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## GEOPOLITICAL FORUM

# The Shifting Geopolitics of Water in the Anthropocene

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### ABSTRACT

This forum responds to recent calls to hypothesize a geopolitics of the Anthropocene by examining how our notions of geopolitics of water may shift in the context of this new and, at times, divisive framework. The Anthropocene describes the geological epoch in which humans are the dominant actor in the global environmental system and has been a concept that is not without controversy. Taking the Anthropocene as an epistemological divergence where nature can no longer be viewed as separate from humanity, this forum asks how moving away from understanding hydraulic systems as essentially stable to understanding them as unstable and profoundly influenced by humans changes our understanding of the geopolitics of water. Collectively the contributions to this forum illustrate that formulating a water geopolitics of the Anthropocene requires 1) moving beyond a focus on fluvial flows to consider other forms of water; 2) broadening our understanding of the actors involved in water geopolitics; 3) examining new geopolitical tactics, particularly those grounded in law; 4) engaging critically with new and emerging forms of visualization and representation in the geopolitics of water, and; 5) examining how the notion of the Anthropocene has been used towards geopolitical ends and worked to elide different positionalities.

## Introduction to the Forum

### *Afton Clarke-Sather and Britt Crow-Miller*

In geopolitical discussion of resources, water has historically played a unique role. As a flow resource, water has been in a contested realm that challenges traditional territorial notions of geopolitical power. Research on the geopolitics of water has often focused on its transboundary nature<sup>1</sup> and the potential for conflict and cooperation in shared river systems.<sup>2</sup> Existing frameworks and foci, however, may no longer be adequate as unprecedented human impact on the environment

makes relevant new geographies of water and ways of governing them. This forum responds to recent calls to hypothesize a geopolitics of the Anthropocene<sup>3</sup> by examining how our notions of geopolitics of water may shift in the context of this new and, at times, divisive framework. The Anthropocene, a term coined by Crutzen,<sup>4</sup> describes the geological epoch in which humans are the dominant actor in the global environmental system. We take as a point of departure Lorimer's conceptualization of the Anthropocene as an epistemological divergence where nature can no longer be viewed as separate from humanity.<sup>5</sup> In essence, this forum asks how moving away from understanding hydraulic systems as essentially stable to understanding hydraulic systems as unstable and profoundly influenced by humans changes our understanding of the geopolitics of water.

In conceptualizing a geopolitics of the Anthropocene, water is an especially appropriate and important place to begin for a number of reasons. As a global resource, it is unique in that it is essential for both human life and ecosystem function, and non-substitutable for both. As we continue into the uncharted territory of fundamentally altered Earth systems, adjusting the ways in which we as humans interact with water will be paramount, above all other resource concerns. The resource's unique materiality—being quite heavy, fluid and yet fixed in place—also constrains the ways in which political actors may try to access and control it. As a flow resource, water must be used where it occurs. While it is relatively easy to move once capital investments have been made, moving water across borders either in physical or in virtual form tends to be guided by regional and global geopolitics. This tension is coming into clearer relief as water-stressed regions and global megacities begin reaching beyond their own borders for water-intensive food production and a diversified supply.<sup>6</sup> One need only look at the case of China, now building up an elaborate global infrastructure of water-intensive food and energy production to support its development agenda<sup>7</sup> to see the acute need for new frameworks for making sense of and governing water geopolitics in this new epoch.

Water is also among the only resources with which humans frequently interact in all three of its physical states: solid, liquid and gas. Yet our existing geopolitical focus on water has been primarily on water as an abstractable liquid resource. The complexity of the human interface with water—becoming increasingly wicked in the face of emerging planetary stresses—both shapes and is fundamentally shaped by politics at multiple scales, including the national, regional and global. Engaging with the geopolitics of water in the Anthropocene therefore represents an important opportunity to address critical challenges across the shifting spatialities of the twenty-first century. Additionally, although the Anthropocene should not be solely understood in relation to climate change, anthropogenic climate change is perhaps the clearest manifestation of the Anthropocene, and many of its direct impacts on humans are mediated through water, including increased frequency and severity of droughts and floods and melting ice in both the Arctic and key

mountain watersheds that provide water for large portions of the global population. While local adaptation to these changes is essential, so too is broader international cooperation around greenhouse gas mitigation, global environmental governance structures and humanitarian efforts for those most impacted by climate change in the global south.

In these ways, a range of water-related issues—from the construction of large dams and changing sediment regimes to the water quality impacts of nitrogen fixation and the push for interbasin water transfers—are all part of the water geopolitics of the Anthropocene. As human–environment interaction increasingly comes—for better or for worse—to be understood through the lens of this emerging framework, water geopolitics demands greater attention and the four essays below represent a first step in setting a new research agenda toward that end. Collectively, the diverse group of scholars we have brought together in this forum examine how geopolitical inquiry and praxis around water might be altered by the epistemological turn encompassed in Anthropocene thinking. In other words, how does a move away from viewing the Earth’s surface features as relatively stable<sup>8</sup> and a concurrent placing of humans at the centre of that instability alter both views and practices of water geopolitics? Some of our contributors frame their work as explicitly geopolitical in the sense of interstate relations, and others examine the spatial politics of water in ways that may inform a new understanding of water geopolitics for our changing world. These pieces also engage with the Anthropocene as both an epoch and an idea. As an epoch, these pieces respond to Dalby’s call to move away from viewing the earth as relatively stable and examine geopolitics in a world where humans make the geo. As an idea, two of the contributions (Banister and Thomas) examine how the Anthropocene has come to be deployed to make geopolitical claims about water.

Banister, for example, explores water and the visual politics of the Anthropocene, highlighting a critical view on the Anthropocene framing through examples of modern water control in Mexico. Thomas interrogates what the Anthropocene means for the governance of international rivers, concluding that we must put into practice governance approaches that take seriously social and spatial difference across the globe and are “attentive to power, scale, and context-specific knowledge” (Thomas, this forum). Drawing on a powerful example of indigenous-led activism to take ownership over water governance in the Pacific Northwest of the United States, Norman’s provocative contribution is a call to action for scholars and educators to assert themselves as actors in the emerging water geopolitics of the Anthropocene. Her contribution gains increased salience alongside ongoing resistance to the Dakota Access Pipeline on the Standing Rock Reservation of the Lakota and Dakota peoples on the ground of potential water quality impacts and both cases highlight the interactions of tribal sovereignty and national juridical control of territory. Finally, Stephenson illustrates how the symptoms of the Anthropocene era (in this case, climate change and polar sea ice melt) contribute to a shifting geopolitics of water as nation-states, transnational

governing bodies and laws, global economic interests, and science all come into play in negotiations over a trans-Polar shipping route.

We identify five key points to guide future work in the context of this emerging framework. First, in understanding the geopolitics of water in the Anthropocene, it is essential to think through the materiality of water in the various forms it may take, and the imbrications that water has with other resources and political actors. Water has most often been treated within geopolitics as an abstractable flow resource through lenses including critical geopolitics and hydro-hegemony.<sup>9</sup> While these approaches remain important, they will require a reformulation in our current epoch (see Thomas in this Forum). Thinking through water and geopolitics in this new context will also require moving beyond fluvial flows. For example, though composed of water, oceans have rarely been viewed through the lens of water geopolitics, instead treated as part of a discrete set of concerns around maritime geopolitics.<sup>10</sup> Yet in an era where pollution and plastics flow readily from river to sea, from bay to open ocean and between continents, the nature of seawater as a flow resource deserves attention. Ice has similarly been relegated to the realm of Arctic studies (for example, see the journal, *Polar Geography*). But as Stephenson's contribution to this forum makes clear, the ongoing state change from ice to liquid water in the Arctic is accompanied by profound geopolitical tensions. In the Anthropocene, the geopolitical imbrications of water must be thought to include not only both salt and freshwater, but also both solid and gaseous states in addition to liquid water. Similarly, rethinking the geopolitics of water calls for rethinking the uses of water. While transboundary water geopolitics and state-building interbasin transfers are concerned with the abstraction of freshwater for direct human use, as Stephenson and Norman's contributions make clear, water, in its changing states, is also an essential resource for global shipping.

A second point raised by this collection of pieces is that we must work to identify the key actors and the scales at which they are operating in the water geopolitics of the Anthropocene.<sup>11</sup> As we begin to broaden the physical spaces and biophysical states through which we think about the links between water and geopolitics, we must also consider who and what is privileged or marginalized, legitimized or delegitimized in the negotiation of power. Geopolitical discussions of water, like geopolitics more broadly, have historically prioritized state actors as units of analysis.<sup>12</sup> Several of the contributions in this forum continue to focus on the importance of relationships between states, including Stephenson's illustration of how Russia has shifted both its geopolitical claims and tactics in the face of a state shift in the waters of the Arctic Ocean. At the same time, there is also a coherent theme of decentering the role of the state in geopolitical thinking. Thomas, for example, considers whether the Anthropocene will challenge the traditional priority assigned to state actors in transboundary water governance, while Banister suggests that an Anthropocene framing "closes down potential pathways for a differentiated understanding of the roles of individual nation-states

operating within the emerging transnational structures of climate governance” (Banister, this Forum). Stephenson, again, raises questions around scale and water governance in his discussion of the United Nations and global governance frameworks, while Norman moves the conversation to a different scale of resolution in her examination of the struggles of indigenous groups to illustrate how both locally and regionally based non-state groups are active participants in geopolitical disputes around water and resources in the Anthropocene. Collectively, these papers point to the need to move beyond state-centric territorial assumptions in the geopolitics of water, and critically view geopolitical actors at different scales.

