

Introduction: Watering the Land-Based Empires

I From the Field's Margins

In the often-quoted description of the field by John McNeill, one of its foremost practitioners, environmental history has three main strands: “Material environmental history concerns itself with changes in biological and physical environments, and how those changes affect human societies. It stresses the economic and technological sides of human affairs. The cultural/intellectual wing, in contrast, emphasizes representations and images of nature in arts and letters, how these have changed, and what they reveal about the people and societies that produced them. Political environmental history considers law and state policy as it relates to the natural world.”¹ This special issue brings together contributions of “political environmental history” that investigate changes in ecosystems and the physical environment, and their impact on human societies exploiting and depending on them. It focuses on the entanglements between imperial and post-imperial states and the physical environments of Central and East Asia,

The five articles comprising this special issue form a “tapestry of water usage” in the words of featured author Beatrice Penati. Central to all of their narratives are bodies of water like Ruth Mostern’s “skinny rivers” juxtaposed with “non-skinny empires,” people and fish. Such a synergy of case studies developed from conversations beginning at the “Empires of Water: Water Management and Politics in the Arid Regions of China, Central Eurasia and the Middle East (16th–20th Centuries)” conference, jointly organized by Lingnan University and the University of Hong Kong in May 2016. The aim of the conference was to historicise water management in the arid regions of Western and Northern China, Central Eurasia, the Middle East and North Africa, and especially its imbrications with forms of communal organization, governance, and knowledge. This event brought together specialists on historical and contemporary cases in Palestine, the Ottoman Empire, Turkestan/Xinjiang, Israel, Syria, Iran, Arabia, and Sudan and many bodies of water. Four plenary addresses, delivered by Donald Worster, Judith Shapiro, Maurits Ertzen, and Nicola di Cosmo, discussed parameters, methods, and the social value of water research. Like the conference, the articles span different time periods and examine locations throughout the broad geographic range sharing the parameter of “arid zone.”

The definition of “arid zone” is notoriously problematic. It not only depends on average precipitation but also on the prevalent evaporation rates in a region. Conventionally, an area characterized by less than 250 mm (9-8 in) in annual rainfall is considered desert, while an area comprised between the 250 and 400 mm (15-17 in) isohyets is considered semi-arid.² Regions located below the 400 mm isohyet cannot support the cultivation of many species of grain. These are areas considered “marginal” for agriculture, which in many regions relied on

¹ J. McNeill, “Observations on the Nature and Culture of Environmental History” *History and Theory* 42/4 (2003): 5-43 (quote from p. 6).

² K. Walton, *The Arid Zones* (Abingdon: Routledge, 2007), chapter 1: “The Nature and Causes of Aridity”.

irrigation.³ However, even if in the steppe region of Ukraine, Russia and Kazakhstan precipitation oscillates between 325 and 400 mm, grain cultivation greatly expanded from the eighteenth to the twentieth century when Russian and Ukrainian peasants settled further south and east, without relying, in most of the region, on irrigation networks.⁴ For the grasslands, a crucial environmental feature is not simply the scarcity of precipitation.⁵ The unpredictability of rain and snowfall makes these areas prone to droughts and their agricultural productivity extremely unstable, as the expansion of the sown area during the twentieth century has amply shown.⁶

The conference papers and resulting articles examine how social and political communities develop strategies of water governance in locales with arid and semi-arid conditions. Until the first half of the 20th century, the macroregion of arid and semi-arid zones stretching from Morocco to Inner Asia fell within the domains of the Ottoman, Persian, Tsarist, Qing, British and French Empires. However, both the imperial and local dimensions of water management in these areas of the world have been understudied, as separate cases or comparatively. Focusing on areas that share similar or comparable environmental conditions at different sides of political boundaries is instrumental in highlighting the cultural and social connections that rely on environmental factors, such as the spread of waterworks techniques, such as underground irrigation. The papers selected for this special issue concentrate on the easternmost section of this trans-continental arid and semi-arid macroregion, the one connecting Central Asia to China. Recently, John McNeill has highlighted the specificities of the Middle Eastern and North African (MENA) environmental history, i.e. the westernmost section of the arid and semi-arid macroregion. Aridity, and the settlement pattern that “resembles that of Polynesia more than that of China or India, with larger and smaller ‘islands’ of habitations existing where enough water could be found”,⁷ are clearly common to the MENA region and Central Asia. The borderline nature of agriculture in the semi-arid stripe and its high sensitivity to rainfall instability is another common feature: in these borderline area for human settlement, “even modest changes in rain fall regimes, whether over years or centuries, carried particularly significant consequences... either enlarging or shrinking human possibilities”.⁸ The major feature differentiates the Middle East and North Africa from Central and Inner Asia is the “pelagic geography” of the former, as opposed to the landlocked location of the latter. The Mediterranean, Black, and Red Seas, along with the

³ D. K. Davis, “Deserts”, in *Oxford Handbook of Environmental History*, edited by Andrew Isenberg (Oxford: Oxford University Press, 2014): 123.

⁴ D. Moon, *The Plough that Broke the Steppes: Agriculture and Environment on Russia's Grasslands, 1700-1914* (Oxford: Oxford University Press, 2013): 7-21.

⁵ A. Isenberg, “Sea of Grass: Grasslands in World Environmental History”, in *Oxford Handbook of Environmental History*, edited by Andrew Isenberg (Oxford: Oxford University Press, 2014): 138-9.

⁶ S. Cameron, “‘People Arrive but the Land Does Not Move’: Nomads, Settlers, and the Ecology of the Kazakh Steppe, 1870-1916” and M. Elie, “Desiccated Steppes: Droughts and Climate Change in the USSR, 1960s-1980s”, in *Eurasian Environments: Nature and Ecology in Imperial Russian and Soviet History*, edited by Nicholas B. Breyfogle (Pittsburgh: Pittsburgh University Press, 2018): 43-59, 75-93.

⁷ J. McNeill, “The Eccentricity of the Middle East and North Africa’s Environmental History,” in *Water on Sand: Environmental Histories of the Middle East and North Africa*, edited by Alan Mikhail (Oxford: Oxford University Press, 2013): 27-50 (quote from p. 31).

⁸ McNeill, “Eccentricity”: 45.

Persian Gulf makes seaborne travel in the region relatively easy and, together with the great rivers (Nile, Tigris, and Euphrates), constitute “a navigable network equal to that of anywhere in the world”.⁹ Another Middle Eastern “eccentricity” is instead shared with the core demographic regions of Central Asia, the Aral Sea basin, where the major rivers of the region (Amu Darya, Syr Darya, and Zeravshan) flow: the “mosaic” pattern of grasslands and arable land, a geographical feature that according to McNeill “maximized the interaction between pastoralists and farmers, between tribal confederations and agrarian states”.¹⁰ This patchwork of natural, economic, and human landscapes stands apart from the much bigger contiguous areas of fields or pastures that it is possible to find in the Americas, northern Eurasia, China, or sub-Saharan Africa. As in the Middle Eastern case, historical and archaeological studies of Central Asia have emphasized the co-evolution of mobile pastoralism and agriculture of populations that lived in close contact, and their political interdependence between the nomadic and sedentary worlds.¹¹

Connecting different cases within the Central and Inner Asian arid macroregion is essential for answering a number of historical questions. Did local knowledge inform imperial and post-imperial plans, techniques, and practices of irrigation? How did state water management affect local societies? What factors were most critical in the formation and execution of imperial conservationist policies? How did inter-imperial competition and technological changes impact water management in the arid macroregion of Central/East Asia? How did international relations and economic development policies impact water management? What were the responses and adaptations to state policies of local communities whose economies were based on specific aquatic ecosystems?

Each article addresses a different combination of these questions, but all of them make contributions to the conception of continentality, and the interplay of imperial and local practices in altering natural environments through disaster control, ecological imperialism, and other means of coping with water scarcity or overabundance.

2 *Environments and Empires*

Arid Central Eurasia is an arena of intellectual paradoxes as reflected in studies on the connection between environmental and imperial histories. On the one hand, perhaps more than any other region, Central Eurasia has been the object of investigations that emphasized the climate and environmental factors to explain the expansion of imperial polities, especially the Mongol empire, which is generally regarded as the most important political conglomerate in Central Eurasian history. Both older and more recent scholarship identify climatic change during the Late Middle Ages as one factor leading to the Mongol expansion. Older studies argued that the cooling of climate during the late twelfth and the early thirteenth century (the

⁹ McNeill, “Eccentricity”: 29.

¹⁰ McNeill, “Eccentricity”: 34.

