The environmental legacy of the Soviet regime

1.

One of the first impressions a foreign visitor has of many cities in Kazakhstan concerns the high level of atmospheric pollution, which is disproportionately high relative to population density. From the heights of Ust-Kamenogorsk (Öskemen), one can see dense smog hovering above the city; in the former capital, Almaty, air pollution is mostly due to car traffic, but the air has been equally –if not more- unbreathable for the past three decades (Tatenko 1984). Train travelers to Ekibastuz to the east and to the former GULag center, Karaganda, can recognize that their stop has come by sensing the smell of coal powder that meets them just out of their carriages. Not far from Karaganda, in the metallurgical city of Temirtau, residents are busy cleaning away the reddish dust that deposits itself on their cars and windows. To the north, coal powder is used for centralized heating in Astana, the new capital, although strong steppe winds contribute to dispersing the smoke.

Air pollution, especially in the form of dusts and other particules, which derives from the presence of heavy industry and from the reliance on coal powder for heating and energy production, is one of the many ways in which the heritage of Soviet development policies is still having an impact on the natural environment and on people’s health. This chapter explains how, from the viewpoint of the environment, the Soviet past is not at all “a foreign country”: on the contrary, it is still continually present –or at least *perceived* as present- in the daily life of Kazakhstanis in three distinctive ways. First, there are situations in which Soviet policies with significant fall-outs on the environment have indeed been interrupted (sometimes before 1991), but their consequences are still visible, for instance on human and animal health. These will be the object of the first section of this chapter. Then, as in the case of the usage of coal powder, productive solutions initiated before independence have not been discontinued or substantially reformed, which leads to the perpetuation of their obnoxious effects in a very different socio-economic context. The second section will provide examples of this type. Each of these two kinds of heritage underpins distinct issues of political responsibility, coping strategies, and memorialization. Finally, the Soviet environmental heritage also exists in a third and subtler form, namely in the political discourse about ecological problems, both officially and at the grass-root level. Such discourse –and the relative economic policy assumptions- was shaped not only by Soviet decision-making patterns, but also by the emergence of ecological movements in the last two decades of the USSR.

In other words, the Soviet environmental heritage extends beyond the material domain (where it is visible both as direct continuity in practices, or as long-term consequences of past policies) to include ideology and decision-making processes. In chronological order, the first great initiatives to shape the landscape in order to increase output -and thereby foster the consolidation and expansion of socialism- date to the late 1940s. They must be understood in the context of the early Cold War and of growing competition between the US and the USSR models of development, not only for either of these two countries but also for propaganda purposes in Asia and Africa. Stalin’s “plan for the transformation of nature”, launched in 1948 and paralleled by his “great communist construction” (Gestwa 2005; Josephson 2013, 119–28), did not reach the degree of *hybris* and absurdity of Mao’s “war against nature” (Shapiro 2001), and was less a tool for overall societal mobilization as Khrushchev’s “Virgin Land campaign” would be half a decade later. Yet, such “transformation” entailed several important projects in Central Asia, which would have a direct or indirect impact on the natural and anthropic landscape in Kazakhstan, namely the Karakum Canal (which actually started in 1947) and the Major Turkmen Canal (never accomplished), as well as the “diversion of Siberian rivers”. While the “gigantism” of Stalin’s “transformation of nature” was rejected under Khrushchev in favor of a more nuanced, “cybernetic” approach that took into account the environment’s ‘feedback’ on human initiatives, the idea of a manipulation of nature for productive goals was never fundamentally shaken (Chida 2016).

At the beginning, all these construction were prompted by the ‘center’, but later on and in particular under Brezhnev, initiatives for the “transformation of nature” were increasingly discussed at the republican level and became an opportunity for national Party and Soviet elites could build their power. This was true not only for the revival of the unaccomplished “diversion of Siberian rivers”, but also for decisions about the Balkhash-Ili basin, and even on the creation of the Medeu dam to prevent mudfloods. In other words, political decisions that entailed the direct manipulation of the environment became a terrain of confrontation between ‘center’ and ‘peripheries’ and underpinned the establishment of patronage networks between politics and expert scientific knowledge. In this, all the episodes reported in the next pages embody the Soviet technocratic approach (Chida 2016; Elie 2013). Not unlike policies in the field of military or industrial development, what these decisions were not really taking into account were negative externalities (desiccation, pollution, loss of biodiversity…): what mattered was output, and in particular output on the short- or medium run. These three characteristics –environmental questions as a political arena, technocracy, and the emphasis on production- seem to be weighing on the way environmental issues are still dealt with in independent Kazakhstan.