The shifting tactics used to negotiate geopolitical engagements with water in the Anthropocene form a third locus of attention throughout the contributions in this forum. Two essays engage directly with the malleable use of law in making geopolitical struggles. In Norman’s case study, indigenous opposition to a coastal coal export terminal rested heavily on the use of treaty rights, and examining how the application of those treaty rights to fishing livelihoods based on use of water would shift in the context of the Anthropocene. In Stephenson’s case study, Russian state actors have looked for ways to reinterpret existing norms of international law in the context of a rapidly changing Arctic. Both of these contributions illustrate that deploying existing legal frameworks in new ways can be a means of achieving geopolitical power in a changing environment.

Fourth, several of the contributions in this forum make clear the important role of representation in how players assert their influence over water in the Anthropocene. The emergence of critical geopolitics (and indeed this journal) has been underpinned by an implicit acknowledgement of the idea that geopolitical representations themselves hold power insofar as they often come to constitute geopolitical reality. The prioritization of (geo)political uses of representations of water is also a defining attribute of critical hydropolitics.<sup>13</sup> All of the contributions to this forum address how representations of water are changing in the Anthropocene. Visualization is perhaps a key form of representation, and Banister examines how forms of visualization of water resources create a specific type of politics promoting inter-basin transfers in Mexico. Two forms of representation are presented in Stephenson’s contribution on Russia’s geopolitical approach to melting sea ice. First, Russia relies upon a representation of the Russian state as a protector of the Arctic from shipping pollution to invoke specific clauses of the United Nations Convention on the Law of the Sea (UNCLOS). Second, through the use of bathymetric surveys, the Russian state endeavours to use scientific forms of representation to claim an extended territorial shelf as the basis for expanding its sovereign power over previously unclaimed portions of Arctic territory. Norman’s contribution also explores how representations of livelihood came to be deployed by indigenous groups to invoke treaty rights. Finally, Thomas examines whether representing the Anthropocene as an organizing framework under which to assemble global forms of knowledge elides persistent geopolitical tensions in transboundary waters.

Finally, as a more general point about the Anthropocene framework raised by many of our contributors, as new spaces and actants come to be entangled in water geopolitics in a variety of ways, the voices, positionality, interests and culpability of others have effectively been erased. These contributions collectively argue that not all humans have altered biophysical processes equally: “Humanity,” as the agent now responsible for fundamentally altering global environmental systems, needs to be disaggregated. Because the Anthropocene framework “collapses the spatial and temporal differences that both drives and is shaped by environmental transformation into one deceptively neat stratum” (Banister, this Forum), we run the risk of losing nuance in how we think about spaces, processes and actors in change as they relate to water geopolitics. The Anthropocene as a concept conjures up an image of a flat-surfaced globe as the stage upon which both problem and solution are acted out, placing them both everywhere and nowhere at once. Spatial and temporal differences are precisely what we need to understand and make explicit, especially insofar as they bring to light equity issues and unequal power geometries. As we grapple with the complex range of conceptual questions raised by the Anthropocene framing, we must also ask operational questions, such as at what scale or scales do we locate action, impact, responsibility and governance around water issues? Importantly, as Thomas argues with her river–border complex framework, we need new approaches to water geopolitics that offer a higher spatial and temporal resolution in the face of the borderless and flat ontologies given renewed credence by Anthropocene thinking.

It is our hope that, taken together, these five points will serve as a foundation for a new research agenda for water geopolitics in the Anthropocene. It is not yet precisely clear how the geopolitics of water will shift in this emerging context, which actors and scales and issues will move to the fore. The contributions in this forum offer some preliminary clues. However, as the changes play out they will, no doubt, be complex and geographically contingent. As we begin to uncover a clearer picture in the years and decades to come, we expect the areas pointed to above to be especially dynamic and important both for understanding the new context of water geopolitics and for operating within it. As this collection shows, Anthropocene thinking is already beginning to unsettle traditional frameworks for water geopolitics, but whether or not changes in the geopolitics of water can support a critical rethinking of the Anthropocene framework remains to be seen.

## **Visions of Water and the Anthropocene**

***Jeffrey M. Banister***

While scholars in the humanities and social sciences have broadly latched onto the idea of the Anthropocene, some have continued to point out the obvious reductionism troubling the concept.<sup>14</sup> Anthropocene discourse, they suggest, facilely collapses the spatial and temporal difference that both drives and is shaped by



environmental transformation into one deceptively neat stratum of geology: Humanity. While “we” (humanity) might all be in “this” (greenhouse gas (GHG)-induced climate change and anthropogenic transformation more broadly) together, they argue, by no means are we in it equally or in the same way. Indeed, placing Anthropocene discourse at the centre of inquiry could simply re-inscribe the very nature–society divide that some suggest the concept effectively obliterates.<sup>15</sup> Accepting that “humanity” has singularly trashed the garden may in fact narrow our scope for comprehending the central role of socio-spatial difference (human and non-human, historical and contemporary) in producing a planet increasingly hostile to biological life. In this regard, Anthropocene discourse shares much in common with other modern abstractions, including the very idea of “water.”<sup>16</sup> Based on the work of Hamlin<sup>17</sup> and Linton,<sup>18</sup> I have elsewhere defined the process “modern water” as “a shift from the traditional notion of water as a heterogeneous element expressive of diverse geographies and histories – waters, that is – toward an understanding of water as a placeless, timeless ‘natural’ substance.”<sup>19</sup> Thinking with the Anthropocene, just like thinking with “modern water,” may actually limit our ability to broadly sense the world and thus think about alternatives to the currently dominant suite of state-centric, technicized and apolitical approaches to the most pressing water problems.

Nicholas Mirzoeff argues that humans haven’t the capacity to “...see the Anthropocene, extending across centuries, through dimensions and across time. It can only be visualized [...such that] all past human history. ...is [therefore also] the contemporary.”<sup>20</sup> Visualization inevitably combines politics and, in this case, literally, a worldview. Politics, writes Rancière, always brings aesthetics along with it—that is, a “system of *a priori* forms determining what presents itself to sense experience.”<sup>21</sup> As Anthropocene discourse gains traction, circulates ever more widely and, in some cases, is enlisted in hegemonic projects of mitigation and adaptation, it is increasingly important to ask, à la Lefebvre, how does a macro-scale abstraction like this actually relate to socio-spatial practice?<sup>22</sup> Circling back to the matter of water control, how does it articulate with other modern abstractions such as the hydrological cycle, also a highly visual and widely accepted concept, one that scholars have recently attempted to broaden into the idea of the “hydro-social cycle”?<sup>23</sup>

Like the hydrological cycle, Anthropocene thought might indeed heighten the historical tensions between vision, space, scale and politics that I see as typifying the modern approach to hydraulics. In an analysis of scale and climate change, Sayre states this tension in terms resonant with geographers: “The processes that link GHG emissions to climate change combine extremely fine grains and extremely large extents, both spatially and temporally.” At the granular level, microscopic (*i.e.* invisible to the human eye) CO<sub>2</sub> molecules are released by diverse and spatially uneven processes ranging from human respiration to coal-fired power generation. Their reach, however, becomes global as they then form part of the Earth’s atmosphere and, thus, fortify the greenhouse effect. The temporality of



GHG emissions is also characterized by “short grain and long extent.” Instantly produced CO<sub>2</sub> molecules can remain in the atmosphere for over 100 years. By the time they are released, those same molecules might have been embedded in trees, soils or fossil fuels anywhere from decades to several million years. The spatial and temporal tensions between grain and extent that climate and anthropogenic environmental transformation bring together make this an extremely difficult set of problems to confront at the level of politics.<sup>24</sup> In the case of GHG emissions, CO<sub>2</sub> molecules are everywhere and nowhere, while the processes creating GHG emissions are unevenly produced yet subtly and complexly bound together within modern capitalism. True adaptation and mitigation, Sayre continues, will necessitate the devaluation of historical (and, often, slow-to-amortize) investments in infrastructure rendered obsolete or ecologically and socially unsustainable by the effects of climate and anthropogenic environmental change. Importantly, here the term “investment” also signifies the deep emotional attachments and material dependencies that develop with infrastructures.<sup>25</sup>

The dominance of the hydrographic basin-as-management unit illustrates some of these tensions rather elegantly. Basin-scale water governance is by no means a new concept. Since the early 2000s and the emergence of the Integrated Water Resource Management approach (IWRM), however, it has become what Molle calls a “Nirvana Concept”: a widely circulated, purportedly “replicable” framework and approach propelled by a “vision of a ‘horizon’ that individuals and societies should strive to reach.”<sup>26</sup> Though Molle does not address it directly, the word “vision” plays a crucial role here, for basin management is an inherently visual-geographic concept. In Mexico City—the focus of my current research—water woes constitute a politically and ecologically untenable situation in part because the official picture of modern water almost invariably begins with a view from on high, a picture of both the city and broader geography of the Basin of Mexico.<sup>27</sup> (The densely populated capital today sprawls out across a large volcanic bowl, covering what was once a series of ancient lakes.) Hydraulic infrastructure thus also includes a variety of historical objects and works that both move water and also deliver a visual narrative of nature and space. From nineteenth-century landscape paintings to today’s computer-based models, digital media platforms and glossy published reports, it is astonishing to see how consistently rehearsed and durable the official, God’s-eye view of Mexico City’s water and hydraulic geography has become. Of course, there have been adjustments over time, for transformations in the basin landscape have made certain types of thinking and politics practically impossible. Still, the basic sketch remains surprisingly intact.

Portrayed as a visually comprehensible whole, then, there seems to be almost no other conceivable option for water managers but to continue down the well-trodden path of large-scale infrastructural interventions. In turn, this perpetuates a vicious cycle wherein the negative socio-environmental consequences of one project necessitate yet another initiative of even grander and more oppressive (for many Mexicans) scale and so on it goes. Each intervention embeds and multiplies the

deleterious social and environmental consequences of its predecessors. In the current context of increasing hydro-climatic variability, the visual discourse of modern water plays a central role in state efforts to control an expert-driven water politics made increasingly unstable by the devaluation of hydraulic infrastructure and the built environment more broadly. To understand the city's water woes, one must start with the assumption that the current structure is ecologically, socially and politically untenable.