¹¹ E.B. Brite, “Irrigation in Khorezm Oasis, Past and Present: A Political Ecology Perspective”. *Journal of Political Ecology* 23 (2016): 1-25; Sebastian Stride, Bernardo Rondelli and Simone Mantellini, “Canals versus Horses: Political Power in the Oasis of Samarkand,” *World Archaeology* 41/1 (2009): 81.

very beginning of the “Little Ice Age” in the northern hemisphere) was the main “push factor” leading the Mongols to migrate south, thereby conquering the Eurasian sedentary empires at lower latitudes.¹² Scholarship applying this kind of cause-and-effect approach have connected particular biological occurrences with consequences that are mostly qualitative and therefore advance understandings of specific sub-fields in history such as social, economic, and political ones.

On the other hand, latest studies are more interdisciplinary in nature, broadening debates in areas other than history, and take advantage of scientific techniques (tree-ring sequences, geological evidence, radiometric dating, and digital hydrological modelling) in order to reconstruct past climates, like the work of Ruth Mostern in this issue.¹³ Enhancing the case of Mongol expansion, to the “push” of harsher winter, underscored by earlier studies, they added the “pull” of the expansion of grassland due to exceptional precipitations during a fifteen-long pluvial period during the early twelfth century, the most significant bout of grassland productivity during the last 1100 years.¹⁴ As a study published in 2016 describes the phenomenon, “wetter conditions leading to increased biomass in arid regions could have fuelled the military conquests of Mongol horsemen across Eurasia... Grass was the energy source that fuelled the horse-driven military conquests of the Mongol Empire – an early *blitzkrieg* with horses rather than panzers”.¹⁵ Only the greening of Central Asian deserts, according to this view, would have permitted the transit of the Mongol army over long distances. It would have also prompted a shift from agriculture to pastoralism of Inner Asian oasis dwellers, thereby allowing the permanence of polities led by nomadic dynasties at the centre of Eurasia for a few centuries after the split of Chinggis Khan’s Empire.¹⁶ “Cliodynamics” theorist Peter Turchin discussed the historical frontier between mobile pastoralism and sedentary agriculture, the arid belt that crosses Eurasia, as the area of the

¹² Gareth Jenkins, “A Note on Climate Cycles and the Rise of Chinggis Khan” *Central Asiatic Journal* 18 (1974): 217-26; Anatoly Khazanov, “Ecological Limitations of Nomadism in the Eurasian Steppes and the Social and Cultural Implications” *Asian and African Studies* 24 (1990): 1-15; Joseph Fletcher, “The Mongols: Ecological and Social Perspectives” *Harvard Journal of Asiatic Studies* 46 (1986): 11-50.

¹³ Gordon C. Jacoby, “Tree Rings, Climate History, and Genghis Khan”, in *Genghis Khan and the Mongol Empire*, edited by William W. Fitzhugh, Morris Rossabi, and William Honeychurch (Houston: Mongolian Preservation Foundation and Arctic Studies Center, Smithsonian Institution, 2009): 53-5; Amy E. Hessler, Caroline Leland, Thomas Saladyga, and Oyunsanaa Byambasuren, “Hydraulic Cities, Colonial Catastrophes, and Nomadic Empires: Human-Environment Interactions in Asia”, in *Dendroecology: Tree-Ring Analyses Applied to Ecological Studies*, edited by Mariano M. Amoroso, Lori D. Daniels, Patrick J. Baker, and J. Julio Camarero (Berlin: Springer, 2017), 345-63.

¹⁴ Neil Pederson, Amy E. Hessler, Nachin Baatarbileg, Kevin J. Anchukaitis, and Nicola Di Cosmo, “Pluvials, Droughts, the Mongol Empire, and Modern Mongolia”, *PNAS* 111/12 (2014): 4375-4379.

¹⁵ Aaron E. Putnam, David E. Putnam, Laia Andreu-Hayles, Edward R. Cook et al., “Little Ice Age Wetting of Interior Asian Desert and the Rise of the Mongol Empire” *Quaternary Science Review* 131 (2016): 33-50 (quote from p. 39). Ulf Büntgen and Nicola Di Cosmo have made a similar case for the Mongol withdrawal from Hungary in 1242, using both historical documentations and “natural archives”. The Mongol would have retired back to Russia because exceptionally cold and wet conditions that year would have temporarily turned the Pannonian plain into a marshy landscape that reduced food resources for horses, and the army’s mobility. See U. Büntgen & N. Di Cosmo “Climatic and environmental aspects of the Mongol withdrawal from Hungary in 1242 CE,” *Scientific Reports* 6/25606 (2016).

¹⁶ Putnam et al., 40.

world in which most of the biggest empires in human history emerged.¹⁷ According to Turchin, empires formed through hostile relations between nomadic and sedentary polities, an interaction that played out between 3000 BCE to 1800 CE in the Old World belt of steppes and deserts. As John McNeill has summarised, “the geographical segregation of arable land and grassland, of farmer and pastoralist, encouraged this scaling-up of polities in response to one another”.¹⁸ This geographical and environmental feature was markedly different from the Middle East and North Africa, where instead the spatial relation between pastures and fields forms a “mosaic”, in which continuous areas used by mobile pastoralists and by sedentary agriculturalists are much more limited.¹⁹

Compared to the rich body of environmentally-focused historiography on ancient and pre-modern Eurasia, studies about the entanglement between empires and environments in post-Mongol Eurasia is comparatively scant. Modern imperial history has been overwhelmingly focused on Western European maritime empires, first and foremost the British Empire.²⁰ The works that defined the field in the environmental history of empires were not an exception, from Alfred Crosby’s early study of European “ecological imperialism” to John McNeill’s compelling analysis of the epidemiological component of transatlantic imperial histories;²¹ or from William Cronon’s classic *Changes in the Land*, to the studies of the origins of environmentalism in colonial tropical islands as discussed by Richard Grove.²² Thus, within the historiography about imperial formations it is thus becoming less disputed the two central features of imperial polities, namely the management of cultural differences and the configuration of political hierarchies between centre and peripheries,²³ cannot be fully understood without taking into account their environmental entanglements. A growing historiography is putting forward the need for an “imperial political ecology”, especially in relation to the globalization wave that was embedded in the last major European imperial expansion between the late nineteenth and the early twentieth centuries.²⁴

Despite the fact that the distinction between “landed” or “continental” empires and “maritime” ones is less clear-cut than an older historiography would suggest,²⁵ it remains

¹⁷ Peter Turchin, “A Theory of Formation of Large Empires”, *Journal of Global History* 4 (2009): 191-217. On Cliodynamics, see Peter Turchin’s blog: <http://peterturchin.com/cliodynamics/> (accessed 7 January 2019).

¹⁸ McNeill, “Eccentricity”: 37.

¹⁹ Ibidem.

²⁰ Krishan Kumar, *Visions of Empire: How Five Imperial Regimes Shaped the World* (Princeton: Princeton University Press, 2017): 14.

²¹ Alfred Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900–1900* (Cambridge: Cambridge University Press, 1986); John R. McNeill, *Mosquito Empires: Ecology and War in the Greater Caribbean, 1620–1914* (Cambridge: Cambridge University Press, 2010)

²² W. Cronon, *Changes in the Land: Indian, Colonists, and the Ecology of New England* (New York: Hill and Wang, 2003 [or. ed. 1983]); R. H. Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600–1860* (Cambridge: Cambridge University Press, 1995)

²³ Jane Burbank and Frederick Cooper, *Empires in World History: Power and the Politics of Difference* (Princeton: Princeton University Press, 2010).

²⁴ C. Ross, *Ecology and Power in the Age of Empire: Europe and the Transformation of the Tropical World* (Oxford: Oxford University Press, 2017): 1-16.

²⁵ See, e.g. Ronald C. Po, *The Blue Frontier: Maritime Vision and Power in the Qing Empire* (Cambridge: Cambridge University Press, 2018); Ilya Vinkovetsky, *Russian America: An Overseas Colony of a Continental*

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nonetheless true that the “imperial political ecology” of polities such as the Qing and Tsarist Empires preserved strong specificities, if compared to the British or French ones. Connections between centres and peripheries were mediated by water in very different ways in comparison with Western European seaborne Empires. The relative position of imperial centres and frontiers in relation to both the Eurasian river basins and the vast central arid macroregion of the continent seem two important specificities that are worth considering. The geographic, environmental, and climatic features shaping the “hydrosocial systems” such as the one studied by Mostern are crucial aspects of imperial histories. Secondly, unlike the expansion to overseas territories, the extension of imperial powers towards the centre of Eurasia happened after long periods of frontier interactions in areas that were environmentally similar in terms of animal and plant species, soil composition, and climates).