2.

The heritage of the Soviet regime in Kazakhstan is conventionally associated to the so-called Aral Sea tragedy and with long-term nuclear contamination in the east of the country. Both these situations belong to the first category of circumstances mentioned above: both the shrinking and ultimate disappearance of the Aral Sea and the Semipalatinsk (Semey) atomic testing polygon belong to the pre-independence period, but their consequences are still very much present now.

The decline of the level of the Aral Sea is related to the demand for water for the expansion of the cultivation of cotton in southern Central Asia, particularly in what used to be the Uzbek SST and the southern Kazakh SSR. Historically, the oases of southern Central Asia had been growing cotton (*Gossypium herbaceum*, locally known as *ghuza*) well before the Russian conquest of the region in the second half of the 19th century. The introduction of long-staple American cotton varieties (*Gossypium hirsutum*, especially *Upland*) in the 1870s, however, marked the beginning of a first ‘cotton boom’, which was made possible by a combination of objectively favourable fiscal policies and of the abundance of available labour in local small-holding peasant households (Penati 2013). This phase, however, can scarcely be compared to what followed in the Soviet era: in 1929, Stalin enunciated cotton autarky as one of the goals of the first five-year plan. The collectivization campaign in the oases of southern Central Asia aimed first and foremost at maximizing the cotton output through the establishment of larger mechanized farms than it had hitherto been the case. The expansion of both cotton acreage and output in the Soviet period was particularly intense in three periods: during the first five-year plan (1928-1932), with the opening of ‘virgin lands’ for cotton under Nikita Khrushchev, and above all after 1966, as a consequence of the renewed mechanization effort, the further expansion of new irrigation, and the presence of more persuasive economic incentives under Brezhnev. At that point, water that should have ended up in the Aral Sea was being diverted not only for cotton, but also for rice in southern Kazakhstan (Glantz 1999).

Some variability in the level of the Aral Sea was well-known before the Soviet period: chronicles on the emergence and consolidation of the Khiva khanate in the Amu-Darya delta, for instance, suggest that variations in the discharge of rivers and even in their courses were not uncommon, and ultimately determined the volume of water that reached the Aral Sea each year (Abdurasulov 2016). Already at the beginning of the 20th century, many observers discussed whether “Central Asia is drying up” on the basis of glaciers and of the water level in rivers and in the Aral Sea (Berg 1905). Since then, Soviet and post-Soviet archaeological and historical scholarship has shown that indeed the Aral Sea (as other Central Asian lakes) expanded for the last time in the 17th-19th c., while the situation changed by the beginning of the 20th c. (Narama et al. 2010). This variability, together with years of relatively abundant water around the middle of the century, may explain some reticence in engaging from the beginning with the shrinkage of the Aral Sea as a consequence of the increased diversion of water for irrigation. More generally, because all the water that ended up in the Aral Sea was regarded as wasted, it is not surprising that for a long time the diminution of the sea level did not cause much worry. Information was not lacking: the Aral Sea was constantly monitored and since 1939 one of the first Kazakhstani natural reserves was located on its shores (Gunin and Neronov 1986, 175). Yet, since 1960 the level of the water level started plummeting, to the point that by 1987 the surface was three-fifths and the volume one-third of what it used to be at the beginning of the period (NASA 2016; P. P. Micklin 1988; Glantz 1999). This was essentially due to the opening of newly irrigated land in southern Kazakhstan and Uzbekistan, in the so-called Hungry Steppe, and to the digging of the Karakum canal in Turkmenistan (Obertreis 2008; Chida 2009). A massive diversion of the Ob and Irtysh rivers was under study as early as the 1970s: although its first goal was to expand the irrigated surface in cotton-producing regions, this project could have helped ‘save’ the Aral Sea. This project, known as *Sibaral* (‘from Siberia to the Aral’) was generally welcomed by the republican Soviet and Party leadership; Russian observers and segments of the Soviet scientific community, instead, expressed substantial doubts. This led to a slow-down in the initial plans and ultimately to the dismissal of the *Sibaral* project in the mid-1980s (P. P. Micklin 1988).

