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Managing the “White Death” in Cold War Soviet Union Snow Avalanches, Ice Science, and Winter Sports in Kazakhstan, 1960s-1980s¹

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In the spring of 1966, a devastating wave of avalanches struck Kazakhstan’s main industrial and urban centers. Avalanches were nothing new in the mountain ranges of Soviet Central Asia. But the sheer volume of snow that poured down into cities that year, destroying infrastructures and claiming lives, was such that avalanches – previously seen as a discrete, random, and low-significance hazard – came to be framed as an important risk and a new threat to the development of Kazakhstan’s capital Alma-Ata (today Almaty).

This article explains how avalanches became a significant object of state action and scientific inquiry in late socialist Kazakhstan. The context is that of a growing anthropic encroachment on mountainous environments that lead to a greater exposure of humans, livestock, houses and infrastructures to slope hazards – ice and snow avalanches, debris and mud flows, and landslides. As in other mountainous environments in the world, the economic development of Kazakhstan’s mountains after World War II increased the exposure of infrastructures and human activities to natural hazards. Given the human pressure on a fragile environment, natural disasters that occurred rarely and caused relatively few damages in the past came to happen often and became a threat to life in the mountains. The commodification of mountainous nature and the increasing vulnerability of its exploiters to natural hazards are two intertwined processes. In Soviet Kazakhstan, too, avalanches and other slope hazards became a growing threat as urbanization and tourism progressed, triggering responses by scientists, engineers, and the state. At this level of explanation, Soviet Kazakhstan is not different from the European Alps or the Peruvian Andes, even if anthropization levels are very low in the former when compared to the latter.²

However, to explain not only why more destructive avalanches were recorded in Kazakhstan from the 1960s, but why and how they became a political issue, we have to turn to problems typical of the Soviet Union during the Cold War.³ The brutal entry of avalanches onto the scene presented Kazakh leaders with a set of sudden problems menacing some of the major Soviet ambitions in the global Cold War competition. At the same time, avalanches appeared as an opportunity to demonstrate the superiority of socialist risk management and scientific research.

The superpowers saw hostile environments like hot deserts, deep oceans and the ice caps as potential war theaters “which needed to be probed, tested, and ultimately brought under control” as Janet Martin-Nielsen convincingly argues in this volume. In this paper, I would like to disclose a new facets of “Cold” in “Cold War.” Studies on the “Cold War cultures” have shown that Cold War competition played out not only in strategic matters, but in economic, social and cultural development as well. With the superpowers entering thermonuclear “peaceful coexistence” in the 1950s, successes in reducing child mortality and raising wages became signs of superiority for both socialist and capitalist “ways of life.” Sports (Olympic Games, chess) and scientific research (space exploration, Nobel prizes) were central fields where the USA and the Soviet Union invested a lot of energy to dominate.⁴ The will to attract and win over countries of the newly independent “Global South,” by offering the best irrigation systems, the best youth movements and superior social and cultural values, was central to Cold War competition. The development of mountainous environments associated several fields of competition:

winter sports with the effort to organize Olympic Games, achieve feats in mountaineering and train teams; science and technology with research on cold environments, glaciers and snow; and touristic and infrastructural development in difficult environments (ski resorts, roads, railways, etc.). Alma-Ata showcased the importance of *civil* Cold War competition in *cold* environments.

First, with renewed intensity under Khrushchev and Brezhnev, Moscow encouraged the economic development and nation building of its Central Asian republics in an effort to elevate this periphery of the Soviet empire into a development model for Southern countries. After the break with Mao's China and as bilateral relations were worsening to the brink of war, the Soviet Union competed for the attention of recently decolonized and non-aligned countries not only with its traditional foe, the USA, but with its former ally, the People's Republic of China, as well.⁵

In the spring of 1966, as avalanches raged in Kazakhstan, an earthquake destroyed parts of Tashkent, the capital of neighboring Uzbekistan. Tashkent's ground zero was used by the Soviet leadership under Leonid Brezhnev and Alexei Kosygin as a *tabula rasa* for developing an ambitious modern urban project. The quake facilitated the dream of turning Tashkent into a flagship of communist urbanism for the recently decolonized South.⁶ Alma-Ata, then Kazakhstan's capital, occupied a similar position in the Soviet Union's ambition to extend its reach internationally. A former borderland of the Russian Empire, Kazakhstan was now striving to achieve communism. Alma-Ata, located in the vicinity of the Chinese border, was considerably expanding and transforming in the 1960s. In this context, avalanche management was tightly harnessed to the goals of developing the Central Asian borderland of the Soviet Union.

Second, in the Soviet Cold War context, avalanches were a privileged research field for the scientific institutes of the Soviet republics. After the 1966 shock, avalanche research (*lavinovedenie*) was dramatically boosted in Kazakhstan. This applied discipline was on the one hand connected to the interdisciplinary science of glaciology, which had acquired military and global significance as Earth system science after World War II.⁷ The mountains of Central Asia were a place of intense research for glaciologists coming from throughout the Soviet Union. On the other hand, avalanches were connected to the emerging field of natural risk studies and management. Unlike glaciology, where the institutes of Moscow and Leningrad (today St. Petersburg) played the leading parts, applied risk research involved researchers and engineers who, to a growing extent, were trained in the national Soviet republics.