Potable provision and drainage since the colonial period have produced this increasingly untenable and highly uneven social geography of exploitation that now spans the populous central plateau region. While water infrastructure makes possible the generation of nearly a quarter of the nation's GDP (produced in the Basin of Mexico), its benefits are by no means enjoyed equitably across the different interconnected watersheds feeding or draining the capital. At best, it marginally supports the social reproduction necessary to feed the basin's economic growth machine. Likewise, the constantly increasing costs (ecological, political, social) of "managing" its rapid decay and devaluation are largely borne by those who benefit least. These are the millions of "informal sector" or otherwise marginalized labourers populating the *colonias* and *barrios* with the most tenuous potable and drainage situations; the inhabitants of distant watersheds who have seen the disappearance of erstwhile abundant surface water; or the farmers and ranchers downstream of the capital's sewer and runoff system who irrigate with its outfall of *aguas negras*. How are we to adequately historicize this kind of infrastructural violence when socio-spatial difference is flattened into a single geological stratum: Humanity?

Basin-scale hydraulic management has its own talisman, the "water user," and large-scale inter-basin transfer and flood control projects are now in various stages of planning and implementation across Mexico. In one way or another, each of them is infused with a climate-change reductionism that now propels centralized hydraulic planning. Government officials in the Mexican state of Sonora, for example, have forced through an aqueduct project that redirects a large portion of Yaqui River's surface flow away from its basin and into the state capital, Hermosillo. Neither months of aggressive protest on the part of farmers and Indigenous people nor Supreme Court rulings could slow construction. Indeed, some of the protesters (water users?) were imprisoned un-trumped-up charges. In other places, they have been kidnapped or assassinated. Farther south, officials with the Río Mayo Irrigation District have teamed up with federal and state authorities to begin construction of an additional large-scale dam and reservoir that will displace Guarijío indigenous villages.<sup>28</sup> This structure is intended to protect downstream cities, towns and fields from periodic floods, which have long lashed the region but are likely intensified by a warming climate. Those who have resisted this effort have also faced state-backed harassment and even deaths threats thinly veiled as having come from drug traffickers. Finally, there is the hallucinatory "Monterrey VI" project, a proposed 300-

kilometer aqueduct to “transfer” water from the Pánuco basin, in the eastern coastal state of Veracruz, to the economically powerful northern city of Monterrey. The project has generated widespread protest, including from several indigenous groups whose water resources will be directly affected.<sup>29</sup> Within the official framing of “adaptation,” one region’s salvation becomes another’s damnation.

Water control, a fundamentally spatial process, is therefore an important place at which to come to terms with the problem of vision that typically haunts large-scale environmental interventions. One prominent feature is a tense connection between the monism of concepts like Anthropocene, River Basin or, indeed, “Potable Water,” and the way it necessitates a vanishing point at precisely the place where the flows connecting the human and non-human become too dense to capture and convey without some sort of stabilizing political-visual device. Such devices, in turn, are effectively (and affectively) built into both politics and waterworks. Furlong argues that the extant scholarship on infrastructure has largely overlooked the so-called global south, and thus embeds the bias of a “modern infrastructural ideal.” Typically, the assumption here is of a “single, universal, and uniform network.” By contrast, in her own research, she finds something quite distinct: a process of “. . . cumulative adaptation and learning [that] . . . is also about custom and coping. When and where adapting to disrepair becomes a normal and everyday as opposed to aberrant, it can generate its own ‘momentum.’”<sup>30</sup> Visualizing the space of hydraulic control involves habits of view that revolve around a singular problematic, reinforced by the connections repeatedly drawn between infrastructure and images, graphs, charts, relief maps and, more recently, seductive geo-visualization. The result is a picture of water control and hydraulic geography that perpetuates either the ideal of spatial-temporal uniformity (Furlong’s “infrastructural ideal”), and an illusory telos of social betterment over time and space by virtue of state environmental intervention. Typically erased is anything resembling the actual process of “custom and coping” often needed to sustain life and livelihood in the shadow of large-scale waterworks. Along with water, therefore, socially and environmentally unsustainable hydraulic infrastructure thus also delivers the very worldview developed to sustain it.

Is the Anthropocene a case of the same water now in a slightly different bottle? Thinking with the Anthropocene adds a new and equally slippery slope to this quintessentially modern visual geography, combining a kind of social stratigraphy with the perspectival vantage point invariably included in river basin cartography. Despite a tacit claim to capaciousness, we are still left with a picture of *the* global environment that leaves very little room for difference, either within the strata or among them.

## Governing International Rivers in the Anthropocene

**Kimberley Anh Thomas**

Biodiversity hotspots. Big bang. Keystone species. Anthropocene. The natural sciences are replete with terms that convey the significance of the referent object or event, and concepts so named often have political as well as scientific salience. The notion of biodiversity hotspots, for instance, has been employed in the designation and protection of critically threatened habitats containing high levels of endemism. In the case of the Anthropocene, this provisional epoch highlights the long-term impacts of human interference with global biogeochemical cycles, which underpin the viability of socio-ecological systems such as international rivers. The Anthropocene has already been invoked in proposals for large-scale geoengineering of the climate and enhanced policing against wildlife trafficking, for example. Might the boundary-transcending concept of the Anthropocene also inform the traditionally territorial issues of international river governance?

It certainly seems that the field could use a fresh perspective, as the strides of conventional forms of transboundary river governance have begun to flag. There is an encouraging trend in which co-riparian states have been increasingly resolving disputes through formal legal instruments. However, asymmetrical power dynamics—characteristic of many a river basin—mean that in practice many treaties lack effective enforcement and may even codify unequal terms of exchange. Meanwhile, the holistic approach of Integrated Water Resources Management (IWRM) has dominated water management discourse for decades, but has fallen far short of its promises. Moreover, joint river organizations foster activities such as shared decision making over river development and diplomatic exchange of data; however, many powerful riparian states like China, Egypt and India refuse to join them. As a result, the Mekong River Commission is limited in its scope and ability to regulate regional water development, while the establishment of a Nile River Basin Commission has been stalled by Egypt's abstention from the Cooperative Framework Agreement that would create a permanent commission. Given that water notoriously “does not respect political boundaries,” is it possible for the planetary-scale focus of the Anthropocene to resolve the knotty jurisdictional and boundary issues that IWRM and joint river commissions seek, and have so far failed, to remedy?

This is not a novel proposition. Recent studies have illustrated how a range of stressors on local and regional hydrological systems (e.g. river impoundments, withdrawals, pollution) cumulate with negative effects that transcend borders, and such findings have been used to argue in favour of global governance informed by universally shared principles.<sup>31</sup> Alternatively, Schmidt argues that IWRM may yet be redeemed by internalizing the idea and the ethical implications that we have entered a new geological period defined by human activity.<sup>32</sup> Together, these studies posit that a global perspective on water can improve governance by emphasizing linkages and feedbacks between social and natural systems.

Orienting water governance around the concept of the Anthropocene is not only thought to challenge ontological distinctions between nature and society that underpin reductionist solutions to water problems, but it is also expected to engender the kind of “global thinking” necessary to achieve equitable and sustainable outcomes.<sup>33</sup>

There are perils to taking an Anthropocene approach, however, that threaten to overwhelm its potential contributions to water governance. I will reflect on just two of these before turning my attention to alternative governance frameworks. The first pitfall pertains to the “global kinds of knowledge” that an Anthropocene approach to water requires.<sup>34</sup> Gupta *et al.* lament that there exists “a vacuum in water governance at the global level,”<sup>35</sup> which is partially attributed to the incomplete penetration of science into water management practice and the public sphere.<sup>36</sup> However, while scientific knowledge may form an obvious basis for developing a “global perspective” and “universal principles” to guide global governance, there are substantial costs that attend the production of such globalized knowledge. Vörösmarty *et al.* assert, “[a] global perspective is essential for providing context to local conditions,”<sup>37</sup> but here the actual relationship between generalized knowledge and context is inverted—it is precisely by decontextualizing and abstracting knowledge that universal claims can be made.<sup>38</sup> As Jasanoff observes about abstraction, “all the moorings that tie scientific claims to local, subjective and contingent circumstances are cut loose so that claims may float freely and persuade people as objective facts.”<sup>39</sup> What we need instead, Hulme argues, is for incomplete, plural, situated knowledges that are fluid and malleable but do not collapse down to a single scale.<sup>40</sup> Such types of knowledge are amenable to the polycentric, adaptive and even anarchic forms of governance that multi-dimensional water challenges demand.<sup>41</sup>

It is perhaps the totalizing tendency of global knowledge that contributes to another pitfall of the notion of the Anthropocene: that all humans are equally culpable for the species extinctions, climate disruptions and other large-scale alterations to planetary systems that define the time. In one of his earliest formulations of the Anthropocene concept, Paul Crutzen acknowledged that only one quarter of the human population is responsible for having produced the effects that characterize the period, yet he and countless others have persisted in naming it in a way that implicates all of humanity.<sup>42</sup> Some proponents of the Anthropocene concept trace contemporary ecological crises back to the invention of the steam engine, a moment that if anything should focus our blame rather than enable us to cast it indiscriminately: “Capitalists in a small corner of the Western world invested in steam, laying the foundation stone for the fossil economy: at no moment did the species vote for it either with feet or ballots, or march in mechanical unison, or exercise any sort of shared authority over its own destiny and that of the Earth System.”<sup>43</sup> This rebuke of the implicit and explicit assignment of responsibility for global environmental disruptions to an undifferentiated mass of humanity lays bare the reality of gross differences in social power that also

permeate water resource governance. Like the capitalists who set the fossil economy in motion, those who wield the financial means, expert knowledge and/or decision-making power to effect dam construction, treaties, large-scale irrigation schemes and virtual water trading, among others, comprise a miniscule fraction of the human population.<sup>44</sup> Moreover, while these individuals may be counted among the many who prosper as a result of these activities, they are the least likely to suffer their unintended, and sometimes devastating, outcomes.

