

# Reinventing the Steppe: The Agromeliorative Complex in the Russian Periphery

**Timm Schönfelder**

Leibniz Institute for the History and Culture of Eastern Europe, GWZO,  
[timm.schoenfelder@leibniz-gwzo.de](mailto:timm.schoenfelder@leibniz-gwzo.de)

On July 1, 1978, Stavropol's First Party Secretary, Mikhail Gorbachev, enthusiastically wrote to General Secretary Leonid Brezhnev. He thanked him for all the good irrigation had brought to his region since the Central Committee's plenary session in May of 1966, when "melioration" (*melioratsiia*) became the staple ideology of Soviet agriculture.<sup>1</sup> In the words of Gorbachev, this formed the basis for crop cultivation and benefited animal husbandry greatly. The advent of the river Kuban's waters in the dry steppe of the North Caucasus was to radically change the lives of the workers for the better.<sup>2</sup> Unfortunately, modern irrigation technology as a panacea to increase agricultural productivity brought with it problems of water shortage and soil erosion as they were witnessed in all the "hydraulic societies" around the world.<sup>3</sup>

As this paper shows, Gorbachev's remarks were symptomatic for the underlying imaginaries of steppe reclamation in southern Russia that are deeply rooted in tsarist times. It argues that the idiosyncrasies of the Soviet system hindered a deeper understanding of the local steppe biome and the implementation of locally well-adapted farming methods. This contributed to the rise of an *agromeliorative complex* that, from 1965, was spearheaded by the highly influential Ministry of Melioration and Water Management (*Minvodkhoz*). The steppe became a showcase for ideals of progress where large-scale technical solutions ruled supreme and trumped attention to detail. In this regard, the region under scrutiny serves as a prism through which the evolution of a high-modernist ideology, mirrored in both state policies and local agency, can be closely observed.

## Under the Plough—the Steppe as an Agricultural Imaginary

With the expansion of Muscovy to the south and east of Eurasia, the steppe was encountered as a hostile and undeveloped territory that served as a buffer

1. The term *melioratsiia*, usually translated as "land-reclamation" or "amelioration," had acquired a limited scope in the Soviet Union. Rather than referring to a set of practices that improve the quality of soils like irrigation, drainage, tillage, fertilization, pest control, and crop rotation, "melioration" focused on the hydrological aspects of soil reclamation: Ol'ga Ivanovna Alekseenko, "Partiino-gosudarstvennoe rukovodstvo stroitel'stvom Bol'shogo Stavropol'skogo kanala, 1966–1975 gg.," *Istoricheskaia i sotsial'no-obrazovatel'naia mysl'* 8, no. 2 (2016): 41–46; here 41.

2. Gosudarstvennyi arkhiv Rossiiskoi Federatsii (hereafter GARF) fond (f.) R-5446, opis' (op.) 112, delo (d.) 944, listy (ll.) 37–38 (Po voprosam mekhanizatsii meliorativnykh rabot).

3. Julia Obertreis, Timothy Moss, Peter P. Mollinga, and Christine Bichsel, "Water, Infrastructure and Political Rule: Introduction to the Special Issue," *Water Alternatives* 9, no. 2 (June 2016): 168–81.

between Russia and its “barbaric” enemies. Successively, it was colonized by Cossack and other forces, and secured through a system of fortified villages (*stanitsy*).<sup>4</sup> Russia’s victory in the first Russo-Turkish War (1768–1774) brought the territories on the right bank of the Kuban under its control.<sup>5</sup> In the course of the nineteenth century, the empire’s southern borders were expanded through targeted settlement, the ethnic cleansing of local peoples like the Circassians (Adyghe), and the “exodus” of the Nogais and others to the Ottoman empire during the Caucasian War (1817–1864) and after.<sup>6</sup> Military encampments like Stavropol’ (founded in 1777) and Yekaterinodar (1793, renamed Krasnodar in 1920) soon became cities that attracted civilian settlers who were generously offered land and credit by the state while being exempt from taxes and military service.<sup>7</sup>

Over time, the frontier became a borderland, and the Greater Caucasus Mountains (*Bol’shoi Kavkaz*), ranging from the Taman Peninsula by the Sea of Azov to the Absheron Peninsula by the Caspian Sea, marked not only a natural, but also a cultural boundary between Orient and Occident.<sup>8</sup> From the 1670s until 1896 about ten million people moved south, of which a third arrived in the last quarter of the nineteenth century alone. By 1897, about 2.5 million farmers settled along the Kuban River and in today’s southern Ukraine. With the indigenous population either displaced or assimilated, the steppe had lost its function as a space of cultural exchange, of negotiation and mediation between Russia and its neighbors.<sup>9</sup> As a result, steppe imaginaries evolved towards the fin de siècle: the conquest of the semi-arid wilderness became a project of national consolidation. This was mirrored in political and scientific discourse, especially on the causes of climate change in the steppe where precipitation seemed to decrease.<sup>10</sup>

4. Brian J. Boeck, “Containment vs. Colonization: Muscovite Approaches to Settling the Steppe,” in Nicholas B. Breyfogle, Abby Schrader, and Willard Sunderland, eds., *Peopling the Russian Periphery: Borderland Colonization in Eurasian History* (London, 2007), 41–60.

5. V.N. Prokhorov and I.Iu. Bondar’ eds., *Ekaterinodar–Krasnodar 1792–1993: Dva veka goroda v datakh, sobytiia, vospominaniia. Materialy k letopisy* (Krasnodar, Russia, 1993), 11.

6. Marie-Carin von Gumpfenberg and Udo Steinbach, eds., *Der Kaukasus: Geschichte—Kultur—Politik* (Munich, 2010), 64–79; and Jeronim Perović, *Der Nordkaukasus unter russischer Herrschaft: Geschichte einer Vielvölkerregion zwischen Rebellion und Anpassung* (Cologne, 2015).

7. David Moon, “Peasant Migration and the Settlement of Russia’s Frontiers, 1550–1897,” *The Historical Journal* 40, no. 4 (December 1997): 859–93; V.V. Kas’ianova and N.S. Korotkogo, eds., *Istoriia Kubani: Uchebnoe posobie* (Krasnodar, 2005), 85–122; and Michael Khodarkovsky, *Russia’s Steppe Frontier: The Making of a Colonial Empire, 1500–1800* (Bloomington, Ind., 2002), 217–20.

8. Michael Khodarkovsky, “Why Is There No Switzerland in the North Caucasus? Some Thoughts on Empire and Identity,” in Guido Hausmann and Angela Rustemeyer, eds., *Imperienvergleich. Beispiele und Ansätze aus osteuropäischer Perspektive: Festschrift für Andreas Kappeler* (Wiesbaden, 2009), 319–35.

9. Moon, “Peasant Migration,” 867–68; and V.M. Viktorin, “Rossiiskoe gosudarstvo i kochevye narody,” in Iu.V. Krivosheeva, ed., *Rossia i stepnoi mir Evrazii* (St. Petersburg, 2006), 319–58.

10. David Moon, “The Debate over Climate Change in the Steppe Region in Nineteenth-Century Russia,” *The Russian Review* 69, no. 2 (April 2010): 251–75.

As a response to the harvest failure and the ensuing famine of 1891/92, scientists and state representatives pondered the necessity of complex means of soil amelioration.<sup>11</sup> The doyen of Russian climatology, Aleksandr Voeikov (1842–1916), was among the first to consider irrigation in the Kuban region.<sup>12</sup> His claim that “even the Sahara’s soil is fertile when there is water” laid the example for later endeavors.<sup>13</sup> Several military expeditions had already conducted research on the specific conditions for agriculture in the North Caucasus at the time. While their reports were inclined to promoting extensive measures for land reclamation as a prerequisite for higher yields, finance minister Sergei Witte (in office 1892–1903) preferred to see state investment concentrated on industry. In his eyes, these expeditions “served only to confirm that large-scale irrigation was not a viable solution in the steppe region.”<sup>14</sup> Without determined support by the state and hindered by revolution and war, hydro-amelioration made few advances until the late 1920s, when collectivization reordered the sphere of agriculture in the North Caucasus (Figure 1).

Before the October revolution, grain cultivation spanned from the Kuban river in the west to the Kuma River in the east, and from the Manych River in the northwest to the town of Mozdok, fifty miles north of Vladikavkaz on the left bank of the Terek. Grain export was a major economic factor for the Russian empire, and the local black earth (*chernozem*) as well as the brighter chestnut soils (*kastanozem*) in the drier areas to the northeast ranked among the world’s most fertile grounds for agriculture.<sup>15</sup> Especially the chernozem was hailed as “a symbol of the glory and strength of the Russian state,” “the most important national treasure,” and “Russia’s main provider.”<sup>16</sup> Except for several minor irrigation canals along the Terek and Malka rivers, the drier steppe areas remained without artificial sources of water as the aquifers were too deep to be reached by wells. Just as Voeikov had suggested, these areas were used for sheep and cattle. However, overgrazing in the steppe soon exacerbated the damage of dry, hot winds from the east (the *sukhovei*).<sup>17</sup> Known “methods aimed to work *with* the steppe environment, rather than combat or struggle against it,” enforcing fallow and crop rotation, were often neglected.<sup>18</sup>

11. David Moon, “Agriculture and the Environment on the Steppes in the Nineteenth Century,” in Breyfogle, ed., *Peopling the Russian Periphery*, 81–105; and Jan Arend, *Russlands Bodenkunde in der Welt: Eine ost-westliche Transfergeschichte, 1880–1945* (Göttingen, 2017), 90–92.

12. B.S. Maslov, *Ocherki po istorii melioratsii v Rossii* (Moscow, 1999), 226–30.

13. Aleksandr Ivanovich Voeikov, “Iskusstvennoe oroshenie i ego primenenie na Kavkaze i v Srednei Azii,” in *Izbrannye sochineniia. Tom 4*, ed. A.A. Grigor’ev (Moscow, 1957), 146–63, here 146.

14. David Moon, *The Plough that Broke the Steppes: Agriculture and Environment on Russia’s Grasslands, 1700–1914* (Oxford, 2013), 239.

