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(xixe - xxe siècles)**

Engineering Empire

Russian and foreign hydraulic experts in Central Asia, 1887-1917

*L'Empire et l'ingénierie hydraulique : les experts russes et étrangers en Asie
centrale, 1887-1917*

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Maya K. Peterson

- 1 In 1912 Russian Minister of Agriculture Alexander Krivoshein proposed a pithy formula which encapsulated his hopes for the future development of the imperial province of Turkestan, the southernmost part of the Russian Empire. Cotton plus colonization plus irrigation would create, in Krivoshein's words,

[...] an area equivalent to the amount of land currently irrigated in Turkestan, as it were creating a second Turkestan. This new Turkestan, not inferior to the old, native one in magnitude, would surpass it in riches and level of culture, and its new population would be Russian.¹
- 2 Krivoshein's formula was an articulation of official and unofficial processes that were already underway in Turkestan: privately- and publicly-financed investigations of the possibility for expanding the production of cotton in the region, as well as the legal and illegal movement to the province of thousands of Russian peasant colonists from the overcrowded regions of central Russia. Krivoshein hoped that through greater government regulation and investment, these processes would transform Turkestan from an arid and underpopulated military colony in Asia into a prosperous and fertile corner of the modernizing Russian Empire.
- 3 Krivoshein was not alone. By the second decade of the twentieth century, Russian officials, along with businessmen, engineers and agronomists concerned with the development of Russia's "Asiatic" borderlands, had increasingly come to agree that "the whole life, wealth, and future of Turkestan" depended on irrigation.² The question of financing and undertaking new irrigation projects in Turkestan arose in meetings of engineers and agronomists, as well as in advisory councils from the level of the province up to the State Duma. Since most agricultural products could not grow in Turkestan without irrigation, successful irrigation projects would be necessary to ensure both the expansion of Turkestan's arable acreage, as well as the viability of Russian agricultural

settlements in the region. By promoting the cultivation of cash crops such as cotton, irrigation would make Turkestan an indispensable, economically integrated part of the Empire, and by opening up new areas for peasant settlement, irrigation would help to mark this territory as indelibly Russian. That this agricultural transformation was highly desirable was clear, yet the irrigation of Russian Turkestan posed myriad challenges.

- 4 Agriculture in arid regions requires particular kinds of knowledge. Over centuries Central Asians had developed sophisticated systems for the cultivation of crops in an arid climate, yet many Russian and foreign observers considered indigenous agricultural methods to be unsatisfactory; they instead called for more “correct” and “rational” usage of land and water resources in Turkestan through the introduction of the latest scientific knowledge and technology.³ In order to display the superiority of imported methods of resource management, however, and translate visions of newly “cultured” lands into reality, practical skills were required. A significant component of the political success of Russia’s imperial project in Turkestan was thus seen to depend upon scientific experts who could help realize Russian ambitions in the region. In the following pages I examine figures involved in the irrigation of Russian Turkestan in an effort to uncover both the important roles that hydraulic engineering experts played in Russian schemes for Central Asian development, as well as the roles that such schemes played in Russia’s ongoing quest in the early twentieth century to define itself to the world as a modern and thoroughly European empire.⁴
- 5 By participating in—and even initiating—campaigns to bring the latest advances in engineering practices and technology to the Central Asian borderlands, hydraulic engineers in Turkestan were at once agents of empire, representatives of the center in the periphery whose goal was to transform remote spaces on the map into places that were recognizably Russian, while also acting as propagandists for empire, aiming to convince the indigenous population in the borderlands of the benefits of Russian rule and demonstrate to the world that the Russian Empire should take its place among the ranks of European empires. These were men who saw themselves as giving the “the gift of empire”—in the case of hydraulic engineers in Turkestan, the gift of engineering science and technologies for modern irrigated agriculture—even while the imperial projects they undertook deprived indigenous peoples of lands and livelihoods, and set in motion processes that in the second half of the twentieth century would subjugate Central Asians to reliance on a cotton monoculture.⁵ They also transcended empire, as they engaged with an international network of professional engineers and experts, harnessing the resources of that network to exploit the resources of Russia to the maximum extent possible. In spite of their zeal, however, and in spite of the calls of Russian technocrats for irrigation expertise in the development of Turkestan, inherent tensions between the dual goals of irrigation—cotton and colonization—which stemmed from the uncertain position of the tsarist government when it came to intervening in land and water resources, hindered the imperial mission of reclaiming the Central Asian borderlands. By the time the government began to make a concerted effort to rectify this situation, it was already too late.

The question of expansion

- 6 According to Alfred Rieber, in the second half of the nineteenth century the Russian state “was forced to acknowledge [...] that a strong engineering profession with its own ethos

was a vital necessity for the maintenance of Russia's great power status."⁶ In the wake of the Great Reforms of the 1860s a mobile group of engineers from increasingly diverse social backgrounds began consistently to exert power at the highest levels of Russian government.⁷ This growth in political influence coincided with the growth of a newfound professional identity, giving these Russian engineers a particular sense of imperial purpose, alongside a zeal for pushing the boundaries of science and technology.⁸ In the 1890s, Finance Minister Sergei Witte's push for the rapid industrialization of the Russian Empire promoted a growing group of "technocrats" in the Russian administration, who began to call for the identification and exploitation of all of the "productive forces" of the empire.⁹ Such calls created new opportunities for engineers and other specialists to help reshape the lands of the empire.¹⁰

- 7 In the late nineteenth and early twentieth centuries, young Russian engineers, trained for imperial careers and assignments in strategic places on the periphery, were confident in the ability of their knowledge and expertise to transform the most intractable spaces of the Empire. Because their expertise accorded with the power ambitions of the Russian state, their confidence came not only from an unshakable faith in the power of "European" science—as opposed to local or "native" knowledge—but also from a self-image as professionals whose expertise was vital to the processes of empire.¹¹ In a newly conquered region such as Turkestan, engineers could play a crucial role in strengthening Russian control and a sense of legitimacy.
- 8 Intertwined with the notion of service to the Empire and its subjects was the notion that Russian engineering achievements were taking place on a world stage. After the humiliating military defeat by Japan in 1905 and the resulting unrest on the domestic front, Russians were particularly keen to prove their ability to keep up with European powers. The province of Turkestan, incorporated into the Russian Empire in 1867 as a governor-generalship under military rule, provided a space where such abilities might be demonstrated. By 1884, the last hostile Turkmen nomads had been subjugated—or massacred—and the Russian Empire ruled over a vast new territory, much of which was desert. In transforming those deserts over the course of subsequent decades, Russian hydraulic engineers in Central Asia might join the ranks of the some of the greatest hydraulic engineers of the time: the architects of the Suez and Panama Canals, the Aswan Low Dam, the Los Angeles-Owens River aqueduct in California, and the irrigators of the Punjab in northwest India. Certainly any progress Russian engineers made in their Central Asian borderlands would be studied by engineers and governments the world over with interest.
- 9 The tsarist government initially appeared to support such ambitions. Soon after the surrender of the Merv oasis on the southern edge of the Qara Qum Desert near the border with Afghanistan, an imperial ukase of Alexander III in August 1887 proclaimed the founding of the Imperial Murghab Estate.¹² According to this decree, all "empty" [*vpuste lezhashchiia*] lands suitable for irrigation and cultivation that could be irrigated without doing harm to irrigated territory nearby were now the property of the tsar.¹³ The estate, situated on the right bank of the Murghab River along the newly constructed Central Asian (Trans-Caspian) Railway line, was to serve as a model plantation which would produce new varieties of crops—cotton in particular, but also various types of fruit—while simultaneously helping to mechanize and modernize "native" agriculture in the region.¹⁴ Though Russian officials had little knowledge of which lands might be suitable for irrigation and cultivation—or, indeed, which lands were "empty"—and though there was

little government capital to invest in such projects and few men qualified to undertake them, under the direction of a civil engineer named Jan J. Poklewski-Koziell construction on a dam went ahead in 1888, on the spot where for centuries a dam known as the Sultan-Bent had already stood.¹⁵