I noted at the outset that the Anthropocene concept has already been put into the service of diverse agendas, but the debate about whether or not to demarcate a new geological period remains unsettled, and some stratigraphers are uncertain that a global chemical signal necessary for establishing a starting date exists. “Some Anthropocene proponents concede that difficulty. But don’t get bogged down in the mud, they say, just stipulate a date and move on. . . Either way, [Will Steffen] says, the new name sends a message: “[It] will be another strong reminder to the general public that we are now having undeniable impacts on the environment at the scale of the planet as a whole, so much so that a new geological epoch has begun.”<sup>45</sup> Setting aside for now the glaring problem of demarcating a new epoch in order to make a point that we now live in a new epoch, there are other political concerns to address. By treating humans as a monolithic force driving global environmental change, the notion of the Anthropocene erases key differences in culpability for, vulnerability to, and capacity to respond to socio-ecological disruptions. Furthermore, attributing planetary-scale transformations to some characteristic immanent in humans, such as the ability to wield fire or domesticate animals, naturalizes processes like climate change, thereby inhibiting prospects for intervention.<sup>46</sup> The notion of a “geology of mankind” effectively depoliticizes what is inherently political activity.

This does not bode well for those of us concerned with the deeply political issues of water resource access and control, transformation and distribution. However, the unsuitability of the Anthropocene concept for addressing recalcitrant transboundary water problems may not pose a terrible loss, for, until we are collectively prepared to retire the term “international river,” we are going to have to contend with such watercourses, as well as the borders that define them. Fortunately, some practical conceptual tools are ready at hand.

Even those who call for global water governance acknowledge that it is not a panacea and cannot operate independently of governance at other scales.<sup>47</sup> Accordingly, there has been broad support for Ostrom’s “polycentric” approach that involves multiple governing authorities at varying scales.<sup>48</sup> Not only can a polycentric system be more productive, coherent, equitable and sustainable than centralized systems guided by international agreements, but they also afford such benefits as increased innovation, learning, adaptation and cooperation. As with global governance, however, neither is polycentrism a silver bullet. The multiplicity of actors in complex systems of governance may lead to perverse outcomes (e.g. leakage, inconsistent policies, inadequate certification, free-riding), and there



are inherent challenges of coordinating activities at multiple scales and reconciling local arrangements with higher-level policies.<sup>49</sup> Also absent from this framework is explicit accounting for the distribution of power.<sup>50</sup>

Polycentric systems of transboundary water governance may therefore be bolstered by integration with such approaches as critical hydropolitics and hydro-hegemony that elucidate, respectively, the “multi-scalar, multi-actor character of water politics”<sup>51</sup> and the asymmetrical power relations between riparian states.<sup>52</sup> These two frameworks crucially inform international hydropolitics by demonstrating how inter-state cooperation can manifest as subnational conflicts, as well as how hegemonic states may structure treaties according to their preferences and coerce weaker states into complying with unequal terms of agreement.

A final challenge of governing transboundary rivers is accounting for the borders that bring such entities into being. Anthropocene proponents echo popular understandings of globalization that emphasize accelerated flows in an increasingly “borderless world.” However, since the 1990s, critical scholars have been complicating “borderless” and analogous “flat world” ontologies, arguing instead for greater cognizance of “the complexity and flexibility of states’ infrastructural power and its territorializing thrust.”<sup>53</sup> Therefore, to the three complementary frameworks of polycentrism, critical hydropolitics and hydro-hegemony, I add a fourth, the river–border complex, which interrogates how international rivers and borders intersect and interact.

The river–border complex reconceptualizes international rivers as synergistic, multifaceted, ongoing interactions of rivers and borders.<sup>54</sup> This approach maintains a concern with water but expands our understandings of river dynamics by encompassing the *non-water flows* (e.g. shipping, sediments, pollutants, kinetic energy) that also fundamentally structure riparian relations. Such an approach reveals that borders and bordering activities (e.g. patrolling, exclusion, policing) mediate both water and non-water flows along transboundary rivers, thereby recognizing borders as active agents shaping socio-ecological processes of hydropower development, navigation and fisheries, for example. The river–border complex therefore provides a method by which we can characterize and trace important linkages, flows and their outcomes across administrative boundaries—necessary activities for contemporary geopolitics.<sup>55</sup>

It is imperative for us to reckon with the patterns of resource extraction, consumption and trade that have rendered species extinct, climates unstable, oceans acidic and habitats polluted on a global scale. In doing so, it is equally important to identify and reform the political, economic and cultural systems that produce and sustain such processes. The notion of the Anthropocene, with its “view from everywhere,”<sup>56</sup> lacks the requisite attention to social and spatial difference to guide such a project. Fortunately, existing and emerging frameworks for international river governance (attentive to power, scale and context-specific knowledge) are well suited to the task and are available to be put into greater practice.



## Water, Fish and Power in the Salish Sea Basin: Indigenous Treaty Rights and Water Politics in the Anthropocene

**Emma S. Norman**

The shifting geopolitics of water in the Anthropocene has global implications. As this forum explores, this shift is salient particularly for Indigenous communities, who not only have deep and sustained connections to place and specific waterways; but whose cultures, worldviews and well-being are reliant on intact ecosystems. The desecration of these systems through human-induced environmental change contributes to what climate justice scholar, Kyle Whyte, describes as colonial *de ja vu*.<sup>57</sup>

For many Indigenous communities the world over, the Anthropocene poses a double bind. That is, as a result of settler-expansion and subsequent colonial framings of land ownership and fixed political boundaries, Indigenous communities are faced with a reduction of traditional territory to small fractions of their original size.<sup>58</sup> This reduction of land base and access to waterways also hinders access to critically important First Foods. In addition, human-induced environmental change has greatly compromised the health of ecosystems necessary to support and sustain subsistence economies. In the Pacific Northwest of North America, for example, the wild runs of culturally important species such as salmon are facing extinction, shellfish beds are closed due to upstream nitrate and fecal coliform pollutants associated with intensive agriculture practices and the phenology of plants and animals are significantly out of synch.

This changing environment poses distinct threats to Indigenous Peoples' ability to self-sustain and is a direct violation of Treaty rights. In many Tribes and First Nations throughout North America, Tribal leaders were forced to give up the majority of their land under the guise that their communities would continue to have access to critically important fishing and hunting areas through what is called "Usual and Accustomed" (U and A) areas. With changing environmental conditions, these U and A areas may no longer house the culturally important habitats the treaties are meant to protect.

In the lines that follow, I employ a narrative style consistent with Indigenous Research Methodologies to explore the complexities of the shifting geopolitics of water in the Salish Sea Basin. Here, the Lummi Nation—in a Battle of Little Big Horn moment—stood up against a billion-dollar company that was trying to build a large shipping terminal to transport coal to foreign markets. The North Dakota Standing Rock Sioux Tribe and the Sacred Stone camp of water protectors is another dramatic example of this growing resistance movement, resulting from communities standing their ground and saying "no." Acts of resistance such as these—and the interaction between Indigenous communities, government and industrial actors—are important facets of water geopolitics in the age of the Anthropocene. These actions not only protect Indigenous communities

and their neighbours, but demonstrate the power of Indigenous leaders in taking these Treaty rights and turning them into opportunities for change.

### ***Our Treaty Rights are Not for Sale—No to the Coal Train***

On May 9, 2016, in the crowded council chamber, Chairman Timothy Ballew, Jr. of the Lummi Nation made a historic announcement. The room was abuzz with the news, with a mixture of celebration and relief. *They had done it.* They had stopped the unstoppable.

What was announced that historic day was that after 4 years of strategizing and fighting, the Lummi Nation—a small, but powerful fishing tribe located in Salish Sea Basin of North America—had defeated a proposal to build a deep-water shipping terminal on the sacred site of Cherry Point (*Xwe'chieXen*) in the traditional territory of the Lummi Nation. The proposed Gateway Pacific Terminal (GPT) would have been the largest of its kind in North America. The terminal was designed for large vessels to transport approximately 54 million metric tons per year of coal to foreign markets such as China. The project was controversial for the Lummi Nation (and other coastal Indigenous communities) as it would have desecrated 1,500 acres of sacred land, compromised critically important coastal salmon habitat and increase the risk of oil spills by increasing shipping traffic by 100-fold. In addition, the construction of new infrastructure to support increased fossil fuel consumption is counter to many Indigenous leaders' commitment to renewable and sustainable energy sources—particularly in light of the impacts of sea-level rise on coastal communities.

For all of these reasons, the Lummi Nation Business Council, represented by Chairman Ballew, firmly said “no” to the proposed shipping terminal, and other Coast Salish leaders and environmental allies stood by them. The company—SSA Marine—had hoped to win the Lummi community over through financial compensation, indicating that they were “confident that they would be able to find a ‘win-win’ solution through negotiation.” Lummi countered, however, that “Treaty rights are non-negotiable,” “once you destroy a habitat, it is gone forever,” and “there is no-where else.”<sup>59</sup> For the Lummi community, like other Coast Salish Indigenous communities, this connection to place is also intrinsically linked to the intricate waterways, to the freshwater and saltwater interchange that produces one of the most ecologically rich estuarine systems in the world.

### ***The Announcement***

On a crisp November day in 2012, the Lummi Nation proclaimed that *their treaty rights were not for sale*. They affirmed that building on the ancestral home of Cherry Point is not an option and destroying fishing habitat would destroy their culture. The Lummi Nation made a stand against corporate greed, unsustainable energy and desecration of their sacred waters. In a powerful moment on the shores

of Cherry Point, Lummi Councilman Jay Julius held a proxy cheque written out for one million dollars with the word “non-negotiable” written across it, and ceremoniously placed it on an open fire. As the cheque slowly burned, testimony from elders spoke to the sacredness of this spot and the need to follow their ancestors’ wishes to protect this land and water for generations to come. With that announcement came a battle to hold a line: to say, “enough is enough.”

