools to historiographical efforts to reshape and challenge conventional analytical boundaries between metropole and colony, imperial centers and “underdeveloped” peripheries, and “Global North” and “Global South” (Patel, 2018; Stoler and Cooper, 1997). Through the common lens of deserts, *Arid Empire* brings distant geographies closer, uniting seemingly unrelated structures of governmentality into a common analytical framework.

From the point of view of environmental history, *Arid Empire* provides an innovative entry point to delve deeper into how “Western” science constructed, problematized, and acted upon the “environmental otherness” of deserts (de Bont, 2022; Lajus, 2022). Similar to tropical and Arctic environments, “Western” anxieties engendered by the unfamiliarity and seeming impenetrability of arid lands spurred various attempts to deploy science and technology to “tame” and “conquer” deserts since the early days of European imperial expansion. Placing *Arid Empire* in this context, it is hard not to notice how the modernizing quest towards “triumphing over” the Arizonan and Arabian deserts was in fact spurred by the urge to radically transform them into more familiar, legible, and ultimately more profitable landscapes. Compared to Indigenous knowledges or agroecological approaches seeking to *live with* and *adapt to* desert ecosystems, arid empire’s key tools – e.g. intensive irrigation (Chapter 3) or desalinization (Chapter 4) – are meant to negate and transcend water scarcity, the most defining feature of deserts. Blooming deserts, wastelands made paradises, and desert Edens are oxymorons after all. Arid empire’s expertise may be indeed viewed as *anti-arid* expertise, as much about knowing the desert as to how to neutralize it.

It takes a certain hubris to fight against the desert, and the kind of desert scientific expertise described in *Arid Empire* seem to have plenty. It is techno-optimist and high-modernist. It – often purposefully – acts as vector of imperial visions. It neglects or even actively obscures alternative ways of knowing and acting upon the desert. Based on this particular representation, *Arid Empire* offers an excellent opportunity to raise the question of whether, and how, it may be possible to provide a comprehensive definition of desert scientific expertise across temporal and spatial scales. Was it inherently techno-optimist, or could it also be “techno-realist” – i.e. pragmatically relativizing the seeming efficacy of modern technologies vis-à-vis desert environments? Did desert “laboratories” systematically erase Indigenous practices, or could they also serve as middle ground, as arenas for the encounter and inter-penetration of scientific expertise and other ways of knowing the desert? And finally, did arid expertise always equate with arid empire, or could experts leave their prescribed role as tools of empire and use science to provide political counter-narratives, alternative visions of desert futures?

4. Settler Colonialism and Science Fiction (Sara Salazar Hughes, California State University Monterey Bay, USA)

I loved reading Natalie Koch’s (2022) book, *Arid Empire*. It has all of my favorite things: science fiction, the U.S. Southwest, dystopia, an analysis of settler colonialism, a critique of ecomodernization, and an examination of U.S. imperialism and the Middle East. It is written in a way that is richly researched and approachable for scholars (from political ecology to settler colonial studies) and nonexperts alike. I could hear Koch’s voice while I read it. Her sometimes sharp humor, the written equivalent of an eye roll (for example, when discussing techno-optimists). Her way of following the questions that interest her wherever they lead, in this case in what felt like both a very natural and a somewhat unexpected evolution of her research trajectory. A journey that took her from her intellectual roots in the Arab Gulf to the place she calls home in Arizona. As researchers, and perhaps especially as geographers, our research is shaped both by where we’re from and by where we end up, and that is very clear in this book.

Given my research on Palestine/Israel, settler colonialism, and sustainable development, each chapter felt both familiar and surprising. Comparative Settler Colonial Studies is a field that analyzes the narrative, material, and morphological continuities across settler colonies (see, for example Veracini, 2010; Wolfe, 2006), and I've spent a lot of time studying and teaching the structuring similarities between Israel and the U.S. So it was very interesting to learn, through Koch's archival research, that American travel writers, explorers, scientists, and government officials described the West as a "Biblical Orient with spiritual and physical power equal to the Old World deserts that populated the Judeo-Christian imaginations of American settlers" (Koch, 2022, p. 12). As Koch tells it: "Nineteenth-century authors' constant references to the Sahara and other Biblical landscapes helped the predominantly Christian settlers imagine the newly American desert lands as a "domestic" Orient and, in this way, somehow familiar" (Koch, 2022, p. 12). In Chapter 2, "Dates," we learn that by the late 1800s, "American popular culture was densely populated with romantic Biblical and Orientalist narratives linking the deserts of the U.S. and the Middle East" (Koch, 2022, p. 49). I did not know that local boosters in Arizona wanted to shake off the "Wild West" stigma and replace it with a different image of agricultural paradise (Koch, 2022, p. 41).