Moreover, in contrast to the ecological imperialism typically associated with cross-continental empires created by maritime powers, empires located in the Eurasian landmass did not entail “encounters with foreign environments”.²⁶ The communities of fishermen who moved from an “island of water” to another one within the vast Central Eurasian sea of grass and sand, as the Ural Cossacks discussed in Pianciola’s article, were in fact moving to aquatic ecosystems within the Aral-Caspian region that shared most animal species, as late Tsarist science pointed out. It is true that, as in the Americas, Tsarist or Qing invasions of Siberia and Inner Asian from the early 17th to the mid-18th centuries were made easier by the spread of smallpox among populations that were particularly vulnerable to it.²⁷ However, the epidemiological side of these conquests is more comparable to the spread of diseases in Eurasia along the “steppe belt” since the Mongol expansion, than to the massive “biotic invasions” and exchanges that shifted world history after the European conquest of America.²⁸ Qing imperial troops in particular, when dispatched from the centre or other frontiers to Inner Asia, did not substantially degrade those places of conquest by introducing animals or plants that threatened indigenous wildlife. Instead, they changed such locales by developing agriculture and other means of resource extraction which were adapted to the semi-arid climate.²⁹ In certain cases, these conquering forces, as they were perceived by indigenous populations, introduced entirely new means to produce food and other essential

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Empire, 1804-1867 (Oxford: Oxford University Press, 2011); Andrei Grinëv, *Russian Colonization of Alaska: Preconditions, Discovery, and Initial Development, 1741-1799* (Lincoln: University of Alaska Press, 2018); Ryan Tucker Jones, *Empire of Extinction: Russians and the North Pacific's Strange Beasts of the Sea, 1741-1867* (Oxford: Oxford University Press, 2014).

²⁶ J. Radkau, *Nature and Power: A Global History of the Environment* (Cambridge: Cambridge University Press, 2008): 165.

²⁷ For Inner Asia, see P. C. Perdue, *China Marches West: The Qing Conquest of Central Eurasia* (Cambridge, MA: Harvard University Press, 2005): 45-9; Chia-Feng Chang, “Disease and Its Impact on Politics, Diplomacy and the Military: The Case of Smallpox and the Manchus, 1613-1795,” *Journal of the History of Medicine and Allied Sciences* 57/2 (2002): 177-97; for Siberia, see D.N. Collins, “Subjugation and Settlement in Seventeenth and Eighteenth Century Siberia”, in Alan Wood (ed.) *The History of Siberia* (London: Routledge, 1991): 37-56.

²⁸ A. Crosby, *The Columbian Exchange: Biological and Cultural Consequences of 1492* (Westport, Conn.: Greenwood, 1972); for a discussion of “biotic invasions” in history: J. D. Hughes, *An Environmental History of the World: Humankind's Changing Role in the Community of Life* (London: Routledge, 2001): 113-9.

²⁹ For a recently published Qing case, see D. A. Bello, “Cultivating Torghut Mongols in a Semi-Arid Steppe,” *Journal of Chinese History* 2/2 (2018): 355-72.

resources. In other cases, the troops who became settled and acculturated in their places of duty as well as subsequent waves of civilian settlers from China's interior, just introduced innovative ways to cope with the challenges of generating adequate food and energy supplies.

3 *Continentality*

Focusing on the central, arid area of the Eurasia, comprising both the semi-arid area of the Eurasian steppe belt, the deserts south of it, and fluvial valleys and oases, also allows to look at the junctures between environmental history and social and political history through continentality. In continental empires, the territorial continuum of centre and peripheries could be connected by hydrographic systems. Obvious examples of empires that pioneered this phenomenon are Egypt and the Mesopotamian states. In Egypt and Mesopotamia, the major rivers flow within a region which is arid both upstream and downstream, while the economy relied on the annual regular flooding of the great rivers. The flows of rivers in semi-arid or non-arid regions abutting arid ones in Eurasia, such as seen in Li Narangoa and Robert Cribb's historical atlas of Northeast Asia, offer meaningful contrast.³⁰

In the case of China, and more specifically in the case of the Yellow River basin as detailed by Ruth Mostern's contribution to the present issue, the connection is instead between a semi-arid frontier upstream (the Ordos plateau, which is located in the northern loop of the river), and the humid region downstream. On the basis of the "geoarchive", constructed through analysis of sediments, pollen, and other physical evidence, Mostern elucidates the "downstream consequences" of "upstream events". Population increase, deforestation, and agricultural expansion led to intensified soil erosion in the Ordos region. Soil erosion magnified the volume of fluvial sediment load, which in its turn increased the occurrence of massive flooding events downstream.

During the last 9500 years, i.e. since the beginning of agriculture in East Asia, a strong intensification of soil erosion happened in three periods, the last of which is the chronological focus of Mostern's study, the late Tang and Song dynasties starting in the ninth century CE. Mostern explains the irregular accelerations of this *long durée* process focusing on the political and military history of the semi-arid Ordos plateau, a multi-ethnic frontier with grasslands that could turn it into a strategic base for nomadic armies invading from the north. Controlling the Ordos had therefore a strategic value throughout Chinese history. This is the region where the Ming started to build walls that eventually were called "the Great Wall" to keep the Mongols out.³¹ According to Mostern, the Northern Song strategy of mass fortifications (the Song built more than 300 forts in the region against the independent Tangut state of Xi Xia founded in the early eleventh century) is the main factor in the acceleration of the land degradation process. Later in the century, up to 800,000 Song and Xi Xia soldiers faced each other in a region that had seen much scarcer disruptive human activity earlier.

³⁰ N. Li and R. Cribb. *Historical Atlas of Northeast Asia, 1590-2010: Korea, Manchuria, Mongolia, Eastern Siberia* (New York: Columbia University Press, 2014).

³¹ Robert B. Marks, *China: Its Environment and History* (Lanham: Rowman and Littlefield, 2012): 184-7.

After a war fought between 1037 and 1042, the borderlands remained disputed and heavily manned. During the following decades, agricultural colonization, construction of new towns, forced migrations, settlement of self-supporting garrisons that expanded the frontier by cutting trees and expanding pastures, made the early Song dynasty a period of rapid environmental deterioration in the Ordos grassland, and increased hydrogeological danger on the Yellow River downstream.³²

The frequency and destructiveness of Yellow River floods made necessary to expand and strengthen the Yellow River dikes system (at present, the dikes are about 1500-km long and were mostly reconstructed between the fifteenth and nineteenth centuries).³³ No observer at the time had made the connection between the condition on the upstream plateau and the Yellow River course downstream, in the agricultural core of the Empire. This insight points to the different temporalities at play, coalescing in a specific “moment” in Chinese history.³⁴ Even if on the scale of the “big history” of the Holocene, the human political and military agency highlighted by Mostern is surely short-term, a momentous acceleration of an on-going thousands-year-long process like soil erosion in semi-arid regions was imperceptible enough to human observers at the time.

Mostern’s claim that soil erosion can be linked to these episodes as a facilitating factor, as shown by the chronological proximity between periods of intense soil erosion upstream and intense flooding downstream, connects her work to the rich scholarship about the Yellow River as a waterway that has literally delivered water as both a force of production and destruction. Ling Zhang has recently discussed one of the worst of such events: in 1048 the river shifted its lower course after breaching its northern banks in an area corresponding to modern northern Henan, and inundating the Hebei Plain.³⁵ Since 600 BCE, the Yellow River catastrophically changed its course eight times, the last in 1855, leading to the migration of its mouth south or north by hundreds of kilometres. In addition, there were 26 more limited changes in course, and 1,600 dyke breaches with subsequent floods.³⁶ David Pietz showed that floods happened every 1.89 years in the North China Plain between 1645 and 1855.³⁷ Not all the course changes were due to processes of siltation, soil erosion, and exceptional precipitation. The power of the river has been used as a weapon, too. The most recent episode is discussed in Micah Muscolino’s study of Henan province during World War II. During the

³² Mostern has detailed these processes in her monograph *“Dividing the Realm in Order to Govern”: The Spatial Organization of the Song State (960-1276 CE)* (Cambridge, MA: Harvard University Press, 2011).

³³ B. Li, “Water and the History of China”, *Social Sciences in China* 39/1 (2018): 124.

³⁴ We are using the idea of “moment” in history as put forward by Richard W. Bulliet, *Cotton, Climate, and Camels in Early Islamic Iran: A Moment in World History* (New York: Columbia University Press, 2009).

³⁵ L. Zhang, *The River, the Plain, and the State: An Environmental Drama in Northern Song China, 1048-1128* (Cambridge: Cambridge University Press, 2016).

³⁶ Q. Zhang, C.-Y. Xu, T. Yang, and Zh.-Ch. Hao, “The Historical Evolution and Anthropogenic Influences on the Yellow River from Ancient to Modern Times”, in *A History of Water: Series II, Vol. 2, Rivers and Society: From the Birth of Agriculture to Modern Times*, edited by Richard Coopey and Terje Tvedt (London: I.B. Tauris, 2010): 152.

³⁷ D. Pietz, *The Yellow River: The Problem of Water in Modern China* (Cambridge, MA: Harvard University Press, 2015): 16-7, 58.