- 10 Through the use of locally made bricks and hydraulic lime mortar, Poklewski-Koziell hoped to build a dam that was stronger than the previous earthen constructions.¹⁶ The first attempt at a new dam, however, ruptured before construction was completed.¹⁷ In part because of this initial failure, the dam's construction costs were ultimately more than twice as high as original estimates.¹⁸ The Russian government's decision to import a British engineer to finish the task also contributed to the expenses. In September 1889, state councilor Stanislav Rauner visited British irrigation engineer Sir Colin Scott-Moncrieff in person in Egypt to invite him to come to Russia for two months and advise the Russians on the irrigation of the Murghab Estate. Scott-Moncrieff, who had spent the first part of his career in India and more recently had become head of the Irrigation Department in Egypt, was chosen specifically because of his experience building a barrage on the Nile, a site the Russians believed to be very similar to Merv. Upon arrival in Merv one month later, Scott-Moncrieff admired Poklewski-Koziell's ingenuity and was impressed by the work, but he also noted that Poklewski seemed to know nothing about irrigation—though he clearly thought he did—and that the Estate, in general, was “a vile place.”¹⁹
- 11 The fact that Poklewski-Koziell, an engineer whose primary experience was working on railroads, and a man who apparently had been exiled for participation in the 1863 anti-tsarist Polish Uprising, was put in charge of the most important imperial construction project in this sensitive border region, only newly incorporated into the empire, tells us something about the state of engineering in general—and hydraulic engineering in particular—in the Russian Empire in the late nineteenth century.²⁰ Whereas waterways had originally been the major arteries of transport in the Russian Empire, by the late nineteenth century a railroad boom had shifted the focus of civil and military engineers away from waterways toward railways. Government committees assigned to consider the question of water usage in Turkestan would suggest that “improving the means of water usage has no less importance for Turkestan than the creation of new railroads,” yet there were far fewer specialists who could attend to the former task than the latter.²¹ Engineers like Poklewski-Koziell were trained in technical institutes—primarily the St. Petersburg Institute of the Corps of Transport Engineers [Engineers of Ways of Communications]—that covered all aspects of civil engineering, without encouraging specialization. Hydraulic engineering remained focused on the theoretical and made up only a small part of the overall engineering curriculum.²²
- 12 Yet the Murghab Estate also revealed the limitations of the Russian state presence in Turkestan in another way. Not only was there a dearth of the kind of experts who might help to demonstrate the superiority of a Russian way of life to the indigenous people of Turkestan, but the 1886 statute that provided for the region's governance by its new rulers simply stated: “Waters in the main canals, streams, rivers, and lakes are given to the population for use according to custom.”²³ This meant that the Russian state did not have control over one of the region's most important resources. In 1887, the year in which the Murghab Estate was founded, State Councilor Nikolai Dingel'shtedt, assistant to one of the Russian military governors in Turkestan, posed a vexing question: “[...] [H]ow can we resolve disputes over water according to custom if the custom [itself] is not

known?”²⁴ Even more damningly, Russian interpretations of “native custom” understood custom as granting land to the person who could bring water to it; unless the Russian government could bring water to new land in Turkestan, reliance on custom threatened to undermine the very legitimacy of Russian rule in the empire’s Central Asian borderlands.²⁵

- 13 In the case of the Murghab Estate, the tsarist government claimed the “empty” lands of the Merv oasis to be the property of the tsar and thus subject to Russian intervention. Such a claim was much more difficult in the most fertile regions of the province, such as the densely-populated Ferghana Valley, where agricultural produce grew in abundance, watered by an extensive irrigation system built by the previous rulers of the region, the khans of Kokand. Initially, rather than attempting to irrigate new lands in the Ferghana region, the Russian government took advantage of this existing irrigation system to encourage agricultural development. As on the Murghab Estate, one of the principal crops promoted by the Russian government in the Ferghana Valley was cotton. In the 1880s strains of American cotton were introduced, in order to produce greater yields of higher quality and longer staple cotton than the indigenous varieties already growing there. Through the efforts of agronomists and a series of economic incentives introduced by Witte in the 1890s, American varieties of cotton came to occupy more and more of Turkestan’s irrigated acreage in Ferghana and beyond.²⁶
- 14 By the first decade of the twentieth century, the Ferghana Valley was feeling the constraints of this intensification of American cotton cultivation without the expansion of the arable acreage.²⁷ Though some Russians argued that cotton production could be increased further without the attempt to irrigate new lands, others disagreed.²⁸ In 1907, at its third session, the newly formed Cotton Committee of the Department of Agriculture of the Main Administration of Land Organization and Agriculture (Russia’s ministry of agriculture from 1905-15; henceforth Main Administration) discussed the question of importing grain from outside the region in order to convert more of Turkestan’s irrigated acreage to cotton-growing. Most present, however, felt that the replacement of too much of the region’s grain with cotton was inadvisable.²⁹ Senator Konstantin Pahlen, whom the tsar sent to Turkestan in 1908 in order to conduct a thorough inspection of the province, echoed these conclusions when he stated that “not one step forward” could be taken in the increase of cotton acreage in the region without an extension of irrigation systems.³⁰

Educating engineers

- 15 Yet on the eve of Pahlen’s arrival little distinguished Russian accomplishments in irrigation from the state of affairs two decades earlier, when Dingel’shtedt had referred to the state of irrigation in Turkestan and the Caucasus as “utter chaos.”³¹ Though in the 1890s posts were created within the provincial military administration for engineers and technicians to oversee irrigation projects and water management in the region, these officials were occupied more with pushing paper than with the actual work of investigation and oversight, nor was there any central oversight of their activities.³² When it came to practice, decisions about irrigation continued to be made at the level of individual irrigation systems by ariq-aqsaqs and mirabs, local community officials who formed a hierarchy of water overseers which the tsarist government had appropriated wholesale after the conquest of the region. Tsarist irrigation officials, in contrast—many of whom, unlike the engineers employed by the Main Administration, were not even

trained as hydraulic specialists—had little knowledge of the details of water management within their vast districts.³³ In 1909 the Main Administration's Resettlement Administration, the bureau charged with overseeing colonization affairs, sent a young law student named Georgii Gins to Turkestan to become familiar with the legal regulations regarding the distribution of water for irrigation. To his surprise, Gins found that although a law had been formulated in 1890 to regulate water distribution in the Caucasus, there was still no such law in Turkestan.³⁴

- 16 Krivoshein, who became head of the Main Administration in 1908, pleaded with the tsarist Council of Ministers for more money to be allocated to the irrigation of Turkestan, reminding the ministers not only of the Russian Empire's "political, economic and cultural tasks in Central Asia, but the prestige of the Russian name among the Muslim population."³⁵ The successful transformation of the deserts of Turkestan into fertile plains could do wonders for legitimizing Russian rule in the eyes of indigenous Turkestanis.³⁶ And yet besides the Murghab Estate, the one government-sponsored irrigation project, a scheme to irrigate 45,000 *desiatinas*³⁷ in the so-called Hungry Steppe near the provincial capital at Tashkent, had progressed only slowly, mostly due to a lack of funding. A commission of the Turkestan Agricultural Society organized in 1907 concluded that the current state of irrigation in Turkestan was dismal, as did the Congress of Hydraulic Engineers that convened in Tashkent at the end of that same year.³⁸ The agricultural commission stated bluntly that irrigation under the Central Asian khans had been more successful than any Russian attempts in Turkestan, a serious blow to Russian pride. Americans, the commission claimed, had irrigated in just three to four decades "what would take us, under the current regime, three to four thousand years." International observers, moreover, had determined that "Russia lies behind everyone in [the fields of] irrigation technology and the development of irrigation systems."³⁹
- 17 Some blamed these failings on the poor state of engineering education in the Russian Empire. In January 1909, the St. Petersburg newspaper *Novoe vremia* published an article by Vasilii Al'bitskii, distinguished professor at Kharkov Technical University, entitled "The Feebleness of Hydraulic Engineering Knowledge in Russia and the Basic Means By Which to Eliminate It." In this article, Professor Al'bitskii bemoaned the current state of technical instruction in Russia in the field of hydraulic engineering (though he was somewhat heartened by the fact that in technical institutes had in recent years increased theoretical instruction). Such poor instruction, he argued, was "the main reason for the paucity in Russia not only of prominent hydraulic engineers, but even of mediocre ones." According to Al'bitskii, Scott-Moncrieff had been brought to Merv "to Russia's chagrin and embarrassment," since the main reason for inviting him had been that "no domestic hydraulic engineers could be found who could build a solid dam [...]."⁴⁰
- 18 Al'bitskii's complaints had merit, but they overlooked the fact that by 1909 there did exist a small but eager group of theoretically trained hydraulic specialists who had taken up the challenge of realizing the Russian government's goals in Turkestan in practice. A group of student apprentices, for instance, wrote from the Murghab Estate to protest Al'bitskii's characterization and defend Russian hydraulic engineering efforts in the region.⁴¹ Remote Turkestan was by no means as desirable a place to make a career as the imperial capital at Petersburg; such enthusiastic students were thus easier to attract to the region than more experienced engineers. Yet the challenges of Turkestan and its appeal as a "backward," "Asiatic" region that could, through the introduction of modern science and engineering, be united with the European heartland of the empire, were such

that some fine engineers ended up devoting a good portion of their lives to solving its perceived problems and became some of the region's most vocal advocates. Engineer Fëdor Petrovich Morgunenko, for instance, worked on various schemes to irrigate the Caspian region, as well as the Hungry Steppe; he would continue to work in the region after the Bolshevik revolution in 1917.⁴² Georgii Rizenkamp, described by one of his compatriots as “full of energy” and “the most talented” engineer within the Main Administration's Department of Land Improvement, took over the management of the government project in the Hungry Steppe in 1912; he remained its head into the early Soviet period.⁴³ After the revolution he also supervised other irrigation works in Turkestan and briefly served as a professor in the reclamation department of Turkestan University.⁴⁴ Acting as an enthusiastic “booster” for Turkestan's Semireche region from 1910 on, engineer Vladimir Alexandrovich Vasil'ev advocated investment in Semireche as both a traditional “colony,” which would provide raw materials for extraction, as well as a settler colony that demanded the input of human and financial capital.⁴⁵