I do know, from months of living in an Israeli settlement bloc in the occupied Palestinian West Bank, that settlers (and particularly American-Israeli settlers in the Judean hills) narrate themselves as rugged "pioneers" settling the "Wild West Bank." So apparently the stigma doesn't flow in the other direction. They made sure to tell me, though, that in this case they are the 'Indians' fighting to reclaim their land from the interloping Arab 'cowboys.' But just like 19th-century American settlers in Arizona, Israeli settlers see their project as working with a 'blank-slate' desert that they would make bloom through their agricultural and technological prowess (Koch, 2022, p. 50). I think there is a very interesting future paper here about the circulation of Biblical and "Wild West" narratives and desert imaginaries from the Middle East to the U.S. Southwest and back again to the occupied Palestinian Territories – a kind of settler imagination knowledge economy. Koch's archival research makes these connections clear.

I also find this to be an excellent teaching text. At this stage in my career, I teach a lot of undergraduate courses, which means that every time I read something interesting I'm thinking: what class could I use this in? I will be assigning chapters of this book across several courses, and I think others will as well. Chapter 3, "Diplomacy," will be excellent for students in my politics of the Middle East courses, particularly the "politics of invisibility" (Koch, 2022, p. 88), transnational agricultural networks, and resource extraction. We'll definitely read "Dates" in my settler colonialism course, as another case study of settler narratives of scientific "expertise," proper use of indigenous lands, and "civilizing" desert wastelands, and as an example of land-grant universities as tools of colonization. The chapters on "Desal" and "Dreams," and the examples of ecomodernist development schemes that they critique, will be assigned in my international development course for our unit on environmental crisis as business opportunity. In fact, in the week before the 2023 AAG Annual Meeting, when I first reviewed this book, my international development students read "Dreams" and watched a video interview with the original architects of Biosphere 2. Like me, they found the chapter fascinating, many of them because of a combined interest in climate change mitigation, development projects, and science fiction – all encapsulated in the dream of Biosphere 2.

I love SciFi and *Dune* (Herbert, 1965) is one of my favorite books. What draws me to science fiction, I think, are two things that are actually a bit contradictory. The first is that science fiction opens up possibility, an invitation to imagine beyond what is and to lean into the dream side of our minds. Biosphere 2's mission of preparing for interstellar colonization by practicing in the Arizona desert definitely fits this bill. But the second reason I love science fiction is, in my experience, reading it is like holding up a mirror.

The reflection we have to face lays bare our own colonial reality – dispossession, extractivism, violence, and ecological collapse all around us. Science fiction is often a great truth-teller. While Biosphere 2 was imagined as a kind of escape hatch out of climate catastrophe on Biosphere 1 (Earth), a “Western fantasy of human beings engineering their way out of eco-apocalypse,” this storyline conceals the fact that huge parts of the world “have already lived through the ecological catastrophe brought about by European colonialism and its repercussions” (Koch, 2022, p. 139). As renowned Michi Saagiig Nishnaabeg scholar Leanne Betasamosake Simpson writes, under capitalism and colonialism it’s been the end of the world for somebody all along (Simpson, 2017). Koch’s analysis of the fantasy of Biosphere 2 holds up a mirror to ecomodernization projects, nearly always rooted in dispossessionary violence.