Second Sino-Japanese War in June 1938, in order to stop the invading Japanese the Nationalist armies led by Jiang Jieshi (Chiang Kai-shek) broke the Yellow River dikes, flooding the Henan plain, devastating its economy, killing hundreds of thousands of people and displacing many more, in “the most environmentally damaging act of warfare in world history”.³⁸ Strategies for executing military operations, survival tactics of refugees displaced by floods and warfare, and the means of extracting hydropower all depended on the varying ways that human actors interacted with the river.

Further west from the Yellow River course, Central Eurasia is not connected by “hydrosocial systems” to “China proper”. The central region of the Eurasian continent is instead characterized by the largest continuum of endorheic river basins in the world, stretching from the Gobi Desert in the east to Volga basin in the west, and from the Qipchaq Steppe in the north to the Iranian plateau in the south. Starting from the mid-eighteenth century, different areas of this macroregion became the object of settlement waves from outside the region (especially from China and Russia), but also of resettlement of agriculturalists within the region.

A number of these resettlement waves were aided by the state (Tsarist Empire in the Qazaq Steppe and Turkestan, the Qing Empire in Kashgaria and Dzungaria, the Khanate of Khiva in the lower Amu Darya region). Many were instead independently driven. Russian, Manchu, or Han colonizers formed frontiers that Owen Lattimore identified as being zones of economic and social interaction between disparate human communities rather than mere spaces on two sides of a politically determined border between states.²⁵ These frontiers were especially prominent in “Inner Asia,” an area by Lattimore’s interpretation that includes most of China’s northern periphery, and simultaneously accentuated and blurred the varying uses of natural resources in a particular locale based on the needs engendered by resident populations’ material cultures and intangible values.

As seen in Eric Schluessel’s article, resettlement did not only imply immigration from outside steppe and desert region. Since the first half of the eighteenth century, for instance, the Qing government resettled and aided groups of refugees from oasis town in Kashgaria to areas under their control, during the decades-long conflict against the last Central Eurasian nomadic Empire, the Dzungars.³⁹ In order to destroy Dzungar power, the Qing conquered Dzungaria and Kashgaria during the 1750s.⁴⁰ Since the mid-18th century, Central Eurasia was conquered by the expanding Qing and Tsarist Empires. The process of subjection and re-

³⁸ M.S. Muscolino, *The Ecology of War in China: Henan Province, the Yellow River, and Beyond, 1938-1950* (Cambridge: Cambridge University Press, 2015): 2

²⁵ O. Lattimore, *Studies in Frontier History: Collected Papers, 1928-1958* (Oxford: Oxford University Press, 1962), 471.

³⁹ For a case of resettlement of 10,000 Turfanis from the Turfan basin to western Gansu in 1732-33, and the Qing aid in order to build five walled towns, irrigation canals, and reclaiming new lands, see D. Brophy and T. Onuma (eds), *The Origins of Qing Xinjiang: A Set of Historical Sources on Turfan* (Tokyo: Program Islamic Area Studies, The University of Tokyo, 2016): 22-30.

⁴⁰ Perdue, *China Marches West*.

Commented [PN3]: Is it ok? It seemed a bit odd to say “they were not only X and Y; X and Y did this and that”

conquest after momentous uprisings lasted more than 120 years, from the mid-18th century to approximately the 1870s. Imperial administrative control over much of semi-arid Central Eurasia was temporary or weak until the second half of the nineteenth century. In the case of the Qazaqs, the larger Central Eurasian nomadic population, obscures the fact that part of them remained in a condition of “double loyalty” to both the Tsarist and Qing Empires until the first half of the 19th century.⁴¹ It is not until the last quarter of the nineteenth century that local population increase on the one hand, and immigration from outside the region on the other hand, led specific imperial connections (in terms of expansion of legal systems, of transport infrastructures, and of colonial settlement) to transform local ecosystems and to have a bigger impact over the use of natural resources. Demographic increase was however a factor that started to put pressure on irrigation systems in Xinjiang at the beginning of the twentieth century. This key point of Schluessel’s study expands the connection between profound social change and economic development in Xinjiang during this time period as identified in precedent works such as James Millward’s comprehensive history of the region.⁴²

The same was true for the lower Aral Sea basin. A wave of migrant fishermen from Russia and Ukraine founded clusters of illegal settlements on or near the deltas of the Syr Darya and Amy Darya. As detailed in Pianciola’s contribution, the population of Slavic fishermen around the Aral Sea more than tripled between 1899 and 1913.⁴³ Again, the character of continuous expansion on land, the continentality of the new imperial ecologies, draws a specific historical trajectory. Peasant resettlement from forested central Russia to the steppes north of the Black Sea, the Caucasus, and further east since the early eighteenth century implied the colonization of a foreign environment, and the displacement of the native flora and fauna.⁴⁴ However, there were no geographical barriers or ecological transitions between the part of the steppes that were already considered “Russia” during the nineteenth century, the Qazaq Steppe, and the southern area of the Aralo-Caspian basin, i.e. the additional regions that received the subsequent migratory wave during the second half of the nineteenth and the first half of the twentieth centuries.

4 Empires of Water

The connection between water management in arid regions of the world and centralized states is common from the mid-twentieth century. In an essay published in 1949, American anthropologist Julian Steward connected the emergence of centralized polities and a

⁴¹ G. Afinogenov, “Languages of Hegemony on the Eighteenth-Century Kazakh Steppe” *The International History Review* (2018): 1-19; Jin Noda, *The Kazakh Khanates between the Russian and Qing Empires: Central Eurasian International Relations during the Eighteenth and Nineteenth Centuries* (Leiden: Brill, 2016).

⁴² J. Millward, *Eurasian Crossroads: A History of Xinjiang* (New York: Columbia University Press, 2009).

⁴³ RGIA, 398/70/25450/138-139ob, Upravlenie Zemledeliya i gosudarstvennykh imushchestv v Turkestanskom krae – v Departament Zemledeliya, 23.09.1913.

⁴⁴ Moon, *The Plough that Broke the Steppes*, 22.

“theocratic class” to the need of expanding irrigation into arid lands.⁴⁵ German sinologist Karl August Wittfogel shortly later proposed the now largely discredited “oriental despotism” thesis. According to Wittfogel, environments where water is scarce and where agriculture can develop only thanks to massive irrigation networks inevitably facilitate the emergence of strongly centralized polities that mobilize labour for vast irrigation works through despotic rule.⁴⁶ This theory, born in the context of the cultural Cold War, was aimed at explaining the persistence of centralized despotic political systems in areas under Communist rule after World War II. Wittfogel’s thesis was curiously specular to the one of the foremost Soviet archaeologist, Sergei Tolstov, head of the Multidisciplinary Archaeological Expedition in Khorezm during the central decades of the twentieth century. According to Tolstov, only a “centralized oriental despotism” could have coerced a sufficient amount of labour into slavery and into the construction of the massive irrigation canals of Ancient Khorezm. If in the case of Wittfogel the causation flowed from the environment to the political system, in the case of the Marxist model of the Soviet archaeological school, the mode of production based on slavery would have made possible both a despotic imperial power, and the harnessing of river waters through the building of huge canals.⁴⁷ Recent archaeological studies have instead emphasized that construction of major engineering works such as the Dargom canal close to Samarkand (more than 100-km-long and bringing under irrigation an area larger than 1000 km²), did not necessitate the tens of thousands slaves postulated by Tolstov, provided that a longer timeframe is taken into account.⁴⁸ Moreover, in regions such as the Middle Zeravshan Valley, the maximum expansion of the irrigation network “dates to the Early Medieval Period, a period of political fragmentation and expansion by segmentation”, not centralization.⁴⁹ In relation to a more recent period and focusing on Ottoman Egypt, Alan Mikhail has shown how “a complex system of irrigation does *not* have to be managed despotically”.⁵⁰

Overcoming deterministic relations between environment and imperial political systems, a more recent historiographical strand has focused on the “environmental imaginaries” underpinning modern imperial projects.⁵¹ In this relation, one influential trope was the

⁴⁵ J.H. Steward, “Cultural Causality and Law: A Trial Formulation of the Development of Early Civilizations”, *American Anthropologist* 51/1 (1949): 19, 22. Steward relied also on previous studies published by Wittfogel.

⁴⁶ K.A. Wittfogel, *Oriental Despotism: A Comparative Study of Total Power* (New Haven: Yale University Press, 1957); see also N. Brown, “Wittfogel and Hydraulic Despotism”, in *A History of Water: Series I, Vol. 2, The Political Economy of Water*, edited by Richard Coopey and Terje Tvedt (London: I.B. Tauris, 2006): 103-16.

