Science, development and modernization in the brezhnev time

The Water Development in the Lake Balkhash Basin

*Science, développement et modernisation à l'époque brejnévienne : aménagement
et gestion de l'eau dans le bassin du lac Balhaš*

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SCIENCE, DEVELOPMENT AND MODERNIZATION IN THE BREZHNEV TIME

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More than twenty years have passed since the disintegration of the Soviet Union, the first socialistic state in world history. Whereas the Soviet Union pursued its socialistic way of modernization, in reality, we can find many more common characteristics than differences between modernity in socialist and capitalist states in the twentieth century. David L. Hoffman rightly mentioned that “socialism itself was one of the many ideological products of European modernity.”¹ James Scott emphasized that modern states strove to make countable and visible all human resources as well as natural wealth, which was a core feature of modernization and could be ensured only through large-scale, standardized measures.² In the Soviet context, leaders and policymakers had unalterably pursued these features of modernity through planned economy, grandiose formalized developmental projects, and socialization and man-induced manipulation of the workforce as well as of natural resources. The Soviet “democratic centralism” gave policymakers virtually limitless authority to politically endorse and expeditiously realize these socialist modernization measures.

The grandiose water development in Central Asia was the most typical and comprehensible example of socialist modernization in the Soviet Union. Its biggest fruits were huge dam constructions in the Aral Sea, Lake Balkhash, and Ob-Irtysh River basins, and lengthwise grandiose irrigation canals and drainage systems for

1. David L. Hoffmann, “European Modernity and Soviet Socialism,” in David L. Hoffmann and Yanni Kotsonis, eds., *Russian Modernity: Politics, Knowledge, Practices* (Basingstoke: Macmillan Press, 2000), 257.

2. James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven: Yale University Press, 1998).

cotton and rice. Paul Josephson noted that “hydropower in the Soviet Union had its roots in Enlightenment notions of nature and the desirability of man’s dominion over it.”³ This desire was legitimized by the “transformation of nature” concept in the Soviet Union, which Marxist philosophers and Soviet geographers had elaborated in earnest since the postwar Stalin period.

However, the water development in Central Asia finally resulted in the Aral Sea catastrophe, which can be listed as “the greatest man-caused ecological catastrophe” in the whole history of mankind.⁴ As is well known, anthropogenic factors like over-irrigation and low water efficiency in the basin were the direct cause of the shrinkage of the Aral Sea. The Soviet governmental authorities and intellectuals recognized them quite well, but they did not (or “could not”) take sweeping, comprehensive measures to save the Aral Sea. Soviet policymakers and planners assumed that every detail of locales were countable and visible to them, whereas in reality, they were absolutely invisible because “locales” and “places” were always distant and, more importantly, separated from the metropolis. The centralized party-state officials always assumed that they could count and grasp all about localities despite never seeing directly what was going on there. Anthony Giddens defined such phenomena as the “separation of space from place”⁵. In the case of the Aral Sea basin, it resulted in on-site irrational use of water resources and impermissible disposition of irrigated plots on marginal farmlands by local bureaucrats and actual tillers of plots, only to make hypocritical shows of accomplishment of plans. This was really one of the limits of modernization under a planned economy.

At the same time, “reflexive modernization” also functioned in the Soviet Union.⁶ As discussed below, from the beginning of the 1960s, not only a number of Soviet intellectuals but also some engineers began to suppose that the transformation of nature itself was good, but that negative feedback on human activities from the transformed nature should be taken into account, when a developmental project was actually planned. The Soviet geographers of the Institute of Geography, U.S.S.R. Academy of Sciences, explicitly conceptualized this change in way of thinking, and modified the “transformation of nature” concept, which was initially refined during “Stalin’s Plan for Transformation of Nature” in the post-war Stalin period.

3. Paul Josephson, *Industrialized Nature: Brute Force Technology and the Transformation of the Natural World* (Washington: Island Press, 2002), 24.

4. Marq de Villers, *Water: The Fate of Our Most Precious Resource* (N.Y.: Mariner Books, 2001), 106.

5. Anthony Giddens, *The Consequences of Modernity* (Stanford: Stanford University Press, 1990), 18-19.

6. As Giddens noted, “reflexivity” is the consistent “never-to-be-relaxed monitoring” of actions, which is “the necessary basis of modernity.” In this sense, “reflexive modernity” is a corollary of the monitoring of the modernization process itself. Ulrich Beck characterized it as “the self-confrontation with the effects of risk society” in the industrial era, which urges the transformation of the approaches and practices of modernization. Giddens, *The Consequences of Modernity*, 36-37; Ulrich Beck, “The Reinvention of Politics: Towards a Theory of Reflexive Modernization,” in Ulrich Beck, Anthony Giddens and Scott Lash, *Reflexive Modernization: Politics, Traditions and Aesthetics in the Modern Social Order* (Cambridge: Polity Press, 1994), 6.

However, this Soviet version of “reflexiveness” in practice spoiled the legitimacy of the “socialist” variation of modernization. The alteration of the socialist concept of modernization and the approach to the human-nature relationship contradictorily played a role in hampering the actual realization of some developmental projects in the agricultural-water sector in Central Asia. The restoration of the irrigation development in the Lake Balkhash basin is one good example that occurred during the Brezhnev era. We can also observe the causes of the infinite postponement and final rejection of the Siberian rivers diversion project from this perspective.

In this paper, first, the author will make a rough sketch of the “transformation of nature” concept and the chronological change of its content. It will be clearly shown that the Soviet geographers of the Institute of Geography in Moscow gradually modified the “transformation of nature” concept during the 1960-1970s. Second, the author will overview the developmental plans in the Lake Balkhash basin, correlating them with the “transformation of nature” concept, especially under the Brezhnev authorities. Finally, this paper will argue that “reflexive modernization” under the socialist regime, typified by modification of the “transformation of nature” concept, prevented the progress of the actual developmental policy, which explicitly bears evidence of the declining legitimacy of “socialist modernization.” The Brezhnev era is a crucial period in this argument, and this paper will evince one of the key elements of the Brezhnev authorities: “political indecisiveness.”

Various scholars have already discussed the “transformation of nature” concept and its actual establishment. The pioneering works of Marshall Goldman and Zhores Medvedev still have academic significance today.⁷ Philip Pryde concurrently touched upon various aspects of “conservation” in the Soviet Union while mentioning some of the conceptual background.⁸ Stephen Brain’s work concentrates upon the conceptual change in forest management from the second half of the nineteenth century up to the end of “Stalin’s Plan for Transformation of Nature.”⁹ Douglas R. Weiner also touches upon the concept, but his main academic interest is more in the Soviet-Russian nature protection discourses and movements.¹⁰ Julia Obertreis portrayed the colonial history of Central Asia from the tsarist period until the demise of the U.S.S.R., mentioning the actual situation of “transformation of nature” and “nature protection” in Uzbekistan.¹¹ The above-cited Paul Josephson

7. Marshall I. Goldman, *The Spoils of Progress: Environmental Pollution in the Soviet Union* (Cambridge, MA: MIT Press, 1972); Zhores A. Medvedev, *Soviet Agriculture* (New York: W.W. Norton & Company, 1987), 145-150; Zh.A. Medvedev, *Vzlët i padenie Lysenko* [The Rise and Fall of Lysenko] (M.: Kniga, 1993), 197-209.

8. Philip R. Pryde, *Conservation in the Soviet Union* (Cambridge: Cambridge University Press, 1972).

9. Stephen Brain, *Song of the Forest: Russian Forestry and Stalinist Environmentalism, 1905-1953* (Pittsburg: University of Pittsburg Press, 2011).

10. Douglas R. Weiner, *A Little Corner of Freedom: Russian Nature Protection from Stalin to Gorbachev* (Berkeley: University of California Press, 1999).

11. Iu. Obertrais, “‘Mertvye’ i ‘kul’turnye’ zemli: Diskursy uchënykh i imperskaia politika v Srednei Azii, 1880-e–1991 gg. [The “Dead” and “Cultured” Lands: Scientists’ Discourses and Imperial Policy in Central Asia, 1880s-1991],” *Ab Imperio*, no. 4 (2008): 191-231.

made a comparative analysis of modernization between the Soviet Union and the United States, referring to the “transformation of nature” concept during the post-war Stalin era and construction of dams in the Volga River basin.¹² Compared with these previous studies, this article is unique in its explanation of the linkage between the developmental concept and actual development in a concrete region of the Soviet Union by use of archival materials in Moscow and Almaty as well as Soviet periodicals and monographs.