After learning about Biosphere 2 from Koch’s chapter, my students asked: *Did they believe this was going to work? Did they think this was a good idea?* And the best question I got: *What problems were they trying to solve, and for whom?* In settler societies, the dispossessionary and eliminatory logics of settler colonialism pervade every aspect of society, including “green” development. Throughout the book, Koch shows how the techno-optimist experiments of Arid Empire are not ahistorical discourses, commodities, nor technologies, but elements of historically situated settler colonial and imperial projects. As colleagues and I have argued in relation to Israel’s green tech strategy, regardless of the ecological impact of individual technologies and innovations, in a settler colonial context, they further Indigenous dispossession and elimination and are therefore incommensurable with long-term socio-ecological resilience (Hughes et al., 2023).

Though settler narratives deny it, it’s been the end of the world for somebody all along. Potawatomi scholar Kyle Whyte writes that there are three environmental injustices ingrained in settler colonialism, and the third is the inherent unsustainability of settler colonies themselves, based as they are in endless accumulation (Whyte, 2018). My students also asked: If they wanted to see if humans could live in a closed system sustainably, if they wanted to test their ability to maintain the ecosystem that kept them alive, why not do it on Biosphere 1? But where’s the profit in that? Koch’s research and analysis holds up a mirror to these ecomodernist projects in the Arizona desert laboratory, and helps us understand the history and future of development on this one planet that sustains us.

5. Unmaking Arizona (Brittany Meché, Williams College, USA)

Natalie Koch’s *Arid Empire: The Entangled Fates of Arizona and Arabia* is a pathbreaking work that bridges the fields of political geography, science and technology studies, historical geography, and political ecology. The book manages to be both deftly written and accessible to a general audience, while also retaining scholarly rigor through its detailed use of archival evidence. A signal contribution to the burgeoning field of critical arid studies (Davis, 2016; Henni, 2022), Koch’s book troubles normative narratives about desert landscapes by situating the state of Arizona within broader global circuits of American imperial power, scientific knowledge, and arid lands mythologies.

Before delving into a few thematic aspects of the text, I’d like to take a detour through the sonic landscapes that the book evoked for me. At the start of this millennium, singer-songwriter Jaimie O’Neal (2000) released the song “There is No Arizona,” which eventually topped the country music charts. While the song is admittedly a bit melodramatic and clichéd—rehearsing the classic country tropes of a scorned lover abandoned by a two-timing partner—what I want to focus on is the title and repeated refrain of the song. In the chorus, O’Neal sings:

There is no Arizona

No Painted Desert, no Sedona
If there was a Grand Canyon
She could fill it up with
The lies he's told her
But they don't exist
Those dreams he sold her
She'll wake up and find there is no Arizona

Throughout the song, O'Neal's protagonist laments the shattering of her dream of a "new and better life out in Arizona," and she unmakes the mythos of the state by negating the existence of some of its most iconic sites: the Painted Desert, Sedona, the Grand Canyon. O'Neal does so to inveigh against false promises and romantic delusions.

I'd like to suggest that in her insightful and empirically rich book *Arid Empire* Natalie Koch pushes the geographical unmaking at the heart of O'Neal's song even further. Koch opens the text detailing and then interrogating her own childhood fantasies about the magic of Arizona. She explores how these family connections, expressions of settler kinship, informed ways of seeing and relating to the desert. Koch also interrogates how citizens of empire are taught to take ownership over specific kinds of lands, as she reflects on how she was taught to see Arizona as hers (Koch, 2022, p. 4). The book demands that we rethink these entrenched stories about the U.S. Southwest by making visible modes of imperial citizenship threaded through its landscape.

Furthermore, by carefully unspooling Arizona's "entanglements" with parts of the Arabian Peninsula, Koch breaks apart the apparent geographical fixity of Arizona itself, showing her readers how this place exists in relation to multiple other places. In this way, Koch perhaps ultimately proves O'Neal right: that indeed there is no Arizona, at least not in the way U.S. empire seeks to demarcate its tidy territorial boundaries. As Koch writes, "But the state itself had to be created: it had to be fashioned in people's imaginations, and built into a palpable, material presence. A state can't be made real by cartographers alone" (Koch, 2022, p. 8). Building upon key interventions from Indigenous Studies (Estes, 2019; Powell and Curley, 2008), Koch shows how Arizona was constructed through the twinned projects of genocidal violence and environmental science.