15. Aleksandr Aleksandrovich Nikonov, *Proizvodstvennye tipy kolkhozov i sovkhovov Stavropol’ia* (Stavropol’, 1973), 18, 27.

16. A.P. Shcherbakov, I.I. Vasenev, ed., *Antropogennaia evoliutsiia chernozemov* (Voronezh, 2000), 16–23.

17. Moon, *The Plough*, 142.

18. David Moon, “The Steppe as Fertile Ground for Innovation in Conceptualizing Human-Nature Relationships,” *Slavonic and East European Review* 93, no. 1 (January 2015): 32.



**Figure 1. Map of the Caucasus showing the rivers Kuban, Yegorlyk, Kalaus, Kuma and Terek (from west to east). Image creator credit: Manana Kurtubadze, available at <https://www.grida.no/resources/5333>.**

It was not until the advent of Soviet power that major irrigation projects were undertaken, as large-scale engineering solutions were considered not only a prerequisite for civil settlement, but a form of modernity that promised social progress and material wealth.<sup>19</sup> The steppe, which was a “zone of innovation” during the nineteenth century that inspired the evolution of genetic soil science as a holistic approach to agriculture, became a showcase for technological advancement and man’s dominion over nature as a new driving geological force.<sup>20</sup> In the mid-1980s, this introduction of “Asian and Egyptian irrigation principles and techniques” was openly criticized by Soviet pedologists like Viktor Kovda (1904–1991), who for decades had seriously doubted the suitability and sustainability of such measures on European soils.<sup>21</sup>

19. Julia Obertreis, *Imperial Desert Dreams: Cotton Growing and Irrigation in Central Asia, 1860–1991* (Göttingen, Germany, 2017), 76–81; and Ewald Blocher, *Der Wasserbau-Staat: Die Transformation des Nils und das moderne Ägypten, 1882–1971* (Paderborn, Germany, 2016).

20. Moon, “The Steppe,” 20; and Dey Ber Krimgold, “USSR: Conservation Plan for the Steppe and Timber-Steppe Regions,” *Land Economics* 25, no. 4 (November 1949): 336–46.

21. Viktor Kovda, “Kak pomoch’ nashim chernozemam,” *Nash Sovremennik*, no. 7 (1986): 124.

## Social Upheaval through Wars and Collectivization

Following WWI and the revolutions of 1917, the North Caucasus was especially affected by the ensuing civil war and famine of 1921.<sup>22</sup> In November of 1926, Stavropol's Party organs decided to propagate collectivization through the formation of collective farms (*kolkhozes*), "tractorization," and the struggle with supposed "kulaks" (*kulatskie elementy*) in the villages.<sup>23</sup> By September of 1929, however, the number of agricultural collectives had risen to a mere ninety-two, officially on a voluntary basis.<sup>24</sup> Collectivization turned brutal in the North Caucasus when the local population protested Stalin's policy of grain requisitioning (*khlebozagotovka*), which was again followed by famine.<sup>25</sup> By 1933, the situation had worsened drastically: in January and February more than 40,000 people died of hunger. The death toll reached its peak in April and May with 120,000 victims. During the year 1933, more than 424,000 people perished; another 100,000 were incarcerated, and 26,000 of them deported to Kazakhstan and the far north.<sup>26</sup>

As a result of forced collectivization and so-called "dekulakization," more than one million farmers and farm workers fled either to cities or to construction sites all over the USSR. This meant not only the loss of valuable agricultural knowledge, but also of productive forces in the countryside.<sup>27</sup> The rural exodus prepared the ground for large-scale solutions that were to be implemented without special local expertise. At the end of 1937, 2,433 *kolkhozes* existed along the Kuban River with more than 360,000 workers. The degree of mechanization remained low, however, and the use of horses was still common.<sup>28</sup> Most of the work on the fields was done through manual labor. The fledgling chemical industry, tasked with the development of fertilizers, focused on the production of weapons and ammunition instead.<sup>29</sup> Not until

22. Jonathan D. Smele, *The "Russian" Civil Wars, 1916–1926: Ten Years That Shook the World* (New York, 2015).

23. Party Archive of Stavropol' Krai (PASK) [now State Archive of the Newest History of Stavropol' Krai (GANISK)], f. 5938, op. 1, d. 9, ll. 157–158ob. cited in D.V. Kochura, ed., *Nash krai: Dokumenty, materialy (1917–1977 gg.)* (Stavropol', 1983), 121–22.

24. State Archive of Stavropol' Krai (GASK), f. R-602, op. 1, d. 207, ll. 63–67, in Lutsenko, *Nash krai*, 133–34.

25. N.A. Tokareva, "Problema goloda 1932–1933 gg. na Severnom Kavkaze," *Gumanitarnye i sotsial'nye nauki* no. 3 (2010): 268–77; and V.V. Kondrashin, "Golod 1932–1933 godov—obshchaia tragediia narodov SSSR," *Izvestiia PGPU* 11, no. 15 (2009), 117–20.

26. N.A. Ivnikskii, *Golod 1932–1933 godov v SSSR: Ukraina, Kazakhstan, Severnyi Kavkaz, Povolzh'e, Tsentral'no-Chernozemnaia oblast', Zapadnaia Sibir', Ural* (Moscow, 2009), 210–12.

27. Oleg Vital'evich Khlevniuk, Robert W. Davies, Larisa A. Rogovaya, Edward Rees, and Liudmila P. Kosheleva, eds., *Stalin i Kaganovich: Perepiska, 1931–1936 gg.* (Moscow, 2001), 14.

28. A.P. Skorik, V.A. Bondarev, "Mekhanizatsiia agrarnogo proizvodstva Krasnodarskogo kraia v 1937–1941 gg.: dinamika modernizatsii," in V.E. Shchetnev and A.A. Zaitsev, eds., *Sotsial'no-ekonomicheskie, politicheskie i istoricheskie aspekty razvitiia Kubani* (Krasnodar, 2007), 262–65.

29. R.W. Davies, Mark Harrison, Oleg Khlevniuk, and Stephen G. Wheatcroft, *The Industrialisation of Soviet Russia Volume 7: The Soviet Economy and the Approach of War 1937–1939* (London, 2018), 216–22.

the 1970s did “chemicalization” (*khimizatsiia*) take a hold around Stavropol’.<sup>30</sup> In its wake, misuse of pesticides was common as farm workers seldom knew the correct dosage.<sup>31</sup> This eventually led to an increased child mortality, notably higher cancer rates among women, and the mass extinction of fish in the Kuban River.<sup>32</sup>

In the eyes of political leaders, both the forced industrialization of the first five-year plan (1928–1932) and the evolution of large-scale agriculture through collectivization required the expansion of a hydrotechnical infrastructure. Thus, the Russian periphery was to be integrated into the Soviet system under the guise of modernization.<sup>33</sup> As the 1920-GOËLRO-plan on the electrification of Soviet Russia remained unfulfilled by 1937, several small and medium-sized hydropower-stations along the Kuban River were projected to satisfy the ever-increasing energy demand.<sup>34</sup> Canals were designed to divert water to the fields. The hydrotechnical complex Laba-Urup-Kuban to the south, between the two cities of Krasnodar and Stavropol’, became “the most important endeavor in creating a hydro-technical basis for the evolution of arable and horticultural crops. . .cattle breeding. . .regional water supply, and the fight against floods.”<sup>35</sup> However, pedologists and other experts tasked with evaluating this project by the State Planning Committee (*Gosplan*) identified several problems early on: they especially doubted the overall profitability of the complex, as energy production was only feasible on the largest tributaries of the Kuban River. Also, its water quality was fluctuating and seldom corresponded to the official standards for potability. Its high mineralization rate largely prohibited its use for irrigation.<sup>36</sup> The lack of a concerted approach delayed the development of hydropower along the Kuban well into the 1950s.<sup>37</sup> With the discovery of seemingly cheap fossil fuels in Siberia, the “hydroenergetic decade” (Klaus Gestwa) came to an end before the majority of these ideas were realized in the North Caucasus.<sup>38</sup> What remained of the

30. GARF, f. A-259, op. 46, d. 6213 (Okhodestroitel’stva Krasnodarskogo khimicheskogo zavoda Ministerstva khimicheskoi promyshlennosti SSSR).

31. Timm Schönfelder, “Bodenerosion und Pestizidbelastung: Das Erbe des Reisanbaus im Gebiet Krasnodar,” *Osteuropa* 70, no. 7–9 (2020): 319–30.

32. Lev Aleksandrovich Fedorov and Alexei Vladimirovich Yablokov, *Pesticides. The Chemical Weapon that Kills Life: The USSR’s Tragic Experience* (Sofia, 2004), 27, 49–50; Krasnodarskii kraevoi komitet okhrany okruzhaiushchei srede i prirodnykh resursov ed., *Aktual’nye ekologo-gigienicheskie problemy Severnogo Kavkaza* (Krasnodar, 1995), 1–4, 109–14, 119–22; GARF, f. R-5446, op. 108, d. 961, ll. 56, 66ob (Ob uskorenii rabot po osvoeniiu Priazovskikh plavnei. . .); and State Archive of Krasnodar Krai (GAKK) f. R-687, op. 1, d. 1944, ll. 33, 42 (Ob organizatorskoi rabote Pavlovskogo raiispolkoma. . .).

33. Julia Obertreis, “Infrastrukturen im Sozialismus: Das Beispiel der Bewässerungssysteme im sowjetischen Zentralasien,” *Saeculum* 58, no. 1 (2007): 151–82.

34. Rossiiskii gosudarstvennyi arkhiv ekonomiki (RGAE), f. 4372, op. 35, d. 224v, ll. 3–6, 137–43 (Tekhniko-ekonomicheskii doklad o Labino-Urupo-Kubanskom komplekse. . .).