⁴⁷ S. Tolstov, *Drevnyi Khorezm: Opyt istoriko-arkheologicheskogo issledovaniia* (Moskva: MGU, 1948). This point is made in Stride, Rondelli and Mantellini, “Canals versus Horses”: 74-5.

⁴⁸ H.-P. Francfort and Ol. Lecomte, “Irrigation et société en Asie centrale des origines à l’époque achéménide.” *Annales. Histoire, Sciences Sociales*. 57/3 (2002): 632-5. Francfort and Lecomte pointed out that the rule for the construction of large irrigation canals in ancient Central Asia was the slow expansion of initial work that were limited in size and length.

⁴⁹ Stride, Rondelli and Mantellini, “Canals versus Horses”: 83.

⁵⁰ A. Mikhail, *Nature and Empire in Ottoman Egypt: An Environmental History* (Cambridge: Cambridge University Press, 2011): 36.

⁵¹ D.K. Davis and E. Burke (eds), *Environmental Imaginaries of the Middle East and North Africa* (Athens: Ohio University Press, 2011).

“resurrection” of ancient irrigation system, constantly brought up by European imperial rulers of arid extra-European lands during the nineteenth and twentieth centuries. The European states that conquered sections of the Afro-Asiatic arid macroregion legitimized their rule also by positing that the local inhabitants or the previous rulers (typically the Ottomans) had turned the fertile regions into desert thanks to overgrazing and administrative mismanagement, in what Diana K. Davis has called “the desert blame game”.⁵²

The restoration of the existing irrigation networks was a priority of the British administration in India, in order to increase agricultural production and fiscal revenue, and foster political stability in the countryside. As the foremost British imperial irrigator at the turn of the twentieth century, William Willcocks, wrote in his autobiography, the British aimed at “the resurrection of this ancient land”.⁵³ After a series of famines in the first half of the nineteenth century that had shown that irrigated areas fared much better during crisis than non-irrigated ones, the government started to see the expansion of irrigation as an important tool for famine prevention.⁵⁴ This not saved India from a series of devastating famines during the second half of the century, the outbreak of which had much to do with British economic policies in the subcontinent.⁵⁵ In northern India, especially in the Indus valley, the British greatly expanded the irrigation system with private and public investments. Since the 1850s the colonial government contracted out the construction of canals to joint-stock British companies that would raise the necessary capital in London. In practice, many of those companies overspent and went bankrupt, so that the British provincial administration was forced to eventually purchase the companies. These policies were linked to plans of cash crop (including cotton, opium, and sugar cane) expansion, also through peasant resettlement to “canal colonies” in Punjab.⁵⁶ The colonies had also a military rationale, as Punjab was providing the majority of recruits for the British Indian Army at the turn of the twentieth century.⁵⁷ The construction costs were recovered from the Indian population charging irrigation fees, rents, duties, and fines for breaching irrigation regulations. Nonetheless, profits from new canals did not cover the costs of the huge expansion of the Indian irrigation network, which reached 22,400 km at the end of the nineteenth century.⁵⁸ The expansion of irrigation brought about environmental and ultimately other economic costs, as soil salinization and waterlogging degraded agricultural lands, and waterborne epidemics such as malaria became endemic in heavily channelled territories.⁵⁹ Starting from the late-nineteenth century with the conquest of Egypt,

⁵² D.K. Davis, *The Arid Lands: History, Power, Knowledge* (Cambridge, MA: The MIT Press, 2016): 81-116.

⁵³ Quoted in D. Worster, *Rivers of Empire: Water, Aridity, and the Growth of the American West* (Oxford: Oxford University Press, 1985): 150.

⁵⁴ W. Beinart and L. Hughes, *Environment and Empire* (Oxford: Oxford University Press, 2007): 134.

⁵⁵ M. Davis, *Late Victorian Holocausts: El Niño Famines and the Making of the Third World* (London: Verso: 2000).

⁵⁶ M. H. Fisher, *An Environmental History of India: From Earliest Times to the Twenty-First Century* (Cambridge: Cambridge University Press, 2018): 147-51.

⁵⁷ A. Morrison, *Russian Rule in Samarkand, 1868-1910: A Comparison with India* (Oxford: Oxford University Press, 2008): 239.

⁵⁸ Beinart and Hughes, *Environment and Empire*: 135; Fisher, *Environmental History of India*: 151.

⁵⁹ E. Whitcombe, “The Environmental Costs of Irrigation in British India: Waterlogging, Salinity, Malaria”, in *Nature, Culture, Imperialism: Essays on the Environmental History of South Asia*, edited by D. Arnold and R. Guha (Delhi: Oxford University Press, 1995): 237-59.

the British controlled territories shaped by the most ancient irrigation riverine systems in the semi-arid Afro-Asian macroregion: the lower Nile and, after World War I, Mesopotamia. Here, too, restoration projects like works on the Nile delta barrage, and the expansion of perennial irrigation to the detriment of basin irrigation had the function to expand cash crop production.⁶⁰ Between the early 1860s and the late 1890s, the average annual production of long-stapled cotton in Egypt had a six-fold increase.⁶¹ The construction of the first Aswan dam in 1902, “transformed water from a local resource into one that could be controlled and allocated at the level of the central state”.⁶² This led to profound economic and social dislocations, and had negative environmental (increased salinity of soils, given the absence of effective drainage) and epidemiological (waterborne parasitic diseases became endemic among the peasantry) consequences.⁶³

Compared to the irrigation activism of the British Empire in India and Egypt, imperial administrations at the eastern end of the arid macroregion did not achieve much, especially in comparison to plans of remaking the central Asian waterscape that especially the Russians put forward during the second half of the nineteenth century. The most important project that remained at the level of plan was the idea of diverting the waters of the Amu Darya from the Aral Sea to the Caspian, following what was considered its ancient riverbed – another case of projected imperial restoration of the landscape to an earlier configuration. The new/old route would have been instrumental in putting more land under cultivation, and in creating a transportation infrastructure between the centre of the empire and the Central Asian province.⁶⁴ Even if cotton production increased manifold under Russian rule, this was not the result of significant investment, or legislative activity by the imperial government. It was private initiative, by Central Asian and Russian entrepreneurs, and by local peasants, which drove the “Turkestan Cotton Boom”.⁶⁵ Irrigation efforts were concentrated in the Hungry Steppe, a relatively small intermontane depression southwest from Tashkent (it straddles the borders of present-day Kazakhstan and Uzbekistan), where canals started to be built from the 1880s thanks to the initiative of the exiled Grand Duke Nikolai Konstantinovich Romanov. Later, during the 1890s, the Ministry of Agriculture took over, but with very limited results and intermittent funding from St. Petersburg.⁶⁶ As historian Akifumi Shioya has shown, the Tsarist administration also favoured an extension of irrigation canals at the least in the Khivan Khanate, downgraded to a protectorate after Khiva’s defeat in 1873. Here, too, the main project, the New Lawzan Canal, the construction of which started in 1894 without sufficient planning, was a failure. As in Egypt under the British, the construction of water

⁶⁰ J.L. Derr, “Drafting a Map of Colonial Egypt: The 1902 Aswan Dam, Historical Imagination, and the Production of Agricultural Geography”, in Davis and Burke (eds), *Environmental Imaginaries*: 136-57.

⁶¹ Beinart and Hughes, *Environment and Empire*: 142.

⁶² Derr, “Drafting a Map of Colonial Egypt”: 146.

⁶³ Derr, “Drafting a Map of Colonial Egypt”: 148-51.

⁶⁴ J. Obertreis, *Imperial Desert Dreams: Cotton Growing and Irrigation in Central Asia, 1860-1991* (Göttingen: V&R Unipress, 2017), 81-5.