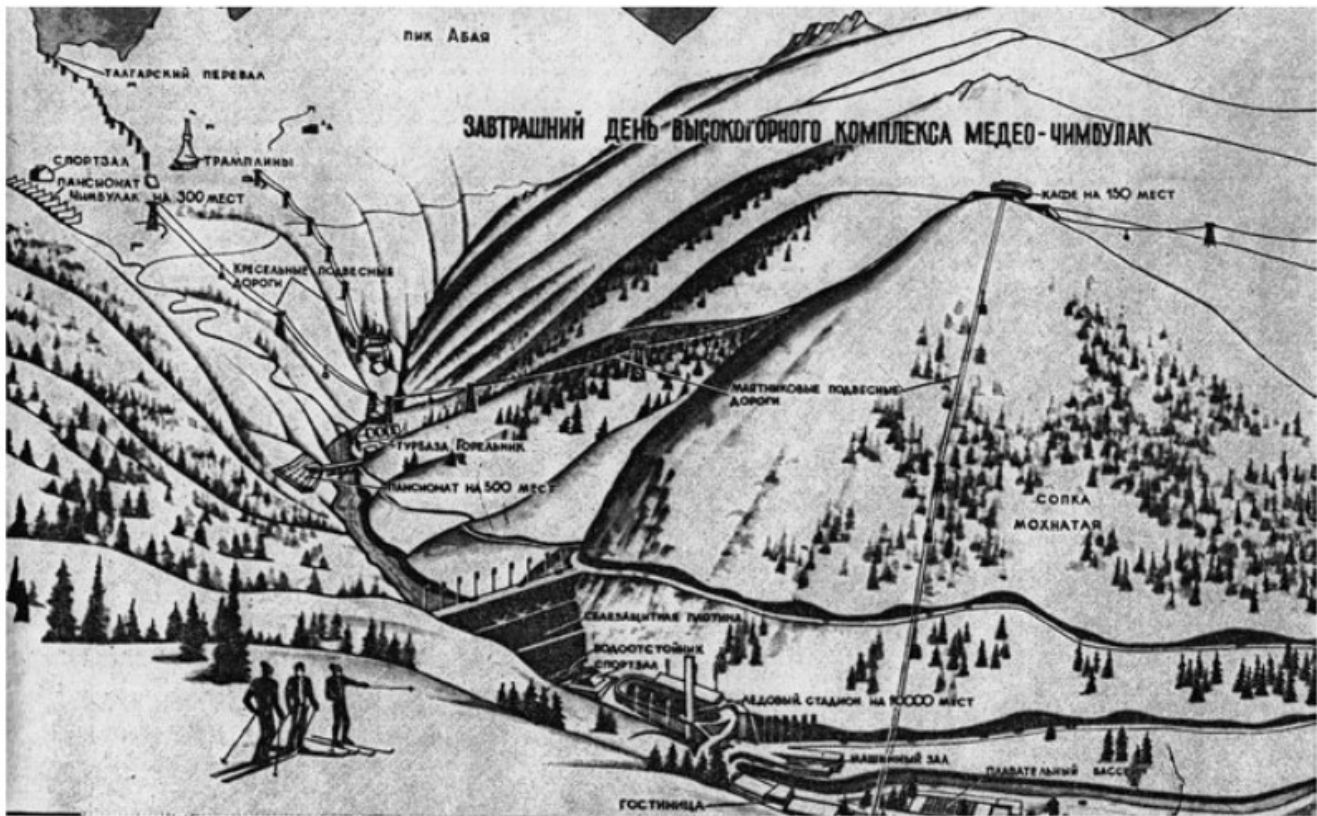
Risk management had a twofold link with the military: first, the bond uniting geographers and the military during cartographic missions in the nineteenth century was reaffirmed in their shared interest in mapping the mountains of border regions. In the 1970s, the general staff of the armed forces and the KGB Border Troops tasked Kazakh glaciologist Igor' Severskii with mapping the avalanche corridors of many mountainous regions of Central Asia and Siberia.⁸ Second, risk prevention technology entered new developments in the 1960s: the use of explosives for construction purposes was reinforced in an effort to "civilize" a key military technology and promote "peaceful explosions" (*mirnyi vzryv*) after the Limited Test Ban Treaty had prohibited surface nuclear tests in 1963. In Kazakhstan, the Medeo dam was erected to protect Alma-Ata from debris flows using two massive, widely publicized explosions in 1966 and 1967.⁹ Avalanche control in Central Asia also recurred to explosives and preventive shelling, with the assistance of military technique and personnel first of the Turkestan Military District (TurkVO) and then of the Central Asian Military District, created in the course of the conflict with China, with headquarters in Alma-Ata (SAVO).¹⁰

Third, avalanches were a challenge to the transformation of Alma-Ata into a winter sports hub. In 1966, infrastructures recently built to develop tourism in the Kazakh capital were most strongly hit by the wave of avalanches. The city had embarked on a path of intense development of its leisure infrastructure in the early 1960s under First Party Secretary Dinmukhamed Kunaev and City Head Esen Duisenov. According to the master plans (*general'nye plany*) adopted in 1963 and 1970, paraseismic hotels were erected in the city center, roads extended into the higher valleys and touristic infrastructures grew in the Trans-Ili Alatau, the mountains overlooking the Kazakh capital. Dreaming of hosting the Winter Olympics someday, Alma-Ata had to cope with avalanches threatening skiers and sports infrastructures.¹¹ Sports were a field of Cold War competition and cooperation, and the reciprocal boycott of the games in Moscow and Los Angeles by the USA and Soviet Union respectively in 1980 and 1984 shows that they were heavily politicized in the Cold War context.¹²

Keeping in mind this Cold War context, I will show how scientists and politicians made avalanches an urging issue of applied science, mountain engineering, and economic development. After a first part devoted to the 1966 wave of avalanches and its consequences on touristic projects for the capital, I will show how scientists and engineers dramatized the avalanche risk to expand their research capacities. Then, in the last part, I will show what risk management reveals of the attitude towards nature in Soviet Kazakhstan.

[Picture: “Tomorrow at the alpine resort Medeo-Chimbulak”, from: V. Evdokimov and G. Popov, Medeo, Alma-Ata, ‘Zhalyn’ Baspasy 1977: “The Medeo ice-rink is called a “factory of records” ... On 3 September 1972 Leonid Brezhnev, the General Secretary of the Central Committee of the CPSU has visited the site.”]

