

# Imperial Desert Dreams

Cotton Growing and Irrigation in Central Asia,  
1860-1991



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Titelbild: On a road near Urgench in April 2008. © Julia Obertreis.

*To Bea*



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Along the way, I’ve met different kinds of people, among them many who encouraged and supported me. My beloved, charming spouse Bea Trogand is the most important of them, and that’s why the book is dedicated to her. She found the subject I worked on interesting – something you cannot always expect from your partner – and advised me to think big, to write the book in English, and not to get discouraged by challenging situations. I guess she will be happy to finally see the book.

In the beginning Christoph Bernhardt, for whom I worked at the IRS (Institute for Research on Society and Space) in Erkner, introduced me to the field of water history. Finding his work on the Rhine very stimulating, I decided to work on water history in Eastern Europe. Klaus Gestwa (University of Tübingen) directed me to the idea of examining irrigation in Central Asia. As I had been to Central Asia on a prolonged trip through the Soviet Union just after its collapse in 1992 with my friend Barbara Kettnaker, I was immediately interested and worked out a project design. Sitting in the ZBW library in Kiel with its superb selection of journals and a useful thematic catalogue and enjoying the view from the readers’ rooms onto much water, I became excited about the idea of analyzing the somewhat dry literature on irrigation and cotton growing in Russian-language journals by using James C. Scott’s *high modernism*.

After a visit to the Uzbek Embassy in Berlin, I found the uneasy way into the Tashkent archives. I remember the excitement of my first visit to the Central State Archive in 2007 and my relief when I was granted permission to use it for one year. One of the highlights of my time at the archive was being invited to the

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Berlin, in August 2017



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## Introduction

On July 25, 1848, Captain Aleksei Ivanovich Butakov and his men left the Russian port of Raim on two schooners. The governor general of Orenburg had founded the port on the Syr Darya River in modern Kazakhstan just a year earlier.

Butakov's undertaking was to explore the enormous lake the boats were now heading towards. The body of water was so big that the Russians called it a sea – the Aral Sea (*Aral'skoe more*). It was situated in a transit zone between the Russian forts at the Syr Darya River and the Khanate of Khiva. South of the Aral Sea began the world of the Muslim khanates, which remained largely unknown to the Russians. The rest of the summer and again the following year, Butakov sailed the lake in order to survey its western shores and to explore its hitherto unknown waters. One of the aims of the expedition was to draw a precise map of the Aral Sea. The going was not always easy, such as when the crew ran out of fresh water and was forced to drink the salty water of the lake. Because of heavy wind fluctuations and the strong motion of the sea, measuring the western shores proved to be a real adventure. At the end of the first trip, Butakov noted in his diary that the lake was one of the “most uncalm of waters that offers to sailors no secure and comfortable haven”.<sup>1</sup> Despite these adverse conditions, geological and botanical studies were conducted. In the delta of the Amu Darya River, Butakov and his crew carried out soundings and assessed characteristic points in the landscape. Sometimes they had to stand in the water up to their chests until they managed to determine the eleven points that formed the basis for the first “scientific” map of the lake. The military researchers were not permitted to go further into the delta of the Amu Darya for fear of being attacked by the inhabitants of the Khanate of Khiva. The Russian exploration zone was therefore clearly delineated up to this point.<sup>2</sup>

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1 M.-R. Uhrig, ‘Einleitung’, in M.-R. Uhrig (ed.), *Butakov, Aleksei Ivanovich: Tagebuch der Aralsee-Expedition 1848/49* (Zell 2008), pp. 7–23, citation p. 16.

2 Ibid., pp. 12, 13, 18. On board the schooner “Konstantin” was Taras Shevchenko, one of Ukraine's most famous poets. He had been arrested for his membership in the Society of



As we know from the Baltic German Theodor Basiner, Butakov's contemporary, the Aral Sea was strikingly blue at that time and the Russians sometimes called it the "Blue Sea" (*Sinoe more*).<sup>3</sup> There were countless sea birds such as gulls, sea ravens and pelicans. Butakov described the little pelicans he saw with great sensitivity. He also closely observed the flora and gathered minerals and algae. What he collected was later sent to various institutions in St. Petersburg or to leading specialists.<sup>4</sup>

Despite his tender feelings towards small wildlife, Butakov presented himself as a hard-nosed tiger hunter in a letter to his parents dated November 24, 1848. During their winter stay in a camp near the lake, 45 men had been hunting a Caspian tiger (*dzhulbars*) on one of the islands near the coast. Butakov noted, "Not long ago we had an amusing experience that doesn't exist in Europe: It was nothing less than a tiger hunt!" He described the hunt in some detail until the climax, when one of the soldiers finally shot the tiger:

... but the soldier was quicker than the tiger and just when it was about to jump at him, from a distance of two sazhen<sup>5</sup> he shot a bullet into its forehead. [...] In a triumphal march, we carried it to the fort; the pelt was handed over to me, of course. I had it tanned by a Kyrgyz friend, and the head of the *dzhulbars* (that is to say, just the skull) now hangs above my bed.<sup>6</sup>

In the colonies, tiger, lion and other forms of hunting were a typical pastime of European officers and officials. The British are best known for having had a "special hunting relationship" with the tiger with which they "seemed in some ways to be locked in conflict for command of the Indian environment".<sup>7</sup> In his

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Saints Cyril and Methodius, and because of his critical poems he was exiled as ordinary soldier to the Orenburg special corps. Butakov had heard of him being stationed there and had called on him to serve the expedition as painter. This special position allowed Shevchenko to share the captain's cabin with Butakov. During the trip, he painted pictures that give us an idea of what Butakov's crew saw: the endless shores of the lake and the appearance of the Kazakhs they met. After the expedition, Butakov sent these paintings to St. Petersburg, which had negative consequences for both himself and Shevshchenko: Butakov was not allowed to publish the results of his expedition for several years; and Shevshchenko was imprisoned again and freed only in 1857. Ibid., pp. 17, 19, 20.