Chairman Ballew and other Coast Salish leaders banded together, citing the treaty rights that their ancestors negotiated with the US government in 1855: The Treaty of Point Elliot. This Treaty guaranteed that, in exchange for the millions of acres that were relinquished to the settlers, the tribes would relocate to small parcels of land so that their rights to harvest from the sea, rivers, shorelines and land would be upheld. This treaty guaranteed their inherent right to self-determination, in which fishing and harvesting is central to their Way of Life. Specifically, Article 1 of the Treaty relinquished millions of acres to settlers, Article 2 relocated Indigenous Peoples to Reservations and Article 5 assured fishing and hunting rights. It is Article 5 of the Point Elliot Treaty (which was upheld by Judge Boldt 100 years later in *U.S. vs. Washington State*) that *promises* the right to harvest from the sea.

In essence, the Coast Salish peoples of the United States, like most Indigenous Peoples throughout North America, were forced to cede the majority of their territory to Newcomers. This cessation, however, came with the explicit promise that the Indigenous people and their ancestors would be able to provide for themselves and their families from the land and water—in a way that was consistent with their belief systems. In these negotiations, however, the thought that the fish—which were so incredibly bountiful—would no longer run was unfathomable. In this emerging era of the Anthropocene, where development and industrialization have destroyed habitat, warmed waters and melted ice, the impacts for Indigenous communities who gave up so much for these rights is profound.

Opportunities exist, however, to leverage these negotiated Treaty rights as a way to continue to hold the line against continued development and industrialization, to use these rights as a way to halt “business as usual” models and envision more sustainable ways of life.

Building the proposed terminal would directly impact those rights—directly impact the Lummi Peoples’ ability to provide for themselves, their families and those that would walk ahead of them. Destroying the habitat directly impacts a way of life that is sacred to the Lummi community and other Coast Salish communities.

So, we have a stand—a stand for the right to protect fish, to protect water and its habitat. A stand against big business who blithely moved forward as if it was a done deal. Yet, the small Coast Salish community, made up of 4,000 members, stopped it. They banded together and said no.

No more. Not again.

And, they won.

They won *this* battle.

Yet, the celebration was a cautious one. Not one hour after the announcement was made were the Chairman and the Council back in their offices, strategizing protection from the next affront to their land, their water, their Way of Life.

### ***Holding the Line in the Age of the Anthropocene***

The power of the Lummi community to hold this line is significant. For one, the treaties signed in the 1850s with scores of tribes throughout the United States (including the Lummi Nation and other Coast Salish tribes with the 1855 Point Elliot Treaty) obligate the federal government to uphold their Treaty Trust responsibilities. In general, these obligations have been systemically and egregiously ignored by the federal government. However, the civil rights American Indian Movement of the 1960s, including the Fish-ins in Washington state, with famed Indigenous rights activist, Billy Frank, Jr., brought about one of the most powerful pieces of legislation for fishing rights to date—the Boldt Decision (followed by the *Raferdeee*, and the *Culvert* cases). Second, Indigenous Peoples’ historically deep knowledge of and connection to the lands and waters they inhabit make them well poised to make contributions to ecosystem protection.

In addition, as with the case of the Lummi People, with inherent rights—rights to fish and harvest, and rights to water—comes the responsibility to protect. That is, the codes and laws making up the societal fabric intrinsically protect these lands and waters from over-extraction, over-harvesting and polluting. To do so would not only impact “the environment,” but would impact their survival. Central to this approach is the lack of distinction between “environment” and “humans”—replaced by the recognition of a complex, synergistic inter-relationship.<sup>60</sup> Central are the concepts of relationality and reciprocity that illuminate the importance of viewing simultaneously the rights to harvest as a responsibility to protect. This perspective is one that, in the era of the Anthropocene, could be usefully adopted.

The question then is how to enact these responsibilities with fragmented governance structures and deeply politicized economic structures that externalize costs to human and ecosystem health. In this complex and fragmented geopolitical system, how are Indigenous Peoples able to carry out these responsibilities on the slivers of land that are left, when the impacts to the ecosystems are occurring largely from those that do not follow the same credo and ethics and when the environment has changed so drastically around them? How can a seven-generation vision of planning be integrated into the mainstream government narrative of 4-year governance cycles, where jurisdictions are carved by and fragmented relics of political battles of yesteryears: where the waters of the Salish Sea are severed at the 49th parallel—as a result of the negotiations between the Crown and the nascent governors of Washington Territory after a skirmish between British and American soldiers over a pig in the contested space of San Juan Island.<sup>61</sup>

In the age of the Anthropocene, where human impacts have damaged ecosystems and waterways in an unprecedented way, we will need to look for new ways of environmental governance. In this era, Treaty rights and Indigenous Knowledge Systems have an incredibly important part to play. For those on the parameters of this shift—for those watching the geopolitics of this battle, and witnessing the heroism of those on the frontline of the social and environmental justice movements, for those that are saying enough is enough—I encourage you to also do your part; be part of the solution. Scholars and educators have a responsibility to not just reflect, report and theorize; they have a responsibility to consider how to amplify, to influence, to act, to support. If you do not accept the responsibility for your own benefit, accept it for those that will come after you.

## The Geopolitics of an Ice-Free Arctic

**Scott R. Stephenson**

One of the most striking developments of the Anthropocene is the changing materiality of water, exemplified by the ongoing state change from an ice-covered to a seasonally ice-free Arctic Ocean.<sup>62</sup> In addition to amplifying high-latitude warming by lowering sea surface albedo, a younger, thinner and more dispersed ice cover<sup>63</sup> is fuelling speculation about the opening of shipping routes in the coming decades, as well as enabling new geopolitical configurations of marine accessibility and territoriality. Shipping along Russia's Northern Sea Route (NSR) began in the 1950s and continues today in support of mineral and oil and gas activities,<sup>64</sup> while the Northwest Passage (NWP) through Canada's Arctic archipelago is increasingly becoming a destination for tourism.<sup>65</sup> Compared to these routes, relatively little attention has been given to the possibility of shipping via the so-called "trans-polar route" (TPR; alternatively, the trans-polar sea route or North Pole route<sup>66</sup>) from the North Atlantic to the Bering Strait through the central Arctic Ocean, passing over or near the North Pole. This route is the most direct passage through the Arctic and is therefore the shortest possible marine link between Europe and Asia. In a global economy often characterized by ever-expanding networks of flows,<sup>67</sup> the TPR represents a potentially significant, if seasonally limited, bridge for transport and trade.

The length advantage of the TPR and other Arctic routes implies significant potential fuel and emissions savings over traditional shipping lanes through the Suez and Panama Canals. Even though shipping is not among the sectors targeted by the Paris Agreement, the shipping industry will have to significantly reduce emissions in order to reach the Agreement's goal of limiting warming to 1.5°–2° C above pre-industrial levels. Meeting the 2° C threshold would require the shipping industry to reduce its emissions by 2.6% annually from 2020 to 2050, most likely through a variety of strategies such as efficient ship designs, lower carbon fuels, operational practices and alternative routes.<sup>68</sup> As the shortest

of all Arctic routes, it is conceivable that the TPR will be promoted as a means of mitigating the same climate-altering mechanisms that enabled its existence in the first place. However, even after the Arctic transitions to a summer ice-free state, considerable doubt remains over whether the fuel savings potential of the route will outweigh the environmental risks. To date, no commercial voyages have used the TPR due to its year-round ice cover and high incidence of hazardous multi-year ice. Market opportunities in the central Arctic are non-existent and the length of the navigation season will be highly uncertain for the foreseeable future, limiting long-term economic planning.<sup>69</sup> While the central Arctic basin is believed to contain significant quantities of oil and gas,<sup>70</sup> the costs of extraction in the region are prohibitive, and states do not (yet) control access to seabed resources beyond their 200-nm exclusive economic zones (EEZ).<sup>71</sup> Moreover, Arctic shipping will always pose environmental risks from oil spills, which would be especially severe along the TPR due to extreme remoteness from ports, search-and-rescue stations and other spill cleanup infrastructure.

The elevated risk of an environmental disaster in ice-covered waters has led to a somewhat unusual international governance regime for the Arctic Ocean. The rules of marine territoriality established by the UN Convention on the Law of the Sea (UNCLOS) apply to the Arctic, an ocean surrounded by five coastal states (Canada, Greenland [Denmark], Norway, Russia and the US), such that in most respects, the legal status of the Arctic Ocean has been considered the same as that of any other marine area.<sup>72</sup> The exception lies in the so-called “ice clause” or “Arctic exception” in Article 234, which grants Arctic coastal states the right to enact non-discriminatory regulations for the purpose of “prevention, reduction and control of marine pollution from vessels in ice-covered areas within the limits of the EEZ, where particularly severe climatic conditions and the presence of ice covering such areas for most of the year create obstructions or exception hazards to navigation...”<sup>73</sup> Russia has interpreted this as an authorization to require mandatory icebreaker escort along ice-covered sections of the NSR, with attendant fees currently estimated at \$800,000 in summer for an open-water vessel.<sup>74</sup> It may be argued that this interpretation amounts to an “imposition of a system of expansive control” intended to extend a form of limited political sovereignty beyond Russia’s territorial seas.<sup>75</sup> Indeed, the US contends that such fees impinge on freedom of navigation and place Moscow in a position to deny passage for political gain.<sup>76</sup> Nevertheless, all ships transiting the NSR to date have agreed to Russia’s terms, and the issue has been largely ignored outside the domain of political and legal scholars.