Three thematic threads weave through the text. First, the racial ecologies (Nishime and Williams, 2018) of arid landscapes. The book shows how race was central to arid empire, both in efforts to make "Indian country" white and in efforts to shore up U.S. expertise about deserts *vis-a-vis* Arab countries (Koch, 2022, p. 35). Koch recounts the explicit Orientalizing of desert areas, as imperial boosters came to view the Southwest as a mini "Orient" (Koch, 2022, p. 49). She shows how deliberate policies to advance agricultural promotion for whites only furthered the racialized dispossession of indigenous peoples. These specific forms of racial violence became moments of crisis revealing a tension between U.S. democratic ideals—always already soaked in blood—and despotic fantasies about the military strategies needed to "conquer" arid lands.

A second theme developed throughout the book is technological optimism in arid lands. It is striking that in many visions of arid empire, the desert never stays a desert. The purchase of this version of technological optimism is that imperial knowledge can, in the famed words of Alan George (1979), "make the desert bloom." *Arid Empire* shows the central role of educational institutions in propagating this kind of techno-optimism. As Koch writes: "From the perspective of 'modern science,' which the university and other scientists in the late 1800s and early 1900s were trying to advance in Arizona and other parts of

America's new arid empire, the ultimate goal was to transform the desert into a blossoming paradise for farming" (Koch, 2022, p. 30).

Of course, the desert-turned-green-paradise trope persists as a durable chimera of green imperialism (Davis, 2007; Grove, 1996), and at the heart of this fantasy is an assertion of idealized technological supremacy, that it would stand as a testament to the very prowess of imperial science to make a "viable" empire here, in these kinds of lands. Perhaps for those familiar with critical scholarship on American empire and landscape (Cronon, 1996; Kosek, 2006; Taylor, 2016) this point is unsurprising, but what Koch's text does so well is establish how the stakes of this project were much higher and much more fraught in arid lands because of the biophysical specificities of these environments, which encouraged technological projects in excess of what was at play in parts of the temperate Northeast. This is reminiscent of Jen Rose Smith's (2021) idea of temperate-normativity, and how agricultural technologies worked to affirm a temperate ideal by attempting to manage "problem environments" like arid lands.

Chapter 5, "Dreams," considers contemporary examples of technological aspirations assembled in deserts. Turning her attention to Biosphere 2 and the United Arab Emirates' Mars 2117 project, Koch shows how technological optimism persists in and through repeated practical and technical failures. As she explains:

So even if an experiment never serves as a model—Biosphere 2 never was a closed system and it never illustrated how humanity could 'evolve off' planet Earth, just as the UAE's Mars 2117 project will probably never result in a habitable Mars colony—the prototype is effective because it uses *realism* to suggest that the idea is *realistic*. The model allows observers to 'see (or at least imagine)' that the techno-futures on display could actually be realized, even if they are theatrical. (Koch, 2022, p. 158).

This intervention is all the more relevant amid the present prospects of geoengineering and climate change-related techno utopias and dystopias, and it begs the question of whether another science possible (Stengers, 2018)? To what end? And for whom?

A third theme of the book is arid lands and/as homelands. *Arid Empire* concludes with an unresolved question: are there durable, more ethical versions of homemaking in arid lands? It is an important one given that many nightmarish climate change scenarios involve projections suggesting that arid lands will eventually become uninhabitable, that indigenous communities will no longer be able to build viable homes in these places. The book ends with an open possibility inspired by the work of Tohono O'odam scholar Dr. Ofelia Zepeda—possibility that refuses to cede the desert to inevitable catastrophe. Koch writes: "*Tohono O'odham* means 'desert people,' so for her community, the desert is home. It need not be a cruel, militarized landscape. It is life and it is possibility. And for someone like me to have the privilege to be born on Tohono O'odham lands and to listen to Dr. Zepeda...I hear her enjoinder not to give the desert over to the violence. For me too, it is home, life, and possibility" (Koch, 2022, p. 164-165). The elements of this concluding triptych—home, life, possibility—are worthy endeavors in service of unmaking the violences of arid empire.