35. RGAE f. 4372, op. 35, d. 224d, l. 20 (Tekhniko-ekonomicheskii doklad. . .).

36. RGAE f. 4372, op. 35, d. 224d, ll. 3, 14, 45–46, 50, 96.

37. RGAE f. 4372, op. 50, d. 679, l. 2 (Materialy po vodokhoziaistvennym meropriiatiiam v Krasnodarskom krae).

38. Klaus Gestwa, “Technik als Kultur der Zukunft. Der Kult um die ‘Stalinschen Großbauten des Kommunismus,’” *Geschichte und Gesellschaft* 30, no. 1 (January-March 2004): 37–73.

hydrotechnical complex was the practice of irrigation, which originally was more of an offshoot of hydropower than a truly independent branch.

Because of the diverse geographical and climatic makeup that ranged from humid, mountainous areas in the south to the semi-arid steppe in the northeast, Stavropol' became—in the words of the last president of the Lenin All-Union Academy of Agricultural Sciences (*VASKhNIL*), Aleksandr Nikonov, (1984–1992)—a “laboratory”; a testing ground for Soviet agriculture.<sup>39</sup> The region's abundant resources—water from the mighty rivers that spring from the Caucasus mountains, and the fertile chernozem and kastanozem of the plains—were to be exploited in an exemplary way through the construction of an extensive network of canals, pumping stations, and sprinkler systems. One of the major projects to reclaim Stavropol's steppe was greenlighted by the Council of People's Commissars in April of 1935. Until year's end, the construction trust *Terstroj* in Pyatigorsk, about eighty-five miles southeast of Stavropol', was tasked with developing a scheme that would ensure water-supply on 3.5 million hectares of land and create an irrigation infrastructure on a tenth of this area between the rivers Kuban, Kalous and Yegorlyk.<sup>40</sup> The first important step was excavating the Nevinnomyssk Canal to divert water from the Kuban to the Yegorlyk across a distance of about thirty miles. Although construction started in 1936, the first section was finished only in 1948—at the same time as the Svistukhinskaia hydroelectric power plant, which was one of the few connected to the grid.<sup>41</sup> Apart from the often-uncoordinated planning and an overall lack of machinery and building material, the turmoil and destruction of the Great Patriotic War and German occupation were eventually blamed for the delay.<sup>42</sup>

Following the example of the Great Fergana Canal in Central Asia, which had been finished in 1939 in just forty days through forced labor, the Nevinnomyssk Canal was also designated a “people's construction site” (*narodnaia stroika*), to be built by the local population under harsh conditions.<sup>43</sup> This proved extremely problematic for kolkhoz workers as it did not allow them to tend to their fields and animals while they were on site. Further food shortages and hunger were the result. Additionally, the kolkhozes had to carry a great part of the financial load: in the case of the Nevinnomyssk Canal, it was half of the overall capital investment.<sup>44</sup> In 1940 alone, more

39. Nikonov, *Proizvodstvennye tipy*, 4, 15.

40. GARF, f. A-341, op. 4, d. 1522 (Dorabotka vodokhoziaistvennoi skhemy basseina r. Kubani); and A.A. Kondratenko, *Ispytanie vodoi. 55-letie Pravo-Egorlykского kanala* (Stavropol', 2015), 7. *Terstroj* was a predecessor to the mighty North Caucasian Institute for Water Management and Melioration Design “Sevkavgirovodkhoz,” created in 1970.

41. PASK, f. 1, op. [?], d. 182, ll. 133–35, in Lutsenko, *Nash krai*, 174.

42. Speech on the fourth five-year plan by the Secretary of the Stavropol' City Party Committee (*Gorkom*), A.N. Popov, at the 23rd Plenary Session of the Stavropol' Regional Party Committee on May 28, 1946 in PASK, f. 1, op. 1, d. 1205, ll. 2, 6–7, cited in Lutsenko, *Nash krai*, 259–60.

43. On the Great Fergana Canal, see Christian Teichmann, *Macht der Unordnung: Stalins Herrschaft in Zentralasien, 1920–1950* (Hamburg, 2016), 211–20; and Maya K. Peterson, *Pipe Dreams: Water and Empire in Central Asia's Aral Sea Basin* (Cambridge, Eng., 2019), 308–16.

44. GARF, f. R-5446, op. 25a, d. 8468, ll. 167–68 (O meropriiatiakh po obvodneniiu, vodosnabzheniiu i orosheniiu Stavropol'ia).

than 50,000 *kolkhozniki* were forced to help in construction, among them 15,000 adolescents, mobilized by the *Komsomol* (Communist Youth League) as “shock workers.”<sup>45</sup> In the glorious language of Party propaganda, “poverty, famine and the ruin of local farmers” were to be issues of the past, as the new “efficient technology” of these canals would conquer nature. “Water is the source of life. Water can transform Stavropol’ into a blooming region; it allows raising grain, cotton, fruits, and vegetables to abundance!,” a local newspaper promised.<sup>46</sup> At least 45,531 Gulag prisoners lived in no less than ten different settlements all over Stavropol’ during these times. They were forced to work in road construction and the timber industry, but also in agriculture and hydrotechnical projects.<sup>47</sup> After the reorganization of the GULag-system in the mid-1950s, the Ministry of Internal Affairs continued to produce irrigation equipment in its corrective colonies until the fall of the Soviet Union.<sup>48</sup> Thus, the project to reclaim the steppe was not only a mission to cultivate its semi-arid “wilderness” but also to subjugate and “civilize” the undesired elements of Soviet society.

In order to evaluate the designs for water-supply and irrigation of Stavropol’s steppe through the Nevinnomyssk Canal, Gosplan had put together an expert commission of soil scientists, geologists, and engineers that convened in Moscow from September 1 to November 26, 1938. Even though they generally supported the project in their final report, they explicitly warned of its very high water consumption: while irrigated fields encompassed less than three percent of the whole area supplied with water, they used almost a third of the local resources. Especially in the semi-arid regions to the north, this was considered unnecessarily wasteful. To lower the risks of water logging and soil salinization, the commission furthermore underlined the need for drainage on at least 36 percent of the fields.<sup>49</sup> Their warnings, however, were not heeded.

The discussion whether to build drainage systems or not was of a highly ideological nature. It culminated in the late 1940s when the agronomist and charlatan Trofim Lysenko (1898–1976) became the president of the Lenin All-Union Academy of Agricultural Sciences (*VASKhNIL*). Soil scientist Viktor

45. PASK, f. 1, op. 1, d. 470, ll. 167–168; and PASK, f. 1, op. 1, d. 462, 1. 7—both in Lutsenko, *Nash krai*, 183, 186–87.

46. *Ordzhonikidzevskaia pravda*, February 21, 1940 in Lutsenko, *Nash krai*, 177–78.

47. Larisa Bakhmatskaia, “‘Ne nazyvaiut takie mogily bratskimi.’ Pod Stavropol’em Otkrytaia Rossiia nashla zakhoroneniia vremeni GULAGa,” *Otkrytaia Rossiia* at [openrussia.org/notes/709794/](http://openrussia.org/notes/709794/) (accessed May 31, 2021, no longer available); and Memorial’s virtual GULag-map (in German) at [www.gulag.memorial.de/maps/map5.html](http://www.gulag.memorial.de/maps/map5.html) (accessed February 9, 2022).

48. GARF, f. R-5446, op. 110, d. 1084, 1. 234 (O plane melioratsii zemel’ na 1976–1980 gody. . .). Production was carried out by the penal colony IPK-2 in Engels, among others, see “FKU UK-2 UFSIN Rossii po Saratovskoi oblasti,” *Ofitsial’nyi sait UFSIN Rossii po Saratovskoi oblasti*, at [www.64.fsin.ru/structure/fku-ik-2-ufsin-rossii-po-saratovskoy-oblasti.php](http://www.64.fsin.ru/structure/fku-ik-2-ufsin-rossii-po-saratovskoy-oblasti.php) (accessed February 9, 2022).

49. GARF, f. R-5446, op. 24, d. 4184, ll. 1–7 (Svodnoe zakliuchenie ekspertnoi komissii Gosplana pri SNK SSSR po rassmotreniiu skhemy orosheniia i obvodneniia Stavropol’ia i tekhnicheskogo proekta Nevinnomysskogo kanala); see also RGAE, f. 8390, op.1, d. 925, ll. 1–4 for the VASKhNIL-Session on April 25, 1936 (Postanovleniia plenuma sektsiia gidrotekhniki melioratsii po bor’be s zasoleniem zemel’ v oroshaemykh raionakh).



Kovda, who propagated the installation of drainage systems as part of a comprehensive method of soil reclamation, was harshly attacked as a proponent of “reactionist theories in pedology” that “played into the hands of the enemies of Communism” by the hydrologist Vagram Shaumian (1908–1964), a proponent of Lysenkoism, and representatives of Gosplan in a series of talks and articles.<sup>50</sup> Thus, as a result of Soviet science politics under Stalin and Khrushchev, who kept Lysenko as a personal advisor after the dictator’s death in 1953, the criticism of melioration as wasteful remained unmitigated until the late 1980s when Gorbachev reorganized the agricultural sector.<sup>51</sup> The preference for large-scale solutions, often implemented with insufficient observance of local conditions, was the most striking systemic flaw of the USSR’s centrally administered economic planning body. It was also one of the main reasons for its failure to establish a sustainable and self-reliant system of land reclamation.

### From Post-War Reconstruction to Large-Scale Infrastructures

On the eve of the German attack on the Soviet Union in June 1941, the basic outlines for the hydro-ameliorative infrastructure were drawn: since the late 1920s, Krasnodar had developed a strong focus on rice cultivation while Stavropol’s canals kept expanding into the dry steppe.<sup>52</sup> After the war, however, agriculture was in a deep crisis: not only was the highly fertile black earth in Ukraine and southern Russia riddled by the brutal fighting and scorched earth-tactics of both the Wehrmacht and the Red Army, it also lacked laborers.<sup>53</sup> Furthermore, the consequences of collectivization and dekulakization were strongly felt in the Soviet village: most kolkhoz workers continued to live in poverty, and they were in dire need of specialized tools and a formal agricultural education. The continuing rural exodus could not be contained.<sup>54</sup> The famine of 1946–47, which resulted from a long period of drought, claimed more than one million lives.<sup>55</sup> This catastrophe was later described by the Minister of Melioration and Water Management (*Minvodkhoz*)

50. Maslov, *Ocherki po istorii melioratsii*, 327–36, 359–67.

51. Lysenko substantially influenced the reclamation of the supposed “virgin lands” in Kazakhstan, Ukraine, and southern Russia that tried to turn the Eurasian steppe belt into an agricultural powerhouse: Marc Elie, “Les steppe bouleversées: La grande céréaliculture au nord du Kazakhstan (années 1950–2010),” *Études rurales* no. 200 (July–December 2017): 80–105.