3 T.F.J. Basiner, 'Appendix, Text 1, 1842', in M.-R. Uhrig (ed.), *Butakov, Aleksei Ivanovich: Tagebuch der Aralsee-Expedition 1848/49* (Zell 2008), pp. 103–105, here p. 104.

4 While scientific aims were a clear priority in his exploration of the Aral Sea, Butakov didn't forget to make military observations as well. For example, in July 1849 he discovered a small bay named Chubar-Tarauz in the north-west of the lake that he praised as a natural port and an ideal starting point for military expeditions. Uhrig 2008, pp. 15, 18.

5 1 sazhen equals 2.133 m.

6 A.I. Butakov, 'Appendix, Text 2, 1848', in M.-R. Uhrig (ed.), *Butakov, Aleksei Ivanovich: Tagebuch der Aralsee-Expedition 1848/49* (Zell 2008), pp. 105–107, citation pp. 105, 106.

7 J.M. MacKenzie, *The Empire of Nature. Hunting, Conservation and British Imperialism* (Manchester, New York 1988), p. 179. See also: E. Haschemi Yekani, *The Privilege of Crisis*.

free time, Butakov actively adopted the role of a European colonizer and the tiger's pelt and skull were proud colonial trophies. Even though the area belonged to the Russian Empire already, the expedition to the Aral Sea can be generally interpreted as a colonizer's exploration into unknown territories and waters. It was also part of the modern era's scientific appropriation of the world. Indeed, the work of Butakov and his men is consistent with the process of "measuring the world" that German novelist Daniel Kehlmann has impressively described in his eponymously entitled book.<sup>8</sup>

In 1988, 140 years later, another expedition was made to the Aral Sea that was called "Aral-88". The group of reporters and scientists, led by journalist Grigorii Reznichenko, wanted to document the damage that had been done to the enormous lake and the surrounding region by irrigation. Considerable water had been diverted in the previous decades from the rivers that fed the Aral Sea, the Amu Darya and the Syr Darya. Consequently, the level of the lake had shrunk drastically. At the same time, however, other lakes had emerged nearby. By all appearances, the natural balance between water, land and vegetation had been seriously disrupted. In comparison to the 19<sup>th</sup> century, the fauna, flora, and landscape had changed markedly. By the beginning of the 20<sup>th</sup> century, for instance, Slav and Kazakh colonists had fully extinguished the tigers that had lived along the upper reaches of the rivers and in the delta of the Aral Sea.<sup>9</sup> The journalist Grigorii Reznichenko wrote on October 3, 1988:

Central Asia from the plane is a terrible sight! The Aral Sea has not disappeared without a trace; it is rather poured out into the whole region. Wild lakes have emerged. We were at the Sarakamysh depression, which is west of the Aral; 5 billion cubic meters of dead water pour off into it per year. [...] We tried to approach the water when landing, but it was impossible – it's a swampy salty marsh. And there is no vegetation anywhere – the land is soaked with poisons. [...] Central Asia is a sponge soaked with salty moisture.<sup>10</sup>

During the roughly 120 years of tsarist and Soviet rule, processes of modernization and intensification significantly changed the region's surface and landscape. This was now being addressed by critics who directed their accusations at the Soviet regime. It was not only the new, "wild" lakes that had emerged out of drainage water and the imminent problems relating to rising groundwater and salinization. These changes also had multiple repercussions for the region's

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*Narratives of Masculinities in Colonial and Postcolonial Literature, Photography, and Film* (Frankfurt am Main, New York 2011), pp. 87–97.

8 D. Kehlmann, *Measuring the World*. Translated by Carol Brown Janeway (Oxford 2006); D. Kehlmann, *Die Vermessung der Welt* (Reinbek 2005).

9 On the fate of the tiger: R. Létolle and M. Mainguet, *Der Aralsee. Eine ökologische Katastrophe* (Berlin et al. 1996), pp. 181–182.

10 G. Reznichenko, *Aral'skaia katastrofa. Dnevnik ekspeditsii (s otstupleniiami i kommentarii)* (Moscow 1992), pp. 61–62.

inhabitants. The most prominent issue was the siltation of the Aral Sea, which was widely recognized as an “ecological catastrophe”.<sup>11</sup>

The tsarist era began in the early 1860s, when a succession of military campaigns was initiated east and south of the Aral Sea that would last for more than two decades. As a result, the Russian Empire came to dominate southern Central Asia.<sup>12</sup> Tsarist officers and officials were succeeded by the communists after the October Revolution of 1917, when Central Asia became a part of the emerging Soviet Union. Aiming to bring their own peculiar kind of modernity to a region they perceived as backward, the Tsarist colonizers and Soviet communists developed plans to improve the economy, to make agriculture more productive, and to modernize local societies. Central issues were cotton growing and the expansion of irrigation areas to produce verdant fields and new oases. These IMPERIAL DESERT DREAMS and their deeper exploration constitute the primary focus of the present study. They will be traced in the following through the late imperial and all of the Soviet period until the demise of the Soviet Union, with particular attention directed specifically to today’s Uzbekistan and Turkmenistan.