6. Science, Environmental Knowledge Production, and the Desert (Maria Lane, University of New Mexico, USA)

Arid Empire connects the political histories and geographies of Arizona and the Arabian Peninsula in a number of surprising ways. The book covers extensive ground, ranging across topics as disparate as science fiction, agronomy, and engineering, and it's a highly enjoyable read that provides an engaging perspective on little-known political-geographic episodes in various desert locations. Beyond the historical

facts I learned, however, I really appreciated how Koch asks and answers questions about how we can and should do scholarship on empire. In this brief commentary, I share thoughts from my own historical geography scholarship to highlight the ways Koch's political geography work could be in conversation with research centered on settler colonialism and environmental management in arid places.

First, I admire the way Koch addresses her own positionality as a scholar. She opens the book with a discussion of her personal connection to the Arizona desert, using evocative descriptions of childhood memories to pointedly illustrate the ways whiteness is connected to ignorance (e.g. children playing "cowboys and Indians" and dressing in stereotypical frontier garb). Looking back on her family's history in the region of the Southwestern U.S., Koch reflects on how the ignorance of imperial geographies leads to perceived innocence, giving white settlers in Arizona a vastly different perspective than non-white people inhabiting the same spaces. She uses this framing to animate the book's persistent effort to unravel the threads that link Arizona—through different imperial processes—to various Arabian governments, peoples, and places.

Koch's approach also made me think about the many ways archival work can be inherently complicit with colonialism. Many historical geographers now advocate being modest with theory and sensitive with empirical work, while Indigenous thinkers argue eloquently for the need to decolonize both thinking and methodology in historical scholarship and science studies (e.g. Kurtz, 2001, Leddy, 2017, Smith, 2012, TallBear, 2014). Koch's book reflects the value of using the incompleteness of historical records as an analytical lens, of looking for complexity and messiness in archives, and of focusing on embodied practices despite the difficulty of accessing them through paper archives. In sorting through many records, policies, and texts, Koch discovered several unexpected characters, few of which were people.

One of the most striking characters in imperial knowledge production was the university as an institution. As the book weaves through the agronomy of date production, the diplomacy of agricultural exchange programs, the techno-optimism underlying desalination projects, and the colonization of arid lands in science fiction and other imaginations, universities pop up again and again. In both Arizona and Arabia, educational institutions turn out to be essential to conjuring the political life of deserts. Research programs, funding streams, administrative priorities, and inter-university relationships worked in tandem to reinforce imperial forms of knowledge production.

For me, this raises the question of complicity. How should university-based researchers account for their own participation in institutions that drive the politics of environmental knowledge production? Just because Koch can explain the power relations behind University of Arizona's initiative to improve Oman's date palm industry does not resolve the inequity and imbalance of those power relations. In some ways, explanatory scholarship runs the risk of naturalizing unequal power relations, simply by making them seem legible, rational, and inevitable. I argue that scholarship can and must be part of a reparative effort that questions its own certainties.

My own research on the origins of scientific water management in New Mexico shows that modernist approaches to resource development often started from places of grave uncertainty (Lane, 2024). By tracing and understanding the process through which colonists, imperialists, and universities gain power, our scholarship can illuminate a path toward unraveling and challenging the structures of that power. We academics are great at finding, seeing, and critiquing the operation of empire in both historical and contemporary contexts, but we don't usually bring it home to the places where we work. Koch offers a compelling example of how to follow the threads connecting university research operations to geopolitical maneuvering.

This brings up an area where I think political geography and historical geography have a potentially productive new intersection: geographies of science. Scholarship in science and technology studies (STS) has shown persuasively that producing knowledge is never a neutral act or a reflection of truth; it is always about power: “the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it” (Jasanoff, 2004, p. 2). The geographies of science literature adds to this scholarship by urging scholars to use a spatial framework when exploring the coproduction of science, place, and power (Livingstone, 1995, 2000).

Arid Empire doesn't make new contributions to the geographies of science literature, but it certainly highlights the ways science is fully enrolled in politics, and vice versa. The book also brings attention to a region that doesn't always feature in the geography of science literature: the Middle East. Much of our historical-geographic attention to science and its imperial dimensions is centered on Europe, with a secondary focus on European colonies. In centering independent Arabian governments, Koch focuses more on modernity than on colonialism, artfully balancing attention to science with attention to politics. The book left me wanting more in places about the specifics of environmental knowledge production—e.g. agronomic techniques in date cultivation, or nitty-gritty approaches to irrigation—since those tiny details can be so weighty in how knowledge takes shape. But even with an obvious geopolitical focus, *Arid Empire* demonstrates well the fundamental nature of knowledge networks and circuits. Geographers of science will appreciate that this book does a great job following meetings, visits, and exchanges between scientists and engineers in both Arizona and Arabia.