- 19 Al'bitskii's concern about Russian educational institutions also ignores the fact that these hydraulic engineers were not bounded by the Russian Empire; rather, they actively kept up with technological developments and scientific discussions in other parts of the world through their own travels, observations, and research. With the blessing of the imperial government, they not only circulated throughout the empire, but made journeys to various sites associated with science and technology throughout the world. It was typical, for instance, for Russian hydraulic engineers to travel to Europe and to visit institutions of engineering education, as well as sites of practice. Rizenkamp made a journey to Austria, Germany, Switzerland and Italy when he was still a student studying hydrotechnics and water systems at the Institute of the Corps of Transport Engineers.⁴⁶ Vasil'ev followed a similar route when he undertook a tour of Europe's recent achievements in hydraulic engineering before beginning an ambitious irrigation construction project in Turkestan's Chu River Valley. Vasil'ev's itinerary included visits to the International Building Exhibition at Leipzig, a reservoir in Silesia that might serve as a model for a planned reservoir in Turkestan, and cement factories in France. He proposed observation of rectification programs on the Danube and Po Rivers, and tours of Milan and Lombardy, to learn about how these regions utilized hydraulic power.⁴⁷
- 20 Russian hydraulic engineers in Turkestan, like American and Australian engineers before them, also turned to British India, the training ground of some of the first and greatest hydraulic engineers. In 1906, with the tsar's approval, S.F. Ostrovskii, a recent graduate of the Institute of the Corps of Transport Engineers, traveled to Punjab, where, with the aid of British engineers, he was able to collect valuable material for use on the Russian government endeavor to irrigate the Hungry Steppe.⁴⁸ Such trips abroad were expensive, but they facilitated communications and professional ties between Russian and foreign engineers, and no doubt helped to spark interest abroad in Russian schemes for hydraulic construction.
- 21 In 1912 the Department of Land Improvement called for the collection of “all the existing international literature” that might help to further hydraulic investigations in Turkestan and the Caucasus.⁴⁹ An investigation of Vasil'ev's library at the Chu irrigation project confirms Russian engineers' ongoing interest in keeping up with developments in hydraulic construction and irrigation technologies worldwide. In 1917 the Chu project library had 281 publications in English, eighty-eight in German, sixty-five in French, two in Italian, and three in Swedish. Listings in the index of the library's holdings include

such eclectic titles as “Buckley, The Irrigation Works of India,” “Cooper, Water Power for the Farm Country Home (Albany, 1911),” and the “Official Handbook of Panama Canal (1915).”⁵⁰

- 22 Many Russian engineers also wrote their own books and articles to share their findings and observations with an international community of engineers. These works cited the latest international research. In a work on problems of irrigating the Transcaspian region, for instance, Rizenkampf cited several contemporary discussions of irrigation engineering, including Italian professor Luigi Luiggi’s summary of the International Congress of Engineers held in 1915 in San Francisco, as well as a work on irrigation engineering published in the same year by Ray Palmer Teele, irrigation economist at the United States Department of Agriculture.⁵¹ One of Russia’s foremost engineers and agronomists in the early twentieth century, Evgenii Evgenievich Skorniakov, inscribed a copy of one of his works to Arthur P. Davis, head engineer of the United States Reclamation Service, most likely given to Davis when the latter visited the Russian Empire in 1911.⁵²
- 23 An important component of acquiring expertise is “socialization into the practices of an expert group.”⁵³ When Russian engineers made contact with their colleagues abroad, whether through travel or through the exchange of research findings, they were conscious of doing so both on a personal and professional level that would benefit their individual careers as sought-after experts, as well as on the level of state service, by making use of an international network whose expertise could benefit the Russian Empire. Yet in spite of the fact that Russian engineers felt they had universal knowledge that could be applied everywhere, had careers that took them throughout the empire and the world, and saw themselves as professional men on par with their colleagues around the globe, they did also manage to develop local expertise and attachments. Learning the art of irrigation engineering on the fly required intensive and intimate study of local physical environments and an understanding of conditions that were quite foreign from those in St. Petersburg.
- 24 Though the theoretical training they received in the technical institutes was intended to give engineers the kind of universal knowledge that could be applied anywhere in the empire, Russian hydraulic specialists in Turkestan faced the problem that different parts of the vast Russian Empire were by no means alike. Russian irrigators, like their counterparts in other parts of the world, believed themselves to be “master technicians whose work realized the inherent potential or purpose of the land,” yet the environs of the imperial capital at St. Petersburg did little to prepare a student for the deserts of the south.⁵⁴ On recalling his first trip to Turkestan in 1910, Rizenkampf remembered thinking “that the reclamation engineer, landing in Turkestan from Europe, should immediately lose his nerve: these endless deserts and steppes, oceans of sand, naked, treeless slopes of the mountains [...].”⁵⁵
- 25 Indeed, though it may be argued that “water shaped the engineering profession in Russia”⁵⁶—since Russia’s first generation of engineers had emerged in St. Petersburg to deal specifically with local problems such as the flooding of the Neva River—Russian engineers were used to an abundance of water, not a lack thereof. St. Petersburg was a city built on marshes, where water was a constant threat. In Central Asia, in contrast, water was scarce, trapped in high mountain glaciers, large saline lakes, or slow-moving rivers that dwindled into nothing in the steppes and deserts. Moving from wet, northern environments to the almost diametrically opposed environments of the south posed great

challenges to Russia's newly trained hydraulic engineers. Even Russia's experiences importing new techniques for reshaping land use and agricultural production on the steppes were not adequate preparation for transforming the arid lands of Central Asia.⁵⁷

- 26 Nor did engineers' travels in Europe necessarily prepare them for the sandy spaces of Central Asia. While European and Russian engineers had long experience with the rectification of rivers, the draining of marshes, and the construction of dikes to hold back the sea, irrigation engineering in an arid region produced a host of new problems. The related problems of swamping and salinization, for instance, due to imperfect drainage systems and the leaching of soluble salts up through the soils to the surface, plagued Russian-engineered irrigation systems and irrigated agriculture in Central Asia, leading to a decline in soil fertility, as it had for British engineers in India and Egypt.⁵⁸ Tsarist officials were forced to recognize the difficult work of planning and overseeing irrigation systems in arid regions in comparison with European Russia.⁵⁹
- 27 The work of British engineers in India and Egypt was thus an obvious model for the would-be irrigators of Turkestan.⁶⁰ Postcards in the Russian archives from Algeria and Tunisia, along with an article on the Sahara desert, indicate that Skorniakov studied North Africa as a case for water management in arid regions.⁶¹ But in the first decades of the twentieth century it was the idea of creating a "Russian California" that most captivated enthusiasts for the transformation of Turkestan's deserts.⁶²
- 28 California was symbolic of the entire arid region that spanned the western United States. In the 1890s, in a climate of progressivism and a country wracked by droughts and economic depression, the United States federal government had begun to invest more into irrigation.⁶³ Already at that time, the Russian famine of 1891-1892 had prompted Russians to look to America for ideas on how to improve the steppe and desert lands of the Russian Empire. In an 1892 article in *Russkaia mysl'* on "Irrigation in the Western United States," Aleksandr Voeikov demonstrated the kinds of results that could be attained in Russia through the introduction of "artificial" irrigation on an American model. In 1893 Count Comodzinskii, the Russian Empire's engineer-in-chief and inspector-general of hydraulic works, attended the Second International Irrigation Congress in Los Angeles.⁶⁴ However, it was not until the Russian government began in the twentieth century to realize the crucial role of irrigation in the development of Turkestan that the United States became the focus of Russian attention in the field of hydraulic engineering.
- 29 In the early twentieth century the western United States became an important destination for hydraulic specialists seeking a career in Turkestan. Between 1908 and 1910, for instance, Skorniakov made such a journey. At the Seventeenth National Irrigation Congress in Spokane, Washington in 1909, he expressed both his gratitude for the courtesies shown him on his American travels, as well as his admiration for American engagement with the "latest engineering methods."⁶⁵ He was particularly interested in the hydraulic engineering and resettlement projects initiated under the Carey Act, which introduced private capital to reclamation projects in arid areas of the West, a scheme he believed "could be successfully transferred to Russia for aid in colonizing desert regions of Turkestan and Siberia."⁶⁶
- 30 Engineer Vladimir V. Tsinzerling, who carried out important investigations in the 1910s and 1920s of the irrigation potential of the Amu Daria, one of the primary arteries of Central Asia, seems to have gained valuable hydraulic engineering experience by working on the irrigation of California's Imperial Valley.⁶⁷ In 1912, Russia's Ministry of Agriculture

sent Pëtr P. von Weymarn, a 1906 graduate of the Institute of the Corps of Transport Engineers, to spend two years in the United States and Canada studying dambuilding methods, irrigation canal headworks, and the construction of reservoirs.⁶⁸ Beginning in January 1916, he would serve as Vasil'ev's assistant on the project to irrigate Turkestan's Chu River Valley.