Three skiers look into the future of the leisure and sport infrastructures located along the valley of the Malaya Almatinka torrent above and under the Medeo dam. In the background mount Abai rises over 4000 meters. The Medeo ice-rink and hotel as well as the hotel and ski lifts at the Chimbulak resort have been constructed to Soviet times. To host the Winter Asian Games 2011 Chimbulak was enlarged and connected via cable way to Medeo. The pool downstream in the river, the ski jump at Chimbulak and the other cable ways to join Mount Mokhnatka have not been constructed



From the “black” to the “white death”

The 1966 wave of massive avalanches caught Alma-Ata’s inhabitants off-guard. Founded in 1854, Alma-Ata was a young city. Most residents had recently arrived and could not remember any dramatic avalanche, although the city sat at the foot of a steep mountain ridge, the Trans-Ili Alatau, which belongs to the Tian-Shan range. Just above Alma-Ata, a few kilometers away, Peak Komsomol looms 4,330 meters high. Even the older residents (*starozhily*), who had lived through World War I, had no memory of any massive avalanche comparable to that which took place in 1966. The thaw had just started when the first days of March saw considerable snowfalls. The winter had already been very snowy. Three layers had accumulated: ice, pressed dried snow and fresh snow. The first avalanches descended from March 1 to March 3, due to the excessive weight of freshly precipitated snow on the slopes. Heavy snowfall continued, accumulating 40-50 centimeters in three days (March 7-9) below 1,500 meters of altitude. Suddenly, on March 13 and 14, the snow turned rainy and precipitations disrupted the structure of the snow cover. On March 15, rain turned to snow again and within a day, 50 centimeters of new, fresh snow sat on top of the deep, but weakened and lax snow layers. This concentrated heavy snow triggered massive avalanches in all the valleys above Alma-Ata.¹³

For the first time, snow avalanches directly impacted Alma-Ata’s center¹⁴: the water supply, phone lines, and all the roads leading from the city to the upper valleys were cut.¹⁵ As usual, data on casualties were handled with great secrecy.¹⁶ Some snow heaps could not be removed until the summer of 1966, the largest ones not until the summer of 1967.¹⁷ These obstructions were a threat for life in the valleys: on the Turgenka River (60 kilometers east of Alma-Ata), the 1966 avalanches crossed the riverbed and stopped the watercourse, creating a temporary lake. When the snow dam failed, a mighty flood

rampaged down the valley.¹⁸ Even avalanche specialists were surprised by the 1966 event: “The massive snow avalanches of March 1966 are entirely unusual ... They have not been observed in the last 20-30 years.”¹⁹ Although the disaster was clearly exceptional, politicians and experts worried that it revealed that Kazakhstan’s expanding cities were entirely unprepared.²⁰

From the 1920s, and especially after World War II, the European Alps converted from summer to winter tourism with extraordinary economic success and dramatic consequences for the mountains.²¹ In Soviet Kazakhstan in the 1960s, the economic and political leadership decided to further a similar tendency from summer to winter tourism. The Medeo skating arena and Chimbulak ski resort were the highlights of this shift. Consequently, snow hazards gained in significance. Until 1966, the greatest slope hazards had been debris and mud flows occurring mostly in the summer (summer of 1921, 1956, 1963). However, with the 1966 disaster, snow avalanches became the winter hazard, threatening the development of skiing²²: Chimbulak ski resort was hit and the road leading from the city to the resort was closed by huge snow heaps.

During the 1966 wave of avalanches, the greatest concern was the protection of the construction sites of the anti-mudflow dam and the future skating arena, both located in the Medeo gorge. The avalanches hampered the construction of the dam, an urgent project directly supervised by Kazakhstan’s Communist Party First Secretary Kunaev. The Medeo dam was deemed to give definitive protection to Kazakhstan’s capital against devastating debris and mud flows coming down the Small Almatinka valley. In the mid-1960s, after ten years of debates, rising leader Kunaev had succeeded in imposing a dam construction scheme using directional blasting. However, in the spring of 1966, the construction of the dam had to be stopped after an avalanche heavily injured a sentry in his box and a second one buried a dam worker and a skier’s car. Happily, no one was killed.

Just under the Medeo dam (100 meters high, 1,810 meters altitude), Kazakh planners and architects envisioned the reconstruction of a modest skating rink into a formidable palace of all-year ice. It was planned to rival Swiss Davos and welcome international sports competitions. However, the 1966 avalanches revealed that the rink’s site was located on Mount Mokhnatka’s dangerous avalanche corridor on the left bank of the Almatinka gorge. Avalanche specialists listed no less than eleven spots from where avalanches threatened the rink. “Most of them [starting zones] give avalanches every year,” they warned. In the massive avalanche year 1966 the most dangerous corridor at Mokhnatka discharged 15,000 cubic meters of snow on the rink construction site, and smaller ones gave from a few hundreds to 1,500 cubic meters. From the right bank of the river several avalanche corridors threatened the main road linking Alma-Ata to Medeo and Chimbulak ski resort. A new hazard threatened the development of the Medeo gorge, Kazakhstan’s central Winter sports hub and gateway to Chimbulak snow paradise.²³ Like in the Swiss case analyzed by Galina Achermann in this volume, avalanches posed a new risk when touristic interest for the mountains increased. Avalanches impeded Alma-Ata’s effort to become a major world ski resort; snow scientists were quick to understand that a major opportunity had opened for their field.

Dramatizing the hazard and politicizing the risk

The scientists in charge of monitoring and studying avalanches were prone to underlining the damages caused by avalanches and the risks they represented for the extension of the city in the mountains. Igor’ Severskii, a leading avalanche specialist, has presented avalanches as the “threatening wild force of the mountains” (*groznaia gornaia stikhiia*), as an “enemy” (*vrag*).²⁴ The rhetorical framing of avalanches as an anthropomorphic threat was a classical tool to increase public awareness and raise the

value of research on a natural phenomenon. Together with another Kazakh scientist, Viktor Blagoveshchenskii, Severskii has not hesitated to exaggerate the danger of avalanches:

Snow avalanches, from the point of view of their stretch and occurrence, exceed such dangerous phenomena as ground landslides, rockfalls, mudflows. ... [T]he danger of snow avalanches is greater than that of landslides, floods, cryogenic phenomena and even seismicity.²⁵

This is a bold statement, considering that the city had been entirely destroyed by an earthquake in 1887 and several times heavily damaged by debris flows killing hundreds. Flash floods claimed lives every year in the Trans-Ili Alatau. In comparison, avalanches rated very low on the sinister body-count scale. Apart from the avalanche-rich years 1966, 1969, and 1972, avalanches have not presented a massive threat in Kazakhstan's mountains.²⁶ On average, two persons per year have died in avalanches in the mountains above Alma-Ata.²⁷ This is low compared to the Alps and the Caucasus. In the winters 1950-1951 and 1953-1954, disastrous avalanches hit the Alps, killing hundreds. In 1970, in French Val-d'Isère, 39 tourists died in a gigantic avalanche. In the Caucasus, dense dwelling at high altitudes ensures that avalanches are a constant problem: in the Winter 1975-1976, whole districts were cut off from life-supporting infrastructures for months.²⁸ This difference is mainly explained by the low anthropization of Kazakhstan's mountainous environment.²⁹