The “transformation of nature” concept and its modifications

While various embryonic ideas leading afterwards to the “transformation of nature” concept had already been expressed by Russian intellectuals at the end of the nineteenth century, it was only after the October Revolution that Soviet intellectuals further enriched the debate about the anthropogenic transformation of nature. Eventually, Marxist philosophers and Soviet geographers elaborated the concept after World War II with the start of “Stalin’s Plan for Transformation of Nature” in 1948 that human beings could maximally utilize natural “productive forces” for their own sake, which became possible only under socialism. For them, “humans” and “nature” develop not independently, but “dialectically” with close, strong interactions. As Ivan Ivanov-Omskii, a Marxist philosopher, said, “Only socialist states are able to utilize the geographical environment effectively and transform it rationally on the basis of accurate scientific data,” which “ensures new speed of increase of human dominion over nature.”¹³

Stalin’s Plan for Transformation of Nature consisted of certain components: creation of shelter belts to the west of the Ural River; tree planting around sovkhoz-kolkhoz plots; construction of ponds and cisterns for local amelioration; and introduction of the grassland system of agriculture with crop-fodder rotation on plots. Here, Trofim Lysenko, the notorious Lamarckian agronomist, jumped on the bandwagon with the theory of “cluster planting of trees,” whose ineffectiveness and lack of foundation afterwards became apparent.¹⁴ In 1950, Iosif Stalin further put into practice “Great Constructions of Communism” projects in the framework of the Stalin’s Plan, including the construction of the famous Volga-Don Canal, Stalingrad, and Kuibyshev Hydroelectric Stations in the Volga River basin and so on. The most grandiose project was the Major Turkmen Canal, running across the Karakum Desert through the dried up former riverbed of the Uzboi for around 1,100 kilometers with two water reservoirs and hydroelectric stations on the path to the Caspian Sea. Stalin decided the construction on his own authority without

12. Josephson, *Industrialized Nature*, Chapter 1.

13. I.I. Ivanov-Omskii, *Istoricheskii materializm o roli geografičeskoi sredy v razvitií obščestva* [Historical materialism and the role of geographic environment in the development of society] (M.: Politizdat, 1950), 152-153.

14. Medvedev, *Soviet Agriculture*, 145-146.

any feasibility study. The Major Turkmen Canal should have served for desert irrigation for pasturage in the Karakum Desert with tree or shrub planting along the canal, finally contributing to alleviation of the desert climate.¹⁵ Soviet hydrologists calculated the effects on the water balances of the Aral Sea as a result of the canal construction, which promised a drop in the sea level.¹⁶

Stephen Brain described the confrontation between “technocrats” and “prometheans” of forest management during the Stalin’s Plan. The former respected “local variation, natural limits, and the importance of experimental results,” while the latter consisted of Lysenkoists, who forced all to introduce a uniform method of forestry irrespective of geographic conditions, advanced “the notion that forests could be made to conform to the human will and relied upon ideological claims to back up their beliefs.”¹⁷ Soviet geographers held diverse views on the human-nature relationship and nature transformation, and each can be placed somewhere in between. In general, Soviet geographers both in Moscow and Leningrad succeeded in protecting the independence of the geographical sciences in the Soviet Union, not giving in to Lysenko’s “uniform” approach to nature.¹⁸

In March 1953 immediately after Stalin’s death, the Soviet authorities abruptly shut down obviously reckless nature transformation projects. The Major Turkmen Canal project was also abandoned. Excavation of the main canal had started only five days before Stalin’s death.¹⁹ Soviet intellectuals temporarily ceased to refer to transformation of nature under the wave of “de-Stalinization” in Soviet society.

Soviet geographers and “naturalists” engaged in the legislation process of the Nature Protection Law of the R.S.F.S.R., adopted at the Supreme Soviet in 1960. Here, they called for “nature protection through its enrichment.”²⁰ This idea led

15. Tetsuro Chida, “Sengo Starin-ki Torukumenisutan ni okeru Unga Kensetsu Keikaku to Araru-kai Mondai [Grandiose Canal Construction Projects in Turkmenistan and the Aral Sea Problem in the Post-War Stalin Period],” *Surabu Kenkyuu* [*Slavic Studies*], 56 (June 2009): 17 [in Japanese].

16. Boris Zaikov, a Soviet hydrologist, calculated that the level of the Aral Sea would decline as much as 7.73 meters if the Major Turkmen Canal took 375-400 m/sec in its first phase, and as much as 14.2 meters under the withdrawal of 600 m/sec in the future. Boris Zaikov, *Vodnyi balans i uroven' Aral'skogo moria v sviazi so stroitel'stvom Glavnogo turukemnskogo kanala* [The Water balance and the level of the Aral Sea after the construction of the Major Turkmen Canal] (L., 1952), 33-34.

17. Stephan Brain, *Songs of the Forest*, 141.

18. The author previously discussed the conceptual debates related to “space” and “region (geographical zone)” among Soviet geographers in the post-war Stalin period, which clearly distanced themselves of the “uniformed” approach to nature by Lysenkovists and put a high value to the diversity of landscapes and geographical environments. Tetsuro Chida, “Taminzoku Ryouiki Teikoku Soren ni okeru Chirigaku to Kuukan-Chiiki Ninshiki: Sengo Starin-ki wo Chuushinni [Geographical Science and the Conception of ‘Region’ and ‘Space’ in the Soviet Union as a Multinational ‘Territorial’ Empire],” *Chiiki Kenkyuu* [*Regional Studies*], 10, 2 (April, 2010): 119-121 [in Japanese].

19. “Nachalos' general'noe nastuplenie na Kara-Kumy! Skrepery vyshli na osnovnuiu trassu kanala [A general offensive into the Kara-Kum got underway! Scrapers came to the main track of the canal],” *Turkmenskaia iskra* (04 March 1953): 1.

20. Weiner, *A Little Corner of Freedom*, 265.

directly to a revised concept of “transformation of nature,” which the geographers of the Institute of Geography, U.S.S.R. Academy of Science, brought back in 1956 under the initiative of the Institute head, Innokenti Gerasimov.²¹ They did not initially use the term “transformation of nature (*preobrazovanie prirody*),” which evoked Stalinism, but “thermal and water regime on the earth’s surface and its transformation for practical purposes.” They argued that agricultural crops should be produced in accordance with geographic zones and natural conditions, and that “science and practice designed the techniques, aimed at transformation of natural processes for the purpose of alteration of the thermal-moisture regime in certain territories and its better adjustment to the necessities of agriculture.”²²

In 1960, Gerasimov argued that it should be one of the main tasks of the Institute to conduct “scholarly researches about the object-oriented transformation of natural conditions and the full-fledged usage of natural power to enhance productive forces of the socialist national economy.”²³ In 1961, the “transformation of nature in the Soviet Union and her neighbouring countries” became the key research task of the Institute, which Gerasimov and Andrei Grigor’ev, the former director of the Institute until 1950, got to lead.²⁴

In general, the ongoing scientific and technological revolutions encouraged them to be optimistic about human capacity in nature transformation with its protection and enrichment, which prompted them to bring the concept to the fore again. Gerasimov wrote in the annual research program of the Institute in 1961 that “in our times of technological progress, especially in the field of nuclear energy and its use for peaceful purposes, mankind will be able to proceed with international-scale coordinated activities of radical transformations of nature for his own sake, focusing upon object-oriented changes of natural balance of heat and

21. Gerasimov became the director of the Institute from 1950 and worked out until his death in March 1985. He was initially a geomorphologist and played an active role in geographical and geological expeditions in Central Asia and Kazakhstan during 1930s including around Lake Balkhash.

22. Their argument became the conceptual background to Khrushchev’s policy of regional agricultural specialization. I.P. Gerasimov, “Teplovoi i vodnyi rezhim zemnoi poverkhnosti, ego rol’ v dinamike prirodnkh protsessov, geograficheskie razlichia i metody preobrazovaniia dliia prakticheskikh tselei [Thermal and water regime of the Earth’s surface, its role in the dynamics of natural processes, geographic differences and methods of transformation of nature for practical purposes],” *Izvestiia Akademii Nauk SSSR. Serii geograficheskai*, no. 4 (1956): 47-49.

23. I.P. Gerasimov, “Geografiia v Sovetskom Soiuze (vvedenie) [Geography in the Soviet Union (preface)],” I.P. Gerasimov *et al.*, eds., *Sovetskaia geografiia. Itogi i zadachi* [Soviet geography: results and tasks] (M.: Gosudarstvennoe izdatel’stvo geograficheskoi literatury, 1960): 10.

24. ARAN (Arkhir Rossiiskoi Akademii Nauk [Archive of Russian Academy of Sciences]), f. 200, Institut geografii [Institute of Geography], op. 1, Upravlencheskaia dokumentatsiia Instituta [Administrative documentation of the Institute], d. 155, Plan nauchno-issledovatel’skikh rabot Instituta na 1961 god [The annual research plan of the Institute], l. 16, Plan nauchno-issledovatel’skikh rabot Problemy “Teoriia preobrazovaniia prirody SSSR i prilegaiushchikh territorii [The research plan on the problems “Theories of transformation of nature in the U.S.S.R. and adjacent territories”].

moisture inherent in various natural-climatic zones and large regions.”²⁵ From 1961, the bimonthly journal of the Institute of Geography, *Proceedings of the U.S.S.R. Academy of Sciences, Geographical Series*, started to place a specialized section entitled “Natural Resources, Protection and Transformation of Nature” in almost every number. Gerasimov described the theoretical development of transformation of nature as the “vanguard areas of geographic sciences,”²⁶ but, at the same time, he did not conceal his conviction about the capabilities of the Soviet Union to put grandiose projects of transformation of nature into full-fledged execution. More specifically, Gerasimov apparently endorsed the idea about the death of the Aral Sea as a result of the irrigation development and water reservoir construction in the basin, insisting that “Central Asia is characterized by a closed hydrologic circle, which can be further developed by increase of evaporation, given the expansion of irrigated plots in the foothill and desert areas.”²⁷

However, the Moscow-based geographers significantly modified the “transformation of nature” concept afterwards. They did not suppose it to be the endless process of “development” of humans and nature, but insisted that human beings should beforehand take into account “feedback” from the environment subjected to transformation. That is, Soviet geographers still agreed with human-induced nature transformation itself, but at the same time thought that people should approach landscapes affected by transformation by calculating both “positive” and “negative” effects. Il’ia Novik, a specialist in cybernetics and the human-nature relationship at the Institute of Philosophy, called this conceptual modification the “cybernetization of the natural system,” of which Gerasimov expressed his approval.²⁸

In February 1965, that is, after the dawn of the Brezhnev period, Vsevolod Anuchin, a geographer at Moscow State University and a leading advocate of unification of physical and economic geographic disciplines (“unified geography”), published an acrimonious article in *Literaturnaia Gazeta*, the official paper of the Writers’ Union of the U.S.S.R. Then, he severely accused Gerasimov and the Institute of Geography that, allegedly, they were not able to gain a comprehensive grasp of the relationship between nature and society, giving a high place only to physical geography and driving out economic geography and landscape science (*landshaftvedenie*) from the Institute. Anuchin pinned the label of “antigeografizm” to the academic stance of the Institute of Geography.²⁹ Gerasimov forthwith made

25. ARAN, f. 200, op. 1, d. 155, l. 7-8, Vvedenie k planu nauchno-issledovatel’skikh rabot [Introduction of the annual research plan].