52. RGAE, f. 4372, op. 45, d. 786 (Materialy po meliorativnym meropriiatiiam v Krasnodarskom krae).

53. Manfred Hildermeier, *Geschichte der Sowjetunion, 1917–1991: Entstehung und Niedergang des ersten sozialistischen Staates* (München, 2017), 714–27.

54. Dietrich Beyrau, *Petrograd, 25. Oktober 1917: Die russische Revolution und der Aufstieg des Kommunismus* (Munich, 2001), 150–53; and Jean Lévesque, “‘Into the Grey Zone’: Sham Peasants and the Limits of the Kolkhoz Order in the Post-war Russian Village, 1945–1953,” in Juliane Fürst, ed., *Late Stalinist Russia: Society Between Reconstruction and Reinvention* (Abingdon, Oxon, Eng., 2006), 103–19.

55. Michael Ellman, “The 1947 Soviet Famine and the Entitlement Approach to Famines,” *Cambridge Journal of Economics* 24, no. 5 (September 2000): 603–30, calculated 1–1.5 million victims, whereas the loss due to the lowered birth-rate would be a lot higher; and Nicholas Ganson, *The Soviet Famine of 1946–47 in Global and Historical Perspective* (New York, 2009).

Evgenii Alekseevskii (1906–1979) as the formative moment for the notion that agriculture was generally impossible without irrigation.<sup>56</sup>

Although local Party leaders claimed to be fulfilling the quota of the post-war plan, vast swaths of land lay fallow and hundreds of canals remained destroyed. Reconstruction proved difficult. As a result, agricultural productivity stagnated between two thirds and three fourths of the 1940-level by the end of the decade, even according to optimistic official statistics.<sup>57</sup> It was not until 1954 that the prewar-level was exceeded.<sup>58</sup> Instead of carefully adjusting agricultural policies to the specific needs of collective farms, the Soviet leadership decided to “take the bull by the horns” through the implementation of large hydrotechnical infrastructures.<sup>59</sup> Consequently, the fourth five-year plan (1946–1950) was gradually overshadowed by Stalin’s “Great Plan for the Transformation of Nature.”<sup>60</sup> It promised a solution to the USSR’s most pressing resource problems within the following fifteen years. The “Stalin-Plan” propagated reforestation and the creation of shelter belts against wind erosion as well as crop-rotation and the development of irrigation to conquer drought (*zasukha*) in the semi-arid steppe.<sup>61</sup> It was complemented by the “Great Construction Works of Communism” (*Velikie stroiki Kommunizma*), which focused on hydro-engineering and melioration.<sup>62</sup> While the former was restorative in character, the latter followed a transformational vision.

Adding to these ideas was the “Davydov-Plan,” published in 1949, that called for the diversion of Siberian rivers into the arid steppe of Central Asia. In 1954, the Leningrad bureau *Gidroproekt*, which was responsible for the construction of hydroelectric dams under Stalin, put forth the diversion of northern Russian rivers into the Volga under the auspices of the Ministry of Energy. Together, these projects promised a transition into a bright future of food security and industrial ascent. The reasoning was simple: ninety percent of the arable land in Central Russia, the North Caucasus, Ukraine, and Central Asia—where three quarters of the Soviet population lived—used merely 24 percent of the country’s freshwater resources while two thirds of the cultivated area was situated in the arid and semiarid zone.<sup>63</sup>

56. Evgenii Evgen’evich Alekseevskii, *Ia liubliu etu zemliu* (Moscow, 1988), 153.

57. Center for the Documentation of the Newest History of Krasnodar Krai (CDNIKK), f. 1774-A, op. 3, d. 929, l. 20 (Protocol of the 4th regional Party Conference, March 5–7, 1948).

58. Nikonov, *Proizvodstvennye tipy*, 32.

59. Klaus Gestwa, “Die Hungersnot 1946/47 und ‘Stalins Großartiger Plan der Umgestaltung der Natur,’” in Alfred Eisfeld, Guido Hausmann, and Dietmar Neutatz, eds., *Hungersnöte in Russland und der Sowjetunion, 1891–1947: Regionale, ethnische und konfessionelle Aspekte* (Essen, 2017), 185–235; here 204.

60. Donald Filtzer, “Wirtschaft und Gesellschaft in der Nachkriegszeit,” in Stefan Plaggenborg, ed., *Handbuch der Geschichte Russlands Band, vol. 5: 1945–1991, I* (Stuttgart, 2002), 78–130.

61. Stephen Brain, *Song of the Forest: Russian Forestry and Stalinist Environmentalism, 1905–1953* (Pittsburgh, 2011); and Krimgold, “USSR: Conservation Plan.”

62. Denis J.B. Shaw, “Mastering Nature through Science: Soviet Geographers and the Great Stalin Plan for the Transformation of Nature, 1948–53,” *The Slavonic and East European Review* 93, no. 1 (January 2015): 120–46; and Klaus Gestwa, *Die Stalinschen Großbauten des Kommunismus: Sowjetische Technik- und Umweltgeschichte, 1948–1967* (Munich, 2010).

63. David Tolmazin, “Recent Changes in Soviet Water Management: Turnabout of the ‘Project of the Century,’” *GeoJournal* 15, no. 3 (October 1987): 243–58.

Soviet pedology, although “down to earth” in every sense of the phrase, did not remain unmarred by Stalinist policies: regardless of the fact that Viktor Kovda was a renowned scientist with a notable career ahead of him at UNESCO and the International Society of Soil Science (ISSS), he nonetheless joined the propagandist folklore that surrounded the “Great Plan for the Transformation of Nature” with a popular book published in 1952 that was often read as a call to arms in support of the project.<sup>64</sup> This, however, has to be seen in light of the controversy over Lysenkoism when Kovda had fallen from grace and tried to prove his loyalty to the system in order to save his career.<sup>65</sup>

### Promises and Perils of Progress

The same year that Kovda published his monograph on the Stalin-Plan, the Krasnodar branch of the planning institute *Giprovodkhoz* presented its first comprehensive scheme for the use of the Kuban River’s resources.<sup>66</sup> It revealed a hitherto locally unmatched scope with hydro-infrastructure ranging from Rostov-on-Don to the northern flanks of the Caucasus Mountains, and from the Sea of Azov in the west to the river Terek in the east. In all, 759 kolkhozes and 131 state farms (*sovkhozy*) on an area of 11,650,000 hectares—larger than Portugal—were set to be supplied with water. Irrigation was to be introduced on more than one million hectares.<sup>67</sup> Only the planned diversion of the northern rivers (*perebroška severnykh rek*) in the 1970s expanded upon this scheme with the idea to force water from the north Russian river Pechora through the Volga-Chograi-Canal into the Kuban.<sup>68</sup> Although its construction was halted after protests in the early 1990s, the unfinished canal had devastating environmental consequences for the fauna of Kalmykia to the northeast of Stavropol’, as it hindered the migration of about 160,000 Saiga antelopes and the grazing of even more domesticated animals like sheep. The unlined canal bed soon filled with highly mineralized groundwater and the once fertile pastures surrounding it turned into sandy deserts.<sup>69</sup> In the mid-1990s, the situation in Kalmykia became catastrophic: half of the agricultural area was degraded, especially through anthropogenic soil salinization caused by the failed hydro-ameliorative projects.<sup>70</sup> Here, the promises of irrigation turned into an ecological nightmare for the steppe biome.

The 1952-scheme was not realized for several years. This was mainly due to the often unclear responsibilities within the Soviet planning system. The bureaucratic see-saw is shown not only in the delayed and sometimes

64. Viktor Abramovich Kovda, *Velikii plan preobrazovaniia prirody* (Moscow, 1952).

65. Marc Elie (CERCEC, Paris) is currently researching this conflict.

66. GARF, f. A-341, op. 4, d. 1522, l. 188.

67. GARF, f. A-341, op. 4, d. 1522, l. 14.

68. GARF, f. R-5446, op. 142, d. 1006, ll. 76–84 (Po voprosam provedeniia meliorativnykh i vodokhoziaistvennykh rabot); and GARF, f. R-5446, op. 147, d. 870, ll. 26–30 (Po voprosam provedeniia. . .).

69. Georgi Watschnadse, *Rußland ohne Zensur: Eine Bilanz* (Frankfurt-am-Main, 1993), 204.

70. Valentina Evgen’evna, Prikhod’ko, *Oroshaemyestepnyepochvy: Funktsionirovanie, ekologiia, produktivnost’* (Moscow, 1996), 8, 13–15.

chaotic communication between center and periphery, but also by a lack of clear direction in the development of irrigation infrastructures.<sup>71</sup> This only furthered local initiative, despite warnings from soil scientists who recalled the poor experience in Central Asia and the South Caucasus.<sup>72</sup> Regional Party leaders gladly seized the opportunity to obtain state investment that could be partly diverted into their own pockets and into those of their cronies.<sup>73</sup> Soviet policies of land reclamation developed concomitantly in center and periphery: while Moscow propagated its grand yet abstract transformative visions with the goal to extend its power into the outer reaches of the USSR, local Party leaders often followed their own agenda set on personal political empowerment.

In Stavropol' it was decided to further develop the steppe to the north and northeast through hydro-ameliorative measures. In addition to the Kuban, the eastern rivers Kama and Terek were marked for large canal projects. Thus, the prestigious Kuban-Kalaus system, begun in 1957 and renamed the *Great Stavropol' Canal* in 1968, was to supply three million hectares of land with water—half the area of Stavropol' region—and to irrigate about 550,000 hectares. Here, too, delays were caused by the ubiquitous lack of machinery, expertise, and construction material.<sup>74</sup> Just as the Nevinnomysk canal, this project followed the Central Asian example and was based on the principle of so-called “complex reclamation” (*kompleksnoe osvoenie*) which not only focused on the construction of hydro-ameliorative technology, but also aimed at creating a provisional social infrastructure consisting of schools, cultural centers, and facilities for sports and recreation to promote trust and faith in the system.<sup>75</sup> The reality was bleak, however, as the workers had to live in makeshift housing without general educational facilities for their children and leisure activities for themselves.<sup>76</sup> This truly was a far cry from the full-mouthed promises of blossoming oases of progress in the steppe.