Imperial mindsets

- 31 The similarities between the irrigation of Russian Turkestan and the American West went deeper than scientific exchange, however. Environmental historian Donald Worster has famously argued that the regulation of water in the American West by powerful technocrats, engineers, and large land owners led to the emergence of a hydraulic empire.⁶⁹ Their visions of the most "rational" use of the scarce water resources of the western United States drove development that favored some at the expense of others, particularly those who lived on and worked that land. The development of some sites over others was often an entirely political decision, rather than a scientific one.⁷⁰ Proponents for irrigation of Turkestan, therefore, had more than just a scientific language in common with proponents of irrigation in the American West; they, too, spoke a language that expressed ideas about transformation and resource exploitation which privileged one vision of proper land use at the expense of others, a vision that was inherently political.
- 32 At the irrigation congress in Spokane in 1909, engineer Skorniakov talked about the ways in which the climates and topographies of the United States and Russia were similar. "We have also our arid regions and we have also irrigation," he said, "and we need reclamation of our immense area of the most fertile, but now desert lands."⁷¹ His statement reveals a common trope among engineers in both the United States and Russia: the idea that "desert" was a condition, a temporary state that concealed a latent fertility that could be restored through "reclamation." Like their counterparts in the American West, who in the late nineteenth century began to speak more frequently about the reclamation of "waste" land, Russian irrigators and tsarist officials alike also began to use a similar language of improvement to invoke the redemption of lands that currently lay uncultivated.⁷² In Russian, "arid" can be expressed in several ways, including *bezvodnyi* (waterless) and *besplodnyi* (infertile, barren). Both of these descriptions suggest a kind of land that is unfit for cultivation. Thus, while Russian irrigators did on occasion speak of "arid" (i.e., waterless and barren desert lands), it was much more common to talk about "dead" lands that could be brought to life through the process of *ozhivlenie*, the word most commonly used to describe the process of "greening" the deserts. *Ozhivlenie* literally means to resuscitate or reanimate. Thus "dead" lands were not lands that were infertile or sterile—rather, they were lands in which the potential for life existed.
- 33 Ian Tyrrell has suggested that the language of reclamation "connoted something more than restoration of natural abundance. Rather, it asserted human claims to primacy and possession that fitted the theme of imperial domination of nature."⁷³ In the Russian case, the language of *ozhivlenie* similarly suggested the important human role in the process of bringing deserts to life. This emphasis on human ability to give life to desert wastes assigned a special power to the hydraulic engineer who could set such a process in motion. In Russian, as in English, the word desert (*pustyne*) contains connotations of emptiness—*pustyne* and *pustoi* (empty) share a common root. Deserts were not barren

places where no life existed; they were empty places waiting for the “cultured hand of the engineer” to fill them with life.⁷⁴ The fact that they often were not empty at all was a fact that was not always taken into consideration.

- 34 Indeed, imperial domination was not confined to domination of nature alone. Like their counterparts in the American West, Russian engineers in Turkestan also “viewed themselves as ‘missionaries of light and progress’ and pioneers of a ‘better and higher degree of civilization.’”⁷⁵ In Turkestan, traces of vast, ancient irrigation systems seemed proof of both a more glorious past as well as the region’s future potential. As a well-known nineteenth-century Russian scholar of Central Asia remarked, in the area of irrigation, “perhaps more so than in others, one feels the close linkage between the study of the past of the region and the work being done for its future.”⁷⁶ It was the notion of formerly glorious hydraulic civilizations, juxtaposed with a program of improvement, which gave those who were interested in the hydraulic transformation of Central Asia a sense of purpose. The implication was that if “culture” (agricultural settlement) did not yet exist (or no longer existed) in the empty deserts, it was because the indigenous people of the region did not possess a high enough degree of “civilization.”
- 35 Diana Davis has suggested that French imperialists attempted to justify colonial rule in the Maghreb by “resurrecting the granary of Rome” from centuries of nomadic neglect.⁷⁷ Similarly, some Russian irrigators suggested that nomads were in part to blame for the current situation in Turkestan. A Russian irrigation technician named Matisen, for instance, wrote that “nomads, [...] not knowing how to profit from the culture of the farmers, sometimes wiped [...] [agriculture] out completely, destroying the results of many centuries of work by grain growers and merchants and transforming rich oases into desert [...]. It is self evident,” he went on to write, “that...the new construction of irrigation systems is not in the power of the indigenous population,” a statement clearly meant to justify the intervention of the Russian imperial government.⁷⁸ Another Russian observer noted coolly that the American government had managed to deal with the problem of nomadic peoples quite simply, by means of the creation of a system of reservations.⁷⁹
- 36 Deciding which regions to transform through irrigation and whose visions would be realized in the transformation was always an inherently political process, driven by those who could convince others that they had the knowledge and power to make such visions reality. The similarities between Russian and American visions of making the rivers flow and making the deserts bloom can help to explain the mutual enthusiasm on both sides when, in December 1910, American entrepreneur John Hays Hammond wrote to Krivoshein that he wished to send experts to Turkestan, “[...] with the view of entering into an arrangement [...] for the reclamation of these districts.”⁸⁰ Hammond’s vision of turning “waste land” into productive land resonated thoroughly with Russian visions for the transformation of Turkestan into a prosperous colony of the empire. The Department of Land Improvement quickly agreed to Hammond’s terms—in spite of the fact that Hammond wished to investigate a sensitive border region—reserving the entire Qara Qum desert region of Turkestan for investigation by his team, which consisted of American engineers Arthur P. Davis and William Mackie. Davis was Head Engineer of the United States Reclamation Service, the work of which was “the most important work of this kind being undertaken anywhere in the world,” Hammond reminded the Russians.⁸¹ Mackie, according to Hammond, was “considered the number one American authority on the greening of arid lands.”⁸²

- 37 The American irrigation engineers were enthusiastically received by Russian engineers and officials in Turkestan.⁸³ Davis, for his part, praised the work of Russian hydraulic engineers in Turkestan like Ostrovskii.⁸⁴ After several weeks of investigation in the Qara Qum, however, Davis and Mackie concluded that, “the facts at hand are sufficient to show that there is no possibility of working out a project here that would be profitable for private capital.”⁸⁵ When Hammond requested additional rights to investigate the Hungry Steppe, Krivoshein refused.
- 38 This episode has been interpreted as indicative of the Russian government’s reluctance to involve private entrepreneurs in schemes to irrigate Turkestan.⁸⁶ However, such an interpretation ignores the fact that official discussions about the importance of irrigation for the development of Turkestan often stressed the importance of attracting private capital. Moreover, the fact that Russian officials were so quick to approve Hammond’s plans, privileging his petition over all other domestic and foreign requests, suggests that American knowledge and experience, in the form of some of America’s best hydraulic engineers, may have been as important as (or even more important than) the input of American capital into the irrigation of Turkestan.⁸⁷ American irrigation expertise was what Hammond could offer that domestic and even other foreign entrepreneurs could not. Hammond, moreover, offered the expert knowledge and experience with arid regions which Russian engineers and administrators in Turkestan so greatly desired. For Russian engineers, access to American knowledge would also address the uncomfortable situation prevailing in Turkestan, namely the fact that Russian engineers had hardly expanded the amount of irrigated land in Turkestan. Russia may even have hoped to use American knowledge to beat the Americans at their own game and become less dependent on imports of American cotton.⁸⁸
- 39 So what can explain this seeming paradox? Why did Krivoshein leap to secure American hydraulic engineering expertise to develop irrigation in Turkestan, only to then reject it? The answer may lie with the second goal of irrigation in Turkestan: colonization. The call by Russian technocrats to “use all of the water reserves of the krai [borderland province] and create a ‘new’ cultured Turkestan” was both literal—a program of action to double the amount of irrigated land—as well as politically symbolic—lands colonized by Russians and planted with cotton to feed the empire’s textile mills would “act as a counterweight to the old, Muslim Turkestan.”⁸⁹ The problem was that—as Russian officials widely recognized—Slavic settlers from the more northerly lying regions of the empire, unused to irrigated agriculture and unfamiliar with the cotton plant, did not make good cotton cultivators. For this reason, most of the expansion of cotton had taken place on the lands of indigenous Turkestani smallholders in the Ferghana Valley. Moreover, unlike in the steppe regions to the north, until 1910 there was no provision in the Turkestan Statute to identify “excess” lands that were not in use by the nomadic populations of the region and thus could be reserved for the tsarist state. This concern was repeatedly raised during discussions of the expansion of irrigation for cotton and colonization.⁹⁰ Lastly, the area of colonization was one in which the central government desired to have more control; even overenthusiastic regional officials were chastised for trying to interfere in this process.⁹¹
- 40 There was, therefore, an inherent tension in the dual goals of irrigation in Turkestan. Large, relatively unpopulated areas such as the Hungry Steppe that were slated for development for Russian settlement could only grow small amounts of cotton. Regions such as the Merv oasis or Qara Qum desert could be developed for cotton, but the farmers would have to be indigenous Turkestanis, at least until Russians learned more about