However, Kazakhstan's leadership intended to turn Alma-Ata's mountains into an important Soviet winter sport resort and dreamed of welcoming the Winter Olympics.³⁰ Scientists insisted that for the future development of winter sports and tourism in the mountains, avalanches were a threat: "Avalanches significantly complicate economic activity in the mountains."³¹ In 1978, Severskii showed that avalanches were causing important damages:

In the limits of Kazakhstan's part of the Tian Shan and Altai, as well as in the mountains of the Dzhungar Alatau, snow avalanches descend every year and cause big material damage *even if the territory is weakly developed*.³²

Apart from the glaciologists of the Kazakh Academy of Sciences, meteorologists were the most vocal proponents of an increase of state funding in avalanche research, monitoring and prevention. "The issue of snow avalanches and floods ... has already outgrown the limits of narrow institutional interests and has grown into a large issue for the state," Porfir'ev, the head of Kazgidromet, Kazakhstan's meteorological agency (UGMS), said at a governmental meeting.³³ He calculated that damage from avalanches roughly equaled that of mudflows, the much-feared "black death." And the costs were rising towards the end of the decade because of the avalanche years 1966 and 1969.³⁴ The meteorologists lamented the poor state of their observation network, which proved completely outdated and unadapted. In all Kazakhstan, they had only one specialized avalanche station (close to Chimbulak ski resort), eight high-mountain stations and 15 regular weather stations. These stations in their turn kept smaller posts and gauges alive.³⁵ This was a fairly limited snow observation network for such a broad country, in which the southern regions bordering with the Tian Shan Range concentrated one third of the total population. The department for avalanche control at Kazgidromet was understaffed with only five employees. After the spring of 1966, meteorologists petitioned Kazakhstan's government to have the network significantly extended: they demanded two more specialized avalanche stations and 12 new alpine stations.³⁶

The alarm raised by scientists incited the Kazakh government to augment the funding of avalanche research and observation.³⁷ After a meeting with the head of Alma-Ata, Severskii could set up an avalanche team within the Geography Institute of the Kazakh Academy of Sciences, and received considerable material and financial means to further research and monitoring activities in the hard conditions of high mountains.³⁸ Immediately after the 1966 disaster, the Institutes of Hydrogeology and Hydrophysics of the Kazakh Academy of Sciences went on an expedition to map the avalanche spots of the Trans-ili Alatau. Numerous expeditions took place in the 1970s and 1980s in Kazakhstan and Central Asia.³⁹ Kazakhstan's glaciologists extended their own permanent observation station "T1," founded in 1956 at the foot of the Tuiuk-Su glacier (3,700 meters altitude). It became one of the leading glaciological stations in the Soviet Union. The meteorologists, too, extended their observation networks, insufficiently, however, as we will see.

The Kazakh leadership's eagerness to develop a strong republican scientific base for risk management may be explained by the competition between the republics of Central Asia. Meteorologists had complained that Kazakhstan "lag[ged] significantly behind the neighboring Central-Asiatic" meteorological agencies in terms of avalanche monitoring.⁴⁰ The decentralization campaign launched by Nikita Khrushchev from 1955 onward had deep consequences on the development of scientific knowledge and technological know-how in the republics. From the end of the 1950s, the Academies of Sciences of Kazakhstan and Uzbekistan gained importance in the earth sciences, for instance in hydrology (linked to the irrigation projects for cotton), pedology (linked to the Virgin Lands Program for wheat), and geology (linked to the quest for new resources to mine). The academic institutes of Georgia, Kazakhstan and Uzbekistan were strong players in the ice and snow sciences. The staff of their scientific teams was increasingly composed of and headed by locally trained specialists (as opposed to sent from Leningrad and Moscow), such as Igor' Severskii, alumnus of the Kazakh Pedagogical Institute, and the leading mudflow scientist Iurii Vinogradov, raised and trained in Tashkent before moving to Alma-Ata.⁴¹

The scientists from the Geography Institute of the Kazakh Academy of Sciences around Severskii developed research on avalanches mostly in two directions: the cartography of avalanches and the evaluation of the economic loss inflicted by avalanches. Those were important applied topics that were suitable for appealing to the decision-makers of the Republic for funding and institutional support. Before decentralization, scientific work was carried out by expeditions dispatched from central agencies (the Soviet Academy of Sciences, the Academy of Agricultural Sciences, Moscow or Leningrad state universities). Beginning in the 1960s, the cartographic work, be it in hydrology, seismology or glaciology, was done by the republican academies of sciences. Each republic produced its own map sets, and then a global map for the Soviet Union was compiled from the republican maps. The Soviet seismic and avalanche atlas was created on this organizational model. Although Uzbek scientists were more advanced than their counterparts from Kazakhstan in ice science when the avalanche wave struck in 1966, Kazakhstan had, by the 1980s, succeeded in becoming the first avalanche specialist among Central-Asiatic republics, second only to the Caucasus.⁴² The scientific institutions had helped to politicize and dramatize the avalanche issue. However clear the risk, how best to protect people and infrastructures from avalanches remained a controversial and unsolved issue.

From boot packing to slope blasting

The history of avalanche prevention reflects major dilemmas in the way Soviet society chose to adjust to mountainous nature. Since the construction of the anti-mudflow dam at Medeo in 1966-1972, Soviet Kazakhstan had chosen to isolate the urban environment from the menacing mountains. The Medeo

dam was thought of as a fortification wall protecting Alma-Ata from mountain hazards. Alternate protection schemes relying on a smoother integration of the city with nature through slope afforestation and riverbed adaptation were rejected, and their promoters, silenced. Zoning and extension of vegetation cover were politically costly decisions because they implied to constrain urban geography: in a tense housing situation, inhabitants and enterprises would have to be removed from, and construction would have to be forbidden in exposed places. On the contrary, dams and explosives were seen as prestigious and easy to convey to the public as radical solutions to hazards from the mountain surroundings.⁴³ In avalanche prevention, too, a technophile approach won the day: instead of favoring technically light and traditional solutions like zoning and reforestation, Kazakhstan's engineers and leaders chose to employ heavy and risky means – preventive blasting of avalanche spots, with adverse environmental consequences.