By the mid-1960s, irrigation had become a core concept of Soviet agriculture. Following the creation of the Ministry of Melioration and Water

71. The Ministry of Agriculture (*Minsel' khoz*), for example, responded to an inquiry by the Stavropol' and Krasnodar Party (*kraikom*) and Executive Committees (*kraispolkom*) from June 26, 1953 in a rather terse manner: it neither deemed it necessary to decide on the development of irrigation and water-supply in these regions, nor to elaborate the hydro-infrastructure scheme at the Kuban River more precisely: GARF, f. R-5446, op. 87, d. 2296, 1. 47 (O priemke i vvode v ekspluatatsiiu Novo-Troitskogo gidrouzla v Stavropol'skom krae).

72. I.N. Antipov-Karataev, V.A. Kovda, N.A. Kachinskii, S.S. Sobolev, A.N. Rozanov, “Bor'ba s zasoleniem oroshaemykh pochv,” *Pochvovedenie* no. 2 (1948): 133–41.

73. In Krasnodar, this became evident in the ‘Medunov Affair’ (*Medunovskoe delo*) of the early 1980s: Svetlana Shishkova-Shipunova, *Desiat' pravitelei Kubani: Ot Medunova do Tkacheva* (Krasnodar, 2016), 77–81.

74. GARF, f. R-5446, op. 100, d. 926, ll. 121–25 (Po voprosam provedeniia meliorativnykh i vodokhoziaistvennykh meropriiatii).

75. Christine Bichsel, “‘The Drought Does Not Cause Fear’: Irrigation History in Central Asia through James C. Scott’s Lenses,” *Revue d’etudes comparatives Est-Ouest* 43, no. 1–2 (2012): 73–108, here 90, 98.

76. Letters by the chairman of the Stavropol' executive committee Bosenko to the Soviet Council of Ministers from February 23 and June 21, 1971 in GARF, f. R-5446, op. 105, d. 1002, ll. 20–23 (Po voprosam provedeniia. . .).

Management (*Minvodkhoz*) in 1965, the Soviet leadership finally broke with Lysenkoist ideology. Hydro-engineers formerly involved in the Stalin-Plan were offered new prospects: with the Party decree from June 1966 “On the broad evolution of soil melioration for the yield of high and steady harvests of grain-crops and other agricultural produce,” they focused on hydro-amelioration as the new grand promise of Soviet agriculture instead of planting shelter belts and further experimenting with the hitherto propagated “grassland rotation system” (*travopol'e*).<sup>77</sup> The decree envisioned tripling, and in some cases even quadrupling, crop production. Thanks to close interpersonal connections—since the late 1940s future *Minvodkhoz*-minister Alekseevskii had been working with Khrushchev, in the 1960s he gained Brezhnev’s support—and the systemic economic problems of the USSR, especially its high inflexibility that caused shortages in specialized production, irrigation was seen as the main remedy of an ailing agricultural sector.<sup>78</sup>

Shortly after its creation, *Minvodkhoz* was already reprimanded by the financial authorities for its grandiose spending on hydro-infrastructural projects with little visible return.<sup>79</sup> The non-transparent inner workings of this *agromeliorative complex* are highly representative of the key issues of the Soviet administrative command economy: a lack of external control and internal accountability, overall low productivity, and a waste of natural resources. Much like the Soviet military-industrial complex, it developed into a monolithic structure that became the object of harsh public criticism in the 1980s. Their similarity was not least expressed in the triad *oborona* (defense), *kosmos* (the space program), and *melioratsiia* (hydro-amelioration) as the branches that potentially dealt the most damage to the state budget and the environment.<sup>80</sup>

Nonetheless, the meliorators were given *carte blanche* well into the 1980s as Gorbachev feared the Soviet Union could fall further behind its western competitors in gross agrarian output. In a Politburo meeting on February 17, 1986 the General Secretary was cited saying: “The whole world thrives on irrigation. And us—are we supposed to renounce it? All of the ‘Green Revolution’ is based on irrigation.”<sup>81</sup> Yet the ideals of this “Green Revolution,” which

77. GARF, f. R-5446, op. 100, d. 922, ll. 245–279ob (O shirokom razvitii melioratsii zemel' . . .).

78. On the cooperation with Khrushchev while he was First Party Secretary of Ukraine cf. Alekseevskii, *Ia liubliu etu zemliu*, 157. On patronage in the USSR: Yoram Gorlizki, “Too Much Trust: Regional Party Leaders and Local Political Networks under Brezhnev,” *Slavic Review* 69, no. 3 (Fall 2010): 676–700. Owed to the neglect of research into plant genetics during Lysenko’s reign, the USSR had fallen far behind in seed selection.

79. See the annual budgetary control reports by the Ministry of Finance and the State Bank, e.g. for 1970 in GARF, f. R-5446, op. 105, d. 997 (Ob itogakh finansovokhoziaistvennoi deiatel'nosti Ministerstva melioratsii i vodnogo khoziaistva SSSR za 1970 god). This criticism persisted until the dissolution of the *Minvodkhoz* in 1989/1990.

80. A.V. Kolganov, N.V. Sukhoi, V.N. Shkura, and V.N. Shchedrin, *Razvitie melioratsii zemel' sel'skokhoziaistvennogo naznacheniia v Rossii* (Novocherkassk, 2016), 64. In pre-Chernobyl times, the imminent dangers of nuclear energy were generally overshadowed by the destructive power of the atomic bomb.

81. Anatolii Cherniaev, ed., *V Politbiuro TsK KPSS. . . : Po zapisiam Anatolii Cherniaeva, Vadima Medvedeva, Georgiia Shakhnazarova: 1985–1991*, (Moscow, 2008), 25.

encompassed not only irrigation but also specialized fertilizers, seeds, pesticides and land cultivation technology that would in conjunction significantly boost agricultural productivity, were never fully implemented in the USSR.<sup>82</sup> This is obvious in the limited scope of “melioration” itself. Compared to countries with similar climates, like Canada, Soviet yields were low and unsteady.<sup>83</sup> Consequently, since 1963, the USSR imported grain to avoid undernutrition or even famine among its citizens.<sup>84</sup> This was a bitter lesson learned from the hunger years of 1932/33 and 1946/47. The reclamation of the steppe was thought to end these shortages.

### Conflicting Infrastructures

Krasnodar and Stavropol’ evolved as two centers of agriculture that increasingly competed for resources. While the former focused on crops such as grain, sugar beet, sunflower, and rice, the latter relied on livestock farming to a high degree. With Stavropol’'s *vodniki* (hydro-engineers) reclaiming the steppe, the neighboring region of Krasnodar drastically expanded its capacities for rice-sowing. For this, the Krasnodar reservoir was put into operation in 1975 as the largest artificial body of water in the North Caucasus with a capacity of more than three billion cubic meters—about one tenth of Lake Mead formed by the Hoover Dam.<sup>85</sup> In February of 1966, both the Krasnodar Party and the Executive Committee had argued for its construction, since the Kuban-Kalaus irrigation system in Stavropol’ was expected to drain so much water from the river that rice cultivation at its lower reaches would become impossible without it. The reservoir was built within the boundaries of the Adyghe Autonomous Oblast to the south of Krasnodar city. It flooded fertile pastureland and holy sites, about 16,000 people were resettled.<sup>86</sup> Several waves of protests by the ethnic Adyghe minority notwithstanding, the reservoir is still in use today.<sup>87</sup> It serves as a monument to the recklessness of Soviet and Russian nature politics.

In his memoirs, former Stavropol’ First Party Secretary Mikhail Gorbachev (1970–1978) later blamed Sergei Medunov, Krasnodar’s Executive Committee Chairman (1969–1973) and First Party Secretary (1973–1982), for the fervent

82. H.K. Jain, *The Green Revolution: History, Impact and Future* (Houston, 2012).

83. Philip Hanson, *The Rise and Fall of the Soviet Economy: An Economic History of the USSR from 1945* (London, 2003), 153.

84. Paul R. Josephson, Nicolai Dronin, Aleh Cherp, Ruben Mnatsakanian, Dmitry Efremenko, and Vladislav Larin, *An Environmental History of Russia* (New York, 2013), 150–52.

85. GARF, f. R-5446, op. 100, d. 926, ll. 109–113; and GARF, f. R-5446, op. 109, d. 944, ll. 1–5 (O priemke v ekspluatatsiiu Krasnodarskogo vodokhranilishcha na reke Kubani).

86. GARF, f. R-5446, op. 103, d. 1111, ll. 46–48 (O meropriiatiakh po pereseleniiu naseleniia, perenosu na novye mesta i snosu stroenii i sooruzhenii v sviazi so stroitel’stvom Krasnodarskogo vodokhranilishcha na r. Kubani); and V.P. Kazachinskii and S.V. Mineeva, *Ekologiia: Sostoianie okruzhaiushchei sredy na Kubani* (Krasnodar, 2004), 58–59.

87. See the criticism by President of the Supreme Soviet of the Republic of Adyghea Adam Tleuzh in April of 1993, who demanded the reservoir’s liquidation in GAKK, f. 506, op. 1, d. 224, l. 22 (Pis’ma B.M. Kozenko v Gosudarstvennyi komitet po gidrometeorologii i drugie organizatsii o sud’bakh r. Kubani i Azovskogo moria).

infighting for capital investment and natural resources.<sup>88</sup> While Medunov, a close ally and crony of Brezhnev's, continued the legacy of his predecessors as he heavily propagated rice cultivation with the promise to reach harvests of up to one million tons at the lower Kuban in 1980, Gorbachev proved to be an avid supporter of irrigation as well.<sup>89</sup> He pushed such ambitious projects as the Great Stavropol' Canal, which by the late 1990s tapped the resources of the Kuban, Terek, and Kuma Rivers at a length of more than 200 miles with the goal to supply 2.6 million hectares of land with water. The undiminished faith in high technology increasingly overshadowed the requirements of the steppe biome.