However, the opening of the TPR forces a rethinking of the legal landscape of the Arctic Ocean with some interesting geopolitical implications. Unlike the NSR and NWP, the majority of the TPR lies in international waters beyond state territorial jurisdiction and economic control. By sailing through the central Arctic, ships may circumvent the largely ice-covered coastal seas that provide the legal basis for the Russian tariff regime. It is currently possible to access the

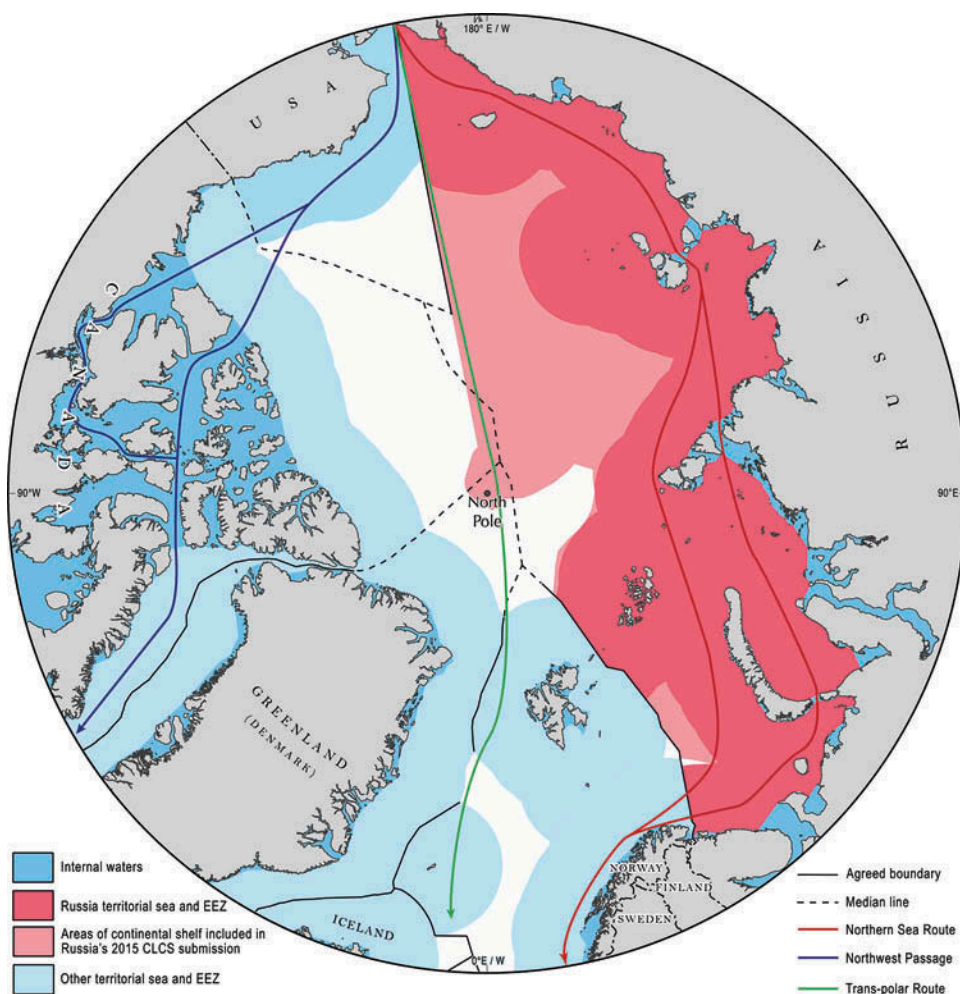


TPR without ever entering Russian territorial seas via the eastern Bering Strait between the US mainland and Little Diomed Island, for as long as the US continues to abide by UNCLOS.<sup>77</sup> As the global maritime shipping industry has remained viable through intense cost concentration and razor-thin profit margins,<sup>78</sup> avoidance of icebreaker fees could render cost-effective the diversion of some summer bulk transit shipments from the NSR to the TPR. Such a development would not go unnoticed in Moscow, as Russia's robust investment in new icebreakers—far more than any other Arctic nation—is predicated on expected increases in icebreaker fee revenues fuelled by growth in traffic along the NSR. While most NSR shipping at present is driven by domestic resource development, Russia's official state policy is to develop the NSR as an international waterway serving both destination and transit shipping demand in the long term.<sup>79</sup> How might Russia respond to the prospect of losing “share” in the emerging Arctic shipping market to new routes beyond its jurisdiction?

The answer will depend in part on the resolution of pending submissions to the UN Commission on the Limits of the Continental Shelf (CLCS). While the US sits on the sidelines as a non-signatory to UNCLOS, Canada, Denmark, Norway and Russia have submitted claims to extend the limit of their Arctic continental shelves beyond 200 nautical miles (Article 76<sup>80</sup>). Of these, Russia's 2015 claim is the largest, a 463,000 square-mile area encompassing the Lomonosov and Mendeleev ridges and the North Pole (Figure 1).<sup>81</sup> If granted, it is possible that Russia will view the CLCS recommendation as an authorization of control over not only seabed resources but also access and environmental protection of its outer continental shelf. Extended shelf claims are not part of a coastal state's EEZ, and therefore are not a zone within which the state could enforce regulations under Article 234. However, Russia could assert that its outer continental shelf is as deserving of the same protection as its EEZ, particularly if it plans to exploit oil and gas resources in the area in the future. An oil spill on ice along the TPR would likely enter Russia's outer continental shelf and EEZ carried by the Transpolar Drift Stream en route to the Fram Strait,<sup>82</sup> potentially inciting Russian icebreakers to interdict vessels deemed unsuitable for unescorted operations in ice-covered waters. A similar scenario could also result if Russia's CLCS submission is rejected, though without a claim to legitimacy on the basis of environmental stewardship.

Such an expansionist interpretation of UNCLOS would surely be contested by other Arctic states, though it would not be the first time that expansionist ideas have been considered in Russia's maritime Arctic. In 1926, the Soviet Union issued a decree declaring all land situated within a sector bounded by baselines drawn from its easternmost and westernmost Arctic coastlines and the North Pole to be territory of the USSR. This so-called “sectoral” concept derived its legitimacy from an extension of the contiguity principle, by which states may claim sovereignty over proximate waters within their “region of attraction,” and the principle of effective occupation, by which activities such as marine patrols,





**Figure 1.** Russian maritime boundaries and continental shelf claims (adapted with permission from IBRU, 2015<sup>29</sup>).

aviation and building settlements and infrastructure effectively amount to delimitation of territory.<sup>83</sup> While such broad claims were largely limited to doctrinal debates and rarely implemented in practice,<sup>84</sup> they were never officially rejected even after accession to UNCLOS. Therefore, Russia's official position on the sector concept remains unclear.<sup>85</sup> In any case, the emergence of the Anthropocene and attendant material transition from ice to water are enabling latent, nationalistic understandings of marine territoriality to achieve new relevance, with opportunities for such doctrines to be entrained into law. Should the sectoral concept reemerge in mainstream political discourse, it could call into question the stability of existing geopolitical agreements, foreshadowing a possible renegotiation of the extent of transnational Arctic governance.

If the purpose of the 1926 decree was to prevent foreign intrusions in the Soviet Arctic, its practical implementation was rendered somewhat trivial by the

persistence of ice. For centuries, Russia has been able to rely on sea ice as a natural barrier to help control activity along its northern coast. With this barrier diminishing for increasingly longer periods of time each year, Russia may begin to perceive attempts by other countries to operate independently outside of its traditional area of jurisdiction—the NSR—as a challenge to its sovereignty and control over marine space.<sup>86</sup> If Russia were to begin maritime interdictions, it is the best equipped of the Arctic states to do so. Russia’s military assets are the largest in the Arctic and have grown in recent years with the rebuilding of several Cold War-era bases and 10 air-defence radar stations along the NSR, as well as three new nuclear-powered and four diesel-powered icebreakers, reflecting a strategic naval orientation toward the Arctic.<sup>87</sup> It should be noted that this pattern of militarization has followed increases in trade and investment in nonmilitary infrastructure in the region, suggesting that economic interests are driving the militarization rather than classical expansionism.<sup>88</sup> Furthermore, Russia has not signalled any intention to formally break with UNCLOS, and thus far has acted in accordance with its provisions with the possible exception of its contested interpretation of Article 234.<sup>89</sup> Maritime interdictions would likely have a destabilizing effect on Arctic security, harming Russia’s ambitions to develop resources and promote shipping along the NSR. Nonetheless, the opening of the TPR and resolution of CLCS claims could serve as a test of Russia’s commitment to existing international law.

Any attempt to circumvent UNCLOS in the Arctic would be new geopolitical territory. If Russia adopts an aggressive or expansionist posture in the central Arctic, our understanding of the region must shift from an arena in which all actors abide by international rules to one which, while not necessarily poised for violent conflict, runs the risk of reverting to tensions not seen since the Cold War. In any case, the changing physical landscape of the Arctic forces a re-examination of whether the tenets of UNCLOS, as written, are sufficient to establish long-term marine governance in the age of the Anthropocene. What it means for an ocean to be legally “ice-covered” will be in flux as the ice recedes, and Article 234 will likely be interpreted broadly in order to maximize state control over Arctic EEZs. For the foreseeable future, however, it is likely that any voyage of the TPR will require icebreaker escort.<sup>90</sup> Regardless of who “owns” the North Pole decades from now, a Russian ship might take them there.