In most parts of southern Central Asia, irrigation is a precondition for growing cotton, thus explaining the close connection between the two topics. Although the pursuit of cotton was not the conquest’s decisive impulse – as has been wrongly stated in historiographic literature – the cash crop became a highly desirable good for the imperial elites from the 1860s onward. In the Soviet period, a real cult emerged centering around the production of the “white gold”. Uzbekistan was by far the largest cotton-producing republic in the Soviet Union. In the post-war period, cotton sowing areas made up more than two thirds of all irrigated areas in the republic.<sup>13</sup> For the kolkhoz farms in Turkmenistan, cotton production was an important source of revenue as well, even if the republic delivered much less than Uzbekistan.<sup>14</sup>

In the post-war period, irrigation systems were widely expanded and huge

11 “The ecological catastrophe” is the subtitle of the most comprehensive book on this phenomenon: Létolle and Mainguet 1996. Reznichenko and others speak of the “Aral Sea Catastrophe”. Reznichenko 1992.

12 I use the term “southern Central Asia” to denote roughly the territory of the later Soviet republics Uzbekistan, Kyrgyzstan, Tajikistan, and Turkmenistan.

13 See production figures of the Uzbek Republic for different years in: *Narodnoe khoziaistvo Uzbekskoi SSR. Statisticheskii ezhegodnik*. Data on production and sowing areas can also be found in: G. Hodnett, ‘Technology and Social Change in Soviet Central Asia: The Politics of Growing Cotton’, in H.W. Morton and R.L. Tökes (eds.), *Soviet Politics and Society in the 1970’s* (New York 1974), pp. 60–117.

14 Data on Turkmenistan from: *Narodnoe khoziaistvo Turkmenskoi SSR za 70 let. Iubileinyi statisticheskii sbornik* (Ashgabat 1987), and A. Dzhumamuradov, ‘Razvitie khlopkovodstva v Turkmenistan za 50 let’, in A. Karryev et al. (eds.), *50 pobednykh let* (Ashgabat 1974), pp. 121–141.

construction projects were undertaken, including the Karakum Canal which was built in the Karakum desert from 1954 until the beginning of the 1970s. Similar to other irrigation installations, it was loudly praised by experts and journalists in propaganda articles as “the river of happy life” and the fulfillment of a long-standing dream of the people. The reorganization of the irrigation systems included reservoir construction and the straightening, shortening and lining of existing canals. In agriculture, major transformation projects included the collectivization of farms, the enlarging and straightening of fields and the introduction of machinery. Political cadres, scientists and technical elites were greatly committed to the realization of their goal to achieve modernity through redesigning of agriculture and irrigation.

These programs represent the broader ideas and visions for the region’s transformation. They are connected in a variety of ways to the exploration of Central Asia and the development of modern scientific and technical schemes. Drawing from concepts of modernity, infrastructural history, environmental history, and the history of technology, this study aims to examine the substance of these schemes, their objectives and how they took shape. It will look closely at the basic ideas and visions that were widely shared by administrators, engineers, and scientists alike.

Though a large portion of Central Asia’s population was and in fact still is engaged in agriculture, this subject has been little studied from a historical point of view. The socioeconomic and cultural history of rural societies in Central Asia is in need of more in-depth research.<sup>15</sup> As a main economic sector, cotton production certainly has been a subject of study in reference to both the tsarist and Soviet periods, and the key significance of Central Asian cotton for the Russian and Soviet economy has been well known for some time. The research has remained fragmentary, however. This state of affairs was humorously touched upon in 2006 by Adeeb Khalid, who noted young researchers’ preference for “the cultural work of Soviet power, a much sexier topic than the history of cotton.”<sup>16</sup> Authors from Central Asia also seem to have done little work on these issues in

15 See as recent exceptions from this rule several chapters in: S.A. Dudoignon and C. Noack (eds.), *Allah’s Kolkhozes. Migration, De-Stalinisation, Privatisation and the New Muslim Congregations in the Soviet Realm (1950s–2000s)* (Berlin 2014).

16 A. Khalid, ‘Backwardness and the Quest for Civilization. Early Soviet Central Asia in Comparative Perspective’, *Slavic Review* 65, 2 (2006), pp. 231–251, p. 232, fn. 3. See on cotton mostly from an economic perspective: M.O. Gately, *The Development of the Russian Cotton Textile Industry in the Pre-Revolutionary Years, 1861–1913*, PhD diss., Lawrence, Kansas, 1968 (UMI 1969); J. Whitman, ‘Turkestan Cotton in Imperial Russia’, *American Slavic and East European Review* 15, 2 (1956), pp. 190–205; B.Z. Rumer, *Soviet Central Asia. “A Tragic Experiment”* (Boston 1989); St. Tompston (ed.), *Rossiiskaia tekstil’naia promyshlennost’. Tekhnologicheskii transfert, syr’e, finansy* (St. Petersburg 2006); and some articles that will be referred to in the chapters of this study.

recent years. A doctoral thesis on cotton production in Karakalpakistan in the Soviet period by M.K. Sarybaev is characteristic for the general treatment of Russian and Soviet rule in modern Uzbekistan as “colonial” and exploitative.<sup>17</sup>

Sven Beckert’s global history of cotton growing and trade puts the Central Asian case in a broader perspective, making it possible to connect it to the much discussed “great divergence” between Europe and Asia. Characteristically, Central Asia transformed from an exporter of cotton textiles to an exporter of raw cotton when the great production boom began in the 19<sup>th</sup> century while Europe began to dominate the manufacturing process.<sup>18</sup> The depiction of Russia as a European imperial power and Central Asia as a colony conforms well to Beckert’s larger picture.