26. I.P. Gerasimov, “Sovetskaia geograficheskaia nauka i problem preobrazovaniia prirody [The Soviet geographic science and the problem of transformation of nature],” *Izvestiia Akademii Nauk SSSR. Serii geograficheskaia*, no. 5 (1961): 7.

27. Gerasimov, “Sovetskaia geograficheskaia nauka,” 11-12.

28. A.G. Dorskach, “Nauki o Zemle i voprosy preobrazovaniia prirody [Earth sciences and the issues on transformation of nature],” *Izvestiia Akademii Nauk SSSR. Serii geograficheskaia*, no. 5 (1962): 136.

29. V. Anuchin, “Istoriia s geografiei [History with geography],” *Literaturnaia gazeta* (18 February 1965), 2.

a written protestation against Anuchin and condemned his criticism as baseless, introducing various examples of new directions and results of economic geographers and landscape specialists at the Institute, stating that “the study about the geographic aspects of the interrelationship between nature and society now became a core task of the Institute.”³⁰ Anuchin’s harsh criticism seemed to make Gerasimov recognize the necessity to elaborate a grand theory of geographic sciences as soon as possible, which finally resulted in the introduction by Gerasimov of the “constructive geography” theory in 1966, which urged geographers to investigate triadic subjects concurrently: systematic transformation of nature, rational industrial distribution, and migration movement and ideal population disposition. Gerasimov emphasized that “the combination of these triadic subjects guaranteed the indispensable ‘economization’ of the geographical sciences as a whole,” which responded to the criticism by Anuchin.³¹

Across the second half of the 1960s, Gerasimov slightly changed his approach to actual conditions around the “transformation of nature” concept. For example, in 1967, Gerasimov recognized that the above-mentioned “closed hydrologic circle” in Central Asia had not been scientifically evinced by exact calculations,” opining that “the problems about water balances in Central Asia are quite complicated and include a number of very important but still-unsettled scientific-technological issues.”³² At last, in 1969, Gerasimov admitted that the future of the Aral Sea was becoming an “imminent issue.” He further demanded that Soviet geographers conduct wholesale investigations and analyses of the basin, without which it would be impossible to set a clear vision about the correct solution to the Aral Sea problems.³³ At the same time, he insisted that planners should beforehand factor into the budget the costs for prevention or elimination of “negative effects,” emanating from nature transformations.³⁴ He further stated that “under contemporary conditions the conservation of nature is becoming inseparable from its transformation, from the rational exploitation of its resources.”³⁵ What is important here is the fact that Gerasimov’s article was published in the most authoritative journal of the C.P.S.U., *Kommunist*, which meant that Gerasimov’s concept received official endorsement from the Central Committee of the C.P.S.U.

30. I. Gerasimov, “‘Ischezla’ li geografiia? [Did geography “disappear”?]” *Literaturnaia gazeta* (29 April 1965), 2; in addition to Gerasimov, six scholars (of four articles), all of whom were based in either the Institute of Geography or Moscow State University, openly debated in the paper.

31. Gerasimov, “Konstruktivnaia geografiia: tseli, metody, rezul’taty [Constructive geography: purposes, methods and results],” *Izvestiia Vsesoiuznogo geograficheskogo obshchestva*, no. 5 (1966): 393.

32. I.P. Gerasimov, *Preobrazovanie prirody i razvitie geograficheskoi nauki v SSSR. Ocherki po konstruktivnoi geografii* [Transformation of nature and the development of geographic sciences in the USSR. The overview of constructive geography] (M.: Znaniie, 1967): 72.

33. I.P. Gerasimov, “Nuzhen general’nyi plan preobrazovaniia prirody nashei strany [Our country needs master plan of transformation of nature],” *Kommunist*, no. 2 (1969): 77.

34. Gerasimov, “Nuzhen general’noi plan,” 69.

35. Gerasimov, “Nuzhen general’noi plan,” 78.

During the 1970s, Soviet geographers paid more attention to “ecology” as with the case of the West, although it was still anthropocentric for many, requiring the optimization of the human-nature relationship and harmonization between economic development and environmental factors. Given such conditions, Vladimir Preobrazhenskii and Lev Abramov, geographers close to Gerasimov, even issued a warning about the destruction of the “society-nature system” as a result of human activities, armed with mighty high-technologies.³⁶ Gerasimov pleaded no contestation against the “struggles for nature protection by progressive public opinion in capitalistic countries,” despite his strong emphasis on the superiority of socialism over the issues of target-oriented nature protection through its transformation.³⁷

Gerasimov remained cautious as to the full-fledged implementation of one of the most gigantic nature transformation projects in the entire world, the Siberian water diversion to Central Asia. He insisted in 1982 that it is “impossible to conduct any transformation of nature without negative side effects. [...] The Asiatic diversion does not meet demands, which necessitates further all-round researches, including about alternative measures.”³⁸ He persisted, on a scientific basis, about negative feedback from the actual transformations of nature up to the end of his life. Gerasimov with Grigorii Voropaev, the director of the Institute of Water Problems in Moscow, even pointed out that the planned quantity of water for diversion in the project document of the first phase was not enough to prevent the process of desertification around the Aral Sea. They alternatively proposed to enhance the efficiency of local water use through reconstruction of irrigation networks and other measures.³⁹

In sum, the “transformation of nature” concept went through significant modification before and after 1960. Gerasimov, the most voiceful proponent of the modified version of the “transformation of nature” concept, assumed it to be the all-embracing balanced notion of “development” and “conservation,” which pursued concurrent ensuring of actual nature transformation, rational use of natural resources, nature protection, and socioeconomic prosperity of people. He obviously raised the bar for the on-site realization of the concept. This was the conceptual aspect of “reflexive modernization” in the Soviet Union during Brezhnev’s time.

36. V.S. Preobrazhenskii i L.S. Abramov, “Stanovlenie konstruktivnoi geografii [The establishment of constructive geography],” *Izvestiia Akademii Nauk SSSR. Seriiia geograficheskaiia*, no. 1 (1976): 15.

37. I.P. Gerasimov, “Vzaimodeistvie prirody i obshchestva i zadachi konstruktivnoi geografii [Interaction between nature and society and the tasks of constructive geography],” in I.B. Novik, ed., *Problemy optimizatsii v ekonomiki* [Problems of optimization in economy] (M.: Nauka, 1978), 13-14.

38. ARAN, f. 1850, Lichnyi fond Gerasimova Innokentii Petrovicha (1905-1985) [Collections of personal documents of Gerasimov Innokentii Petrovich (1905-1985)], op. 1, d. 192, l. 11, Zapiska Gerasimova “O materialakh, svyazannykh s perebroskoi stoka sibirskikh i severnykh rek na iug [Report by Gerasimov about the diversion of Siberian and northern rivers into the south].”

39. G.V. Voropaev, I.P. Gerasimov, O.K. Kibal’chik and N.I. Koronkevich, “Problema pereraspredeleniia vodnykh resursov v Sredinnom regione: prognoz izmeneniia prirodnnykh uslovii [The problem of the redistribution of water resources in the Central region: forecast of translation of natural conditions],” *Izvestiia Akademii Nauk SSSR. Seriiia geograficheskaiia*, no. 6 (1982): 25-26.

“Transformation of nature” and the fate of Lake Balkhash

Lake Balkhash is a unique inland water body with a surface area of 16,400 km² located in the southeastern part of Kazakhstan, and it can be divided into the saline East Balkhash and the freshwater West Balkhash at the narrow strait in the center, called Uzyn-Aral. The Ili River supplies more than 70 percent of water inflow into Lake Balkhash. Four small rivers, Karatar, Aksu, Lepsy, and Ayagoz, flow into the East Balkhash. The altitude of Lake Balkhash depends upon the inflow volume of the rivers and fluctuates periodically. Owing to the constant supply of freshwater from the Ili River, the salinity of the West Balkhash is low, at a level for possible industrial use, which gives economic significance to Lake Balkhash. The precondition of water use was completely different from that of the Aral Sea, filled with economically less valuable brackish water, inside which local people engaged in fishery and water transportation. Balkhash City, one of the centers of non-ferrous metallurgy in Kazakhstan, is located on the northwestern shore of Lake Balkhash, which is the main consumer of water resources in the West Balkhash. The total area of the basin extends up to 410,000 km², and includes China, Kazakhstan, and a small terrain of Kyrgyzstan. The largest river, Ili, is a transboundary waterway between the upstream People's Republic of China and the downstream Republic of Kazakhstan. However, this article concentrates upon the cases in the territory of the former U.S.S.R.