cotton. And while the Russian government was willing to grant concessions to private (even foreign) entrepreneurs who wished to make the deserts of Turkestan bloom with cotton, it was difficult to imagine major concessions of government land in regions that were to be colonized.⁹² Krivoshein was quite willing to grant Hammond's team priority in the deserts—and he encouraged the team to investigate other regions as well—but he could not grant them concessions in the Hungry Steppe; after much discussion, the steppe had been marked as an important region for Orthodox Russian settlers, an important step in the fulfillment of Russian visions of a “new” Turkestan. Even American expertise could not trump the political significance of colonization.

- 41 As Ian Tyrrell has pointed out, “irrigation is not [only] about drains, pumps, pipes, and dams, but [also] about dreams.”⁹³ Russian hydraulic engineers and technocrats alike shared their visions of filling “empty” deserts with life and bringing “culture” to wastelands with imperialists around the world, including, most significantly, the creators of the hydraulic empire taking shape in the arid American west. Politics, however, were both an empowering and a limiting factor. While Russian hydraulic engineers were suitable agents of the tsarist “civilizing mission” in the Central Asian borderlands, they were also hampered by the tsarist state's impotence in the region, particularly when it came to the legal right to use the region's most precious resources, land and water. Though they and other specialists were willing to serve the state by carrying out the scientific studies necessary to clarify the existing patterns of water and land usage and rectify this situation, and though the invitation of Hammond to Turkestan shows that the tsarist government was not above harnessing foreign capital for such investigations, the real problem was time. Though a draft of a water law for Turkestan was finally drawn up in 1916, it was too little, too late. A massive uprising in the region that year signified the beginning of the end for the Russian Empire in Turkestan; a year later, the empire was no more. Though the Bolshevik regime that replaced the tsarist government was in many ways ideologically foreign to irrigation engineers in Turkestan, it embraced visions of a physical transformation of Turkestan's deserts with a new vigor. Small wonder, then, that many of Turkestan's hydraulic engineers, like Rizenkampf, welcomed this new era in which, having learned “to love the East in its past and to think about its future,” they might more fully invest their “creative energy [and] physical strength [...] in order to awaken Turkestan and bring the region to the tempo of European life.”⁹⁴ When Rizenkampf wrote these words in 1921, one phase of imperial engineering in Turkestan had ended, but another era had just begun.

NOTES

1. Aleksandr Krivoshein, *Zapiska Glavnoupravliaiushchego Zemleustroistvom i Zemledeliem o poezdke v Turkestanskii krai v 1912 g.* [Report by the head of land organization and agriculture on the journey to Turkestan krai in 1912] (Poltava, 1912), 30.
2. Vladislav Ivanovich Masal'skii, *Turkestanskii krai* [Turkestan Krai], vol. 19 of *Rossiia, Polnoe geograficheskoe opisanie nashego otechestva* [Russia, complete geographical description of our fatherland], ed. V.P. Tian-Shanskii (SPb., 1913), vi; I.S. Vasil'chikov, “Doklad sel

- ‘skokhoziaistvennoi komissii po zakonoproektu polozheniia o pol’zovanii vodami v Turkestanskom General-Gubernatorstve [Report of the agricultural committee on the draft statute on the use of water in the Turkestan Governor-Generalship],” No. 116 (IV/4-16), *Prilozheniia k Stenograficheskim otchetam Gosudarstvennoi Dumy, Chetvërti Sozyv, Sessiia Chetvërtaia*, 1916 g. [Addenda to the state Duma records, fourth convocation, fourth session 1916], III (No. 88-173) (SPb. : Gosudarstvennaia tipografiia, 1916), 2 ; 15 ; 51-52.
3. See, for example, Masal’skii, *Turkestanskii krai*, vi-vii ; V.E. Nedzvytskii, ed., *Pamiatnaia knizhka i adres-kalendar’ Semirechenskoi oblasti na 1905-i god* [Agenda and directory for Semireche oblast’ for 1905] (Vernyi : Semirechenskoi Oblastnoi Statisticheskii Komitet, 1905), 186.
4. Unfortunately, biographical information on Russian engineers is difficult to find. Publications covering the graduates of technical institutes in Russia are scarce for the years 1905-1917, as are memoirs (Harley Balzer, “The Engineering Profession in Tsarist Russia” in *Russia’s Missing Middle Class : The Professions in Russian History*, in Harley Balzer, ed. (Armonk, NY : M.E. Sharpe, 1996), 55-88, here 76). For Russians as European colonizers, see Jeff Sahadeo, *Russian Colonial Society in Tashkent, 1865-1923* (Indiana Univ. Press, 2007), and Vera Tolz, *Russia’s Own Orient : The Politics of Identity and Oriental Studies in the Late Imperial and Early Soviet Periods* (Oxford : Oxford Univ. Press, 2011).
5. Bruce Grant, *The Captive and the Gift : Cultural Histories of Sovereignty in Russia and the Caucasus* (Ithaca, NY : Cornell Univ. Press, 2009). The disappearing Aral Sea is one of the most visible consequences of the development of a cotton monoculture in Central Asia under Russian and Soviet rule.
6. Alfred Rieber, “The Rise of Engineers in Russia,” *Cahiers du monde russe et soviétique*, 31, 4 (1990) : 539-568, here 563.
7. Rieber, “The Rise of Engineers in Russia,” 539.
8. Up until the 1860s, the engineering profession had been almost entirely connected with state service (Balzer, “The Engineering Profession in Tsarist Russia,” 55-56).
9. For more on the “technocrats,” see Peter Holquist, “‘In Accord with State Interests and the People’s Wishes’ : The Technocratic Ideology of Imperial Russia’s Resettlement Administration,” *Slavic Review* 69, 1 (Spring 2010) : 151-179.
10. For the case of agriculture, see Katja Bruisch, “Contested Modernity : A.G. Doiarenko and the Trajectories of Agricultural Expertise in Late Imperial and Soviet Russia,” in Joris Vandendriessche, Evert Peeters, Kaat Wils, eds., *Scientists’ Expertise as Performance Between State and Society, 1860-1960* (London : Pickering and Chatto, 2015), 99-114.
11. For more on the idea of “imperial careering” and its links to modernization and industrialization, see the introduction to David Lambert and Alan Lester, eds., *Colonial Lives Across the British Empire : Imperial Careering in the Long Nineteenth Century* (Cambridge : Cambridge Univ. Press, 2006).
12. William Wood, “The Sariq Turkmens of Merv and the Khanate of Khiva in the Early Nineteenth Century” (Ph.D. diss., University of Indiana, 1998), 3 ; Svat Soucek, *A History of Inner Asia* (New York : Cambridge Univ. Press, 2000), 96.
13. E.R. Barts, *Oroshenie v doline r. Murgaba i Murgabskoe Gosudarevo imenie* [Irrigation in the Murghab river valley and the Imperial Murghab Estate] (SPb., 1910), Appendix One.
14. John Whitman, “Turkestan Cotton in Imperial Russia,” *American Slavic and East European Review*, 15, 2 (Apr., 1956) : 190-205, here 195. By 1910 the Murghab Estate grew primarily cotton, and that only in small quantities (Barts, *Oroshenie v doline r. Murgaba*, 13, 15, 24).
15. Sergei Iulievich Witte, *The Memoirs of Count Witte* (New York : M.E. Sharpe, 1990, trans. and ed. Sidney Harcave), 110 ; Sir Colin C. Scott-Moncrieff, *The Life of Sir Colin C. Scott-Moncrieff*, ed. Mary A. Hollings (London, 1917), 241.