The subject of irrigation has attracted a great deal of scholarly attention in recent decades. The most prominent work on the history of irrigation in the Orient, a work that is cited in most Western contributions to Central Asia’s irrigation history, is Karl August Wittfogel’s “Oriental Despotism”.<sup>19</sup> As the author’s concept of the “hydraulic society” has been rightly criticized by many authors, it will only be briefly treated here. Wittfogel contends that the construction and usage of large irrigation systems inevitably leads to and supports despotic rule because only a strong central power can guarantee the functioning of these systems. This thesis has proved productive and continues to stimulate thought about the nexus between irrigation infrastructure and political rule. Nevertheless, Wittfogel’s study of Indian, Chinese and other irrigation systems is based on Western language sources only. It thus remains very much on the surface of things and is deeply grounded in a model of totalitarian rule (in Nazi Germany or Stalinist Soviet Russia) that was fashionable in the 1950s, when the study first appeared. The author’s conception of oriental despotic rule is not historically documented for the Asian societies in question and it is not consistent with the rule of Central Asian khans and emirs in the 19<sup>th</sup> century. While Wittfogel does treat the Soviet Union, he does so in a superficial manner and in an overtly anti-communist vein.<sup>20</sup>

17 M.K. Sarybaev, *Politika khlopkovoi monokul'tury Sovetskoi vlasti v Karakalpakstane i ee posledstviia (1917–1990 gg.)*. Avtoreferat dissertatsii na soiskanie uchenoi stepeni doktora istoricheskikh nauk (Tashkent 2008). To be sure, this interpretation fits Karakalpakistan more than some other regions as it suffered most from the darker consequences of Soviet modernity.

18 S. Beckert, *Empire of Cotton. A Global History* (New York 2014), pp. vix–xv.

19 K.A. Wittfogel, *Oriental Despotism. A Comparative Study of Total Power* (New Haven, Conn. 1957).

20 See as an example J. Paul, *Herrscher, Gemeinwesen, Vermittler: Ostiran und Transoxanien in vormongolischer Zeit* (Stuttgart 1996), pp. 43–65, who shows in detail that Wittfogel’s assumptions largely do not hold true for Iran and Transoxania. Joachim Radkau has dealt intensely with Wittfogel. See, among other contributions, his early article: J. Radkau, ‘Der

Since the publication of Wittfogel's study, a broad specter of research on irrigation, both on contemporary developments and with historical perspectives, has emerged, especially in the last 30 years or so. Important work has been done, for example, in the field of "water history".<sup>21</sup> Central Asia's irrigation past and present has also received some scholarly attention, with the pioneering study by Michael Thurman on irrigation in the Ferghana Valley covering the period from 1876 to the present (1999). Thurman's study contains valuable information on the functioning of irrigation and the attendant political transformation efforts.<sup>22</sup> One of its great advantages is that it introduces a historical perspective into irrigation research, while taking into account ecological factors. On the other hand, he aims to confirm the implications of his political studies model, which posits a state administration in opposition to the irrigation community.<sup>23</sup> Thurman sees Central Asia as an extreme example of the transformation process triggered by the advance of European colonial powers.<sup>24</sup> He concludes that the failed policies of the Russian administration led to more inequity and less sustainability than had existed before the Russian conquest.<sup>25</sup> While these points have their validity, Thurman's findings must be judged with some care: He tends, for example, toward a certain idealization of the khanate period and appears to view all negative phenomena, most notably corruption, as being a consequence of Russian rule. At the same time, he characterizes this rule as inefficient and not coercive.<sup>26</sup> Finally, while his account on the tsarist and early Soviet period is very comprehensive, the post-war period is treated in only cursory fashion.

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Emigrant als Warner und Renegat: K.A. Wittfogels Dämonisierung der "asiatischen Produktionsweise", *Exilforschung. Internationales Jahrbuch*, vol. 1 (1983), pp. 73–94. Cf. J. Radkau, *Natur und Macht. Eine Weltgeschichte der Umwelt* (Munich 2002), pp. 112–114.

21 See for the current state of the interdisciplinary fields of water studies and water history the online journal "Water Alternatives" ([www.water-alternatives.org](http://www.water-alternatives.org), accessed May 8, 2017) and the online and print journal "Water History". A milestone in this process was surely "Rivers of Empire" by one of the founders of environmental history in the US, Donald Worster. The book is a leftist, Marxist-inspired and Neo-Wittfogelian study on river usage and irrigation in the American West in the 19th and 20th centuries which criticizes Wittfogel but also continues his approach to the modern era. Worster speaks of the "capitalist state mode" as a development stage in irrigation history. While his study has pointed to the importance of irrigation for the new era and the intertwining of politics, planning, and the transformation of nature, its perspectives on nature and society seem one-sided and it does not try to explain the relation between irrigation and power in non-capitalist societies. D. Worster, *Rivers of Empire. Water, Aridity, and the Growth of the American West* (New York, Oxford 1985), p. 50.

22 J.M. Thurman, *Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present* (doctoral thesis, Indiana University, December 1999, UMI).

23 On this model and others that the author works with: *Ibid.*, pp. 4–9.

24 *Ibid.*, p. 13.

25 *Ibid.*, p. 117.

26 *Ibid.*, especially pp. 248–249.