Kapchagai Hydropower Station and irrigation development

Irrigated agriculture had been conducted from old times upstream of the Ili River in today's People's Republic of China. On the other hand, local Kazakhs in the Zhetysu (Semirechie) region had been nomadic or semi-nomadic and full-scale agricultural development started after Russian colonizers settled there. However, it was only at the end of the 1920s that Soviet intellectuals and engineers began seriously considering the future development of the basin. Experimental rice cultivation along the Karatal River was introduced in 1930,⁴⁰ which shifted into full gear only after the deportation of Koreans from the Far East in 1937. As for the Ili River basin, scholars of the Central Asian State University in Tashkent conducted an expeditionary investigation in the downstream area of the Ili River in 1926 and 1927, which concluded that there existed 500,000 hectares of arable land including 45,000 hectares in the Akdala area, suitable for rice cultivation through irrigation.⁴¹ These “500,000” and “45,000 hectares” would be the fundamental indicators for the future planning of agricultural development in this area. According to Dmitrii

40. P.F. Domrachev, *Balkhash i Pribalkhash'e* [Lake Balkhash and its surroundings] (Alma-Ata: Kazakhskoe kraevoe izdatel'stvo, 1935): 53.

41. M.M. Nedzvetskii, “Irrigatsionnye izyskaniia v Pribalkhash'i [Surveys on irrigation around Lake Balkhash],” *Narodnoe khoziaistvo Kazakhstana*, no. 4-5 (1929), 53, 58.

Bukinich, an irrigation engineer who headed various geographic expeditions in Central Asia, Mongolia, and Afghanistan, there was no other crop except for rice suitable for this region because of the prevalence of saline soil.⁴² They also presented the embryonic idea of constructing the Kapchagai Hydropower Station.⁴³

A full-fledged study for water development of the Ili River was organized only during World War II when many industrial facilities evacuated into the Semirechie, which in turn suffered a shortage of electricity.⁴⁴ The Permanent Ili Comprehensive Expedition (*postoianno deistviushchaia Iliiskaia kompleksnaia ékspeditsiia*) was organized in 1944, headed by Shafik Chokin, the director of the Institute of Energy of Kazakh S.S.R.⁴⁵ They made the primary project document of the Kapchagai Reservoir. Interestingly, they held a negative view on the gigantic irrigation development downstream of the Ili River.⁴⁶ Finally, in 1959, the project document (today's "feasibility study") of the Kapchagai Hydropower Station was submitted and widely acclaimed by the the Gosplan Council for Techno-Economic Assessment (Expert Commission)⁴⁷ in Moscow after its modification by the All-Union Project Designing and Research Institute of Water Facilities Construction (Gidroproekt).⁴⁸ The Kapchagai Reservoir itself was not an efficient hydraulic facility because of its low percentage (23.5 percent) of planned effective water volume. The installed capacity of the hydropower station was only 360 MW, almost ten times less than the Nurek Hydropower Station in Tajikistan (3,000 MW).⁴⁹ According to the project document, the Kapchagai dam would store more than double the volume (28.1 km³)

42. Domrachev, *Balkhash i Pribalkhash'e*, 53.

43. Nedzvetskii, "Irrigatsionnye izyskaniia v Pribalkhash'i," 55.

44. Sh.Ch. Chokin, *Chetyre vremeni zhizni* [Four times of life] (Almaty: Bilim, 1998): 190.

45. Chokin afterward became president of the Academy of Sciences of Kazakh S.S.R. (1964-1967).

46. V.L. Tsenatsevich and V.A. Kiktenko, "Perspektivy razvitiia irrigatsii v basseine r. Ili [The perspectives on the irrigational development in the Ili River basin]," in Sh.Ch. Chokin, ed., *Problema vodokhoziaistvennogo ispol'zovaniia reki Ili* [The problem about the water use of the Ili River] (Alma-Ata: Izdatel'stvo Akademii Nauk Kazakhskoi SSR, 1950): 71-72.

47. The Council for Techno-Economic Assessment (later the State Expert Commission) was the permanent organ within the All-Union State Planning Committee (Gosplan), whose role was to make assessments of the feasibility studies of the developmental projects, which held strategic importance at a national level. The Expertise Sub-Commission was organized to each project, and members of the Sub-Commission were further divided into groups by subjects. Each group made an assessment from a perspective of its specialty, and finally, all documents were assembled and summarized to a final assessment report. The permanent Council (or Expertise Commission) finally adopted an official resolution based on the final assessment report by the Sub-Commission. The resolution would be used as information in making a final decision of each project in Gosplan and the Council of Ministers.

48. RGAE (Rossiiskii gosudarstvennyi arkhiv ékonomiki [Russian State Archive of Economics]), f. 4372, op. 58, 1957-1959 gg., d. 670, Ob ékspertize proektnogo zadaniia Kapchagaiskoi GÉS [About the experts' assessment concerning the project document of the Kapchagai Hydropower Station], l. 186, Postanovlenie Soveta tekhniko-ékonomicheskoi ékspertizy [The resolution of the Council for Techno-Economic Expertise] (18.07.1959).

49. RGAE, f. 4372, op. 58, d. 670, l. 70, Zakliuchenie po razdelam énergetiki [The conclusion about the power engineering section].

of the annual average water outflow from the dam (11.8 km³). Chokin wrote in his memoir that the Kapchagai Reservoir should have been “an instrument for the regulation of long-term fluctuations of river flow, and could be the regulator of the surface level and water regime of Lake Balkhash.”⁵⁰ The instability of the altitude and salinity of Lake Balkhash influenced the water supply to Balkhash City and other settlements around the lake. Yet the Gosplan Expert Commission proposed another variant of water use, which seemed to be “economically” more efficient, urging Gidroproekt “to accelerate the designing of the single comprehensive scheme of land-water usage in the downstream area of the Ili River and to clarify the influence of the water reservoir upon the development of agriculture and animal breeding.”⁵¹

In the Aral Sea basin, the Karakum Canal started operation of its first-phase section in 1959 and of its second-phase section in 1960. As during the Stalin era, the myth of “gigantism” still remained popular and influential among some tiers of Soviet intelligentsia and bureaucrats. In 1959, Nikolai Kalachëv, a hydraulic engineer of the Institute of Energy of Kazakh S.S.R. and a colleague of the above-mentioned Chokin, succeeded in publishing a written proposal in the high-impact journal of the Presidium of the U.S.S.R. Academy of Sciences (*Bulletin of the U.S.S.R. Academy of Sciences*) about the construction of an artificial channel with four hydroelectric stations, connecting the Ili River with the Chu River (transboundary river between today's Kazakhstan and Kyrgyzstan, flowing east of the Ili River), for the irrigation development of 3,500,000 hectares in the Bet-Pak-Dala Desert region. As Kalachëv clearly designated, Lake Balkhash would have been divided into areas of small water bodies after this channel had started full operation in a distant future.⁵² He once again propagated his idea at a conference on comprehensive usage of land-water resources in the Central Asian republics and southern Kazakhstan in May 1962.⁵³ However, the Soviet authorities alone seemed to dismiss this sort of nothing-but-gigantic project without any feasibility demonstration. The mere “massiveness” or the unrealistic transformation of deserts had ceased to appeal in the developmental designing of the U.S.S.R. Rather, Soviet planners came to demand a Soviet version of “feasibility” and scientific basis.

In 1964, the hydraulic engineers of the Kazakh branch of Gidroproekt (Kazgidroproekt) worked out another project document about the irrigation of “430,000 hectares” around the delta zone of the Ili River mainly for rice-pasture rotation (110,000 hectares for rice cultivation), almost at the same time that

50. Chokin, *Chetyre vremeni zhizni*, 195.

51. RGAE, f. 4372, op. 58, d. 670, l. 217, Zakliuchenie ekspertnoi (pod)komissii [The conclusion of the experts' subcommission] (l. 189-218).

52. N.S. Kalachëv, “Kompleksnye issledovaniia v basseine reki Ili [Comprehensive studies about the Ili River basin],” *Vestnik Akademii Nauk SSSR*, no. 5 (1959): 115-118.

53. A.S. Kes', “Soveshchanie po kompleksnomu ispol'zovaniiu zemel'nykh i vodnykh resursov respublik Srednei Azii i Iuzhnogo Kazakhstana [The meeting on comprehensive use of land and water resources in Central Asia and the South Kazakhstan],” *Izvestiia Akademii Nauk SSSR. Seriiia geograficheskaiia*, no. 5 (1962): 193.

the Soviet government officially gave final approval for the construction of the Kapchagai Hydropower Station. The irrigated area would be limited up to 100,000 hectares under natural conditions including 20,000 for rice cultivation with consideration given to irrigation development in the upstream area in Kazakhstan and China and conservation of muskrat breeding in the delta area.⁵⁴ It could have been possible to cultivate “430,000 hectares” only if the whole volume of water resources of the Ili River had been used for irrigation with long-term and seasonal control by the Kapchagai Reservoir. The project premised the probable elimination of Lake Balkhash in the future.