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## Notes

1. M. Zeitoun and J. Warner, 'Hydro-Hegemony – a Framework for Analysis of Trans-Boundary Water Conflicts', *Water Policy* 8 (2006) p. 435; C. Sneddon and C. Fox, 'Rethinking Transboundary Waters: a Critical Hydropolitics of the Mekong Basin', *Political Geography* 25 (2006) p. 181; E.S. Norman, *Governing Transboundary Waters* (New York: Routledge 2014); E.S. Norman and K. Bakker, 'Transgressing Scales: Water Governance Across the Canada–U.S. Borderland', *Annals of the Association of American Geographers* 99 (2009) p. 99.
2. A.T. Wolf, 'Conflict and Cooperation Along International Waterways', *Water Policy* 1 (1998) p. 251; M. Giordano, M. Giordano, and A. Wolf, 'The Geography of Water Conflict and Cooperation: Internal Pressures and International Manifestations', *The Geographical Journal* (2002) p. 293–312.
3. S. Dalby, 'Anthropocene Geopolitics: Globalisation, Empire, Environment and Critique', *Geography Compass* 1 (2007) p. 103; S. Dalby, 'Anthropocene Formations: Environmental Security, Geopolitics and Disaster', *Theory, Culture & Society* (2015) Advance online publication; E. Johnson et al., 'After the Anthropocene: Politics and Geographic Inquiry for a New Epoch', *Progress in Human Geography* 38 (2014) p. 439.
4. P.J. Crutzen, 'Geology of Mankind', *Nature* 415 (2002) p. 23.
5. J. Lorimer, 'Multinatural Geographies for the Anthropocene', *Progress in Human Geography* 36 (2012) p. 593.
6. S. Sojamo, M. Keulertz, J. Warner, and J.A. Allan, 'Virtual Water Hegemony: the Role of Agribusiness in Global Water Governance', *Water International* 37 (2012) pp. 169–182.
7. D.L. Cassell, 'China's Role in African Agriculture', *Bridges Africa* 2/6 (2013) pp. 18–20; C. Dalin, M. Konar, N. Hanasaki, A. Rinaldo, and I. Rodriguez-Iturbe, 'Evolution of the Global Virtual Water Trade Network', *Proceedings of the National Academy of Sciences* 109 (2012) pp. 5989–5994; B. Tilt, *Dams and Development in China: The Moral Economy of Water and Power* (New York: Columbia University Press 2015) pp. 182–190.
8. Dalby (2007) (note 3).
9. Zeitoun and Warner (note 1).
10. See for example J. Hannigan, *The Geopolitics of Deep Oceans* (Malden, MA: Polity Press 2016); K. Dodds and M. Nuttall, *The Scramble for the Poles* (Malden, MA: Polity Press 2016).
11. For a discussion of scale in the role of water politics see E.S. Norman, C. Cook, and A. Cohen, *Negotiating Water Governance: Why the Politics of Scale Matter* (London: Ashgate 2015); for specific discussion of multiscale actors, see A. Clarke-Sather, 'Hydrosocial Governance and Agricultural Development in Semi-Arid Northwest China', in E.S. Norman, C. Cook, and A. Cohen, (eds.), (this note) and Sneddon and Fox (note 1).
12. Ibid.
13. Ibid.
14. D. Haraway, 'Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin', *Environmental Humanities* 6 (2015) p. 159; D. Haraway, *Staying with the Trouble: Making Kin in the Chthulucene* (Durham: Duke University Press 2016); N. Mirzoeff, 'Visualizing the Anthropocene', *Public Culture* 26 (2014) p. 213; R. Nixon, 'The Anthropocene: the Promise and Pitfalls of an Epochal Idea', *Edge Effects* (2014), <http://edgeeffects.net/anthropocene-promise-and-pitfalls>.
15. For example, Lorimer (note 5).

16. J. Linton, *What Is Water? the History of a Modern Abstraction* (Vancouver: University of British Columbia Press 2010).
17. C. Hamlin, 'Waters' or 'Water'?—Master Narratives in Water History and Their Implications for Contemporary Water Policy', *Water Policy* 2 (2000) p. 313.
18. Linton (note 16).
19. J.M. Banister and S.G. Widdifield, 'The Debut of 'Modern Water' in Early 20th Century Mexico City: the Xochimilco Potable Waterworks', *Journal of Historical Geography* 46 (2014) p. 36.
20. Mirzoeff (note 14).
21. Cited in Mirzoeff (note 14).
22. H. Lefebvre, *The Production of Space*, trans. D. Nicholson-Smith (Malden, MA: Blackwell 1991).
23. J. Budds, J. Linton, and R. McDonnell, 'The Hydrosocial Cycle', *Geoforum* 57 (2014) p. 57.
24. N.F. Sayre, 'Climate Change, Scale, and Devaluation: the Challenge of Our Built Environment', *Washington and Lee Journal of Energy, Climate, and the Environment* 1 (2010) p. 93.
25. Ibid.
26. F. Molle, 'Nirvana Concepts, Storylines and Policy Models: Insights From the Water Sector', *Water Alternatives* 1 (2008) pp. 131–156.
27. S.G. Widdifield and J.M. Banister, 'Seeing Water in Early Twentieth-Century Mexico City: Henry Wellge's Perspective Plan of the City and Valley of Mexico, D.F., 1906', *Anales Del Instituto De Investigaciones Estéticas* 38 (2015) p. 9; Banister and Widdifield (note 19).
28. J.M. Banister, 'Publishing the Southwest', *Journal of the Southwest* 56 (2014) p. 365.
29. CEC, 'CEC Receives Submission on Aqueduct Project in Monterrey, Mexico', (2016) [www.cec.org/news-and-outreach/press-releases/cec-receives-submission-aqueduct-project-monterrey-mexico](http://www.cec.org/news-and-outreach/press-releases/cec-receives-submission-aqueduct-project-monterrey-mexico).
30. K. Furlong, 'STS Beyond the "Modern Infrastructure Ideal": Extending Theory by Engaging with Infrastructure Challenges in the South', *Technology in Society* 38 (2014) p. 139.
31. W. Steffen et al., 'The Anthropocene: Conceptual and Historical Perspectives', *Philosophical Transactions of the Royal Society a: Mathematical, Physical and Engineering Sciences* 369 (2011) p.842; C.J. Vörösmarty, C. Pahl-Wostl, and A. Bhaduri, 'Water in the Anthropocene: New Perspectives for Global Sustainability', *Current Opinion in Environmental Sustainability* 5 (2013) p. 539.
32. J.J. Schmidt, 'Integrating Water Management in the Anthropocene', *Society & Natural Resources* 26 (2013) p. 105.
33. Dalby (2007) (note 3); C.J. Vörösmarty et al., 'Fresh Water Goes Global', *Science* 349 (2015) p. 748.
34. M. Hulme, 'Problems with Making and Governing Global Kinds of Knowledge', *Global Environmental Change* 20 (2010) p. 558.
35. J. Gupta, C. Pahl-Wostl, and R. Zondervan, "'Glocal" Water Governance: a Multi-Level Challenge in the Anthropocene', *Current Opinion in Environmental Sustainability* 5 (2013) p. 573.
36. Vörösmarty, Pahl-Wostl, and Bhaduri (note 31); Steffen et al. (note 31).
37. Vörösmarty et al. (note 33).
38. Hulme (note 32).
39. S. Jasanoff, 'A New Climate for Society', *Theory, Culture & Society* 27 (2010) p. 234.
40. Hulme (note 34).

41. Ibid; C. Pahl-Wostl et al., 'From Applying Panaceas to Mastering Complexity: Toward Adaptive Water Governance in River Basins', *Environmental Science & Policy* 23 (2012) p. 24; J. Rockström et al., 'The Unfolding Water Drama in the Anthropocene: Towards a Resilience Based Perspective on Water for Global Sustainability', *Ecohydrology* (2014) p. 1249; K. Wegerich, J. Warner, and C. Tortajada, 'Water Sector Governance: a Return Ticket to Anarchy', *International Journal of Water Governance* 2 (2014) p. 1.
42. Crutzen (note 4).
43. A. Malm and A. Hornborg, 'The Geology of Mankind? a Critique of the Anthropocene Narrative', *The Anthropocene Review* 1 (2014) p. 62.
44. For example, F. Molle, P.P. Mollinga, and P. Wester, 'Hydraulic Bureaucracies: Flows of Water, Flows of Power', *Water Alternatives* (2009) pp. 328–349; S. Sojamo et al., 'Virtual Water Hegemony: the Role of Agribusiness in Global Water Governance', *Water International* 37 (2012) p. 328.
45. J. Stromberg, 'What Is the Anthropocene and Are We in It?', *The Smithsonian* (2016) <http://www.smithsonianmag.com/science-nature/what-is-the-anthropocene-and-are-we-in-it-164801414/?no-ist>.
46. Malm and Hornborg (note 43).
47. For example, C. Pahl-Wostl, J. Gupta, and D. Petry, 'Governance and the Global Water System: a Theoretical Exploration', *Global Governance* 14 (2008) p. 419; J. Gupta, 'An Essay on Global Water Governance and Research Challenges', *Principles of Good Governance at Different Water Governance Level* (2012) pp. 5–11; Vörösmarty et al. (note 33).
48. E. Ostrom, 'Polycentric Systems for Coping with Collective Action and Global Environmental Change', *Global Environmental Change* 20 (2010) p. 550.
49. Ibid; Pahl-Wostl et al. (note 41); H.C. Komakech and P. van der Zaag, 'Polycentrism and Pitfalls: the Formation of Water Users Forums in the Kikuletwa Catchment, Tanzania', *Water International* 38 (2013) p. 231.
50. Pahl-Wostl et al. (note 41).
51. Sneddon and Fox (note 1) p. 182.
52. Zeitoun and Warner (note 1).
53. L. O'Dowd, 'From a 'Borderless World' to a 'World of Borders': "Bringing History Back in"', *Environment and Planning D: Society and Space* 28 (2010) p. 1031; A. Paasi, 'Bounded Spaces in a "Borderless World": Border Studies, Power and the Anatomy of Territory', *Journal of Power* 2 (2009) p. 213; C. Johnson et al., 'Interventions on Rethinking "the Border" in Border Studies', *Political Geography* 30 (2011) p. 61.
54. K.A. Thomas, 'The River-Border Complex: a Border-Integrated Approach to Transboundary River Governance Illustrated by the Ganges River and Indo-Bangladeshi Border', *Water International* 52 (2016) pp. 34–53.
55. Dalby (2007) (note 3).
56. Hulme (note 34) p. 560.
57. K. Whyte, 'Is it Colonial Déjà vu? Indigenous Peoples and Climate Injustice', in J. Adamson, M. Davis, and H. Huang (eds.), *Humanities for the Environment: Integrating Knowledges, Forging New Constellations of Practice* (London: Earthscan 2016).
58. Norman (note 1).
59. K. Misel, 'Gateway Pacific Terminal Faces Opposition from the Lummi Nation', *Western Front Newspaper*, Bellingham, WA (22 January 2015).
60. Whyte (note 57); K. Whyte, 'Indigenous Food Systems, Environmental Justice and Settler-Industrial States', in M. Rawlinson and C. Ward (eds.), *Global Food, Global Justice: Essays on Eating under Globalization* (Newcastle upon Tyne: Cambridge Scholars Publishing 2015) p. 143–56; S. Wilson, *Research Is Ceremony: Indigenous*