⁶⁵ B. Penati, “The Cotton Boom and the Land Tax in Russian Turkestan (1880s-1915)”, *Kritika: Explorations in Russian and Eurasian History* 14/4 (2013): 741-74;

⁶⁶ Obertreis, *Imperial Desert Dreams*: 107-ff.

infrastructure led to long-term social and economic dislocation: in this case the canal construction triggered a Yomut Turkmen rebellion that dragged until the collapse of the Tsarist Empire and the first years of Soviet power in Central Asia.⁶⁷ The historiography has explain in different ways the causes for this Tsarist administrative failure in irrigation policies in Central Asia, especially if compared to British policies. The underfunding of the Turkestan administration, which for imposed a taxation that was lower than the one imposed by the British in their colonies, was one factor. The general inefficiency and corruption of the Tsarist colonial administration was a second aspect to keep in mind.⁶⁸ Third, the Tsarist Empire lacked a school of engineering specialized in irrigation in arid environments as the one that the British has succeeded to implant in India, where their domination was much longer than Tsarist power in Central Asia. Finally, the anti-capitalist discourse hegemonic among Tsarist administrators played a role in curbing effective investments and management of new irrigation systems.⁶⁹ According to Alexander Morrison, even if both the British and Tsarist Empires failed to produce sufficient administrative knowledge to comprehend and control the irrigation systems in India and Central Asia that pre-existed their conquest, had more serious consequences in Tsarist Turkestan, where these older canals were almost the entire network, and were more elaborate than in northern India, as the latter has a wetter climate and peasants do not depend on artificial irrigation for agricultural work as much as in Central Asia.⁷⁰ It is significant that even in the semi-arid areas closer to the centre of the empire, i.e. the southern Russian and Ukrainian steppes, the Tsarist administration at the end of the nineteenth century failed to expand irrigation during the second half of the nineteenth century, due to technical difficulties and budgetary constraints. The foremost statesman of the period, Sergei Witte, consciously articulated the choice of prioritizing investment in railway infrastructures to the detriment of irrigation and other melioration in agriculture, due to their alleged lacked of profitability.⁷¹

As Schuessel's contribution to this issue makes clear, in Xinjiang imperial policies towards irrigation were even less transformative than in Tsarist Turkestan. However, after the reconquest of Kashgaria and Dzungaria by the Qing Hunanese army during the late 1870s, general and statesman Zuo Zongtang implemented a policy of assertive economic reconstruction in which the repair of irrigation network played an important role, along with the expansion of particular economic sectors, such as silkworm raising and silk production, mulberry tree cultivation, and substitution of opium poppy cultivation with cotton.⁷² Along with farming subsidies, the encouragement of sericulture and cotton production was a

⁶⁷ A. Shioya, "Povorot and the Khanate of Khiva: A New Canal and the Birth of Ethnic Conflict in Khorazm Oasis, 1870s-1890s". *Central Asian Survey* 33/2 (2014): 232-45.

⁶⁸ For a comparative discussion of the Turkestan and British Indian cases, see Morrison, *Russian Rule in Samarkand*: 201-44.

⁶⁹ M. Joffe, "Capitalism and Empire: The Politics of Irrigation", *Russian Review* 54/3 (1995): 365-88; Obertreis, *Imperial Desert Dreams*: 109.

⁷⁰ Morrison, *Russian Rule in Samarkand*: 243.

⁷¹ Moon, *The Plough that Broke the Steppes*, 232-3.

⁷² P. Lavelle, 'Cultivating Empire: Zuo Zongtang's Agriculture, Environment, and Reconstruction in the Late Qing', in *China on the Margins*, edited by Sherman Cochran and Paul G. Pickowicz (Ithaca: Cornell University East Asia Program, 2010): 43-64.

traditional Qing policy in the agriculturally marginal lands of the Empire's north and northwest, aimed at preventing social unrest.⁷³ Zuo's policy of agricultural recovery was strictly linked to the creation of new military settlement colonies, in which part of the Qing conquering army was demobilized. This policy was similar to military-agricultural colonization that was standard practice in Dzungaria and Kashgaria since the mid-eighteenth century Qing conquest. Unlike the great waves of agricultural settlements during the nineteenth century in the Americas and, starting from the 1890s, the great peasant migration of Russian and Ukrainian peasants to Siberia and the Qazaq steppe, in which the economic aspect was paramount, the settlement projects implemented by the Tsarist state to the lower Aral Sea basin during the 1870s, and by the Qing state in Xinjiang shortly later, had mostly security and political aims. The economic aspect of measures as Zuo Zongtang's reconstruction of the reconquered northwest were subordinate to the aim of political control. But, as it happens, these measures did not fail to have environmental and social consequences for the region. Schluessel details how the increased agricultural resettlement in the Kashgar river area led to increased competition between different communities for the river's water.

5 *Fluid Normative Systems*

Another topos of imperial environmental history is the transfer of legal systems. Colonizers bring new laws and new ideas and ideologies in relation to "natural resources" that are then transferred into new laws. Typically, into new property laws that change the way in which the original inhabitants of the colonized region relate to natural resources: especially land, but also woods or fisheries.⁷⁴ Among the narratives about the state's legal impact are examples of failure, rather than success, of attempts to transplant legal norms, and expand state capacity either in spatially marginal regions as discussed by Schluessel, Pianciola, and Penati, or, in a relatively core territory of a post-imperial state, as in Ye's case study.

In Schluessel's article, the transfer of legal norms happened in spatial terms, but also in terms of transition between law and custom – shaping the "moral economy" of later generations that would, in turn, prove resilient vis-à-vis the introduction of new legislation connected to water management. Schluessel shows the consequences of the administrative reforms following the Qing re-conquest of Dzungaria and Kashgaria, and the creation of the Xinjiang province, when the addition of a layer of Han Chinese officials manning the new provincial administration, and the delimitation of new administrative units led to the disruption of previous community-based mechanisms in water allocation and dispute settlements. As it was the case in the British and Tsarist administrations dealing with pre-colonial irrigation systems, Schluessel emphasizes how Qing provincial officialdom had only a marginal understanding of the social life of water in Xinjiang, in terms of its distribution, of competition over supply, and of the religious and kinship-based institutions presiding over

⁷³ K. Pomeranz, "The Transformation of China's Environment, 1500-2000", in *The Environment and World History*, edited by E. Burke III and K. Pomeranz (Berkeley: University of California Press, 2009): 125.

⁷⁴ Cronon, *Changes in the Land*: 54-81.

the use of water. Such a lack or disregard of knowledge about local cultural values, and about how water was a resource to be allocated not only through purely economic means, as in China's interior, exacerbated the difficult task of converting Xinjiang from a region that functioned through a combination of several military and civilian political authorities to one in which political and economic control was concentrated in a comprehensive, non-indigenous form of governance that prioritized the imperial centre's interests over those of the region.

The story of the transplant of Cossack communities from the Ural River region to the Aral Sea is another example of a system of norms regulating the exploitation of a natural resource (the Ural River fisheries) that failed to be transferred another ecosystem. Pianciola describes how the Cossacks who were moved to the lower course of the Amu Darya and Syr Darya had been stripped of their estate position and deported to Central Asia. They were thus alienated from a government that generation by generation since the sixteenth century they had learned to serve. Paradoxically, during the 1870s the Tsarist state had shaped a form of colonization that more closely resembled the movement of "runaways from state making processes",⁷⁵ than the advancement of vanguard communities whose expansion coincided with the expansion of state sovereignty over former frontier regions. The "failure" thus was not simply a failure in state capacity, or a failure of the Cossack communal organization. Exiled Cossacks tried to implement conservationist regulations on the Lower Syr Darya and Amu Darya Rivers, especially in relation to their fish of choice in their fishing activities, the ship sturgeon. These regulations failed for reasons that have very much to do with the character of the "hydrosocial system" of the lower Aral Sea basin. Here, unlike on the Ural River, the Cossack communities did not control the riverine ecosystem to an extent that made possible the effective regulation of the fisheries in a way in which the Cossacks could effectively regulate the exploitation of common pool resources. The colonial society that emerged around the fisheries of the lower Aral Sea basin was very peculiar. The deported Cossacks became the higher social stratum of the socio-economic system based on fisheries exploitation. However, unlike on the Ural River, they were too weak to dominate or exclude Qazaqs, Qaraqalpaqs, and, later Russian and Ukrainian settlers from autonomously exploit the fisheries. Thus, both the richer Cossacks who hired or financed native fishermen, and the poorer ones who competed with Qazaq and Qaraqalpaqs operated outside the conservationist communal norms that they had initially brought with them from the Ural River area.

It is telling that later attempts by the Tsarist state to impose fees for the access to fisheries were countered by poor Cossacks invoking a moral economy that give them the right to practice fishing for their subsistence, using a "state property" as the Aral Sea fisheries. They instead pointed at the richer Cossacks hiring or financing local labour for their fishing activities as those who could be legitimately taxed.⁷⁶ Despite these differences, both the

⁷⁵ J.C. Scott, *The Art of Not Being Governed: An Anarchist History of Upland Southeast Asia* (New Haven: Yale University Press, 2009): 24.

⁷⁶ N. Borodin, *Ocherk sovremennago polozeniia amu-dar'inskago rybolovstva* (Sankt-Peterburg: Tipografiiia M.P. Frolovoi, 1904): 18.

stratified fishing society around the Aral Sea and along the Ural River had a communality of animal species and cultural traits of the human population preying on them. Cossacks and Qazaqs (the former were largely bilingual) were part of the steppe cultural and political continuum that had emerged in the Central Eurasian endorheic river basins after the collapse of the Timurid Empire⁷⁷ (another example of the importance of the “continentality” of some of the threads that the articles of the special issue cover). Moreover, no matter how feeble the grasp of the Tsarist state was over its peripheral aquatic environments, the story of the management of Tsarist Aral Sea fisheries shows that the conservation of fisheries was indeed a clear aim of the Tsarist administration. Early conservationist norms, like those existing on the Ural River and managed by the eponymous Cossack Host, were early examples of the firm understanding of the need to regulate the timing and amount of fishing in inland fisheries.