Finally, I want to comment on *Arid Empire*'s exploration of how deserts play into apocalyptic narratives about the end of earth and the future of humans in outer space. Koch discusses the fact that science fiction portrayals of arid outer space, including ultra-popular works like *Star Wars* and *Dune*, often derive from imperial contexts where irrigation provided an opportunity not only to transform landscapes but also to dispossess generational residents. Those same ideas also drive funding for massive projects like the Biosphere 2 experiments, desal plants, and futuristic farms. Notably, white settlers, scientists, and experts are always at the center of such narratives, suggesting that apocalyptic and futuristic visions are part of the settler colonial project. I have explored this idea from different angles in two books—one on Mars and one on New Mexico—that focus on the irrigation of arid landscapes (Lane, 2011, 2024). Both books show that water science, policy, and management were inextricably linked to the broad structures of colonial dispossession that solidified in the late nineteenth century. Koch's stories help confirm that those structures and imaginations persist and travel across newer geopolitical domains.

Overall, *Arid Empire* left me with a lot of questions. I offer two here, under the assumption that political geographers will find it productive and generative to explore them from multiple angles. First: Is there anything really special about deserts? Could the same kind of study be done on any landscape that western imperialists deem forbidding? I'm thinking of Arctic landscapes, high-altitude montane landscapes, or swamps—places where agriculture is difficult or impossible and fundamentally different, and where the imposition of technopolitical administration and governance gets complicated. Second: What forces work against the dominant narratives—technology as a solution to aridity, expertise as a marker of cultural superiority, modernist science as predestination—and connections that Koch revealed? The chapter about Biosphere 2, as an example, touched on the conflict over science versus spectacle, revealing that science is *not* always seen as a perfect solution to the ills of environmental change. Other chapters suggest topics that also could be more deeply explored in terms of the interplay of political stances and knowledge contexts. I list these questions here not to declare holes in *Arid Empire*, but to encourage careful engagement with its text, topics, and concerns.

7. Seeking Surprise in Political Geography (Natalie Koch, Syracuse University, USA)

Writing and researching *Arid Empire* was a pursuit of passion – but it was also the product of sheer luck and surprise. I have written elsewhere about my effort to practice “deep listening” as a way to build in the possibility of surprise in my fieldwork (Koch, 2020). But on a regular basis, the research for this book seemed to overflow even my most deliberate efforts to stay open to new ideas and surprising coincidences. One such chance came early in the project, when I stood in my friend Katia’s kitchen in Abu Dhabi in January 2019.

Katia and I became friends in college, but we didn’t have many chances to see each other in the following years, since we both ended up in careers that had us traveling constantly. I was delighted when she moved to the United Arab Emirates (UAE), not long after I began making frequent trips there in 2012. We were suddenly able to reconnect on a regular basis and I loved hearing about her work in the UAE, and getting her perspective on my own work there. So when we were catching up in January 2019, I began telling Katia about my new idea to explore connections between Arizona and the Arabia Peninsula. “How funny,” she exclaimed, “I was just in Arizona a few months ago!”

Katia then recounted how she has visited Arizona State University (ASU) as part of a high-level delegation from her UAE-based university, which was considering some new partnership ideas in Arizona. ASU president Michael Crow, famous in U.S. higher education circles for his eyebrow-raising entrepreneurialism, pulled out all the stops for the Emirati delegation. They toured campus, heard about ASU’s many unique education initiatives, shook hands, shared stories and smiles – and they ate dates. At the end of the meetings, Crow had regaled the visitors with dates grown on the ASU campus. “These dates,” he declared, “originally came from the UAE. It seems we are destined to be partners!” Katia finished her story with some caveats of uncertainty about Crow’s claims, but I looked straight at her and said, “Bullshit. I don’t believe it!” I wasn’t questioning the accuracy of her account, but rather that of Michael Crow about the origins of the dates.