The envisioned reclamation of the steppe took longer than anticipated, however. By 1968, after more than ten years of construction, the first section of the Great Stavropol' Canal was still not finished. While ever more water was flowing into the dry steppe, not even half of the fields marked for irrigation were reclaimed. The canal's costs were first estimated at a staggering 404 million rubles and soon climbed to 644 million.<sup>90</sup> Nonetheless, the undertaking enjoyed strong support by the Politburo as it was expected to do the region a lot of good, defeating drought and the ravaging dust storms (*pyl'nye buri*) once and for all (which it did not).<sup>91</sup> On the drawing boards, the steppe was reimagined as a future granary for Russia. Yet in the first months of 1969, the project experienced its first major setback: about one million hectares of arable land—more than half of the total sown area—were severely damaged by dust storms, strong winds (*uragany*), and frost in the region of Krasnodar. The agrarian infrastructure—especially canals, shelter belts, and pasture—was badly affected. In Stavropol' region alone, repair costs were estimated at seven million rubles.<sup>92</sup>

These were not the only problems: specialists of Gosplan and VASKhNIL warned of the high content of soluble salts along the Great Stavropol' Canal that was potentially devastating for agriculture. Also, the canal's concrete tunnels were unprotected against the highly mineralized, corrosive groundwater. Countermeasures, like epoxy coating, were not feasible as they either proved to be too expensive or the necessary materials were unobtainable. Regardless of these difficulties, Stavropol's Party and Executive Committee enforced hydro-construction: between 1971 and 1975 another 125,000 hectares

88. Michail Gorbatschow, *Erinnerungen: Das Vermächtnis eines Reformers* (Berlin, 1995), 143.

89. Grigory Leonidovich Zelenskii, "K voprosu o proizvodstve milliona tonn Kubanskogo risa: Istorii i perspektivy," *Nauchnyi Zhurnal KubGAU* 70, no. 6 (2011), at ej.kubagro.ru/2011/06/pdf/29.pdf (accessed February 9, 2022).

90. GARF, f. R-5446, op. 103, d. 1112, ll. 3, 16, 20–21 (Ob utverzhdanii kompleksnogo proektnogo zadaniia orosheniia i osvoeniia zemel' v zone Bol'shogo Stavropol'skogo kanala).

91. GARF, f. R-5446, op. 141, d. 1086, ll. 28–36 (Po obshchim i organizatsionnym voprosam melioratsii i vodnogo khoziaistva).

92. GARF, f. R-5451, op. 58, d. 7971, ll. 1–3, 13–14 (Informatsii Krasnoiarskogo, Stavropol'skogo kraevykh i Luganskogo oblastnogo sovetov profsoiuzov o meropriiatiakh po likvidatsii posledstviu uragana i pyl'nykh bur).

were to be reclaimed at a cost of 525 million rubles.<sup>93</sup> Thousands of Komsomol members were again mobilized to work on the construction sites.<sup>94</sup> Yet, even these grandiose canals did not end the local water shortage. When the region suffered another severe drought in June 1976, with winter wheat yields falling to one third of the previous fifteen years' average, 60,000 tons of animal fodder had to be sent to Stavropol' from Central Russia and other parts of the Soviet Union.<sup>95</sup> Time and again, the Soviet state lost the battle with the forces of nature in the dry steppe to the east of the Kuban.

The introduction of large overhead sprinkler systems in the early 1970s further strained the Kuban's resources. Until the end of the ninth five-year-plan in 1975, 6,000 "Fregat" and 7,500 "Volzhanka" machines were to be installed all over the Soviet Union while the irrigated area grew more than twofold, reaching 3.2 million hectares. The model "Fregat" was widely used on the fields of Stavropol'.<sup>96</sup> It moved virtually independently, propelled by water pressure alone. As the electrification of rural areas remained an issue until the end of the Soviet Union, these devices were connected to diesel-powered pumping stations which used large amounts of fuel and heavily contaminated the air with their exhaust fumes.<sup>97</sup> The model "Fregat" was based on the already outdated "Valley" by the US cooperation Valmont Irrigation. With Soviet industry lagging behind in the often-propagated automation of agriculture, trade representatives had acquired all the necessary blueprints and licenses for this machine in the late 1960s; Soviet specialists were trained by Valmont in the US in its assembly and maintenance.<sup>98</sup> This was typical for the time, as the Soviet Union relied heavily on the import of western technology: Philip Hanson counted 1,300 licenses acquired from the mid-1960s to 1976 alone.<sup>99</sup> Thus, the USSR incorporated capitalist practices and promises of progress into its vision of a scientific-technical revolution.<sup>100</sup>

93. GARF, f. R-5446, op. 105, d. 1007, ll. 3–6 (Ob uskorenii stroitel'stva Bol'shogo Stavropol'skogo kanala. . .).

94. William Taubman, *Gorbachev: His Life and Times* (New York, 2017), 130.

95. GARF, f. R-5446, op. 110, d. 1083, ll. 20–31 (O merakh po razvitiu sel'skogo khoziaistva v zasushliviakh raionakh Stavropol'skogo kraia); GARF, f. R-5446, op. 110, d. 931, ll. 8–10 (Ob okazanii material'no-tekhniceskoi pomoshchi kolkhozam i sovkhozam Stavropol'skogo kraia); and GARF, f. R-5446, op. 110, d. 1022, l. 18 (O prieme pshenitsy v gosudarstvennyye resursy v poriadke obmena ot khoziaistv Ukrainskoi SSR i Stavropol'skogo kraia, ne vypolnivshikh plany prodazhi zerna gosudarstvu).

96. GARF, f. R-5446, op. 106, d. 914, l. 106, l. 56 (Po obshchim i organizatsionnym voprosam melioratsii. . .). However, of the 4,030 Fregat produced until August of 1975, only 3,128 were assembled and 2,602 ready for use: GARF, f. R-5446, op. 110, d. 1084, l. 3.

97. GAKK, f. R-687, op. 7, d. 34, ll. 211–220 (Ob obespechenii ekspluatatsii v 1980 godu dizel'nykh nasosnykh stantsii na risovykh sistemakh).

98. GARF, f. R-5446, op. 106, d. 921, l. 31 (Po voprosam provedeniia meliorativnykh i vodokhoziaistvennykh rabot); and GARF, f. R-5446, op. 106, d. 915, l. 63 (Po obshchim i organizatsionnym voprosam melioratsii. . .).

99. Philip Hanson, *Trade and Technology in Soviet-Western Relations* (London, 1981), 83.

100. Cf. Stefan Guth, "One Future Only: The Soviet Union in the Age of Scientific-Technical Revolution," *Journal of Modern European History* 13, no. 3 (August 2015): 355–76.



In 1973, the USSR officially caught up with the US in their relative use of overhead irrigation on more than 21 percent of the sown area.<sup>101</sup> In the total yearly growth of irrigated territory they had even surpassed their western rival with 960,000 to 600,000 hectares.<sup>102</sup> Overhead irrigation was the last evolutionary step of melioration in the Soviet Union, as more advanced and locally adapted methods like drip irrigation never made it to the fields. This was not for want of knowledge (experimental stations were already set up in the early 1970s) but for the inflexibility of Soviet production, especially in supplying plastic pipes, and for a lack of specialists who could adjust such rather precise devices to local needs.<sup>103</sup> As a result, high water consumption was an urgent problem that remained unsolved throughout the Soviet era. Adding to this was the notion that water was an inexhaustible natural resource that anyone could freely dispose of. Only between 1949 and 1956 did authorities experiment with a fee in some regions. This idea, however, was abandoned as the collective farms lacked the financial resources and refused to pay. Also, consumption could only be estimated; an exact control of the amount of water used was practically impossible.<sup>104</sup> The waste of natural resources was not even accounted for in the calculation of reclamation costs.<sup>105</sup> Planning and maintenance was also regularly disregarded to keep the overall budget artificially low on paper. Eventually, Soviet large-scale meliorative projects never paid for themselves, also due to the unexpectedly low yields.<sup>106</sup> This is the reason why the meliorative industry collapsed in the 1990s under a quasi-liberal competitive market.

The fixation on large technological systems that were to function regardless of local conditions is reflected not only in the planning of meliorative projects, but also in dealing with their negative consequences. In order to address the increasing wind and water erosion of agricultural land, for example, ever “more advanced” methods and machines were to be developed and implemented while only a small group of experts seemed to truly realize the vicious cycle of these actions.<sup>107</sup> In the 1970s, hydro-amelioration was the fastest growing sector of the Soviet economy.<sup>108</sup> Its idiosyncrasies dictated the further course of action: constant expansion trumped demand-responsive water use. With all the resources of the Kuban area to be tapped until 1986, it was deemed necessary to develop the Volga as a supplier for the irrigated areas

101. GARF, f. R-5446, op. 107, d. 933, ll. 82–126 (Po obshchim i organizatsionnym voprosam melioratsii. . .). In 1973, the USSR's irrigated area encompassed 11.42 million hectares—l. 87.

102. GARF, f. R-5446, op. 108, d. 945, l. 122 (Po obshchim i organizatsionnym voprosam melioratsii. . .).

103. GARF, f. R-5446, op. 107, d. 933, ll. 131–136.

104. GARF, f. R-5446, op. 86, d. 4257, ll. 151–153 (O vvode v ekspluatatsiiu Kubanskoi orositel'noi sistemy. . .); and Philip R. Pryde, *Conservation in the Soviet Union* (Cambridge, Eng., 1972), 111.

105. GARF, f. A-341, op. 4, d. 1522, l. 157.

106. Thane Gustafson, *Reform in Soviet Politics: Lessons of Recent Policies on Land and Water* (Cambridge, Eng., 1981), 123–33.

107. GARF, f. R-5446, op. 109, d. 848, ll. 89–90ob (O merakh po uluchsheniuiu organizatsii rabot po zashchite pochv ot vetrovoi i vodnoi erozii).