Alexander Morrison devotes one chapter of his study on Russian tsarist rule in Samarkand to irrigation. Similar to Thurman, he concludes that the tsarist regime had failed to govern in Ferghana, and that its lack of influence resulted in widespread corruption.<sup>27</sup> Morrison's study compares Russian rule in Samarkand to British rule in India. When comparing both colonial regimes, Morrison states that the Russian administration, in contrast to that of the British, failed in its modernization efforts and should be recognized as having been ineffective and corrupt. He explains that this was mainly due to a lack of money, power, and expertise. For Central Asian peasants, however, Russian governance turned out to be more "humane" than British rule in India, where, among other things, there was much heavier taxation. Impoverishment and the loss of land were undoubtedly present in Turkestan, too, yet to a much lesser degree.

Two points of criticism about Thurman's and Morrison's evaluations of Russian rule in Turkestan seem justified. First, they use "corruption" as a normative concept, whereas the term needs to be historicized and questioned.<sup>28</sup> Second, their view of Russian rule and administration is too static. In fact, the nature of Russian rule was not unchanged during the five decades between the establishment of the general-governorship and the end of tsarist rule. Moreover, rule on the peripheries was complex, with multiple dimensions and layers. In the words of Paul Werth, the tsarist empire "simultaneously drew on several models of state organization: a traditional, dynastic, composite state; an emerging (incomplete) national state; and a modern colonial empire."<sup>29</sup> The traditional imperial policies, which included the hierarchical status and privileges of different groups and considerable leeway for non-Russian cultures and non-Orthodox religions, gradually gave way to the elements of a modern, homogenizing state, both with and without a colonial context.<sup>30</sup> This study, by contrast, at-

27 A.S. Morrison, *Russian Rule in Samarkand 1868–1910. A Comparison with British India* (Oxford et al. 2008), p. 237.

28 Judgments about "corrupt" officials do not explain much, whether in regard to how administration work actually proceeded or which guidelines and values were applied by certain individuals. The concept of "corruption" requires further scrutiny. It has been separated in recent Western historiography from its normative political core and regarded as rather a functioning, instead of malfunctioning, system. Cf. the criticism of "corruption" in Morrison's work by: J. Sahadeo, 'Russia's Place in an Imperial World', *Kritika* 11, 2 (2010), pp. 381–409, p. 399. New approaches to the subject of corruption: S. Schattenberg, *Die korrupte Provinz? Russische Beamte im 19. Jahrhundert* (Frankfurt a.M. 2008), pp. 53–56; J.I. Engels, 'Politische Korruption in der Moderne. Debatten und Praktiken in Großbritannien und Deutschland im 19. Jahrhundert', *Historische Zeitschrift* 282 (2006), pp. 313–349.

29 P. Werth, 'Changing Conceptions of Difference, Assimilation, and Faith in the Volga-Kama Region, 1740–1870', in J. Burbank, M. von Hagen, and A.V. Remnev (eds.), *Russian Empire. Space, People, Power, 1700–1930* (Bloomington 2007), pp. 169–195, p. 170.

30 On the tension between traditional empire and modern nation-state in the Russian Empire, compared with the British Empire, the Habsburg Monarchy, and the Ottoman Empire: J.

tempts to differentiate more precisely between the various periods in this process.

Other historians' contributions have treated irrigation construction as political and economic projects in an imperial context, focusing on engineers, entrepreneurs, and/or the tsarist and communist rulers.<sup>31</sup> These studies treat different periods leading up to the Second World War. They also represent very different approaches, including environmental history. The most elaborate work is the still unpublished PhD thesis by Maya Peterson, which is concerned, among other things, with the contribution of foreign experts to Central Asian irrigation and is attentive to regional developments transcending the Russian/Soviet borders.<sup>32</sup> Christian Teichmann has viewed irrigation and cotton growing in Uzbekistan from a political-history angle, embedding it into the history of pre-war Stalinism and Soviet nationality politics.<sup>33</sup>

Geographers, ethnographers, and others have concentrated on irrigation in Central Asia after the collapse of the Soviet Union. Some of them have critically evaluated Western development aid. Local studies of irrigation shed light on irrigation practice and its social implications.<sup>34</sup> The evaluation of agrarian policies, water resources and their uses in post-Soviet Central Asia illuminate the economic, political, and ecological problems that are partly a legacy of the Soviet period.<sup>35</sup>

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Leonhard and U. von Hirschhausen, *Empires und Nationalstaaten im 19. Jahrhundert* (Göttingen 2009).

31 E. Pravilova, 'River of Empire: Geopolitics, Irrigation, and the Amu Darya in the Late XIXth Century', *Cahiers d'Asie Central* 17–18 (2009), pp. 255–287; M. Joffe, 'Autocracy, Capitalism and Empire: The Politics of Irrigation', *The Russian Review* 54, 3 (1995), pp. 365–388.

32 M. Peterson, *Technologies of Rule: Empire, Water, and the Modernization of Central Asia, 1867–1941*. PhD Diss. (Harvard University 2011).

33 C. Teichmann, *Macht der Unordnung. Stalins Herrschaft in Zentralasien 1920–1950* (Hamburg 2016). See among his contributions on the subject also: C. Teichmann, 'Cultivating the Periphery. Bolshevik Civilizing Missions and 'Colonialism' in Soviet Central Asia', in S. Conrad, N. Heé, and U. Schaper (eds.), *Ordering the Colonial World Around the 20th Century. Global and Comparative Perspectives = Comparativ. Zeitschrift für Globalgeschichte und vergleichende Gesellschaftsforschung* 19, 1 (2009): 34–52 and C. Teichmann, 'Canals, Cotton, and the Limits of De-Colonization in Soviet Uzbekistan, 1924–1941', *Central Asian Survey* 26, 4 (2007), pp. 499–519.