In Kazakhstan, preventive unloading of avalanche spots began systematically after 1966. Kazakhstan did not have the necessary expertise in this field and had to call the Central-Asiatic Meteorological Institute (SANIGMI) in Tashkent for help. SANIGMI specialists promoted remote “prophylactic unloading” of avalanche spots using artillery. TurkVO, the military region of Central Asia, whose headquarters were in Tashkent, provided them with a mine-launching unit including six 160-millimeter mine-launchers.⁴⁴ SANIGMI specialists and Kazakh meteorologists visited the mountains exploited by the foresting enterprise Kazles in East Kazakhstan. To remove the avalanche danger from the Ust'-Kamenogorsk—Zyrianovsk railway section, the scientists set up the mine-launchers. In a confusing situation where it seems that the railway workers fired the artillery untimely, 19 mines were launched in one day. To no avail: no avalanche descended. This fiasco disappointed the railway direction, who refused to continue working with SANIGMI, “estimating that the prophylactic gunning method is not sufficiently efficient.”⁴⁵ The Kazakh meteorologists were equally unimpressed by the shelling.⁴⁶

The delegation from Tashkent encountered further disappointment when confronted to risk management in Tekeliiskii Combine for Lead and Zinc, located in the mountains of Dzhungar Alatau. The combine's managers favored a penny-wise method to tame avalanches:

After snowfalls, ... they send people out to avalanche-prone slopes to trample the snow underfoot (!). This practice exposes the life of people to a deadly threat... In fact an accident involving a combine worker has already occurred.

The dangerous snow trample shocked the meteorologists and avalanche specialists who came from Uzbekistan to advise their Kazakh counterparts.⁴⁷ Kazgidromet had to write an alarmist letter to the Kazakh Council of Ministers denouncing the “inadmissibility, from the point of view of the prevention of accidents, of the avalanche prophylactic method consisting in letting workers trample the snow on avalanche-prone slopes.” After this incident, which made Kazakhstan look ridiculously backward in comparison to Uzbekistan, the combine was forced to abandon this practice.⁴⁸ However, “boot packing” (meaning compacting fresh snow on slopes by walking or skiing on it in order to harden it) is widely used throughout the world on small areas. Its categorical rejection in Kazakhstan led to the use of more explosives.

SANIGMI experts did not succeed in exporting the shelling method to Alma-Ata. Possibly, the competition in snow science between Uzbekistan and Kazakhstan made Kazakhstan reluctant to adopt SANIGMI's know-how. As far as the city and republic authorities were concerned, gunning avalanche

spots next to urban centers – Alma-Ata and its satellites Talgar and Kaskelen – could endanger people and infrastructures. For these reasons, after the unsatisfying tests of the late 1960s, the agencies responsible for avalanche control were not allowed to use artillery to shell avalanche spots from a distance in the Trans-Ili Alatau, whereas anti-avalanche specialists in the Caucasus (as well as Switzerland and Austria) used mine-launchers.⁴⁹ They had to use still another method to unload potential avalanches: instead of shelling from a distance, blaster teams hiked to the dangerous spots to plant explosives by hand.⁵⁰ First experienced in the Kazakh part of the Altai Mountains, this technique was then exported to the mountains surrounding Alma-Ata. This was a more controlled manner to unload avalanche spots. Mines thrown from a distance had a high percentage of non explosion (up to 30%): the explosives were hard to remove and remained for long periods in the snow, which was a constant danger to skiers and hikers.⁵¹ A team setting up the charge and working in the immediate vicinity of the avalanche spots could avoid such dangers. However, the anti-avalanche teams ran considerable risk for themselves: the handling of explosives at high altitude, the risk to trigger an avalanche when hiking to a spot, and be buried in an avalanche after detonating the charge made it a dangerous assignment.⁵²

Whatever the method used, explosive unloading had far-reaching environmental consequences. Geographers underlined that,

The artificially triggered avalanches have destroyed forest strips [...] that do not have time to recover; the corridors left by the avalanches in the forest zone are longer every year and will reach the bottom of the valley in the foreseeable future, creating new avalanche-dangerous zones for the first time in the last century or millennium.⁵³

Preventive unloading led to adverse and even opposite effects: by destroying the vegetation cover, it increased the long-term slope risks in the mountains, causing landslides and avalanches to occur more frequently. Scientists working on avalanches were aware that the snow cover stood in close relationship to the mountainous environment: in particular, vegetation and soil are instrumental in understanding how avalanches work. For most blast engineers unloading avalanches, mechanics and geology were central, and they ignored botany and pedology. There were no standards or rules for anti-avalanche explosions in the Soviet Union. Specialists relied on their “experience and intuition” to choose the size of the charge, the mode of triggering, and its position.⁵⁴ This unsystematic approach led to the establishment of the false belief among explosion experts that “the biggest the charge, the highest the probability to unload the avalanche.”⁵⁵

Preventive unloading shaded other measures of caution and conveyed a false sense of security: avalanche observation and alarm systems received insufficient attention. A bureaucratic stalemate hampered the development of a competent avalanche service in Soviet Kazakhstan. To make a long story short, no agency wanted to take responsibility for the construction and maintenance of an extensive observation and alarm network for Kazakhstan’s mountains, and the government was unwilling to fund necessary but expensive meteorological stations equipment and personnel. The meteorologists from Kazgidromet consistently refused to become the central player in avalanche risk management, arguing that avalanche surveillance had to stay under the responsibility of each enterprise and district.⁵⁶ However, ministries were reluctant to maintain their own costly avalanche services in their enterprise network.

The crux was communication: it took the Kazakh government 23 years (1951-1974) to install electricity and telephones in the existing observation stations of Kazgidromet in the Big and Small Almatinka rivers, the two main valleys above the capital.⁵⁷ The great majority of valleys elsewhere in Kazakhstan retained poorly connected avalanche stations in far too low numbers for years. In February 1977, nine residents of Zubovka (Zyrianov district, East-Kazakhstan oblast') died in an avalanche. The only road between Ust'-Kamenogorsk and Zyrianovsk was blocked. An inquiry showed that the local avalanche station had no telephone to warn the population, and the city of Leninogorsk could not find office space and flats to accommodate an avalanche team.⁵⁸ Hikers and skiers were at risk when progressing even in the well-known valleys of the Trans-Ili Alatau: information on avalanche alert was kept secret, and dangerous corridors and spots were not correctly signaled.⁵⁹ In the end, notwithstanding the declared goals, avalanches were not under control.