In 1910, the last Tsarist-era draft project for fisheries regulation on the Aral was written by Lev Berg and a fishing specialist at the Directorate for Agriculture, V.I. Meisner. This project was the first that was explicitly aimed at regulating the entire Turkestan fisheries, including also the other main fishing area, Semirech'e. In this latter *oblast*, fishing was practiced (albeit in a much smaller scale than in the Aral region) on lakes Balkhash and Issyk-Kul, and in the Ili River. The draft was discussed by a number of institutions in Tashkent and Saint Petersburg. During these discussions, one can easily identify the cultural and political gap between, on the one hand, Meisner and Berg, and, on the other hand, administrators and “specialists” in Tashkent who worked for the local office of the Resettlement Administration and the Turkestan branch of the General Directorate for Agriculture and Land Settlement (the late Tsarist equivalent of a ministry of agriculture). The latter shared what Peter Holquist described as an “etatist” and dirigiste ideology that “emphasized ‘productive’ labour over ‘speculation’”.⁷⁸ One of the main changes proposed by the interdepartmental meeting held in Tashkent in 1910 to discuss the draft regulations was to insert an article barring Jews and Armenians from investing in Turkestan fisheries and fish processing, since these groups were “harmful elements because of their exploitative activities”.⁷⁹ Meisner and Berg firmly refused to insert this article in their final draft. Eventually, their draft could not be turned into law before the outbreak of World War I.⁸⁰

The impact of wars on the relations between humans and the environment is increasingly the focus of environmental historians. The issue is touched upon by the contributions collected here. Unlike military activity in the Chinese imperial borderlands discussed by Mostern for a much earlier period, inter-state wars fought by imperial formations that had incorporated

⁷⁷ On this, see J.-Y. Lee, *Qazaqlıq, or Ambitious Brigandage, and the Formation of the Qazaqs: State and Identity in Post-Mongol Central Eurasia* (Leiden: Brill, 2016).

⁷⁸ P. Holquist, “‘In Accord with State Interests and the People’s Wishes’: The Technocratic Ideology of Imperial Russia’s Resettlement Administration”, *Slavic Review* 69/1 (2010): 157.

⁷⁹ RGIA, 398/70/25449/146, Zasedanie Osoboi Komissii, Tashkent, 28.08.1910.

⁸⁰ RGIA, 398/70/25449/229-277, Proekt pravil rybolovstva v basseine Aral'skogo morya i v Semirechenskoi oblasti; obyasnitel'naya zapiska k proektu, 1910.

parts of Central Eurasia within their borders had uneven effects on the relation between human communities and the environment. During World War I, the Tsarist Empire extracted resources in a much more systematic way from the region. Salted fish from the Aral Sea became a food resource for the Russian army.⁸¹ The most important resource to be mobilized for the war were humans themselves: fishermen were turned into soldiers, thereby contributing to stop the collapse of the Aral Sea ship sturgeon population. This also involved the systematic requisition of horses and cattle from the Central Asian nomadic population – first and foremost the Qazaqs, the most numerous among them –, pushing part of them towards the subsistence threshold and starting a period punctuated by famines that lasted fifteen years, until the great famine of 1931-33 that killed one third of them.⁸² In other words, thanks the construction of the railway connecting Central Asia to Russia in 1906, Central Asia had become much more integrated into the “social metabolism” of the imperial military machine.⁸³ This had important consequences during the war, and during the construction of the warlike Stalinist economic system.

As in the Xinjiang case studied by Schluessel, the decoupling of “hydraulic” and administrative units is also analysed by Penati’s article. She shows that in early Soviet Central Asia it was possible that “water communities” and “congresses” not only transcended the existing province and districts’ borders, but also the borders of Soviet national republics. Some of the fiercest conflict between, for instance, Kazakhstani and Uzbek administrators during the “national delimitation” of Central Asian Soviet republics in 1924 focused on areas served by the same canals in the Hungry Steppe, to set up a parallel pyramid of “hydraulic” territorial units controlled by a consolidated Central Asian Water Administration would have been a way not only to disempower bottom-up participation, as Penati intriguingly and convincingly explains, but also a way to relieve any republican organ from controlling the irrigation networks of crucial areas divided between different republics (Hungry Steppe, Fergana Valley, Khorezm).

It is also possible that the decoupling of the hydraulic bureaucratic system from republican borders was also seen as a way to improve the “self-sustainability” of the irrigation system, because it would have helped minimize water-related conflicts between different communities on different sides of a “national” republican border. In another work, Penati has shown that between 1924 and 1927 communities at the two sides of the Uzbek-Kyrgyz border in the Fergana Valley filed petitions asking that republican borders would be redrawn. The main aim of the petitioners was to keep on the same side of the republican border all the

⁸¹ GARF, 1783/2/532/13, 23, 42, 122, Perepiska s finansovo-schetnym otdelom Ministerstva prodovol'stviia, glavnym intendentskim upravleniem, central'nym Komitetom ...po prodovol'stvennomu delu o zagotovke ryby v basseine Aral'skogo moria... dlia armii, 13.01-30.12.1917

⁸² On the famine in Kazakstan, see R. Kindler, *Stalin's Nomads: Power and Famine in Kazakhstan* (Pittsburgh: Pittsburgh University Press, 2018) and S. Cameron, *The Hungry Steppe: Famine, Violence and the Making of Soviet Kazakhstan* (Ithaca: Cornell University Press, 2018).

⁸³ For the conception of “social metabolism” and its use for the environmental and social history of wars, see Muscolino, *Ecology of War in China*: 4-9, 89-90, 236-37.

communities sharing the same irrigation network.⁸⁴ Conflicts over water use between communities and even administrative units at the two sides of a Soviet republican border were widespread for a long time in the arid regions of the Soviet Union (in former central Soviet archives it is possible to find descriptions of conflicts at the border between the Russian Soviet Federative Socialist Republic and Kazakhstan in the Ural/Caspian region during the 1950s and early 1960s, for instance).⁸⁵

Penati highlights the “performance” role of early Soviet legislation and of the creation of Soviet institutions which de facto were not functioning. By establishing a Turkestan “Water Management Administration” in June 1918, during the civil war and in a time of famine in large areas of Turkestan, the new regime was signalling its state-building intentions. Given what the author writes, and what other historians have written (see Maya Peterson’s dissertation, for instance), it does not seem that the Water Management Administration did much during the civil war in Turkestan. The same may apply to water legislation that was not implemented until the mid-1920s. Despite their lack of action, the creation of institutions that remained on “stand-by” given the political, economic and military situation, along with the drafting of laws pretending to regulate matters that remained de facto not regulated, fulfilled an important role in legitimizing “Soviet” power in Central Asia in a context of (temporary) low state capability. After the Soviet state had taken firmer roots in the region during the 1920s, the stakes of legislative activity (therefore the very meaning, aims and significance of the laws) changed. Penati thus underscores how the very short-term conjuncture is a crucial political context that should lead our interpretation of early Soviet legislative activity. The famine and disruption in one of the central – if not the most important – agricultural and irrigation districts of Turkestan, the Fergana valley, was for example an important context that helps to explain the provisional and tentative character of early Soviet water legislation. Until at least 1923, the valley was under de facto military rule, and special economic policies were implemented as part of a series of measures aimed at smothering the ongoing insurgency and helping the economic recovery, such as the liberty to trade in the region’s agricultural markets since 1920. The divergence of legislation and norms effectively implemented, so common in imperial contexts in Central Eurasia, was mirrored by the practices of the Communist state, in which campaigns of social and economic transformation could be launched without regard for the existing legislation.

In the cases studied by Penati, Pianciola and Schluessel, the issue of the distinction between existing norms and rights and de facto property rights is paramount. For instance, on the basis of Tsarist law, Qazaqs were only entitled to the use of the land, which remained state

⁸⁴ B. Penati, “Life on the Edge: Border-Making and the Agrarian Policies in the Aim District (Eastern Fergana), 1924-1929”, *Ab Imperio* 2 (2014): 193-230.

⁸⁵ RGAE, 4372/63/654/34-36, Predsedatel' ispolkoma A. Bochkarev, Ispol'nitel'nyi Komitet Saratovskogo oblastnogo soveta deputatov trudiashchikhsia -- Zamestiteliu Predsedatelia Soveta Ministrov Soiuza SSR, tov. Ignatovu N.G. (05.01.1961).

property.⁸⁶ But in a number of cases, Qazaq groups extracted illegal taxes from communities of immigrant fishermen on the Aral Sea, while other Qazaq groups rented out land in the steppe to immigrant peasants.⁸⁷

By comparison, Shirley Ye investigates the puzzle of why the Republican government failed to manage the problems caused by flooding of the Grand Canal, a centuries-old infrastructure that connected the Yangzi delta region to Beijing crossing the Yellow River. Regulating the riverine flow in an area south of the Ordos Plateau, the focus of Ruth Mostern's article, restoring the Grand Canal as a high-functioning flood control mechanism was a crucial project for the Republican government to bolster its political legitimacy, as the canal was the main north-south trade artery of the country, and was instrumental in the Beijing's food provisioning. Chinese experts with suitable academic and professional backgrounds oversaw the reconstruction project and ultimately its miscarriage.