- Research Methods* (Black Point, N.S.: Fernwood Publishing 2009); Z. Grossman, A. Parker, and B. Frank. *Asserting Native Resilience: Pacific Rim Indigenous Nations Face the Climate Crisis* (Corvallis: Oregon State University Press 2012); D. Wildcat, *Red Alert!: Saving the Planet with Indigenous Knowledge* (Golden, CO: Fulcrum Publishing, 2009).
61. M. Vouri, *Pig War: Stand off at Griffin Bay* (Seattle: University of Washington Press 2013).
  62. P. Steinberg, 'Of other seas: metaphors and materialities in maritime regions', *Atlantic Studies* 10 (2013) pp. 156–169.
  63. J.A. Maslanik, C. Fowler, J.C. Stroeve, S. Drobot, J. Zwally, D. Yi and W. Emery, 'A Younger, Thinner Arctic Ice Cover: Increased Potential for Rapid, Extensive Sea-ice Loss', *Geophysical Research Letters* 34 (2007) doi:10.1029/2007GL032043; J.C. Comiso, 'Large Decadal Decline of the Arctic Multiyear ice Cover', *Journal of Climate* 25 (2012); J.C. Stroeve, M.C. Serreze, M.M. Holland, J.E. Kay, J. Maslanik and A.P. Barrett, 'The Arctic's Rapidly Shrinking Sea Ice Cover: A Research Synthesis', *Climatic Change* 110, doi: 10.1007/s10584-011-0101-1 (2012); R. Lindsay and A. Schweiger, 'Arctic Sea Ice Thickness Loss Determined using Subsurface, Aircraft, and Satellite Observations', *The Cryosphere* 9 (2015) doi: 10.5194/tc-9-269-2015.
  64. A.B. Farré, S.R. Stephenson, L. Chen, M. Czub, Y. Dai, D. Demchev, Y. Efimov, P. Graczyk, H. Grythe, K. Keil, N. Kivekäs, N. Kumar, N. Liu, I. Matelenok, M. Myksvoll, D. O'Leary, J. Olsen, S. Pavithran, E. Petersen, A. Raspotnik, I. Ryzhov, J. Solski, L. Suo, C. Troein, V. Valeeva, J. van Rijckevorsel and J. Wighting, 'Commercial Arctic Shipping through the Northeast Passage: Routes, Resources, Governance, Technology, and Infrastructure', *Polar Geography* 37 (2014) doi: 10.1080/1088937X.2014.965769; S.R. Stephenson and J.A. Agnew, 'The Work of Networks: Embedding Firms, Transport, and the State in the Russian Arctic oil and Gas Sector', *Environment and Planning A* 48, doi: 10.1177/0308518X15617755 (2016); L.W. Brigham, *The Soviet Maritime Arctic* (Annapolis, MD: Naval Institute Press 1991).
  65. E.J. Stewart, J. Dawson, S.E.L. Howell, M.E. Johnston, T. Pearce and H. Lemelin, 'Local-Level Responses to Sea Ice Change and Cruise Tourism in Arctic Canada's Northwest Passage', *Polar Geography* 36 (2013); B. Dennis and C. Mooney, 'A Luxury Cruise Ship Sets Sail for the Arctic, Thanks to Climate Change', *Washington Post* (2016).
  66. M. Humpert and A. Raspotnik, 'The Future of Arctic Shipping Along the Transpolar Sea Route', *Arctic Yearbook* 2012 1 (2012) pp. 281–307.
  67. Stephenson and Agnew (note 65).
  68. K. Anderson and A. Bows, 'Executing a Scharnow Turn: Reconciling Shipping Emissions with International Commitments on Climate Change', *Carbon Management* 3 (2012) pp. 615–628; A. Bows-Larkin, K. Anderson, S. Mander, M. Traut and C. Walsh, 'Shipping Charts a High Carbon Course', *Nature Climate Change* 5 (2015) pp. 293–295; H. Schøyen and S. Bråthen, 'The Northern Sea Route versus the Suez Canal: Cases from Bulk Shipping', *Journal of Transport Geography* 19, doi: 10.1016/j.jtrangeo.2011.03.003 (2011).
  69. S.R. Stephenson and L.C. Smith, 'Influence of Climate Model Variability on Projected Arctic Shipping Futures', *Earth's Future* 3, doi: 10.1002/2015EF000317 (2015); L.W. Brigham, 'Think again: The Arctic', *Foreign Policy* 181 (2010) p. 71.
  70. D.L. Gautier, K.J. Bird, R.R. Charpentier, A. Grantz, D.W. Houseknecht, T.R. Klett, T. E. Moore, J.K. Pitman, C.J. Schenk, J.H. Schuenemeyer, K. Sorensen, M.E. Tennyson, Z.C. Valin and C.J. Wandrey, 'Assessment of Undiscovered Oil and Gas in the Arctic', *Science* 324/5931 (2009) pp. 1175–1179.
  71. IBRU, 'Maritime Jurisdiction and Boundaries in the Arctic Region', *Centre for Borders Research, Durham University* (2015).

72. C. Cinelli, 'The Law of the Sea and the Arctic Ocean', *Arctic Review on Law and Politics* 2 (2011) pp. 4–24; P. Steinberg, J. Tasch and H. Gerhardt, *Contesting the Arctic: Politics and Imaginaries in the Circumpolar North* (London: I.B. Tauris 2014).
73. O.S. Stokke, 'A legal regime for the Arctic? Interplay with the Law of the Sea Convention', *Marine Policy* 31 (2007) pp. 402–408; UNCLOS, 'Section 8: Ice-covered areas. Article 234', UN Commission on the Limits of the Continental Shelf (1982).
74. FTS of Russia, *On Approval of the Tariff Rates for Provision of Icebreaking Pilotage Services Provided by the FSUE «Atomflot» on the Northern Sea Route water area* (Moscow: Federal Tariff Service of Russia 2014).
75. A.B. Farré, S.R. Stephenson, L. Chen, M. Czub, Y. Dai, D. Demchev, Y. Efimov, P. Graczyk, H. Grythe, K. Keil, N. Kivekäs, N. Kumar, N. Liu, I. Matelenok, M. Myksvoll, D. O'Leary, J. Olsen, S. Pavithran, E. Petersen, A. Raspotnik, I. Ryzhov, J. Solski, L. Suo, C. Troein, V. Valeeva, J. van Rijckevorsel and J. Wighting (note 65).
76. W. Østreng, K.M. Eger, B. Fløistad, A. Jørgensen-Dahl, L. Lothe, M. Mejlænder-Larsen and T. Wergeland, *Shipping in Arctic Waters: A Comparison of the Northeast, Northwest and Trans Polar Passages* (Berlin, Germany: Springer 2013).
77. D.R. Rothwell, 'International Straits and Trans-Arctic Navigation', *Ocean Development & International Law* 43 (2012) pp. 267–282.
78. T. Notteboom and J.-P. Rodrigue, 'The Future of Containerization: Perspectives from Maritime and Inland Freight Distribution', *Geojournal* 74 (2009) pp. 7–22.
79. A. Moe and L.W. Brigham, 'Organization and Management Challenges of Russia's Icebreaker Fleet', *Geographical Review* (2016) doi: 10.1111/j.1931-0846.2016.12209.x.
80. K. Dodds, 'Flag Planting and Finger Pointing: The Law of the Sea, the Arctic and the Political Geographies of the Outer Continental Shelf', *Political Geography* 29 (2010) pp. 63–73.
81. IBRU (note 72).
82. S.L. Pfirman, H. Eicken, D. Bauch and W.F. Weeks, 'The Potential Transport of Pollutants by Arctic Sea Ice', *Science of the Total Environment* 159 (1995) pp. 129–146.
83. L. Timtchenko, 'The Russian Arctic Sectoral Concept: Past and Present', *Arctic* 50 (1997) pp. 29–35; W. Østreng, 'The Northern Sea Route and jurisdictional controversy', Centre for High North Logistics (2010), <http://www.arctis-search.com/Northern+Sea+Route+and+Jurisdictional+Controversy>.
84. J.J. Solski, 'New Developments in Russian Regulation of Navigation on the Northern Sea Route', *Arctic Review on Law and Politics* 4 (2013).
85. L. Timtchenko (note 84)
86. S. Pezard, A. Tingstad, K. Van Abel and S.R. Stephenson, *Maintaining Arctic Cooperation with Russia: Planning and Preparing for Regional Game Changers* (Santa Monica, CA: RAND National Defense Research Institute, in press).
87. Ibid; S. MacCormac, 'The new Russian naval doctrine', Center for International Maritime Security (2015), <http://cimsec.org/new-russian-naval-doctrine/18444>.
88. E. Brutschin and S.R. Schubert, 'Icy Waters, Hot Tempers, and High Stakes: Geopolitics and Geoeconomics of the Arctic', *Energy Research and Social Science* 16 (2016) pp. 147–159.
89. D.W. Titley, 'Climate risk and Arctic security', Presented at A 5°C Arctic in a 2°C World, Columbia University, New York, NY (2016).
90. L.W. Brigham, 'Navigating the New Maritime Arctic', *Proceedings Magazine, US Naval Institute* 135 (2009).