A good illustration of this is an accident that caused a stir in governmental circles in the winter of 1975. In the night from April 4 to 5, a group of skiers went on a hike to Kok Zhailau, a pasture close to Alma-Ata. Located between the Small and Big Almatinka rivers, it offers a famous vista at 1,500-2,000 meters. An avalanche struck the team, burying Anatolii Antsupov, main engineer of Proektmontazhavtomatika and Vladimir Ushakov, main constructor of the All-Union State Institute of Technological Design. The remainder of the ski group organized the first rescue operation on April 5 with the help of alpinists and a crew of rescuers. This group was, however, not numerous enough to find the place where Antsupov and Ushakov were buried. The search was not resumed the following day. A group of seven (four co-teamers and three rescuers) merely inspected the place. On the third day after the accident, on April 7, a team of officials led by the deputy chief of police for the Alma-Ata region carried out an aerial inspection of Kok Zhailau. Their conclusions were not reassuring: rescue operations were "dangerous" in the zone because the starting spot of the avalanche was still full with snow. New avalanches could occur during rescue works. No machines could be lifted to the place, the body search operation could be carried out only by hand. To find the bodies, the experts saw only one solution consisting in digging up a 500-meter long search trench – a two-week task for 60 workers. Before the works could begin, the avalanche starting zone had to be cleared of snow with explosives. All this required important logistical, material and financial efforts that the government hesitated to invest.⁶⁰ Although often employed in emergency management, the army was not called in to help. Eventually, notwithstanding the demand of Antsupov's and Ushakov's widows, the operations to locate the bodies of the two engineers from Moscow were not engaged. They wrote to the Council of Ministers:

We and our children ask to get help, to examine all possible solutions to find our husbands and fathers, because waiting until the summer, until the natural melting of the snow is a horrible, unbearable torture, the avalanche [cover] may not disappear and water from under the ice will carry their bodies away.⁶¹

The dramatic death of two high-ranking engineers showed that it was hard for Alma-Ata and Kazakhstan to procure the necessary rescue teams and technical means to organize large-scale rescue operations and find the bodies of lost skiers and hikers even at short distance of the capital. Rescue operations are everywhere hard, dangerous and costly. Chances of survival in avalanches are in any case very low. It is not unusual that bodies of dead skiers cannot be found until the thaw.⁶² If large and well-equipped rescue teams were indeed missing in late Soviet Kazakhstan, the lack of proper preventive and protective measures and regular information on

avalanches was patent.⁶³ Displaying confidence that the avalanche hazard was under control and enforcing information about avalanche risk were two contradictory objectives. In the 1970s, the first had priority over the second.

Avalanches challenged Alma-Ata's ambitions to become a model of modern socialist urban development where leisure and international sports would occupy central positions. They were at the same time an opportunity to develop applied research and snow know-how in Kazakhstan. In the context of Cold War competition and urgency, this ambivalence of risk perception led Kazakhstan's elite to enforce a dysfunctional pattern of control over nature that combined environmental destruction with deficient security for persons and infrastructures.

This story can be told as a typical Cold War tale. First, like other extreme and hostile environments, alpine mountains were seen as the last natural frontiers on Earth and thus as important sites of East-West competition: climber teams rivaled for personal achievements as well as national victories; cities and states competed to show mastery in developing high mountains for tourism and sports and prove their engineering and urbanistic superiority. In the run to win over decolonized countries, the Soviet Union—which competed both with the USA and China—wanted its Central-Asiatic republics to be flagships of socialist progress in urbanism.⁶⁴ Second, avalanche prevention shows how military technologies extended into aspects of civil life. The “prophylactic unloading” of avalanche spots made use of shelling techniques, artillery units and explosives from the military bases in Soviet Central Asia. Last, Cold War competition seemed to justify a brutal and radical attitude towards fragile environments, as there was no interest for more modest, less risky and less destructive approaches to nature when it came to scientific and engineering prestige.

The way in which Soviet Kazakhstan handled avalanches shows how far the Union republics loosened from Moscow in the post-Stalin decades. In urban planning and associated applied sciences, the leadership of the republics could take any decision it saw fit and engage the appropriate funding to realize it, without referring either to Moscow or to a set of union-wide rules. Relying on its own scientific and technical knowledge institutions, it was free to design its own comprehensive scheme to protect infrastructure from avalanches and mudflows, free to use shelling, mining, protective works, boot packing or a composition of those. As a result, competition among republics and their scientific institutions gained momentum, as exemplified here in how Kazakhstan refused to import Uzbekistan's technology for avalanche control. Making Alma-Ata a world ski resort may have been equally important for both the Soviet Union in the system competition of the Cold War and the Kazakh leader Kunaev for his own glory and that of Kazakhstan and its capital city. From an extremely centralized state under Stalin, the Soviet Union had turned into a superstate tightly controlling a federation of republics which enjoyed growing prerogatives. This shift is instrumental to understanding why it could collapse so quickly at the turn of the 1980s-1990s.⁶⁵

Post-socialist Almaty continues to dream the winter dream of Soviet Alma-Ata. Host to the Winter Asian Games in 2011, Kazakhstan's former capital applied for the 2022 Winter Olympics but lost to Beijing. Alma-Ata's Olympic ambitions were born in the 1960s when the leadership launched the assault on the valleys of the Trans-Ili Alatau and developed a winter sports paradise around the Medeo fortress. During the Cold War competition, Medeo became a famous skating arena, and the Soviet alpine ski team trained at Chimbulak ski resort. Avalanches entered the scene in Kazakhstan in 1966 in

this crucial time of desired conversion to winter tourism of a Southern periphery of the Soviet Union. Limited financial and technological resources, encroaching urban development, and the quest for quick fixes incited the leadership exclusively to favor “prophylactic unloading” in avalanche control, over protective building,⁶⁶ local boot packing, zoning and afforestation, and even prevention and observation.⁶⁷ The failure of avalanche risk management reveals that the predatory attitude towards nature is not tantamount to the idea of total control over nature, let alone with its realization.⁶⁸ Typical for the Soviet rule over nature is its unachieved and controversial character, notwithstanding the great plans and noisy statements. This aspect of Soviet environmental history still remains to be explored.