34 See on both aspects the instructive study by: C. Bichsel, *Conflict Transformation in Central Asia. Irrigation Disputes in the Fergana Valley* (London 2009). Bichsel criticizes the overly simple and non-proven theories popular in development aid, like e.g. that ethnic groups equal conflict parties and tend to fight each other. *Ibid.*, pp. 34–37. She also stresses the importance of the upstream-downstream users' constellation for water distribution. *Ibid.*, pp. 49–52.

35 See among other publications by these authors: K. Wegerich, 'Water: The Difficult Path to a Sustainable Future for Central Asia', in T. Everett-Heath (ed.), *Central Asia. Aspects of Transition* (London 2003), pp. 244–263; E. Giese and J. Sehring, 'Konflikte ums Wasser. Nutzungskonkurrenz in Zentralasien', *Machtmosaik Zentralasien. Traditionen, Restrikti-*



The present study not only draws on existing (Western) research literature, but also on Soviet literature. In the 1970s, the four-volume “Irrigation of Uzbekistan” was published, a lavish series containing many maps and pictures that became the “bible” of Uzbek Soviet irrigators.<sup>36</sup> As with most other publications on irrigation and agriculture, the work is mainly an enumeration of successful Soviet construction projects with numerous figures and the names of scholars, engineers and shock workers. In Soviet literature, the tsarist period is largely depicted as having seen some promising beginnings but little in the way of results. It is often compared to the Soviet period, where mechanization and modern construction projects had finally become reality. The books by A. Mamedov on Russian and Central Asian irrigation experts before and after 1917 proved very useful for this study.<sup>37</sup> These and other Soviet publications contain essential information that cannot be easily gathered from sources. Indeed, when reading between the lines, it is possible to detect information about failures and grievances.

Another interesting type of Soviet literature is devoted to pre-revolutionary irrigation and deals with the practices of the indigenous population on the ground. Besides the works of Soviet ethnographers, there are contributions by Central Asian scholars that are ostensibly harmless short little publications of an ethnographic type yet contain important information on how irrigation actually worked before Soviet engineers started to build their canals and transform irrigation.<sup>38</sup>

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onen, *Aspirationen = Osteuropa* 57, 8–9 (2007, pp. 483–496; E. Giese, J. Sehring, and A. Trouchine, ‘Zwischenstaatliche Wassernutzungskonflikte in Zentralasien’, *Giessener Elektronische Bibliothek*, October 26, 2004, <http://geb.uni-giessen.de/geb/volltexte/2004/1823/> (accessed July 27, 2017) [2004b]; J. Sehring, *Kooperation bei Wasserkonflikten: die Bemühungen um nachhaltiges Wassermanagement in Zentralasien* (Mainz 2002); J. Sehring, ‘Die Aralsee-Katastrophe. Ein Nachruf auf das multilaterale Krisenmanagement’, *Machtmosaik Zentralasien. Traditionen, Restriktionen, Aspirationen = Osteuropa* 57, 8–9 (2007), pp. 497–510.

36 *Irrigatsiia Uzbekistana: v chetyrekh tomakh* (Tashkent, 1975–1981). Cf. Thurman 1999, p. 24.

37 A. Mamedov, *Russkie uchenye i razvitie irrigatsii Srednei Azii* (Tashkent 1968); A. Mamedov, *Irrigatsiia i irrigatory Uzbekistana* (Tashkent 1971).

38 As one example for the latter: G.J. Astanova, ‘Iz istorii vodopol’zovaniia v Karakul’skom tumane bukharskogo emirata vtoroi poloviny XIX – nachala XX veka’, *Obshchestvennye Nauki Uzbekistana* [in the following: ONU], 8 (1979), pp. 27–29. As an example for relevant ethnographic studies: M.V. Sazonova, *Traditsionnoe khoziaistvo uzbekov iuzhnogo Khozstva* (Leningrad 1978).

## People, Geography, and Agriculture

In view of the fact that agriculture, rural societies, and natural conditions of Central Asia are underrepresented in our historical understanding and gaps have necessarily emerged in the scholarship of various fields of study, the following introduction to Central Asia's population and geography, and to the subjects of irrigation and cotton growing in particular, is essentially interdisciplinary in nature.

The imperial desert dreams of tsarist and Soviet rulers and scholars concerned an area that is certainly rich in deserts and steppes. Geographically, the territory extends from the mountains. Turkmenistan and Uzbekistan belong to the wider region of Turan, bounded in the south and east by several high mountain ranges. The Hindukush forms the border to Afghanistan. The Tien Shan mountain system extends west to east. Between its ranges, there are mountain basins which are generally flat and characterized by steppe or desert conditions. The largest is the Fergana Valley, one of the most densely settled areas in Central Asia.

As with the Tien Shan, the Pamirs have numerous glaciers. Together they form the basis of the water source for Central Asia. The Kopet Dag Mountains in southern Turkmenistan are isolated from the other mountain systems. Their foothills contain rich wind-swept loess soils, while the base of the mountains is occupied by a strip of clayey desert.<sup>39</sup>

In the north, the basin of Turan is open to Siberia. Departing from the foothills of the mountains in the south, the area gradually and almost imperceptibly declines over hundreds of kilometers to the centre of the Aral Sea basin. The lowest point is not the Aral Sea, but the bottom of the Caspian Sea. There are other depressions that are below sea level, e.g. the Sarykamysh Lake at -42 m. In general, these lowlands of Turan are plains.<sup>40</sup>

About 80 % of the territory of modern Turkmenistan (488,100 km<sup>2</sup>) consists of desert. The desert Karakum (Turkic for: "black sand") is the biggest desert in Central Asia and covers about 350,000 to 380,000 km<sup>2</sup>.<sup>41</sup> It mostly consists of ridge sand. There are sand dunes that are held in place by psammophilic (sand-loving) vegetation and stretch longitudinally in the direction of the wind. Stretching in a nearly meridional direction, they once facilitated the movement

39 P. Sinnott, 'The Physical Geography of Soviet Central Asia and the Aral Sea Problem', in R. A. Lewis (ed.), *Geographic Perspectives on Soviet Central Asia* (London 1992), pp. 74–97, pp. 79–81; J. Stadelbauer, 'Zwischen Hochgebirge und Wüste. Der Naturraum Zentralasien', *Osteuropa* 57, 8–9 (2007), pp. 9–26, p. 9.