108. Gustafson, *Reform in Soviet Politics*, 123.

of Krasnodar and Stavropol' until the year 2000. This project was directly linked to the diversion of the north Russian rivers. Even Gosplan criticized these plans: Minvodkhoz should rather adapt to scarcity and increase the “economic effectiveness” of irrigation, as it already exceeded natural capacities more than fivefold, while yields were two and a half times lower than anticipated.<sup>109</sup> The idea to convert the steppe into an agricultural powerhouse bore potentially devastating results, as the Kuban region faced a similarly dreadful fate as the desiccating Aral Sea basin.<sup>110</sup>

In the following years, recommendations on “rational water use” and the “perfection of irrigation methods” were largely ignored. In 1979, Krasnodar presented plans for the expansion of its reservoir, while irrigation was significantly intensified along the Great Stavropol' Canal.<sup>111</sup> In 1982, a group of experts including Ivan Aidarov (born 1932), who would later criticize Soviet melioration for its “formal transfer of irrigation experience from Central Asia. . .with quite different natural conditions and requirements for irrigated agriculture,” noted that an increase in agricultural production was possible most of all through the expansion of the meliorative industry.<sup>112</sup> By the early 1980s, the meliorators strongly believed in the motto emblazoned in big letters on the main weir of the reservoir at Ust-Dzheguta where the Great Stavropol' Canal begins: “The water of the Kuban flows where the Bolsheviks command it to.”<sup>113</sup>

### Belated Attempts at Structural Reform

Obvious flaws of the meliorative infrastructure tainted the utopian image of control over nature. Criticism from within the administrative system grew louder, as the Minvodkhoz evolved into a monolithic structure that combined the planning, construction, and control of its own projects. This development did not come as a surprise: already in 1965, when the ministry was founded, skeptical voices within the Council of Ministers warned of the absence of outside supervision. The recurring complaint was: “The ministry itself approves the design work plan, designs itself, carries out project appraisals, approves projects itself and builds them itself. This is a complete lack of control, but so

109. RGAE, f. 4372, op. 66, d. 6897, ll. 163–197 (Materialy ekspertizy skhemy kompleksnogo ispol'zovaniia i okhrany vodnykh resursov basseina reki Kuban').

110. Cf. Philip P. Micklin, “Water Management in Soviet Central Asia: Problems and Prospects,” in John Massey Stewart, ed., *The Soviet Environment: Problems, Policies and Politics* (Cambridge, Eng., 1992), 88–114.

111. RGAE, f. 4372, op. 67, d. 4644 (Materialy ekspertizy TEO uvelicheniia emkosti Krasnodarskogo vodokhranilishcha na r. Kubani).

112. E.I. Pankova, “Critical Analysis of Irrigation History in the Soviet Union,” *Eurasian Soil Science* 41, no. 9 (September 2008): 1005–1007; and RGAE, f. 4372, op. 67, d. 5339, ll. 215–226 (Materialy ekspertizy tekhniko-ekonomicheskogo obosnovaniia rekonstruktsii Kubanskogo vodokhranilishcha v Stavropol'skom krae).

113. The *lozung* “Идет вода Кубань-реки, куда велят большевики” is commonly ascribed to the local poet Andrei Isakov, see photo at [www.etoretro.ru/data/media/744/1360829124d82.jpg](http://www.etoretro.ru/data/media/744/1360829124d82.jpg), (accessed February 10, 2022).

it became.”<sup>114</sup> The often-repeated short version of this was *sami stroiat, sami prinimaiut* (they build and commission themselves).<sup>115</sup> As a high-modernist agency, its projects replaced local knowledge by standardized procedures that made the steppe “legible” from the center, that is, intelligible and manageable in an abstract manner.<sup>116</sup> This oversimplified understanding of complex ecological processes proved highly deceptive.

Meanwhile, the expansion of melioration was accelerated by the long-term food program (*prodovol'stvennaia programma*)—designed by Mikhail Gorbachev as secretary to the Central Committee on questions of agriculture and passed in 1982. It aimed to increase grain yields by 34 and meat production by 53 percent. In Stavropol', the resulting costs for the maintenance of infrastructure and irrigation were estimated at 1.208 billion rubles.<sup>117</sup> The ensuing criticism had many voices. Writer and editor of the literary journal *Novyi mir* Sergei Zalygin (1913–2000) was the most prominent example of a renegade meliorator. Channeling the frustration uttered in internal reports for decades about state policies of large-scale hydro-engineering, he coined the often-cited phrase “nature was against it, society was against it, but the administration was in favor.”<sup>118</sup> This rang especially true for the “projects of the century,” the planned redirection of the Siberian and northern Russian rivers to the south of the Soviet Union. The better-known eastern part *Sibiral* was to alleviate the dire state of the Central Asian cotton growing regions that drew ever more water from the dying Aral Sea.<sup>119</sup> The northern river diversion, in turn, was to provide the expanding agrarian sectors along the Volga and the Kuban with irrigation water.

On October 2, 1985 *Literaturnaia gazeta* published an open letter by Zalygin to Minvodkhoz-minister Nikolai Vasil'ev (1979–1989), criticizing the irresponsible waste of natural resources. Zalygin called the misguided notion that water was free a central fallacy, as this had led to its scarcity in the first place, creating the vicious cycle of the river diversion scheme: ever larger irrigation systems that needed ever more water. It would be better, he reasoned, to finally enforce strict cost accounting and more responsible resource use instead.<sup>120</sup> Following the tone of this letter, many *vodniki* vented their frustration in complaints (*zhaloby*) to the Soviet Council of Ministers, bringing to the fore cases of falsified production numbers (*prpiski*), corruption, nepotism,

114. “Министерство само утверждает план проектных работ, само проектирует, осуществляет экспертизу проектов, само утверждает проекты и само строит. Это бесконтрольность полная, но так и удалось”: GARF, f. R-5446, op. 100, d. 922, l. 280.

115. Such was the criticism by the People's Control Committee (*komitet narodnogo kontrol'ia*) in GARF, f. R-5446, op. 107, d. 933, ll. 18–37, among others.

116. James C. Scott, *Seeing like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, 1998).

117. RGAE, f. 4372, op. 67, d. 5339, ll. 234–235, 264; and Karl Eugen Wädekin, “Sowjetische Landwirtschaft in der Stagnation,” *Osteuropa* 33, no. 2 (February 1983): 89–100.

118. Sergei P. Zalygin, *Povorot* (Moscow, 1987), 30.

119. Obertreis, *Imperial Desert Dreams*, 382–86; and Micklin, “Water Management,” 88–114.

120. Douglas Weiner, *A Little Corner of Freedom: Russian Nature Protection from Stalin to Gorbachev* (Berkeley, 1999), 423.

personal enrichment, and overall questionable management practices within the Minvodkhoz-system.<sup>121</sup>

In September of 1986, soil scientists also presented their damning verdict on the effectiveness of melioration in a letter to the Chairman of the Council of Ministers Nikolai Ryzhkov (1985–1991): while the need for comprehensive land reclamation was paid lip service in official decrees, it was carried out insufficiently, as the largest part of state investment was used for irrigation. Even if the irrigated area was doubled, dryland farming would still account for 92 percent of the nationwide grain yield and for 80 percent of fodder crops while only racking up one seventh of the costs in comparison to irrigated agriculture. In fact, one ruble invested in hydro-ameliorative systems yielded only 79 kopecks in return. In the non-black-earth region it was as low as 25 to 35 kopecks, in Siberia 15 to 20 kopecks.<sup>122</sup> In dryland farming the ratio was 1.95 rubles per every one invested, or 95 percent profit and 2.5 times higher yields.<sup>123</sup> Soviet agriculture was thus a heavily subsidized system that tied up more than one quarter of the state budget in the mid-1980s. Meanwhile, food prices were kept artificially low to avoid protests, as they had been observed in Poland in 1970, and later in Rostov-on-Don, Kiev, and Riga. By 1981, food imports accounted for one quarter of calorie intake by the Soviet population.<sup>124</sup>

Before Gorbachev tried to tackle the endemic problem of “regulation by the regulated” (Paul Josephson) from the mid-1980s by promoting cost-accounting and cost-effective management (*khozrazschet, samofinansirovanie*), the Party’s Central Committee presented the concept of an agroindustrial complex (*agropromyshlenni kompleks*) at its plenary session in July 1978.<sup>125</sup> This idea could be traced back to Khrushchev’s failed economic reforms in the late 1950s when he tried to strengthen local initiative by creating regional economic councils (*sovnarkhozy*).<sup>126</sup> While central ideas of the agroindustrial complex, which aimed at integrating the manufacturing industry into the collective farm system, were modelled after similar structures in Hungary and Yugoslavia, the USSR’s highly centralized political apparatus did not allow for the economic freedom and flexibility necessary to create such a self-regulating system.<sup>127</sup> This made it even more difficult for the kolkhozes and sovkhozes to efficiently plan and manage their production; it rendered the vision of their proposed self-sufficiency (*samookupaemost’*) a sham.<sup>128</sup>

121. GARF, f. R-5446, op. 147, d. 861, ll. 19–25 (Po obshchim i organizatsionnym voprosam. . .).

122. Zhores A. Medvedev, *Soviet Agriculture* (New York, 1987), 359, aptly called these the “disaster areas” of Soviet agriculture.

123. GARF, f. R-5446, op. 148, d. 773, ll. 67–74 (Po voprosam zemlepol’zovaniia i gosudarstvennogo balansa zemel’ i zashchity pochv ot erozii).

124. Hanson, *Rise and Fall*, 149–54, 159–61.

125. Paul Josephson, *An Environmental History*, 203. These ideas date back to Kosygin’s economic reforms: Medvedev, *Soviet Agriculture*, 358.

126. Hanson, *Rise and Fall*, 68, 144.

127. GARF, f. R-5446, op. 144, d. 881, ll. 1–7 (O sozdanii agropromyshlennogo kombinata ‘Kuban’ v Krasnodarskom krae); and Michael Ellman, *Socialist Planning* (Cambridge, Eng., 2014), 222–24.