The State Expert Commission of Gosplan began the assessment process in March 1965. The final report of the Expert Sub-Commission encompassed the obviously conflicting opinions of its members, which were split between “pro-development” and “anti-development” regarding gigantic melioration measures. On the one hand, the final report demanded expansion of the area of rice cultivation up to 33 or 40 percent of the whole irrigated land, not the 25 percent proposed in the project document,⁵⁵ although the standard irrigation demand for rice (20,000 m³/ha) is four to five times more than that for other crops.⁵⁶ One member of the Expert Sub-Commission suggested a further investigation into the possibility of irrigation development not only in the downstream sites below Akdala, but also on uncultivated lands between Kapchagai and Akdala.⁵⁷ On the other hand, the final report further mentioned that

in a distant future, Lake Balkhash will cease to exist if the hydromelioration measures in the scheme are implemented fully. [...] The Expert Sub-Commission thinks that it should be a subject for broad public discussion in the Republic whether the complete disappearance of Lake Balkhash is admissible or not.⁵⁸

Vadim Dēzhkin, a biologist and specialist in hunting from the Central Union of Consumers’ Societies, expressed this view to the Expert Sub-Commission.⁵⁹

54. Muskrats are valuable fur animals to make fur coats and caps, introduced from the North America and Scandinavia to the Ili River delta in the 1930s. RGAE, f. 4372, op. 66, 1965-1975 gg., d. 466, Materialy ekspertizy skhemy gidromeliorativnykh meropriiati dlia razvitiia sel'skogo khoziaistva i zverovodstva v nizov'iakh r. Ili [Materials of the experts' assessment about the scheme of hydromelioration measures for the development of agriculture and animal breeding in the lower reaches of the Ili River], l. 120, Postanovlenie Gosëkspertizy [The resolution of the State Expertise] (24.04.1965) (l. 120-125), 130, Zakliuchenie ëkspertnoi podkomissii [The conclusion of the Experts' Subcommission] (10.04.1965) (l. 126-144).

55. RGAE, f. 4372, op. 66, d. 466, l. 131.

56. *Tekhniko-ëkonomicheskii doklad sravnitel'noi ëkonomicheskoi ëffektivnosti i ocherëdnosti orosheniia zemel' pod risoseianie v perspektivnykh raionakh SSSR* [The techno-economic report about the comparative economic analysis of the effectiveness and preference of irrigation for rice cultivation in the promising regions in the U.S.S.R.] (M., 1968), 37.

57. RGAE, f. 4372, op. 66, d. 466, l. 137.

58. RGAE, f. 4372, op. 66, d. 466, l. 133.

59. The Central Union of Consumers' Societies was the competent agency of hunting of wild animals including muskrats. Its Kazakh branch was responsible for animal hunting in the delta area of the Ili River.

He made an assessment of the project document over the future perspective of muskrat hunting in the delta area. What is critical is that the Commission heard and accepted his harsh criticism against the project. He further states in his assessment report the following:

The author of the scheme takes one-sided approach to the consequences of the complete drying up of Lake Balkhash, measuring them only through expected economic effects. The disappearance of the vast water surface of Balkhash is bound to lead negative climatic changes of northern Kazakhstan and deterioration of living conditions in the cities and towns around Balkhash. Neither must we forget about the great historical and aesthetic values of the lake. We are obliged to categorically cast doubt on the righteousness of the designers' task in making a scheme for the full use of the delta zone of the Ili River for irrigation. Comprehensive economic development of this area should include agriculture (in less than the estimated area) in conjunction with hunting and fishery as well as keeping part of the valuable natural system intact.⁶⁰

This statement corresponded well with the arguments, elected by "naturalists" of that time, as given in the above-cited Douglas Weiner's work. In fact, Dēzhkin himself pursued his career at the state nature reserve in Voronezh. However, the important point here is that he did not oppose agricultural development as a whole, but appealed as to the necessity of its coexistence with other economic sectors.

Lake Balkhash and the delta areas of its basin were also important for fishery. Accordingly, it was quite natural that V. Dashenkin, a Sub-Commission member representing the fishery sector, severely accused Gidroproekt that no fishery specialist took part in the designing work and that no compensation measures were considered for the damage to the fishery sector inflicted by ecological degradation in the basin as a result of the agricultural development. He resoundingly proclaimed that "we must not agree to the disappearance of Lake Balkhash in the future."⁶¹ In addition, an expert in livestock breeding also demanded rewriting of the project document, complaining of its sketchiness about the feasibility of developing transhumance in the delta area.⁶² Thus, specialists in three important economic sectors downstream of the Ili River and in Lake Balkhash made critical reviews of the project document. Furthermore, several experts condemned the ignorance about the negative effects on industrial and domestic waters caused by the irrigation development, although no representative of the metallurgical industry in Balkhash City participated in the assessment processes.

60. RGAE, f. 4372, op. 66, d. 466, l. 86-87, Zakliuchenie po razdelu "zverovodstvo" [The conclusion about the "animal breeding" section] (24.03.1965).

61. The author could not find the detailed biography of Dashenkin. RGAE, f. 4372, op. 66, d. 466, l. 96, Zakliuchenie po razdelu "rybokhoziaistvennye meropriiatiia" [The conclusion about the section of "measures for fishery"] (27.03.1965).

62. RGAE, f. 4372, op. 66, d. 466, l. 100-105, Zakliuchenie po razdelu "obvodnenie" [The conclusion about the section of "watering of pastures"] (11.03.1965).

Followed by the Expert Sub-Commission's final report, the Gosplan Expert Commission at last rejected the perspective of future irrigation development on "43,000 hectares," and demanded a "fundamental rewriting" of the project document. Rather, it recommended to begin land reclamation in the Akdala area on no more than 40,000 or 50,000 hectares and to remake a project document for it.⁶³ One of the reasons was the advantage of rice cultivation at the downstream sites of the Syr-Darya River from the perspective of reclamation costs and farmers' experiences. The Lake Balkhash basin was markedly inferior to the lower Syr-Darya regarding these points. The second and more important factor was the invalidity of the data provided by the Gidroproect engineers. The project was not designed comprehensively, and did not take into consideration damages to other economic sectors (fishery, hunting, river transportation, and industrial and domestic water supply) as a result of the shrinkage of Lake Balkhash after the full-fledged agricultural water development of the region.⁶⁴ That is, the Expert Sub-Commission criticized the lack of investigation and analysis of the project document concerning negative feedback from the transformed nature to human activities. This way of thinking resonated quite well with the modified version of the "transformation of nature" concept.

In fact, in 1961, Mark L'vovich, a hydrologist of the Institute of Geography in Moscow, emphasized the priority of agriculture over hydroelectric power generation in water development, saying that "in practice, the use of water for agricultural production (soil moisture, irrigation water) should take the first place in the designing of the comprehensive planning for water usage." He explicitly endorsed irrigation expansion in Central Asia, but at the same time did not forget to point out,

It is important to take into consideration that to use one source of water inevitably influences another source. [The Soviet] economic complex envisages distribution of waters properly to all sectors of the national economy on the basis of general national interests.⁶⁵

In 1964, Anatolii Korobov, the deputy chairman of the U.S.S.R. Gosplan, made a speech in front of Soviet geographers at the Fourth Congress of the All-Union Geographic Society, accentuating

the increasing role of transformation of nature by socialist society poses new challenges to geographic sciences. [...] More and more scholar-geographers are now being engaged in the preliminary studies about the development and disposition of productive forces in the U.S.S.R., and providing consultative support to our planning organs.⁶⁶

63. RGAE, f. 4372, op. 66, d. 466, l. 124-125.

64. RGAE, f. 4372, op. 66, d. 466, l. 124-125, 142-144.

65. M.I. L'vovich, "O kompleksnom ispol'zovanii i okhrane vodnykh resursov [Comprehensive use and conservation of water resources]," *Izvestiia Akademii Nauk SSSR. Seriiia geograficheskaiia*, no. 2 (1961): 37, 39-40.

66. A.V. Korobov, "Geografiia i khoziaistvo [Geography and economy]," *Izvestiia Akademii Nauk SSSR. Seriiia geograficheskaiia*, no. 4 (1964): 4-5.

As he mentioned in his speech, Gerasimov was a member of the Expert Commission of Gosplan at that time.⁶⁷ Although the author did not find any clue that geographers actually took part in the above-mentioned assessment processes, it is certain that Gerasimov's view on transformation of nature was shared with specialists in the Expert Commission in Gosplan.

It was not by chance that, at almost the same time as the above-mentioned final report was issued, the editorial board of the journal *Proceedings of the U.S.S.R. Academy of Sciences, Geographical Series* gave approval to publish one article about a future perspective on the industrial development around Lake Balkhash, written by an economic geographer of the Institute of Geography in Moscow, Mikhail Buianovskii. Although his main argument that Balkhash City should be the center of the steel industry in Kazakhstan with use of abundant freshwater resources was not brought to realization, his strong assertion did hit the mark that any developmental measure must not enhance the mineralization process of the lake. He even proposed that the Kapchagai Hydropower Station not be constructed. He further rightly warned that degradation of the delta area would lead to "complete destruction of reeds and muskrats" there, and that salinization of Lake Balkhash would be inevitable in the case of organizing irrigated agriculture in large areas, which "would cast the problem of the fate of Lake Balkhash into the future, analogous to the Aral Sea."⁶⁸ It seemed that the "anti-developmental" forces gained the upper hand in the case of the irrigational expansion as for the Lake Balkhash basin.

However, the Plenum of the Central Committee of the C.P.S.U. in May 1966 encouraged backing up further irrigational developments all over the Soviet Union, particularly for grain production including rice. Minister of Land Reclamation and Water Resources of the U.S.S.R., Evgenii Alekseevskii, declared that the Soviet Union would aim for 100 percent self-sufficiency in rice in spite of a 40 percent self-sufficiency rate at that time.⁶⁹ At the same Plenum, Masimkhan Beisebaev, the chairman of the Council of Ministers of the Kazakh S.S.R., stated that Kazakhstan owned a tremendous potential for grandiose rice cultivation along the Syr-Darya, Ili, Karatal, and Charyn Rivers. The latter three rivers are located in the Lake Balkhash basin.⁷⁰

The Plenum became an additional accelerator to start experimental irrigation in the Akdala area. In 1967, the central government decided to experimentally

67. Korobov, "Geografiia i khoziaistvo," 11.

68. M.S. Buianovskii, "Balkhash – Ili i vozmozhnost' organizatsii krupnogo promyshlennogo kompleksa v Pribalkhash'e [The Balkhash-Ili basin and the potential of the establishment of a large-scale industrial complex around Lake Balkhash]," *Izvestiia Akademii Nauk SSSR. Seriiia geograficheskaiia*, no. 3 (1965): 61-62.