40 Létolle and Mainguet 1996, pp. 5–6.

41 Article "Garagum Desert" in: R.F. Abazov, *Historical Dictionary of Turkmenistan* (Lanham, MD 2005), pp. 65–66.

of the caravans. Crescent-shaped and mobile sand dunes called “barchans” are also typical for the Karakum and were feared by the indigenous population and the Russian colonizers alike. They form when sand-fixing vegetation is absent or damaged.<sup>42</sup>

With a territory of 447,400 km<sup>2</sup>, the largest desert in modern Uzbekistan is the Kyzylkum, which literally means “red sand”. It extends from the Aral Sea to the Tien-Shan over an area of about 250,000 km<sup>2</sup> in Uzbekistan and Kazakhstan. It, too, is a sandy desert that has ridge sand and sandy hills, but no mobile barchans.<sup>43</sup> Among the several other deserts and steppe areas of Uzbekistan, one deserves particular mention because of its central importance to this study: the Hungry Steppe situated southwest of Tashkent.<sup>44</sup>

Piedmont plains and loess foothills form a transitional area between the desert lowlands and mountains. They are found in an irregular belt adjacent to the mountains’ base. This area is divided into two parts: the first contains well-defined and dissected loess-covered foothills and low uplands as well as mountain spurs. The second, lower part of the Piedmont consists of a gradually sloping alluvial plain that eventually merges with the desert lowlands. Both are traditional areas of settlement.<sup>45</sup>

Central Asia’s geographical isolation to the south strongly influences its climate and natural conditions. The region’s climate is continental and continental-sub-tropical in the south.<sup>46</sup> Temperatures can rise to over 50° Celsius in the desert Kyzylkum.<sup>47</sup> In winter, temperatures can drop to minus 38° Celsius in the north-west of Uzbekistan.<sup>48</sup> In most parts of Uzbekistan and Turkmenistan, precipitation is low, accumulating between around 30 mm per year in the Hungry Steppe in certain years and 200 mm in the northern lowlands of Turan. In Ashgabat, precipitation reached an average of 230 mm per year in the first half of the 20<sup>th</sup> century.<sup>49</sup> Air humidity is generally very low.<sup>50</sup> Strong winds in the Aral Sea basin come from westerly and northerly directions, and low air pressure leads to heavy storms from January to April, mostly south and southeast of the Aral Sea.<sup>51</sup>

42 Sinnott 1992, p. 82.

43 Létolle and Mainguet 1996, p. 11; Sinnott 1992, p. 82.

44 See more detailed information on the Hungry Steppe in Chapter Three.

45 Ibid., p. 81.

46 Stadelbauer 2007, p. 16.

47 Létolle and Mainguet 1996, p. 42.

48 The winter temperature is from: *Usbekistan. Fünfzehn Jahre Unabhängigkeit*, ed. by Botschaft der Republik Usbekistan in der Bundesrepublik Deutschland (Berlin 2006), p. 8.

49 Just as a rough comparison: nowadays, Germany and the USA have around 500 to 1,000 mm of precipitation annually in most parts. Uzbekistan has between 100 and 330 mm, Turkmenistan from 76 to 305 mm annually.

50 Létolle and Mainguet 1996, pp. 41–42.

51 Ibid., p. 37.

Despite the usual perception, water resources in Central Asia are not insufficient per se or constrained. Surface water is rather concentrated in a limited number of (big) rivers and lakes.



Fig. 1: Survey map of the Aral Sea Basin. It shows the two major rivers, the Amu Darya and the Syr Darya, and the coastal lines of the Aral Sea in 1977 (when siltation had already begun) and in 2013

In 1960, when the Aral Sea was fed by two mighty rivers, it was the world's fourth biggest lake with a surface area of 66,458 km<sup>2</sup>.<sup>52</sup> As with all major rivers in Central Asia, they have their sources in the high mountains and carry melting snow and glacier waters down to the lowlands. The larger river is the Amu Darya. It was 1,445 km long from the point where its tributaries – the Piandsh and Wakhsh rivers – unite to the former coast of the Aral Sea.<sup>53</sup> Before major construction projects were undertaken in the 1950s, the water discharge of the river at the city of Kerki (today's Atamurat in eastern Turkmenistan) equaled 1,850 m<sup>3</sup>/s.<sup>54</sup>

52 Ibid., p. 54.

53 Ibid., p. 79. The Amu Darya's longer tributary, the Piandsh, emerges at the border of the Pamir and the Hindukush at 4,900 m height, and together with it the length of the Amu Darya amounts to 2,540 km.

54 Ibid., p. 83. In 1914, the geographer A.I. Voeikov indicated the average yearly runoff of the Amu Darya at 1,613 cubic meters per second at Chardzhou (Chärjew, today's Türkmenabad).

At 2,212 km long, the Syr Darya was the only feeder of the Aral Sea besides the Amu Darya.