Then in a flash, my own certainty that he must have been lying to make a deal with his Emirati partners started to waver. I grew up in Tucson, Arizona and I don’t normally think of Arizona in association with dates. But as I contemplated it more, I began to call to mind all the palm trees dotted around the cities of Arizona. I remembered the gooey mess that some trees would leave on the sidewalks when they dropped their fruit. I remembered the glorious palm in my grandmother’s front yard, which I would play under for hours as a child. Where did these palms come from after all?

I knew at least that palms are not native to the Southwest. I had learned in my college geography classes that Los Angeles and other parts of California had embarked on massive palm-planting campaigns. But I had never stopped to consider where California’s trees came from, let alone Arizona’s. Katia’s story set me off on a mission to find an answer, partly out of sheer curiosity but also (mostly, perhaps) to prove Michael Crow wrong. I obsessively read about this history in the week after our conversation and I quickly discovered that the U.S. date industry, now famously linked to Southern California’s Coachella Valley, actually got its start in Arizona (Colley, 1971). But that start was only possible because some men in the U.S. worked to import date palms from the Arabian Peninsula and other parts of the Middle East and Northern Africa. One of the first palms to arrive in Arizona came from Oman – received by the University of Arizona’s new Agricultural Experiment Station in 1891.

As luck would have it, I was scheduled to visit Oman just one week after Katia and I spoke, and my date palm curiosity was ignited. I didn’t have any specific plans to investigate the history of dates when I arrived in Oman on that trip, but on a whim, I decided to take a daytrip to the mountains outside Muscat,

Oman's seaside capital. My driver Mohsen quickly noticed my interest in the trees. As we travelled through the date-producing fringes of the countryside, he started making unplanned stops so I could learn about village production approaches, to see the famous *aflaj* channels distributing spring water to the individual- and community-managed farms, and speak with local farmers. At the end of our day in the mountains, as we were saying goodbye, Mohsen furrowed his brow, trying to think of other date-related connections that I might find interesting. Suddenly, he turned to me and said, "Well, you've heard about the Million Date Palms project, haven't you?" In fact, I had not.

Once I got to my room that night, I went straight to Google to search for it. The first hit was a bold University of Arizona news release from one month before: "UA-Led \$3.9M project to focus on date palm production in Oman" (McGinley, 2018). My jaw dropped. When I first started looking at ties between my home state of Arizona and the Arabian Peninsula, I thought it might be a small story about some contemporary financial or political connections. But all the geopolitical threads spinning out from what I learned about the date palms in only 10 days, started to feel more like some kind of vast superstructure that I had always been living in, but was simply oblivious to. It took me another year of archival research, interviews, and site visits in Arizona and Oman to piece together the bigger story about the date industry, its place in the efforts of white settlers to colonize the territory now known as Arizona, the crafting of desert farming expertise by Arizona "experts," and how this expertise was then packaged and sold back to the Omani government in the UA's date palm project (Koch, 2021, 2022).

I doggedly pulled on the geopolitical threads that I encountered in those early weeks of January 2019, but I have never forgotten how much chance was involved in sparking the questions that led me to the story. In fact, most of the cases of connection that I collect in *Arid Empire* have a similar backstory. Rather than dwelling on anecdotes, the bigger point I want to make is that one of the greatest strengths of political geography today is that the field is so very *open* – theoretically, methodologically, and empirically (if not linguistically). The generous – and generative – responses to my book here are a testament to this openness, coming not just from colleagues in geography but also history.

Indeed, political geographers today are uniquely positioned to cut across disciplinary bounds, unite contemporary and historical inquiries, join our personal histories and ethnographies with the insights of interlocutors like Katia and Mohsen, and put these findings in the broader context of geopolitical structures like arid empire. That is, if political geographers recognize the power of speaking beyond our discipline and seeking out new ways to unite systematic research, chance, and surprise. Or in the words of John Agnew (2006, p. 4), "We must be more open to being theoretically and empirically surprised by what the world throws up. But we can only be surprised, and then act appropriately, if collectively we stand open to it."

Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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