The change of norms in this case occurred in an area that was more securely in the control and certainly within the formal legal jurisdiction of the Republican government than the territories examined by Schluessel, Pianciola, and Penati. The norms in flux were not legal ones but the principles affecting technology transfer to develop the Grand Canal into a "modern" structure informed by foreign science in the 1920s. Zhang Jian, an industrialist representing the Republican government to oversee the Grand Canal Improvement Project, and John Ripley Freeman, the head consulting engineer selected by the AIC were two of the many actors that embodied the genuine optimism about cross-cultural and international collaboration. Before the American International Corporation (AIC) became a partner in this endeavour, Zhang employed three Dutch experts based on his faith in Western technology. Freeman employed Chinese personnel with similar respect for the differences in professional culture and practice between American and Chinese engineers. However, the American-Chinese project team could not carry out their work while threatened by bandits and stymied by popular opposition to the environmental consequences of constructing a new version of the canal. Ye argues that the apparent failure of the Republican government-AIC venture is less significant than the subsequent continuation of hydraulic works by warlord governments and later incarnations of the Republican government, and the lasting transfer of knowledge about water management between China and the United States. Her work sheds light on a case of international cooperation and bilateral knowledge transfer in which the value of the process outweighs that of the ostensible result. It also reinforces a more general principle that applies to both semi-arid and verdant regions of China, and to other parts of the world, that many regional governments have tried to preserve and exploit the natural environment

⁸⁶ S. Abashin, D. Arapov, N. Bekmakhanova (eds), *Tsentral'naia Azia v sostave Rossiiskoi Imperii* (Moskva: Novoe Literaturnoe Obozrenie, 2008): 138-9.

⁸⁷ RGIA, 398/70/25450/168-169, Ministerstvo putei soobshcheniia. Upravlenie zheleznykh dorog - Gospodinu Glavnoupravliaiushchemu Zemleustroistvom i Zemledeliem, 18.03.1914.

concurrently through policies that were not regarded as contradictory when they were implemented.⁸⁸

The case studied by Ye is important because it lies at the historical crossroad between (semi-)colonialism and proto-developmentalism, as shown by the transition between the river conservancy board dominated by European powers to the American International Corporation project. The emergence of the United States during the early twentieth century as the foremost economic power (and late-comer oversea empire that projected an ideology of imperial reformism) is deeply entwined to this international evolution.⁸⁹ This shift is, once more, linked to the history of the Afro-Asian arid macroregion, as according to historian Priya Satia it was during the Mesopotamian campaign of World War I that the notion of colonial development emerged, as a coordinated and foreign-led effort of technological and infrastructural improvement justified by expectations of improving living standards and strengthened state-building. The British Indian government that initially led the military campaign in the eastern provinces of the Ottoman Empire aimed at the “transformation of Mesopotamian transportation facilities, through the provision of technical experts, labour and material for the construction of ships, wharves, railways, dams, canals, harbours and so on, in what was conceived of as a developmental effort, an effort to stake out the land of two rivers as a material object”.⁹⁰ The fact that these colonial proto-developmental measures were conceived within, and were seen as functional for, a campaign of military conquest, brings to the fore the imperial origins of the objectification of “underdeveloped” territories and populations. The British scaled down plans of infrastructural development in Iraq after the victory, when moreover it became clear that the new weapon, the airplane, could dominate the land relying only on a number of strategically-positioned air bases. But, until it lasted, “the project of reclaiming Mesopotamia and re-joining it to a prosperous West seemed to invest the entire war with meaning”.⁹¹ The transnational conjuncture between the two wars made the need to “reinvigorate and re-legitimize empire” even more felt by imperial administrations, as “it was being challenged by nationalist movements, labour militance, and increased questioning of colonial rule”.⁹² During this period, imperial developmentalist projects were implemented. Possibly the biggest of all was, once more, set up by the British in the arid macroregion. In 1925, the Gezira Irrigation Scheme in Sudan, watering new land cultivated only with cotton, started working, following plans drafted since the beginning of

⁸⁸ The apparent lack of conflict between policies of intensive exploitation and conservation in the Qing empire have been demonstrated in the three-case study work by David Bello and by the two-case study work by Jonathan Schlesinger. See Bello, *Across Forest, Steppe, and Mountain: Environment, Identity, and Empire in Qing China's Borderlands* (Cambridge: Cambridge University Press, 2016), and Schlesinger, *A World Trimmed with Fur: Wild Things, Pristine Places, and the Natural Fringes of Qing Rule* (Stanford, CA: Stanford University Press, 2017).

⁸⁹ I. Tyrrell, *Reforming the World: The Creation of America's Moral Empire* (Princeton: Princeton University Press, 2010).

⁹⁰ P. Satia, “Developing Iraq: Britain, India and the Redemption of Empire and Technology in the First World War”, *Past & Present* 197 (2007): 213.

⁹¹ Satia, “Developing Iraq”: 227.

⁹² F. Cooper and R. Packard, “Introduction”, in *International Development and the Social Sciences: Essays on the History of Politics of Knowledge* (Berkeley: University of California Press, 1997): 7.

the century. The new system, was trumpeted by the British government and the press as the most successful case of “imperial development”, in which the profits were shared with local tenants.⁹³ During the 1930s, the British government expanded its understanding of “development” to include the provision of social services.⁹⁴ However, the “developmental” side of British colonial measures remained palliative acts and were never really aimed at raising the standard of living of the subjected populations in the colonies.⁹⁵ The situation in the French colonial empire in North Africa and elsewhere was very similar in terms of both political goals and action.⁹⁶ Nonetheless, the early-twentieth century imperial development projects are important both for modern environmental history, as they relied on specific “environmental imaginaries”, and connected technical knowledge that had developed in different arid areas of the arid Afro-Asian macroregion under imperial rule. As Priya Satia explained: “the very existence of British-Indian technical expertise in transforming nature was predicated on past exercises in imperial development, such as the river projects in India and Egypt. Indeed, like Egypt, Mesopotamia was constituted as a geographical and political entity centered on the basic developmental ‘problem’ of an ancient river system ringed by desert and a backward population”.⁹⁷

This special issue about the continental empires of modern Central and East Asia brings to the fore different aspects of the entanglements between empires and ecologies: how juridical pluralism and imperial social hierarchies interacted in shaping the exploitation of natural resources; how “skinny empires” (to reverse Ruth Mostern’s quip) failed to regulate the exploitation of resources such as fisheries and, more crucially, water for agriculture; how continentality and the geographic and hydrographic connections between the inner continental peripheries bounced back to influence the downstream imperial cores. The articles, as individual works and as contributions to these shared themes, all advance the importance of understanding how water as a resource for the sustenance and growth of human societies mattered in not only semi-arid natural environments but also for the broader empires that encompassed these vital political and economic zones.

⁹³ M.W. Ertzen, *Improvising Planned Development on the Gezira Plain, Sudan, 1900-1980* (Basingstoke: Palgrave Macmillan 2016).

⁹⁴ In 1929, the “Colonial Development Act” was passed by the British Parliament; in 1939, the “Colonial Development and Welfare Act”. See H. W. Arndt, “Economic Development: A Semantic History,” *Economic Development and Cultural Change* 29/3 (1981): 457-466.

⁹⁵ S.R. Ashton, S.E. Stockwell, «Introduction», in *Imperial Policy and Colonial Practice, 1925-1945. Part I: Metropolitan Reorganization, Defence and International Relations, Political Change and Constitutional Reform*, edited by S.R. Ashton, S.E. Stockwell (London: HMSO, 1996), LXI.

⁹⁶ M. Thomas, *The French Empire between the Wars: Imperialism, Politics and Society* (Manchester: Manchester University Press, 2005), 54-124; G. Rist, *The History of Development: from Western Origins to Global Faith* (London: Zed Books, 2002), 47-68.

⁹⁷ P. Satia, “‘A Rebellion of Technology’: Development, Policing, and the British Arabian Imaginary”, in Davis and Burke (eds), *Environmental Imaginaries*: 36.

Archives

GARF	State Archives of the Russian Federation (Moscow, Russia)
RGAE	Russian State Archives of the Economy (Moscow, Russia)
RGIA	Russian State Historical Archives (St. Petersburg, Russia)

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