69. RGANI (Rossiiskii gosudarstvennyi arkhiv noveishei istorii [Russian State Archive of Contemporary History]), f. 2, Plenumy TsK KPSS [Plenums of the Central Committee of the C.P.S.U.], op. 3, Materialy Plenumov [Materials of Plenums], d. 9, Maiskii Plenum TsK KPSS (25-27.05.1966). Stenogramma pervogo zasedaniia (25.05.1966). Nepravlennii ekzempliar [May Plenum of the Central Committee of the C.P.S.U. (25-27.05.1966). Shorthand record of the first session (25.05.1966). Unmodified copy], l. 28, Doklad Alekseevskogo E.E. [Report by Alekseevskii E.E.].

70. RGANI, f. 2, op. 3, d. 9, l. 130, Rech' Beisebaeva M.

organize two rice sovkhozes in the Akdala area under the direct control of the all-union Ministry of Melioration and Water Economy. The authorities of Kazakh S.S.R. further lobbied for the prompt realization of rice cultivation in the lower reaches of the Ili River. In the same year, Dinmukhamed Kunaev, the authoritative party head of Kazakhstan and candidate member of the Politburo in Moscow, sent a petition to the C.P.S.U. Central Committee to urge hydraulic engineers to finish constructing irrigation facilities (head work and a magisterial irrigation channel) and irrigated plots of 40,000 hectares in the Akdala area by 1973 at the latest, referring to the potential irrigation development in the lower reaches of the Ili River on “430,000 hectares” in the future.⁷¹

In 1968, the Gosplan Expert Commission approved the “Feasibility Report on the Comparative Cost Effectiveness and Priority of Irrigation for Rice Growing in Promising Regions of the U.S.S.R.,” made up of the All-Union Project Designing Institute of Water and Amelioration Construction (Giprovdokhoz). This document admitted the “advantageous position” of the Akdala area for rice cultivation, but, at the same time, still mentioned the future potential for land melioration on 430,000 hectares downstream of the Ili River. Furthermore, the report clearly stated that “in connection with the decrease of the influent quantity to Lake Balkhash, we should take into account that, according to the available data, the efficiency of the current regime of the lake is insignificant, and incomparable with the efficiency of the usage of the Ili River flow for irrigation.”⁷² The local Kazakh authorities and the Soviet ameliorators had not given up the grandiose agricultural development in the Ili-Balkhash basin. At that moment, in turn, the political back-up for the expansion of irrigated farms by the Brezhnev regime seemed to be immovable.

Some geographers also gave support for irrigational development in the basin. In 1967, Viktor Shul'ts, a big name in hydrology in Tashkent, proposed a grandiose idea in a monograph entitled “Transformation of Nature in Central Asia,” edited by Gerasimov. He argued as follows:

If we consider that relatively a lot of water is now lost in vain [by evaporation], it is possible to drain Lake Balkhash. After the completion of drainage, it will be easy to predict that we will gain the prospect of irrigating 14-15 million hectares with use of our own water resources in Central Asia alone [including those of the Aral Sea basin].⁷³

71. AP RK (Arkhiv Prezidenta Respubliki Kazakhstan [The President's Archive of the Republic of Kazakhstan]), f. 708, TsK KP Kazakhstana, op. 42, 1967 g., d. 194, Peregiska s TsK KPSS, l. 85-86, Zapiska D. Kunaeva v TsK KPSS o stroitel'stve Akdalinskogo massiva orosheniia [Report by D. Kunaev to the Central Committee of the CPSU about the consolidation of irrigated lands in the Akdala area] (05.04.1967).

72. *Tekhniko-ekonomicheskii doklad*, 37.

73. V.L. Shul'ts, “Izuchennost' vodnykh resursov Srednei Azii i puti ikh ispol'zovaniia [The research degree about water resources in Central Asia and the way of their usage],” in I.P. Gerasimov, A.S. Kes' i V.N. Kunin, eds., *Problemy preobrazovaniia prirody Srednei Azii* [Problems about transformation of nature in Central Asia] (M.: Nauka, 1967): 67.

Gerasimov also contributed an article with the general introduction of the book, in which he presented the vast area of cultivable lands through irrigation in Central Asia, as Shul'ts did, but, at the same time, he emphasized the difficulty of predicting what would happen after the implementation of developmental measures in the region, calling for the wholesale progress of scientific researches on "the most effective ways of transformation of nature, and a forecast of changes of natural conditions instigated by the growing scale of technical measures."⁷⁴ He also touched upon the necessity of accurate scientific predictions about the future water balance of Lake Balkhash after the wholesale irrigational development in the basin. Here, Gerasimov held onto his "transformation of nature" concept.⁷⁵

Once again, matters took a turn for the worse for the developers in 1969, when citizens in Balkhash City were whipped into a panic, since they felt serious misgivings as to the future shrinkage of Lake Balkhash and the potential depletion of drinking water as a result of the construction of the Kapchagai Reservoir and the irrigation development of the lower reaches of the Ili River. According to Nikolai Guliaev, the first secretary of the Balkhash *gorkom*, a number of inhabitants began to leave the city.⁷⁶ In response to this, the Central Committee of the Communist Party of Kazakhstan gave an order to publish an explanatory article in the republican newspaper to dispel citizens' concerns until 15 September.⁷⁷ The mainstream of the Ili River finally closed on 28 September 1969. However, it was only on 12 November when R. Sedykh, head of Kazgidroproekt, and B. Amosov, the chief engineer of the construction site of the hydropower station, published an account in the republican newspaper *Kazakhstanskaia Pravda*. That is, they tried to excuse themselves, only after the situation became irreversible. In the article, they tried to address apprehensions over environmental degradation and deterioration of living conditions, asserting that the Kapchagai would bring win-win results for all the stakeholders downstream of the Ili River, including fishery, livestock breeding, and muskrat hunting, through artificial regulation of seasonal water discharge from the Kapchagai. They estimated the drawdown of Lake Balkhash to be only around 1 to 1.25 meters during impoundment into the water reservoir. As mentioned above, the water level of Lake Balkhash had

74. I.P. Gerasimov, "Nauchnye problemy preobrazovaniia prirody Srednei Azii dlia razvitiia oroshaemogo zemledeliia i pastbishchnogo zhivotnovodstva [Scientific issues on transformation of nature in Central Asia for the development of irrigation farming and pasturable livestock farming]," in Gerasimov *et al.*, eds., *Problemy preobrazovaniia prirody*, 15, 19.

75. Gerasimov dealt with this topic about Lake Balkhash along with the Aral Sea. Gerasimov, "Nauchnye problemy," 17-18.

76. AP RK, f. 708, op. 46, 1969 g., d. 149, Informatsii obkomov, ministerstv i otdelov TsK [Information of provincial party committees, ministries and departments of the Central Committee], l. 18-19, Ob usilenii volneniia zhitel'ei goroda Balkhasha [About intensification of unrest among residents of Balkhash City] (28.07.1969).

77. AP RK, f. 708, op. 46, d. 149, l. 69, Zapiska M. Fazylova o situatsii v g. Balkhashe [Report by M. Fazylov about the situation in Balkhash City] (03.09.1969).

changed in the long term, depending upon the inflow volume from the rivers and precipitation. And they concluded that this level of drawdown was within the boundaries of natural fluctuations of the lake.⁷⁸

However, the apology of the project representatives provoked open debates in *Literaturnaia Gazeta*, which Marshal Goldman concurrently referred to.⁷⁹ Èligii Stavskii, a naturalist writer, incited animadversions on the project. He inserted in his article the voice of Mikhail Gorodetskii, a department head of the Balkhash Copper-Smelting Plant:

“We need Lake [Balkhash] no less than air. [...] You see that deserts are surrounding us. Then, where do we take waters if the lake will not exist?”

Stavskii further condemned the ill-preparedness of the project. Full-fledged scientific research about future water use and its impact on nature and human activities had only just begun. According to an official of Kazgiprovodkhoz, their result would be given only in 1972.⁸⁰ Following this, the editorial board published a number of voices, which evidently defended the anti-developmental opinions. One item of feedback to Stavskii’s article was really suggestive:

We do not oppose the transformation of nature itself, but go against the one-sided, bureaucratic, and unwise approach to it, against the violation of the comprehensive principle, and against any anti-scientific actions in the case of matters of nature.⁸¹

By the beginning of the 1970s, this mentality, resonant with the modified version of the “transformation of nature” concept, seemed to be widely shared with intellectuals, who developed a keen interest in nature. At the same time, it should be added that there was no consensus around what was “scientific.”

At last, Ufa Akhmedsafin, the most authoritative hydrogeologist in the Republic and a full member of the Academy of Sciences of Kazakh S.S.R., raised an alarm over the optimistic estimations about the drawdown of Lake Balkhash. He calculated that if irrigated plots were developed up to 50,000 hectares until 1978, then 57 percent of the annual water flow of the Ili River would be lost in the Kapchagai and for irrigation. As a result, according to him, the altitude of Lake Balkhash would drop by as much as 2.5 meters (not 1.25 meters as Sedykh and Amosov estimated) during the first six to eight years of impoundment into the

78. R. Sedykh i B. Amosov, “Kapchagai — soiuznik Balkhasha [Kapchagai — the ally of Balkhash],” *Literaturnaia gazeta* (12 November 1969), 4.