128. Medvedev, *Soviet Agriculture*, 323–34.

The meliorators were hard-pressed to present solutions for the stagnating agricultural output. However, their ideas remained limited to continuous expansion instead of a thorough revision of their practices with the goal of adapting them to local needs. Quantity still trumped quality in hydro-amelioration. In an attempt by the USSR's Council of Ministers to solve the ubiquitous problem of accountability, Minvodkhoz itself was gradually integrated into the system of the *agroindustrial complex*.<sup>129</sup> Thus, the newly created superstructure of the State Agroindustrial Committee (*Gosagroprom*), which in 1985 had united the Ministry of Agriculture with smaller bodies like the Ministries of Fruit and Vegetables, Meat and Milk Production, Procurement, Rural Construction, and their respective local administrative organs, determined the Minvodkhoz-budget from the year 1988 on.<sup>130</sup> Yet Gosagroprom followed the same path as Minvodkhoz had since the mid-1960s: it became a monolithic block without external control.<sup>131</sup>

During these technocratic and self-serving reforms, the meliorators became wholly oblivious to the conditions in the steppe: In August 1988, the Presidium of the Russian Council of Ministers complained that neither Minvodkhoz nor Gosagroprom paid sufficient attention to the planning, construction and use of irrigation systems along the Volga and in the North Caucasus. As a result, efficiency remained low while agricultural soils eroded: in Krasnodar region, 13 percent of the irrigated area was severely damaged by water logging and salinization; in Stavropol' it was almost a third while in Dagestan half of the soil was affected. In the entire RSFSR, almost 14 percent of soil was either water-logged or salinized. As a result, kolkhozes and sovkhoses recorded significantly lower harvests than expected. The poor condition of the irrigated lands was clearly attributed to the grave mismanagement by both Minvodkhoz and Gosagroprom. The Presidium complained that priority in capital investment had been given to the reclamation of new areas that followed grandiose schemes to the detriment of a qualitative improvement within existing meliorated zones.<sup>132</sup>

The transfer of competencies from Minvodkhoz to Gosagroprom prompted a two-year process of reshuffling. When it ended, Minvodkhoz had become the Ministry of Water Construction (*Minvodstroï*) which retained merely the core responsibilities of its predecessor. It is important to note here that the driving force of this restructuring was not a newly developing ecological consciousness—it was for the financial constraints of a crisis-ridden economic

129. GARF, f. A-259, op. 48, d. 7196, ll. 17–18; 1. 25–33ob (Delo o merakh po dal'neishemu razvitiu oroshaemogo zemledeliia v Stavropol'skom krae).

130. GARF, f. R-5446, op. 148, d. 859, ll. 7–7ob (Ob usilenii roli agropromyshlennykh komitetov v planirovanii rabot po melioratsii zemel'); and Medvedev, *Soviet Agriculture*, 333–34; while Medvedev acknowledged the creation of *Gosagroprom* as a “bureaucratic masterpiece,” he also noted that “approaches to reform on the basis of sensible economic principles could hardly be discerned,” Zhores Medwedjiev, *Der Generalsekretär. Michail Gorbatschow: Eine politische Biographie* (Darmstadt, 1986), 173.

131. Peter Rutland, *The Politics of Economic Stagnation: The Role of Local Party Organs in Economic Management* (Cambridge, Eng., 1993), 148, diagnosed “The whole Gosagroprom structure was a disaster for Soviet agriculture.”

132. GARF, f. A-259, op. 49, d. 1654, ll. 21–25 (Delo o merakh po uluchsheniui meliorativnogo sostoianiia oroshaemykh zemel' v Povolzh'e i na Severnom Kavkaze, t. 2).

system whose slow demise had been evident at least since the early 1980s.<sup>133</sup> The northern river diversion was cancelled in 1986 for its lack of economic feasibility while the Siberian diversion scheme was sent back to the drawing board and has led a rather curious half-life ever since.<sup>134</sup> Gorbachev's inconsistent reforms only exacerbated the systemic chaos.<sup>135</sup> The chimaera of a “planned market economy” weakened the Party's control without establishing new working market structures. Observers coined the phrase of a “centralized planned economy with a knocked-out center.”<sup>136</sup>

In 1990, Minvodstroi was reorganized as a state group, humbly named *Vodstroi*. The fall of the Soviet Union brought large-scale hydrotechnical construction in the dry steppe to a halt, and the once influential meliorators were condemned to a thorough soul search in the following years.<sup>137</sup> Only in 2006 was the fourth section of the Great Stavropol' Canal officially completed after a hiatus of more than a decade. The planned fifth and sixth section were never realized.<sup>138</sup> Today, the regions chosen in the mid-1930s for these grandiose meliorative projects to reclaim the steppe are in an often-dire state. Extensive maintenance work and repairs are to be done on one of Russia's largest hydro-technical infrastructures.<sup>139</sup> The full-mouthed promises of steppe-reclamation have proven fruitless.

### Conclusion: Dreams Turned to Dust

As the native population was either displaced or assimilated during the nineteenth century, the steppe in southern Russia lost its function as a space of cultural exchange, of negotiation and mediation between the tsarist empire and its neighbors. During the twentieth century, transformational visions

133. T.I. Saslavskaja, Die Studie von Nowosibirsk [commented German translation], *Osteuropa-archiv* (January 1984): A1–A25; and Dietmar Neutatz, *Träume und Alpträume: Eine Geschichte Russlands im 20. Jahrhundert* (München, 2013), 499, further points at the high dependency on the international energy market.

134. GARF, f. R-5446, op. 147, d. 879, l. 73 (O prekrashchenii rabot po perebroske chasti stoka severnykh i sibirskikh rek); and Tat'iana Chernova, “Povorot rek. ‘Za’ i ‘protiv’ techeniia...,” *Nezavisimaia gazeta*, December 23, 2014, at [www.ng.ru/stsenarii/2014-12-23/13\\_sibreka.html](http://www.ng.ru/stsenarii/2014-12-23/13_sibreka.html) (accessed February 11, 2022).

135. Stephen Whitefield, *Industrial Power and the Soviet State* (Oxford, 1993), 180–92; and Hanson, *Rise and Fall*, speaks of a “trial-and-error character of Gorbachev's reforms” as they became more erratic, but also more radical, 222.

136. Hans-Hermann Höhmann, “Der ökonomische Systemwechsel,” in Eduard Schewardnadse, Andrej Gurkow, Wolfgang Eichwede, and Friedhelm Wachs, *Revolution in Moskau: Der Putsch und das Ende der Sowjetunion* (Hamburg, 1991), 207–23, here 214.

137. Among other publications, this is exemplified in the foreword to the reissue of E.E. Alekseevskii's memoirs, *Ia liubliu etu zemliu* (Moscow, 2006) by the former deputy minister of Minvodkhoz and chairman of Vodstroi Polad Adzhievich Polad-Zade (1931–2018).

138. D.V. Kozlov, A.N. Danil'chenko, I.V. Korneev, and S.A. Maksimov, “Bol'shoi Stavropol'skii kanal,” at [water-rr.ru/Водные\\_объекты/882/Большой\\_Ставропольский\\_канал](http://water-rr.ru/Водные_объекты/882/Большой_Ставропольский_канал) (accessed February 10, 2022).

139. Alexey V. Sobisevich, Vera A. Shirokova, “Bol'shoi Stavropol'skii kanal—obvodnitel'no-orositel'naia sistema Severnogo Kavkaza,” *Grozenskiiestestvennonauchnyi bulletin'* 3, no. 1 (July 2018): 81–89; A.V. Sobisevich, and T.B. Schönfelder, “Ekologicheskie aspekty proekta sozdaniia kanala ‘Volga-Chograi,’” *Vestnik Instituta kompleksnykh issledovaniï aridnykh territorii* 38, no. 1 (2019): 77–79.

reimagined the steppe in abstract terms to make it legible by a highly centralized state apparatus. Starting in the late 1920s near Krasnodar and Stavropol', an ever-growing network of canals and reservoirs brought water to the semi-arid periphery. Hydro-engineering was used as a vehicle for state control over a region once considered uncivilized and backward by the administration. An *agromeliorative complex* evolved in the riverine landscape of the North Caucasus. This was furthered by personal networks within the Communist Party that profited from the expansion of large-scale hydro-infrastructures. It fundamentally restructured agriculture in one of Russia's granaries. The steppe became both a testing ground and a showcase for the achievements of the Soviet system, as the periphery was conquered and integrated under the guise of modernization.

What had started in the late nineteenth century as a civilizing mission to cultivate the wilderness soon turned into a high-modernist project that transformed the steppe environment according to the ideals of technologically fueled progress. For this, the experience of the drought and the ensuing famine of 1946/47 was a formative moment. The unidirectional ideals of *melioratsiia* (drainage, water-supply, irrigation) followed a promise of abundant yields that created problems not only in the Soviet Union, but also in many other states with a strong hydro-ameliorative sector. This globally shared belief in engineering as a panacea for the problems of agricultural productivity connected perfectly to the Soviet paradigm of progress mirrored in the projects to reclaim the steppe. The import of western technology only propelled this lasting struggle with the forces of nature in lieu of a locally rooted understanding of steppe ecology.

In the end, even the highly subsidized system of Soviet agriculture did not manage to subdue the "inherently dynamic"<sup>140</sup> nature of the steppe. Nor did its meliorative machinery overcome aridity and drought. The dream of blossoming oases drained its financial and natural resources. Soils eroded and became unproductive in large parts of the country. In the Soviet state's attempt to transform the environment, it revealed its systemic flaws. This played an important role in the collapse of the USSR, as it was not least through the prism of dryland reclamation that the deceiving ideology of progress was exposed. Crucial to this was local knowledge gained by a long-neglected scientific field that has always offered the best understanding of the steppe whence it originally evolved in the late nineteenth century: *pedology* (soil science).

140. Andrew C. Isenberg, "Seas of Grass. Grasslands in World Environmental History," in Andrew C. Isenberg, ed., *The Oxford Handbook of Environmental History* (Oxford, 2014), 133–53, here 139.