16. Barts, *Oroshenie v doline r. Murgaba*, 39 ; Minutes of the Proceedings of the Institution of Civil Engineers, with Other Selected Papers, vol. 121 (London, 1895), 368.
17. "Irrigatsionnyi otdel na Turkestanskoi sel'sko-khoziaistvennoi vystavke [The irrigation section at the Turkestan agricultural exhibition]," *Turkestanskii sbornik* [Turkestan collection] (TS), 513 : 175-8, here 178.
18. Count K.K. Pahlen, *Mission to Turkestan : Being the Memoirs of Count K.K. Pahlen, 1908-1909* (New York : Oxford Univ. Press, 1964, ed. Richard A. Pierce, trans. N.J. Couriss), 147.
19. Scott-Moncrieff, *The Life of Sir Colin C. Scott-Moncrieff*, 232 ; 242 ; 250.
20. Count Sergei Witte believed Poklewski-Koziell had been exiled for his participation in the uprising (Witte, *Memoirs of Count Witte*, 110). For more on Poklewski-Koziell's career, see *Mémoires de la Société des ingénieurs civils de France* (1896), 13-14 ; 147-148.
21. I.P. Demidov, "Zakliuchenie finansovoi komissii (zasedanie 1 maia 1914 goda) [Conclusion of the Financial Committee (from the meeting 1 May 1914)," No. 116 (IV/4-16), *Prilozheniia k Stenograficheskim otchetam Gosudarstvennoi Dumy, Chetvërti Sozyv, Sessii Chetvërtaia*, 1916 g., III (No. 88-173) (SPb. : Gosudarstvennaia tipografiia, 1916), 52.
22. Under Witte the creation of new industry-oriented technical institutes doubled, from seven in 1895 to thirteen by 1902. Balzer, "The Engineering Profession in Tsarist Russia," 59.
23. Article 256, *Polozhenie ob upravlenii Turkestanskogo kraia*, izd. 1892 g. [Statute for the administration of Turkestan Krai, 1892 ed.] (1886 ;1892). http://www.pereplet.ru/history/Russia/Imperia/Alexandr_III/pol1892.html
24. Emphasis in the original. RGIA (Rossiiskii gosudarstvennyi istoricheskii arkhiv, Russian State Historical Archive), f. 426, Otdel zemel'nykh uluchshenii Ministerstva zemledeliia, op. 1, d. 19, N. Dingel'shtedt, "Doklad : Pol'zovanie vodoiu po obychaiu [Report : Use of water according to custom] (1887)," l. 34.
25. For debates over a water law for Turkestan, see George C. Guins, *Professor and Government Official : Russia, China and California : An Interview Conducted by Boris Raymond*, University of California Regional Oral History Archive (Berkeley : Bancroft Library, 1966) ; Vasil'chikov, "Doklad...po zakonoproektu polozheniia o pol'zovanii vodami..." For land as belonging to the person who irrigates it, see the discussion within the Cotton Committee, in *Glavnoe Upravlenie Zemleustroistva i Zemledeliia, Departament zemledeliia, Trudy Khlopkovogo komiteta* [Proceedings of the Cotton Committee], I (SPb., 1907), 20 ; 23-24.
26. Cotton was mainly grown by smallholders, who were encouraged to plant American cotton by tax breaks and credit in advance of the harvest. The Russian government also kept American cotton prices artificially high ; by 1900 the protective tariff on imported cotton had increased to four rubles and fifteen kopecks per pood (16.38 kilograms) from one ruble fifteen kopecks in 1887. *Ezhegodnik Glavnogo upravleniia zemleustroistva i zemledeliia po Departamentu zemledeliia i lesnomu departamentu* (1907) [Yearbook of the main administration of land organization and agriculture for the departments of agriculture and forestry (1907)] (SPb., 1908) ; G.G. Lerkhe, "Doklad po zakonoproektu ob ustanovlenii osobogo sbora s khlopka, postupaiushchego iz predelov Srednei Azii i Zakavkaz'ia na vnutrennyi rynok (Predstavlenie Glavnoupravliaiushchego Zemleustroistvom i Zemledeliem, ot 18 fevralia 1910 g., No. 139) [Report on the draft of a law pertaining to the establishment of a special levy on cotton reaching the domestic market from outside the borders of Central Asia and Transcaucasia (Presentation of the Head of Land Organization and Agriculture on 18 February, 1910, No. 139)]" in *Gosudarstvennoe Duma, Prilozheniia k Stenograficheskim otchetam Gosudarstvennoi Dumy, Tretyi Sozyv, Sessii Piataia, 1911-12 g., III* (No. 351-500) (SPb : Gosudarstvennaia tipografiia, 1912), No. 414 (III/5-1912).
27. By 1907 one-third of Ferghana's irrigated land was planted with cotton (Lerkhe, "Doklad po zakonoproektu ob ustanovlenii osobogo sbora s khlopka..." 3).

28. See, for example, Iu.A. Shpilev, "Kratkaia zapiska o vozmozhnom rasshirenii khlopkovodstva v Turkestane i glavnym obrazom v Fergane, sostavlennaia Komissarom Ferganskoi Poz.-pod. Komissii k.a. Iu. A. Shpilevym [Short report on the potential expansion of cotton agriculture in Turkestan and in particular in Ferghana, compiled by the Commissar of the Ferghana Land Tax Commission Iu.A. Shpilev]," *Glavnoe Upravlenie Zemleustroistva i Zemledeliia, Departament zemledeliia, Trudy Khlopkovogo komiteta*, I, 45-51. For another argument for converting more arable land to cotton production in the Ferghana Valley, see Lerkhe, "Doklad po zakonoproektu ob ustanovlenii osobogo sbora s khlopka..., " 3.
29. *Trudy Khlopkovogo komiteta*, I, 29-33.
30. Cited in Krivoshein, *Zapiska Glavnoupravliaiushchego Zemleustroistvom i Zemledeliem*, 6.
31. RGIA, f. 426, op. 1, d. 19, "Proekt pravil i perepiska s turkestanskim General-Gubernatorom, s Departamentom obshchikh del, i drugimi uchrezhdeniiami ob otvode gosudarstvennykh zemel' chastnym litsam i obshchestvam v Turkestanskom krae dlia orosheniia [Draft law and correspondence with the Turkestan Governor-General, with the Department of Joint Activities, and other authorities on the allotment of state lands to private individuals and companies in Turkestan Krai for the purpose of irrigation]" I. 40ob.
32. N. Sinel'nikov, "Uporiadochenie vodnogo khoziaistva v sviazi s kolonizatsiei oroshaemykh ploshchadei [Normalization of water management in connection with the colonization of irrigated areas]" in TS, 496 : 89-117, here 112; "Uporiadochenie irrigatsionnogo dela [Normalization of irrigation affairs]" in TS, 510 : 122-125, here 122.
33. A. K-in, "K s'ezdu gidrotekhnikov [Toward a congress of hydrotechnicians]," *Sankt-Peterburgskie vedomosti*, no. 269 (1907) in TS, 450 : 116-18, here 117.
34. Guins, Professor and Government Official, 67.
35. Cited in Muriel Joffe, "Autocracy, Capitalism and Empire : The Politics of Irrigation," *Russian Review*, 54, 3 (July 1995) : 365-388, here 370.
36. V.N. Zaitsov, "O pereselenii [On resettlement]" in TS, 434 : 51-53.
37. 1 desiatina is 1.092 hectares.
38. K.A. Timaev, "Turkestanskii irrigatsionnyi otdel [Turkestan irrigation department]," *Turkestanskii kur'er*, 116 (1909) in TS, 508, 105-8, here 105.
39. "Zhurnaly soveshchaniia komissii, obrazovannoi pri Turkestanskom obshchestve sel'skogo khoziaistva po voprosu ob oroshenii chastnymi predprinimateliami zemel' v Turkestanskom krae [Journals of the meetings of the commission established within the Turkestan Agricultural Society on the question of private individuals irrigating land in Turkestan Krai]" in TS, 454 : 145-51.
40. V. Al'bitskii, "Slabost' gidrotekhnicheskikh znaniy v Rossii i osnovnoi sposob eia ustraneniia" *Novoe vremia*, No. 11858 (1909) in TS, 502 : 108-110. Twenty-one years later, American hydraulic engineer Arthur P. Davis would note that although Soviet engineers were "well up on irrigation literature and theoretical matters generally...[they were] almost devoid of experience with modern irrigation and construction." (Letter from Davis to A.J. Wiley [8 February 1930], Box 5, Folder 4, Arthur Powell Davis Collection [APD], circa 1865-1974, Collection Number 01366, American Heritage Center, Univ. of Wyoming).
41. "Po povodu stat'i professor Al'bitskogo o nedostatke gidrotekhnikov v Rossii [Concerning the article by Professor Al'bitskii on the lack of hydrotechnicians in Russia]," *Novoe vremia* No. 11881 (1909) in TS, 507 : 143-44.
42. G.K. Rizenkamp, *Trans-Kaspiiskii Kanal (Problema orosheniia Zakaspiia) [Trans-Caspian Canal (problem of irrigating Transcaspia)]* (M. : Vysshii Sovet Narodnogo Khoziaistvo, 1921), 48; F.P. Morgunenko, "Sud'ba Aral'skogo moria [The Fate of the Aral Sea]," *Vestnik Irrigatsii*, 3-4 (June-July, 1923), 15; RGASPI (Rossiiskii gosudarstvennyi arkhiv sotsial'no-politicheskoi istorii, Russian State Archive of Socio-Political History), f. 62, Sredazbiuro, op. 2, d. 1289, "Sudebnyi

protsess nad rabotnikami 'Vodkhoza' [Legal Proceedings Against the Workers of 'Vodkhoz']" (1928).