With its longest tributary in the upper reaches, the river Naryn, it extended a total of 3,019 km.<sup>55</sup> Before 1914, the river had an average runoff of 671 m<sup>3</sup>/s near the Hungry Steppe.<sup>56</sup>

The water levels of both rivers depend on the melting waters from the mountains and are unstable. While the Amu Darya has two periods of seasonal high water – a smaller one in April/May due to the melting mountain snow and a bigger one in June/July caused by glacier melting – the Syr Darya has only one such period in June. The considerable disparity in the water levels in relation to the time of year may be indicated by the following example: in 1947, the Syr Darya carried 436 m<sup>3</sup>/s in January and 1,640 m<sup>3</sup>/s in June at the point where it exits the Ferghana Valley.<sup>57</sup>

Additionally, the high level of alluvium that is characteristic of both rivers made their waters enormously valuable for usage in agriculture. The Amu Darya's waters are especially rich in phosphates, lime, and potassium. Until 1960, the river carried more sediment than any other river in the world (210 million tons per year and more recently 128 million tons). As a result of its relatively high speed of water flow and the low cohesion of the materials that make up its embankments, the river is highly susceptible to erosion. Because of the fine texture of the alluvium, the river's course tends to change quickly, as does the depth of its bed.<sup>58</sup> As a consequence, the Amu Darya came to be known to Russian and Soviet writers as an even "capricious" river.

Agriculture in the region, which dated back millennia, was an oasis economy limited to a relatively small area surrounded by steppe or desert lands. Travelers from Russia or Western Europe have long been impressed by the contrast between the "barren" steppe and the green of the oases. Fruits and vegetables, rice, grain and cotton have been cultivated for many centuries. The date of the introduction of cotton as an annual plant to Central Asia is not known.<sup>59</sup> In Central

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Woeikof, 'Die Gewässer Russisch-Turkestans und die Zukunft der Bodenkultur des Landes', *Zeitschrift der Gesellschaft für Erkunde zu Berlin* (1914), pp. 341–355, p. 343.

55 Létolle and Mainguet 1996, p. 88.

56 Woeikof 1914, p. 343.

57 Létolle and Mainguet 1996, p. 91. Woeikov compared the differences between maximum and minimum of water levels of the Amy Darya and Syr Darya to those of the Nile and Volga in 1914. While the difference was relatively small in the case of the Syr Darya being 3,6 : 1, the Amu Darya's equaled the Volga's with 9 : 1. The Nile's water levels differed far greater with 22 : 1. Woeikof, 1914, p. 343.

58 Sinnott 1992, p. 83; Létolle and Mainguet 1996, pp. 83–85.

59 Cotton was first cultivated 7,000 years ago by the inhabitants of the Indus Valley. In Iran (Persia), the history of cotton dates back to the Achaemenid era (5th century B.C.); however, there are few sources about the planting of cotton in pre-Islamic Iran. The planting of cotton was common in Merv and other parts of Iran. As a comprehensive introduction to cotton

Asia, the crop is sown in spring and harvested in autumn. Its spiny capsules are harvested when they are ripe. They are then separated from the white cotton fiber, which has to be cleaned of seeds and dirt. The length and quality of the cotton fiber are important for its usage in textile production. The fiber of long-staple cotton can reach up to 51 mm in length, compared to the usual 24–27 mm.<sup>60</sup> In the 20<sup>th</sup> century, many attempts were made to grow long-staple cotton in Central Asia, which had previously been imported, mainly from Egypt.

In general, the successful cultivation of cotton requires a long frost-free period, plenty of sunshine, and moderate rainfall, usually between 600 to 1,200 mm (24 to 48 inches). Soils normally need to be fairly heavy, although they do not need to have an especially high concentration of nutrients. Cotton is fairly salt and drought tolerant, and can thus be cultivated in arid and semiarid regions. Due to the climatic conditions and high temperatures with low precipitation in summer and the characteristics of the water resources, cotton growing and agriculture typically required man-made irrigation systems in most areas of Central Asia. Where precipitation was sufficient, *bogara* fields could be cultivated without irrigation systems, although their sizes depended on the season's rainfalls.<sup>61</sup>

Irrigated agriculture usually was small-scale and tenuous, especially in the large, densely populated areas of Bukhara, Khiva, and in the Ferghana valley. Irrigation systems have existed for many centuries and were usually derived from rivers. They accordingly depended on the rivers' water levels. Fortunately, water levels were high in the summer at the peak of the vegetation period and low in winter when water was only needed for preparatory irrigation.

Irrigation systems differed regionally and locally and were interwoven with the social and political organization of the respective societies. It is not easy to historically reconstruct the forms and usage of irrigation systems, and existing information is often difficult to date. Some of the main features of irrigation in the 19<sup>th</sup> century will, nevertheless, be presented here. The most detailed knowledge of irrigation is available for Khiva, where irrigation was especially labor-intensive. The following, however, generally holds true for several other areas as well.

First, there were "archaic" forms of irrigation that continued to be used well into the 20<sup>th</sup> century such as by diverting a water course into a depression that

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with many aspects see: C.W. Smith and J.T. Cothren, *Cotton. Origin, History, Technology, and Production* (New York 1999).

60 The history of long staple cotton is not explored well. Genetically, it has a complex ancestry. Cf. *Ibid.*, p. 154.

61 *Bogara* is the Russian term for dry farming which was known in the region as *bāharikarlik* to the Uzbeks and *baharikari* or *lalmikari* to the Tajiks. I.M. Matley, 'The Golodnaya Steppe: A Russian Irrigation Venture in Central Asia', *Geographical Review* 60, 3 (1970), pp. 328–346, footnote 1, p. 328.