79. Goldman, *The Spoils of Progress*, 58-62.

80. Èligii Stavskii, “Sud’ba Balkhasha [The fate of Balkhash],” *Literaturnaia gazeta* (19 November 1969), 11.

81. “Balkhash mozžno spasti! Pis’ma sporiat [Balkhash can be saved! Letters are arguing],” *Literaturnaia gazeta* (25 March 1970), 12.

Kapchagai dam.⁸² The editorial board also gave an opportunity for the above-mentioned Sedykh to make an excuse. He dared to denounce the above-mentioned Kalachëv's gigantic scheme of water diversion from the Ili River to the Chu River basin as "seditious," seeking to evince that the prospective disappearance of Lake Balkhash was only related to this sort of too-grandiose idea. Indeed, he promised to satisfy the requirement of a number of scholars to prolong the term of initial impoundment in the dam (from five to six years as in the project document to eight to nine years) and, as a result, minimize the shrinkage and mineralization of Lake Balkhash. He promised "not to make a conflict with nature," stating that "Balkhash City has stood, is standing, and will stand along the shore of Lake Balkhash."⁸³

The Kapchagai Reservoir began to impound water on 26 December 1969. The first generator started operation on 22 December 1970. The Kazakh branch of Giprovdokhoz (Kazgiprovdokhoz) drew up another project document related to land reclamation on 52,000 hectares in the Akdala area only in 1971. This small-scale project was named "Phase One." Kazgiprovdokhoz proposed to take 1.1 km³ per year for irrigation, that is, one-tenth of the annual water flow of the Ili River. However, the Gosplan Expert Commission rejected the project document once again, restricting the organization of an experimental sovkhoz to 2,000 or 3,000 hectares in northern Akdala.⁸⁴ First, the soil, relief, and other geographical conditions of the area were far from ideal; at least, they were much worse than those of the lower Syr-Darya Massif. In addition, more than half of the potential plots should have been washed out thoroughly for cultivation because of soil salinity.⁸⁵ Second and more important, the Expert Sub-Commission regarded it risky to further expand water-consumptive irrigated lands without any coordinated scheme for seasonal water outflow from the Kapchagai Reservoir.⁸⁶ In fact, the Soviet government had already ordered the relevant ministries to formulate a "seasonal scheme" for water outflow from the Kapchagai dam in 1967.⁸⁷ Kazgidroproekt was responsible for working out a coordinated

82. U.M. Akhmedsafin, "Opasnost' odnobokogo podkhoda [The danger of one-sided approach]," *Literaturnaia gazeta* (25 March 1970), 12.

83. R. Sedykh, "Sem' raz otmer'! [Measure out seven times!]" *Literaturnaia gazeta* (11 February 1970), 11.

84. RGAE, f. 4372, op. 66, d. 5058, Materialy ekspertizy proektnogo zadaniia orosheniia i osvoeniia zemel' Akdalinskogo massiva v nizov'iax reki Ili Kazakhskoi SSR [Materials of the experts' assessment about the project document on the irrigation and land development in the Akdala area in the lower reaches of the Ili River, Kazakh SSR], l. 221-222, Postanovlenie Gosëkspertizy [The resolution of the State Expert Commission] (14.04.1971).

85. RGAE, f. 4372, op. 66, d. 5058, l. 226, 234, Zakliuchenie ekspertnoi podkomissii [The conclusion of the experts' subcommission] (31.03.1971) (l. 223-247).

86. RGAE, f. 4372, op. 66, d. 5058, l. 244-245.

87. TsGA RK (Tsentral'nyi gosudarstvennyi arkhiv Respubliki Kazakhstan [Central State Archive of the Republic of Kazakhstan]), f. 1626, Ministerstvo melioratsii i vodnogo khoziaistva Kazakhskoi SSR [Ministry of Melioration and Water Economy of Kazakh SSR], op. 3, 1940-1975 gg., d. 1108, Dokumenty po zatopeniiu Kapchagaiskogo vodokhranilishcha (1972 g.). T. II. [Documents concerning the impoundment in the Kapchagai Water Reservoir (1972). Volume 2], l. 75, Zapiska Ia. Sokolova, nachal'nika Kazgidroproekta [Report by Ia. Sokolov, the director of Kazgidroproekt].

scheme. In accordance with these conclusions, the Gosplan Expert Commission demanded that the relevant ministries and agencies make out a coordinated plan for water outflow and impoundment, and a comprehensive scheme of land-water usage downstream of the Ili River.⁸⁸ However, subsequent deployment suggests that this requirement was never satisfied. A number of stakeholders in water resources had demanded various amounts of water at a huge variety of times. It appeared to be just impossible to make up a fixed well-coordinated scheme. Furthermore, the experimental discharge of copious amounts of water from the Kapchagai in March 1972, which targeted the artificial inducement of floods in the delta area to push the maximum growth of natural pasturage in spring, resulted in miserable failure.⁸⁹ A representative of Kazgidroproekt lamented at an interministerial meeting in April 1972, “Considering the extraordinary complexity of evaluating the economic effects of various proposals [about seasonal discharges by the stakeholders], the [seasonal discharge] regime should be worked out every year ... with the participation of the relevant agencies and with consideration of forecasts of influent quantity into the [Kapchagai] Reservoir and Lake Balkhash.”⁹⁰

This evaluation of the Gosplan Expert Commission eventually determined the direction of the water development of the Ili River. The Akdala area would be further cultivated unless it would have negative effects on the other economic sectors and Lake Balkhash itself. In 1975, S. Duisenov, a hydrologist of the Hydrometeorological Department of Kazakh S.S.R., asserted that “the value of Balkhash as a source of water supply is much more significant than its significance in other economic sectors (water transportation, fish catch, and so on).”⁹¹ Nevertheless, local party officials in Alma-Ata and ameliorators in Moscow did not give up massive irrigation development in the Akdala region. Asanbai Askarov, the first secretary of the Alma-Ata *obkom*, expatiated how local leaders supported the idea of large-scale land reclamation in the lower reaches of the Ili River. He honestly remembers in his memoir that he raised the issues of further development of the Akdala region as a promising agenda to Leonid Brezhnev himself, who visited Alma-Ata in 1976 and took part in a meeting of the party-economic activists of the Republic. Brezhnev had job experience in Kazakhstan as the party head of the Republic during the Khrushchev era, and was familiar with

88. RGAE, f. 4372, op. 66, d. 5058, l. 221-222.

89. TsGA RK, f. 1626, op. 3, d. 1107, Dokumenty po zatopeniiu Kapchagaiskogo vodokhranilishcha (1972 g.). T. I [Documents concerning the impoundment in the Kapchagai Water Reservoir (1972). Volume 1], l. 101, Zapiska Zh. Baigisieva po povodu rezul'tatov martovskogo popuska iz Kapchagaiskogo vodokhranil'sha [Report by Zh. Baigisiev about the results of water discharges from the Kapchagai Water Reservoir in March].

90. TsGA RK, f. 1626, op. 3, d. 1107, l. 46, Zakliuchenie po materialam “K osnovnykh polozhenii po rezhimu popuskov vody v period pervonachal'nogo napolneniia Kapchagaiskogo vodokhranilishcha [The conclusion about the materials “To the basic provisions about the regime of water discharges during the period of primary impoundment in the Kapchagai Water Reservoir].”

91. S.T. Duisenov, “Problema ozera Balkhash v sviazi s vodokhoziaistvennym ispol'zovaniem stoka rek v ego basseine [Problems about Lake Balkhash in connection with the use of river flows in its basin],” *Meteorologiya i gidrologiya*, no. 9 (1975): 59.

the situation of the southern Balkhash region. There and then, he gave instructions to the above-mentioned Alekseevskii, who accompanied Brezhnev, to accelerate the tempo of the irrigation development in the Akdala area. Alekseevskii agreed with the idea.⁹² After that, the Ministry of Land Melioration and Water Economy of the Soviet Union, together with the Gosplan and the Ministry of Energy and Electrification, elaborated future developmental targets of the Ili River basin, and proposed in the first place to develop 52,000 hectares in the Akdala area with the construction of one more reservoir nearby, while they estimated the potential to cultivate 124,000 hectares.⁹³ In 1980, the Ministry of Agriculture of Kazakh S.S.R. published a brochure about the future potential for rice cropping in the southern Balkhash region, which displayed the possibility of a total cultivation of 200,000 hectares for crop rotation, including 100,000 hectares for rice, although only 20,000 hectares had been used for rice until that time.⁹⁴ In spite of these initiatives and movement, the total area of irrigated plots in the downstream area of the Ili River did not greatly expand, limited to 30,000 hectares for rotation including 12,500-14,200 hectares for rice.⁹⁵

Afterward, it seems that the target of intensive cultivation gradually moved from the lower range of the Ili River to the middle reaches around the republican capital, Alma-Ata. Askarov wrote in his memoir that the soil salinity of the Akdala made the republican authorities reconsider the place of intensive irrigation, and they afterwards began to push cultivation in proximity to the Kapchagai Reservoir. In addition, the Great Alma-Ata Channel was planned and actually constructed from 1981 to 1985, cutting across various tributaries of the Ili River from east to west.