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Werner Bätzing, *Die Alpen : Geschichte und Zukunft einer europäischen Kulturlandschaft*, 2 ed. (Munich: Beck, 2003), pp. 247–253; Mark Carey, *In the Shadow of Melting Glaciers: Climate Change and Andean Society* (Oxford: Oxford University Press, 2010). On the Himalaya, see Hewitt, Kenneth, and Manjari Mehta, “Rethinking Risk and Disasters in Mountain Areas,” *Journal of Alpine Research | Revue de Géographie Alpine*, 100-101 (23 Feb., 2012).

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Here I hint not only at the traditional distinction of ‘hazards’ and ‘risks,’ but at the sociology of risk construction, which elaborates on how risk issues are set on the political agenda. Olivier Borraz, “Vers une sociologie du risque?,” *Risques, crises et incertitudes: pour une analyse critique*, ed. Groupement d’intérêt scientifique Risques collectifs et situations de crise (France), Claude Gilbert, and Pierre-Benoît Joly (Grenoble: Publications de la MSH-Alpes, 2005), 21-67, 28.

⁴Peter J. Kuznick, Gilbert James Burkhardt, eds., *Rethinking Cold War Culture* (Washington: Smithsonian Institution Press, 2001); Klaus Gestwa and Stefan Rohdewald, “Verfechtungsstudien. Naturwissenschaft und Technik im Kalten Krieg,” *Osteuropa* 59, 10 (2009): 5-14.

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On the worsening of the relationship between the USSR and PRC, see Lorenz M. Lüthi, *The Sino-Soviet Split: Cold War in the Communist World* (Princeton (N.J.): Princeton University Press, 2008).

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Nigel Raab, “The Tashkent Earthquake of 1966: The Advantages and Disadvantages of a Natural Tragedy,” *Jahrbücher für Geschichte Osteuropas* 62, 2 (2014): 273-274; Romain Huret and Marc Elie, “Soviet and American Ways of Dealing with Disasters in the Cold War Years, 1940s-1990s” (presented at the international workshop “Dealing with disasters. An international approach” (9-10 September 2013)); Paul Stronski shows how pre-earthquake Tashkent was already seen as a model socialist city in ‘backward’ southern societies. Paul Stronski, *Tashkent : Forging a Soviet City, 1930-1966* (Pittsburgh: University of Pittsburgh Press, 2010), 234.

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In the growing body of works on the link between Earth system science and Cold War militarization of scientific research, see the articles in this volume, especially Janet Martin-Nielsen’s, Ingo Heidbrink’s, Sophie Elixhauser’s, Roger Launius’, and Peder Roberts and Lize-Marie van der Watt’s. Boris Belge and Klaus Gestwa, “Wetterkrieg und Klimawandel. Die Meteorologie im Kalten Krieg,” *Osteuropa* 59 (2009): 15-42; Ronald E. Doel, “Constituting the Postwar Earth Sciences: The Military’s Influence on the Environmental Sciences in the USA after 1945,” *Social Studies of Science* 33 (2003): 635-666; Especially on polar research: Matthias Heymann et al., “Exploring Greenland: Science and Technology in Cold War Settings,” *Scientia Canadensis* 33 (2010): 11-42.

⁸

Recorded interview with Igor’ Vasil’evich Severskii, deputy director of the Institute of Geography of the Republic of Kazakhstan, 3 October, 2011, Almaty.

⁹

Marc Elie, “Coping with the ‘Black Dragon’ Mudflow Hazard and the Controversy over the Medeo Dam in Kazakhstan, 1958-1966,” *Kritika: Explorations in Russian and Eurasian History*, 14 (2013): 313-342.

¹⁰

Vitalii I. Fes’kov, Konstantin A. Kalashnikov and Valerii I. Golikov, *Sovetskaia armiiia v gody ‘kholodnoi voiny’ (1945-1991)* (Tomsk: Izdatel’stvo Tomskogo universiteta, 2004), 9.

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Marc Elie, “Governing by Hazard: Controlling Mudslides and Promoting Tourism in the Mountains above Alma-Ata (Kazakhstan), 1966-1977,” *Governing Disasters: Beyond Risk Culture*, eds. Sandrine Revet and Julien Langumier (New York: Palgrave Macmillan, 2015), 23-58.

¹²

V. E. Bagdasarian et al., *Sovetskoe zazerkal’e. Inostrannyi turizm v SSSR v 1930-1980-e gody: Uchebnoe posobie* (Moscow: Forum, 2007), 165-167; M. Iu. Prozumenshchikov, *Bol’shoi sport i Bol’shaia politika* (Moskva: ROSSPEN, 2004).

¹³

R. D. Kudrin, M. P. Tolstunov, G. G. Kharitonov, “Note on the formation and descent of avalanches in March 1966 and on the situation to expect in the mountains of the Trans-Ili Alatau,” 22 March 1966, Central State Archive of Kazakhstan (TsGAK) fond 2017, opis’ 1, delo, 1238, listy 12-17 (henceforth TsGAK 2017/1/1238/12-17).

¹⁴

Precise data show that prior to 1966, the biggest avalanches descended in the winters 1926/27, 1936/37, 1944/45, 1947/48, 1954/55, 1956/57, 1960/61 (Trans-Ili Alatau), in 1934/35, 1940/41, 1944/45, 1959/60 (Dzhungar

Alatau) and 1944/45, 1948/49, 1951/52, 1955/56, 1960/61 (Altai). But they did not “disrupt the normal rhythm of life” of city dwellers: S. M. Miagkov and L. A. Kanaev, eds, *Geografiia lavin* (Moscow: Izdatel'stvo Moskovskogo universiteta, 1992), 300; D. Kachalov, Head of the Department of Weather Forecast of the Alma-Ata Weather Bureau, 30 May 1966, TsGAK 2017/1/1238/59-64.

T. Baimoldaev and V. Vinokhodov, *Kazselezashchita - Operativnye mery do i posle stikhii* (Almaty: Bastau, 2007), 8.

We do, however, learn of three teenagers who disappeared on the road to Chimbulak ski resort. Letter of Tolstunov to Porfir'ev, 4 March 1969, TsGAK 2017/1/1606/60.