43. A.A. Tatishchev, *Zemli i liudi : v gushche pereselencheskogo dvizheniia (1906-21)* [Lands and peoples : In the thick of the resettlement movement] (M. : Russkii Put', 2001), 88. Rizenkamp's two plans for model towns in the Hungry Steppe before and after the revolution can be found in RGIA, f. 432, *Izyskatel'nye partii po sostavleniiu proektov orosheniia v Turkestane Otdela zemel'nykh uluchsheni Ministerstva zemledelii*, op. 1, d. 768a, "Plan i smety stroitel'stva tipovogo goroda Golodnostepska [Plan and estimates for the construction of a typical city Golodnostepska] (1918) and RGAE (Rossiiskii gosudarstvennyi arkhiv ekonomiki, Russian State Archive of the Economy), f. 4372, Gosplan, op. 27, *Vodnoe khoziaistvo (1929-31)*, d. 354, "Zakliuchenie chlena Vysshego tekhnicheskogo soveta po skheme orosheniia Golodnoi stepi professora GK Rizenkompfa [sic] [Conclusion of a member of the highest technical council on the scheme of Professor Rizenkompf [sic] to irrigate the Hungry Steppe" (1929).

44. RGAE, f. 282, *Kollektsiia dokumentov deiatelei melioratsii i gidrotekhniki*, op. 1, d. 4b, Professor Georgii Konstantinovich Rizenkamp, l. 40-45, here 40-41. Thanks to Julia Obertreis for sharing her notes on this file.

45. V.A. Vasil'ev, *Semirechenskaia oblast' kak koloniia i rol' v nei Chuiskoi doliny. Proekt orosheniia doliny reki Chu v Semirechenskoii oblasti* [Semireche oblast' as a colony and the role within it of the Chu Valley. Plan for the irrigation of the Valley of the River Chu in Semireche oblast'] (Petrograd, 1915); "Issledovanie Chuiskoi doliny [Investigations of the Chu Valley," *Semirechenskie oblastnye vedomosti*, 231 (October 15, 1916), 2. See also TsGA RK (Tsentral'nyi gosudarstvennyi arkhiv Respubliki Kazakhstan, Central State Archive of the Republic of Kazakhstan), f. 19, *Zaveduiushchii Pereselecheskim upravleniem Semirechenskoii oblasti*, op. 1, d. 230, "Stat'i i zametki, podgotovlennnye dlia opublikovaniia v periodicheskoi pechati, o rabote pereselencheskoi organizatsii i drugim voprosam [Articles and remarks prepared for publication in the periodical press on the work of the resettlement organization and other questions]," l. 22.

46. Leonid Korenev, "Voistinu, 'net proroka v svoem otechestve' [In truth, 'no man is a prophet in his own land']" (<http://korenev.org/index.php/ru/2011-04-07-13-55-37/2011-04-07-14-16-28/114-2012-02-13-20-30-39>, accessed 28 February, 2015).

47. RGIA, f. 426, op. 3, d. 390, "Perepiska o komandirovanii inzhenera Vasil'eva za granits dlia oznakomlenii s meliorativnymi rabotami [Correspondence on sending engineer Vasil'ev abroad for acquaintance with reclamation works]" l. 1-3, 15ob, 19-20.

48. *Trudy Khlopkovogo komiteta*, I, 60; for more on the connections between British, Australian, and American engineers, see Jessica Teisch, *Engineering Nature : Water, Development, and the Global Spread of American Environmental Expertise* (Chapel Hill : Univ. of North Carolina, 2011).

49. S.I. Zubchaninov, "Doklad po zakonoproektu ob otpuske sredstv na usilenie gidrotekhnicheskikh izyskanii v Turkestane i Zakavkaz'e (Predstavlenie Glavnoupravliaushchego Zemleustroistvom i Zemledeliem, po Otdelu zemel'nykh uluchsheni, ot 6 fevralia 1912 g., za No. 1354) [Report on the draft law on the release of funds to boost hydrotechnical investigations in Turkestan and Transcaucasia (Presentation of the head of land organization and agriculture, department of land improvement, 6 February 1912, ref. No. 1354)," *Gosudarstvennoe Duma, Prilozheniia k Stenograficheskim otchetam Gosudarstvennoi Dumy, Tretii Sozyv, Sessiia Piataia, 1911-12* (No. 671-861) (SPb : Gosudarstvennaia tipografiia, 1912), No. 785 (III/5-1912).

50. TsGA KR (Tsentral'nyi gosudarstvennyi arkhiv Kirgizskoi Respubliki, Central State Archive of the Kyrgyz Republic), f. I-54, *Nachal'nik rabot po orosheniiu doliny reki Chu Komiteta zemel'nykh uluchsheni Ministerstva zemledeliia*, op. 2, d. 122, "Katalog inostrannykh knig [Catalogue of foreign books]," l. 1-7.

51. Rizenkamp, *Trans-Kaspiiskii Kanal*, 27-8.

52. The two volumes of Skorniakov's *Oroshenie i kolonizatsiia pustyn' shtata Aidago v Severnoi Amerike na osnovanii zakona Keri (Carey Act)* [Irrigation and colonization of the deserts of the state of Idaho in North America on the basis of the Carey Act] (1911) are now in the United States Library of Congress.
53. Harry Collins and Robert Evans, *Rethinking Expertise* (Univ. of Chicago, 2009), 3.
54. Mark Fiege, *Irrigated Eden : The Making of an Agricultural Landscape in the American West* (Seattle : Univ. of Washington Press, 2000), 23.
55. G.K. Rizenkampf, *Problemy orosheniia Turkestana* [Problems of irrigating Turkestan] (M. : 1921), 5.
56. Randall Dills, "The River Neva and the Imperial Façade : Culture and Environment in Nineteenth Century St. Petersburg, Russia," (Ph.D. dissertation, University of Illinois at Urbana-Champaign, 2010), 80.
57. David Moon has written about Russian efforts to improve agriculture in the steppe regions within the context of the establishment of imperial power. As in Central Asia, improvement of steppe agriculture drew in part on America as a scientific and agricultural model and included (limited) experimentation with irrigation (*The Plough that Broke the Steppes : Agriculture and Environment on Russia's Grasslands, 1700-1914* [Oxford : Oxford Univ. Press, 2013]).
58. Teisch, *Engineering Nature*, 33.
59. Vasil'chikov, "Doklad...po zakonoproektu polozheniia o pol'zovanii ...," 16.
60. Vasil'chikov, "Doklad...po zakonoproektu polozheniia o pol'zovanii ...," 18.
61. RGAE, f. 320, E.E. Skorniakov.
62. Rizenkampf, *Trans-Kaspiiskii Kanal*, 66. In 1907 German observer Willy Rickmer Rickmers also described the area between Turkestan's Amu and Syr rivers as the "California of Russia" ("Impressions of the Duab (Russian Turkestan), read March 27, 1907," *Proceedings of the Central Asian Society* [London, 1907], 7). See also Sinel'nikov, "Uporiadochenie vodnogo khoziaistva...," 89-90. America was also a model for Australian irrigation projects after 1880, when it began to replace references to European and British imperial engineering projects (Ian Tyrrell, *True Gardens of the Gods : Californian-Australian Environmental Reform, 1860-1930* [Berkeley, CA : Univ. of California Press, 1999], 107 ; 121).
63. Teisch, *Engineering Nature*, 59. According to Teisch, "by the early twentieth century, California engineers were certainly among the most renowned water technicians in the world..." (ibid., 9).
64. Official Report on the 2nd International Irrigation Congress (Los Angeles, 1893), 57.
65. Arthur Hooker, ed., *Official Proceedings of the Seventeenth National Irrigation Congress held at Spokane, Washington, U.S.A., August 9 to 14, 1909* (Spokane, WA : Shaw and Borden, 1909), 447.
66. Skorniakov, *Oroshenie i kolonizatsiia pustyn' shtata Aidago*, I, 6. For more on the Carey Act, see Robert E. Bonner, "Elwood Mead, Buffalo Bill Cody, & the Carey Act in Wyoming," *The Magazine of Western History*, 55, 1 (Spring, 2005), 36-51.
67. Vladimir V. Tsinkerling, *Oroshenie na Amu-Dar'e* [Irrigation on the Amu-Daria] (M. : Izdanie Upravlenie vodnogo khoziaistva Srednei Azii, 1927), English title page.
68. RGIA, f. 426, op. 5, d. 289, Lichnoe delo P.P. Veimarna [Personal file of P.P. Veimarn] ; RGIA, f. 426, op. 3, d. 165, "Perepiska s nachal'nikom rabot po izyskanii i sostanovleniiu proektov orosheniia v basseine r. Chu Semirechenskoi oblasti o proizvodstve rabot s prilozheniem spiskov lichnogo sostava [Correspondence with the head of investigations and creation of a plan to irrigate the Chu River basin in Semireche oblast' on the execution of work with appendix of lists of labor force]" ; Arthur Hooker, ed., *Official Proceedings of the Twenty-First International Irrigation Congress held at Calgary, Alberta, Canada, October 5-9, 1914* (Ottawa : Government Printing Bureau, 1915), 250.
69. Donald Worster, *Rivers of Empire : Water, Aridity, and the Growth of the American West* (Oxford : Oxford Univ. Press, 1992).