In the early 1970s, Soviet hydrologists had already foreseen the shrinkage and the elevation of the salinity level of Lake Balkhash owing to a combination of anthropogenic and natural factors. In June 1970, the Presidium of the Council of Ministers set an altitude of 341.0 m as the critical level of Lake Balkhash.⁹⁶ As to the saline level, 2 g/l is the limit for domestic use. Although the irrigation potential was not fulfilled in the lower Ili River, long-term precipitation deficiencies had an impact on the altitude and the saline concentration of Lake Balkhash. The water level declined from 343 m in 1969 to 340.5 m in 1986. The saline level in the West

92. A. Askarov, *Sud'ba* [Destiny] (Almaty: Merei, 1994), 145.

93. RGANI, f. 5, Organy TsK KPSS [The organs of the Central Committee of the C.P.S.U.], op. 69, Za 1966 g., d. 1077, Sel'skokhoziaistvennyi otdel. Dokumenty po voprosam melioratsii zemel' [Agricultural Department. Documents about issues on land melioration], l. 138, Zapiska o bolee polnom ispol'zovanii Kapchagaiskogo vodokhranil'shcha dlia orosheniia zemel' [Report about more complete use of the Kapchagai Water Reservoir for irrigation] (22.12.1976).

94. *Rezervy uvelicheniia risa v iuzhnom Pribalkhash'e Alma-Atinskoi oblasti* [Available capacity of expansion of rice production around the southern shore of Lake Balkhash in Alma-Ata Province] (Alma-Ata: Kainar, 1980), 2.

95. Masanobu Nomura, "Kazafusutan ni okeru nouson no henyuu: Baruhashi-chiku Bereke mura ni tsuite [The Transformation of a Farming Village in Kazakhstan: The Case of Beleke Village in Balkhash District]," *Kyouyou Kenkyuu* [Cultural Research], 6, 3 (March 2000): 132 [in Japanese].

96. V. Nikolaev, "A mozhет, ёto ёksperiment? [Maybe, is this an experiment?]" *Kazakhstanskaia pravda* (6 March 1987): 4.

Balkhash increased from 1.23 g/l in 1970 to 1.79 g/l in 1983. As Kadar Keser and Hiroshi Matsuyama calculated, the inflow into the Ili delta decreased by an average of 3.4 km³ per year from 1970 to 1986, affected by natural factors (accounting for 62 percent) and anthropogenic causes (accounting for 38 percent).⁹⁷ The continuous regression of Lake Balkhash obliged the power engineering authorities in Kazakhstan to further slow the tempo of impoundment into the Kapchagai Reservoir. Eventually, it never fully accumulated the planned volume of water (28.1 km³). Only two of five power generators were operating in the middle of the 1980s.⁹⁸ When the altitude of Lake Balkhash dropped lower than the predetermined critical level in 1986, the authorities of Kazakh S.S.R. made a decision to start

97. Kadar Keser and Hiroshi Matsuyama, "Decrease of river runoff in the Lake Balkhash basin in Central Asia," *Hydrological Processes*, 20, 6 (April, 2006): 1422-1423.

98. A.A. Tursunov, I.M. Mal'kovskii and Zh. Dostaev, "K peresmotru proektnoi otmietki NPU Kapchagaiskogo vodokhranil'shcha [About resetting of the planned normal headwater level of the Kapchagai Water Reservoir]," in A.A. Tursunov et al., eds., *Problemy kompleksnogo ispol'zovaniia vodnykh resursov Ili-Balkhashskogo basseina. Sb. nauchnykh statei* [Issues on

constructing the dam across the Uzyn-Aral Strait, which was afterwards abandoned owing to public pressure. Afterward, hydrologists in Moscow and Leningrad “scientifically” verified its ineffectiveness to maintain the altitude and salinity level of the Western Balkhash, and actually the water level once again began rising from 1987. The Kapchagai Hydropower Station became inefficient, the irrigation development was limited, and hence Lake Balkhash is still “standing” and supplying industrial water to Balkhash City.

At all events, it is possible to say that the republican and provincial political figures (for example, party officials) were the most energetic advocates of water development in the Lake Balkhash basin. For local leaders, the implementation of gigantic projects was the simplest way to flaunt their authority and power. And every republican and provincial leader of Brezhnev’s time competed with each other over the acquisition of budgets and subsidies from Moscow for concrete projects. However, it should be added that Kunaev’s place in it was quite impalpable. First, Kunaev was a hero for citizens of Kapchagai City, because he gave significant contributions to the infrastructure building of the city. He wrote in his memoir that he provided directions for land reclamation of the Kerbulak Massif, located close to Kapchagai City. As a result, the newly cultivated lands began to supply vegetables, potatoes, and watermelons for the citizens of Kapchagai and Almaty.⁹⁹ Second, he had been repeatedly elected as the deputy of the Supreme Soviet of Kazakh S.S.R. from the Bakanas electorate, located in the lower reaches of the Ili River (Balkhash District), which encompassed its delta zone and the Akdala area. Therefore, he was also responsible for the economic development and the environmental protection of the region. Third, Balkhash City was a special place for him, since he started his career in 1936 as a metallurgical engineer in the Balkhash Copper-Smelting Plant as soon as he graduated from an institute in Moscow. He could not put aside the misgivings of the citizens of Balkhash City. In fact, he referred to one dialogue with Aleksei Kosygin in his memoir where he petitioned him to lay down a water pipeline to Balkhash City in order to supply abundant fresh drinking water for the citizens, which was realized afterwards.¹⁰⁰

Conclusion: Science, development, and modernization in the Brezhnev period

The “transformation of nature” concept was elaborated after World War II during Stalin’s Plan for Transformation of Nature. As a result of the scientific and technological revolution, Soviet geographers, mainly staff of the Institute

comprehensive use of water resources of the Ili-Balkhash basin. Collection of research papers] (Alma-Ata: Izdanie KazGU, 1985): 18-19.

99. D.A. Kunaev, *Ot Stalina do Gorbachëva (V aspekte istorii Kazakhstana)* [From Stalin to Gorbachev (In the aspect of the history of Kazakhstan)] (Almaty: Sanat, 1994): 184.

100. Kunaev, *Ot Stalina do Gorbachëva*, 160-161.

of Geography, U.S.S.R. Academy of Sciences, renewed the concept after 1960 with significant modification of its content. Now, nature should be transformed with precautions against negative effects as a result of transformation and pre-calculation of costs for this measurement. As mentioned above, this conceptual change itself was the Soviet version of "reflexive modernization."

Many of the projects related to transformation of nature were implemented without delay like the construction of the Karakum Canal in the Aral Sea basin and the Kapchagai Reservoir in the Lake Balkhash basin. These projects had received approval during the Stalin or Khrushchev era. Brezhnev's significant concern for irrigation in Central Asia further promoted the expansion of irrigated lands in the Aral Sea basin. During the Stalinist period, agricultural and irrigation development had to be promoted swiftly and uniformly on a massive scale, which was regarded as "scientific" by Stalin himself. Khrushchev's de-Stalinization unleashed pro-conservational voices of Soviet naturalists and scholars. However, Khrushchev himself advocated the massive and uniform style of development of the Stalinist type. He also often made self-righteous decisions with scientific contents, particularly about farming methods. Brezhnev also supported the idea of large-scale extensive development, but only on the basis of feasibility and scientific technical substantiation. As a result, Soviet scientists and engineers gained more liberty. If scientists and experts said "no," then the Brezhnev regime did not give any political support. His regime clearly hesitated in implementing economically groundless or scientifically unsubstantiated projects related to nature transformation, charging final decisions to Soviet scholars and technicians. Furthermore, it often took a great amount of time to scientifically verify the effectiveness of nature transformation measures. The diversity of their opinions and projections, in turn, hindered the formulation and implementation of actual measures. Thus, the U.S.S.R. Gosplan Expert Commission rejected twice the feasibility studies on agricultural development in the downstream area of the Ili River, but the Soviet government had not given any political endorsement to these projects. Local leaders strove to obtain the consent of Brezhnev himself about the further irrigation development in the Ili River basin, which finally ended in vain.

In this manner, it is possible to say that the renovated concept of "transformation of nature" in reality played both promoting and hampering roles in actual nature transformation in Central Asia. The "transformation of nature" concept during the post-war Stalin era actually promoted the large-scale irrigation development in Central Asia. The "unproductive" Aral Sea had been regarded as an inevitable sacrifice to the economic development of Central Asia. Concerning the Ili-Balkhash basin, the "transformation of nature" concept at least had restrictive effects on preventing catastrophic ecological degradation of Lake Balkhash. The freshwater of the West Balkhash was an important resource for the industrial development of Balkhash City. Therefore, both Kazakhstani and Russian scientists eagerly engaged in investigations into the negative impacts of the developmental measures on the altitude and salinity of Lake Balkhash. At the same time, Gerasimov's concept of "transformation of nature" premised the priorities of science and human potential

under socialism, where all changes in environment could be properly foreseen and guided to maximize human wellbeing. However, the reality of actual developmental projects showed that it took so much time or appeared to be just impossible. The abandonment of several developmental plans in the Lake Balkhash basin itself was a byproduct of the reflexive modernization in the Soviet Union. However, then, the concept had already ceased to function as expected, as a lubricant for “real” nature transformations, but adversely played the role of restraining them if scientifically not justified. The “transformation of nature” concept was a product of socialist modernity plus a tool for utopian social engineering. Deprivation of its effectiveness, accompanied by the “political indecisiveness” of the Brezhnev era, nullified the legitimacy of socialist modernization, and, eventually, of the socialist ideology. The Brezhnev regime helplessly observed what was going on. As a result, Lake Balkhash was saved, but the Aral Sea was pushed forward unto its death.

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