Kudrin and Tosltunov, Note on the repartition and volume of the avalanche heaps in the Small and Big Almatinka rivers. TsGAK 2017/1/1238/42-43.

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R. D. Kudrin, M. P. Tolstunov, G. G. Kharitonov, Note on the formation...

Esen Duisenov, *Alma-Ata* (Alma-Ata: Kazakhstan, 1968), 82.

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Igor' Severskii and Viktor Petrovich Blagoveshchenskii, *Lavinoopasnye raiony Kazakhstana, Institut geografii Akademii nauk Kazakhskoi SSR* (Alma-Ata: “Nauka” Kazakhskoi SSR, 1990), 2-3.

Miagkov and Kanaev, 300.

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Severskii, 12-13.

Charis Keller-Lengen, Felix Keller and Roland Ledergerber, *Die Gesellschaft im Umgang mit Lawinengefahren: Fallstudie Graubünden*. Arbeitsbericht NFP, vol. 31 (Zürich: Vdf Hochschul.-Verl. an der ETH, 1998), 14; Interview with Severskii.

V. Evdokimov, *Ledovaia zhemchuzhina* (Alma-Ata: Kazakhstan, 1978), 5-6, 28, 61.

Severskii and Blagoveshchenskii, 2.

Igor' Severskii, *Snezhnye laviny Zailiiskogo i Dzhungarskogo alatau* (Alma-Ata: Nauka, 1978), 3. Emphasis mine.

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A total of more than 9 million rubles for each hazard. "Material damage from snow avalanches," 1969. TsGAK 2017/1/1606/52.

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M. P. Tosltunov, "Observations on the study of the formation of snow cover and on the organization of the observation and prevention service on the avalanche danger in Kazakhstan's mountains," not after 29 December 1967. TsGAK 2017/1/1368/55-62.

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Ibid.

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Decree of the KSSR Council of Ministers no. 103, 16 February 1967, "On measures to ameliorate the protection of the population and economic sites of the Kazakh SSR from snow avalanches and mudflows," quoted in Central State Archives of Almaty (TsGAgA) 174/29/1206/88.

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Interview with Severskii.

39

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Report of UGMS "On the fulfillment of the snow and avalanche works in Kazakhstan's mountains" after the decree of the CM no. 103 from 16 February 1967, end of 1967. TsGAK 2017/1/1368/31-36.

⁴¹Elie, "Governing by Hazard," 23-58.

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Miagkov and Kanaev, 192.

43

Elie, "Coping with the 'Black Dragon.'" "

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R. D. Kudrin, M. P. Tosltunov, GG Kharitonov, Note on the formation...

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Head of SANIGMI snow avalanche laboratory Iu. D. Moskalev and SANIGMI Junior Researcher G. G. Kharitonov, April 1966. TsGAK 2017/1/1238/12-17/35-39.

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Head of KSSR UGMS I. F. Porfir'ev to Deputy Chairman of KSSR CM I. G. Slazhnev, 15 July 1966. TsGAK 2017/1/1238/65-67.

49

Interview with Blagoveshchenskii.

50

Tolstunov to Porfir'ev, "Report on the possibility of the prophylactic unloading of snow avalanches"...

51

Baimoldaev and Vinokhodov, 135.

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Interview with Blagoveshchenskii.

53

Miagkov and Kanaev, 303.

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A. K. Diunin, A. R. Gerber and A. G. Fomin, "Sostoianie issledovaniia po inzhenernoi zashchite ot lavin," *Trudy vtorogo vsesoiuznogo soveshchaniia po lavinam (Iangiabad, Mai 1985)*, (Leningrad: Gidrometizdat, 1987), 283-294 (283).

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SSSR,” *ibid.*, 337-339 (338).

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Porfir'ev, “On the comment of [deputy head of the KSSR Council of Ministers] comrade Simakov K. M. on the decree project ‘On measures to ameliorate the protection...’,” 1967, TsGARK 1137/25/769a/39-41. Gidromet’s function was to produce “background coverage (*fonovoe osveshchenie*) of the hydrometeorological regime,” but not to coordinate a specific risk management network.

57

Alma-Ata Ispolkom to Governmental Flood Commission, 14 March 1973, TsGAga 174/29/1206/75-77.

58

Iu. Izrael’ to USSR Council of Ministers, 14 March 1977, TsGARK 1137/27/912/34-35; Governmental Commission’s Report, 21 March 1977, *ibid.* 45-46.

59

TsGARK 1137/25/1372/86-93; Interview with Blagoveshchenskii.

⁶⁰Act of the rescue commission of Alma-Ata’s regional Soviet, 7 April 1975. TsGAK R-1137/26/2065/41-42.

⁶¹Request of M. I. Antsupova and F. P. Ushakova to I. G. Slazhnev, deputy chairman of the KSSR CM, 9 April 1975. TsGAK R-1137/26/2065/40 and verso.

⁶²In Switzerland, from the mid-1960s to the mid-1990s, only 4 from 10 skiers and alpinists buried in an avalanche survived. Chances of finding a victim alive are higher within the 15 minutes following the avalanche. After half an hour, one out of two buried victims dies from suffocation, trauma or hypothermia. Walter Ammann, Othmar Buser and Usch Vollenwyder, *Lawinen* (Basel: Birkhäuser, 1997), 152.

⁶³TsGAK R-1137/26/2065/4-5.

⁶⁴Kalinovsky, “A most beautiful city for the world’s tallest dam : Internationalism, social welfare, and urban utopia in Nurek”, *Cahiers du monde russe*, vol. 57, no. 4, 819-846.

⁶⁵Elie, “Coping with the ‘Black Dragon.’”

66

Wooden avalanche fences were installed only on Mount Mokhnatka to protect the rink. Interview with Severskii.

67

The use of explosions to solve problems was common in mudflow protection: not only had the Medeo dam been built through directional blasting, but explosions were used to empty swollen moraine lakes (with great danger and adverse environmental impact). Elie, “Governing by Hazard.”

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Douglas Weiner, “The Predatory Tribute-Taking State. A Framework for Understanding Russian Environmental History,” *The Environment and World History*, eds. Edmund Burke and Kenneth Pomeranz (Berkeley: University of California Press, 2009), 276-315.