70. Marc Reisner, *Cadillac Desert : The American West and its Disappearing Water* (New York : Penguin, 1993).
71. Official Proceedings of the Seventeenth National Irrigation Congress, 447.
72. Tyrrell, *True Gardens of the Gods*, 107.
73. Tyrrell, *True Gardens of the Gods*, 108.
74. "Turkvodkhoz na Vserossiiskoi sel'sko-khoziaistvennyi i kustarno-promyshlennoi vystavke [Turkvodkhoz at the All-Russian agricultural and trade show]," *Vestnik irrigatsii*, 9 (December 1923), 118-120 : 119 ; Tyrrell, *True Gardens of the Gods*, 112-113.
75. Teisch, *Engineering Nature*, 9.
76. Vasilii Vladimirovich Barthold, *K istorii orosheniia Turkestana (izdanie Otdela zemel'nykh uluchsheniia Glavnogo upravleniia zemleustroistva i zemledeliia)* [Toward a history of irrigation in Turkestan (publication of the department of land improvement of the main administration of land organization and agriculture)] (SPb., no pub. date), 3.
77. Diana Davis, *Resurrecting the Granary of Rome : Environmental History and French Colonial Expansion in North Africa* (Ohio Univ. Press, 2007).
78. A. Matisen, "Polozhenie i nuzhdy orosheniia v Turkestane [Conditions and needs of irrigation in Turkestan]," Ch. 12 in *Ezhegodnik Otdela zemel'nykh uluchsheniia, god pervyi (1909)* [Yearbook of the department of land improvement, first year (1909)] (SPb. : G.U.Z.i.Z. O.Z.U., 1910), 274-301 : 275-76.
79. *Trudy Khlopkovogo komiteta*, I, 15.
80. RGIA, f. 426, op. 1, d. 804, "Perepiska po khodataistvu amerikanskogo finansista Dzhona Gammonda ob issledovanii zemel' v Turkestane, s tsel'iu orosheniia [Correspondence concerning the petition of American financier John Hammond regarding investigating land in Turkestan with the goal of irrigation]," l. 5.
81. RGIA, f. 426, op. 1, d. 804, l. 81-82 : 81.
82. RGIA, f. 426, op. 1, d. 804, l. 76-76ob.
83. RGIA, f. 426, op. 1, d. 804, l. 90-91, Letter from Dubasov to Masal'skii (8 April 1911).
84. Letter from Davis to Hammond (14 March 1912), Box 1, Folder 10, APD.
85. Letter from Davis to Hammond (24 May 1911), handwritten manuscript, 10 (Box 1, Folder 10, APD).
86. Ian Murray Matley, "The Golodnaya Steppe : A Russian Irrigation Venture in Central Asia," *Geographical Review*, 60, 3 (July 1970) : 328-346, here 336-37. In her excellent article on the Moscow textile industrialists and irrigation ("Autocracy, Capitalism and Empire"), Muriel Joffe does not mention Hammond, but this interpretation supports her general conclusions.
87. Hammond himself would suggest as much ("Speech on the Russian Passport Question at the Hungarian Republican Club, New York, December 5, 1911," John Hays Hammond, Sr. Papers [MS 259], Manuscripts and Archives, Yale University Library, Box 11, Folder 1, 22-31, here 24).
88. The failure in 1912 to renew the Russian-American trade treaty of 1832 made the Russian desire for independence from expensive imports of American cotton even more urgent. On the treaty and cotton : F.A. Seleznev, "Konflikt vokrug rastorzheniia Russko-Amerikanskogo torgovogo dogovora i moskovskaia burzhuaziia (1911-12 gg.) [Conflict around the annulment of the Russian-American trade treaty and the Moscow bourgeoisie]," *Vestnik Nizhegorodskogo universiteta im. N.I. Lobachevskogo, Seriia Istoriia*, 1 (Nizhnyi Novgorod, 2002), 74-82 ; on cotton and irrigation : Lerkhe, "Doklad po zakonoproektu ob ustanovlenii osobogo sbora s khlopka..., " 3-5 ; on independence from American imports : *ibid.*, 9-10 ; Krivoshein, *Zapiska Glavnoupravliaiushchego Zemleustroistvom i Zemledeliem*, 6-7 ; Masal'skii, *Turkestanskii krai*, vii.
89. Masal'skii, *Turkestanskii krai*, vii ; S. Poniatovskii, *Opyt izucheniia khlopkovodstva v Turkestane i Zakaspiiskoi oblasti* [Attempt to study cotton agriculture in Turkestan and the Transcaspiian oblast'] (SPb., 1913), 10.

90. See, for example, the discussions of the Main Administration's Cotton Committee in 1907, Trudy Khlopkovogo komiteta, I, 12-23.
91. "Kolonizatsiia Turkestana pri Grodekova [Colonization of Turkestan under Grodekov]" in TS, 417 : 146-50.
92. This dilemma was discussed in 1907 by a commission of the Turkestan Agricultural Society on the question of irrigation by private capital ("Zhurnaly soveshchanii komissii obrazovannoi pri Turkestanskom obshchestve sel'skhogo khoziaistva...", 145-149).
93. Tyrrell, True Gardens of the Gods, 103.
94. Rizenkampf, Problemy orosheniia Turkestana, 13, 5.

ABSTRACTS

This essay examines hydraulic engineers in Central Asia under tsarist rule and their participation in processes of agricultural expansion and empire-building in the imperial province of Turkestan. This province theoretically provided the perfect space in which Russians, who continually worried about their own "backwardness" in relation to Europe, could demonstrate their ability to be a colonial power on par with European empires, yet the lack of an understanding of irrigation engineering and the difficulties of irrigating arid regions threatened to jeopardize Russia's efforts at a "civilizing mission." Still, a growing group of Russian technical specialists was able to participate in scientific dialogue and transnational technological exchanges with other hydraulic engineers in other parts of the world who were similarly enthusiastic about the potential of science and technology to create a more modern future in the Russian Central Asian borderlands. Ultimately, however, even though the zeal of these Russian and foreign hydraulic experts coincided with Russian political ambitions in Turkestan, the political realities of the tsarist government's position in the region would determine the fate of their grand visions for transformation.

Cet article étudie la participation des ingénieurs en hydraulique en Asie centrale à l'époque impériale dans les processus d'expansion agricole et de renforcement de l'empire dans la province du Turkestan. A priori, cette province rassemblait tous les critères pour que les Russes, qui déploraient constamment leur « retard » vis-à-vis de l'Europe, puissent y faire la preuve de leur capacité à être un pouvoir colonial au même titre que les empires européens, mais leur méconnaissance de l'ingénierie en irrigation et les difficultés à irriguer des régions arides menaçaient de compromettre les efforts de la Russie dans sa « mission civilisatrice ». Pourtant, on comptait toujours davantage de techniciens russes capables de participer au dialogue scientifique et aux échanges technologiques transnationaux avec les ingénieurs en hydraulique étrangers, eux-mêmes tout aussi enthousiastes sur le potentiel de la science et de la technologie à créer un avenir plus moderne en Asie centrale russe. Finalement, cependant, même si le zèle de ces Russes et des experts hydrauliques étrangers coïncidait avec les ambitions politiques russes au Turkestan, les réalités politiques de la position du gouvernement impérial dans la région déterminèrent le destin de leurs grandes visions transformatrices.

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