Although the health effects of the desiccation of the Aral Sea were not unknown to Soviet authorities and were indeed named in *perestroika* publications, and despite since independence the region has been receiving abundant attention in scientific circles and media, nonetheless in 2001 *Médecins sans Frontières* observed with some alarm that the “tragedy” of the sea (that is, its disappearance) has obscured the “tragedy” which the five million people who lives along its shores have experienced(Small, van der Meer, and Upshur 2001). Studies in physical geography, zoology, botany, and climate science have long been more abundant than reliable analyses of the impact of desiccation on human health – a first step in building up advocacy. Such impact is both direct, because desiccation induced salinization and greater concentrations of pesticides and cotton fertilizers in water and food, and indirect, because of the increased incidence of dust and salt storms. Furthermore, the desiccation has led to the disappearance of the two major sources of income enjoyed by the riparian population: fishing and, to a lesser extent, hunting of musk rats (Glantz 1999). In sum, the regions shows –and is still producing- high rates of morbidity and mortality because of infectious diseases (especially tuberculosis), chronic illnesses of the heart, kidneys, and lungs, and cancer. For instance, the rate of esophageal cancer in the autonomous province of Karakalpakstan is 25 times higher than the world average (Synnott 2015).

Nowadays, scarce awareness of what environmental risk is, the unavailability of venues for discussing it, and the exasperation of an “assessment fatigued” population that for a long time has seen no tangible measures taken to improve its condition have important social consequences: while focus on more compelling problems (*e.g.* unemployment) has averted the danger of a fight over the (very few) water left in the Aral (Koch 2016), more than a decade ago health practitioners had noticed a significant level of somatized post-traumatic stress, more characteristic of acute environmental disasters than of exposure to environmental risk. In other words, ten years after independence the riparian population had not yet developed the psychological coping strategies that occur among those subject to a long-term obnoxious condition (Small, van der Meer, and Upshur 2001).

The current situation is similar, but not at all identical, at the opposite end of Kazakhstan, close to what used to be the Semipalatinsk nuclear test site (or ‘Polygon’). For around forty years starting in 1949, the population was exposed to radiation as a consequence of over- and underground nuclear explosions. Around 450 tests were performed at the polygon, around one-fourth of which in the atmosphere or ‘surface’, until the Limited Test Ban Treaty of 1963 (Holloway 1996; Werner and Purvis-Roberts 2006). Data on the effects on men were surreptitiously collected under the cover of zoonosis prevention, but were considered as top-secret until the late 1980s. Around 1.6 million people were exposed to potentially dangerous radiation levels, but very rarely residents were evacuated or even simply warned about what was taking place (Werner and Purvis-Roberts 2006). It was with Mikhail Gorbachev’s “Lenin’s policy” and the growing availability of *fora* where to voice public health worries that information started leaking. Unsurprisingly, the lead belonged to recognized Soviet intellectuals and WWII veterans, who had a relatively higher ability to engage in public debates; in particular, the poet and writer Olzhas Suleymenov emerged as the main voice that requested transparency (*glaznost’*) on this matter. Rallies sprung up from 1989 in several cities in the Kazakh SSR, so that at some point the movement changed its name from *Nevada-Semipalatinsk* to *Nevada-Kazakhstan* and collected snowballing grievances not only from East Kazakhstan, but also from Baykonur (where the Soviet –now Russian- facilities for space exploration and satellite launch were located) and other localities. An account was opened to collect funding, and the movement tried to reach out not only to those protesters who, in Nevada, had successfully blocked the local testing ground, but also to the United Nations and global NGOs, such as *Greenpeace*. In this respect, it has been argued that *Nevada-Semipalatinsk* was an “eco-internationalist” movement (Schatz 1999); in the light of its own propaganda, one may add that *Nevada-Semipalatinsk*’s internationalism echoed the Soviet ‘peace’ rhetoric of the same years – and even more the Soviet emphasis on “friendship of the people”, as embodied by Kazakhstan’s ethnically mixed population (Shafir 1990). The *Nevada-Semipalatinsk* movement and Olzhas Suleymenov’s role in it represent a foundational moment in the consecrated history and memory of Kazakhstan’s “path to independence”, almost on a par with the repression of the demonstrations against the appointment of Gennadiy Kol’bin as first secretary of the republican Party December (*Zheltoqsan*) 1986 in Almaty. For sure, the reference to the movement and to the nefarious consequence of the tests was a cornerstone of Nazarbayev’s nuclear ‘clean-up’ policy (Werner and Purvis-Roberts 2006). Yet, one should stress with Schatz (1999) that in no way the polygon has been depicted, either by Suleymenov or by Nazarbayev, as a foreign ‘colonial’ installation. This, as explained below, has a parallel in the way scholarship has evolved.

Nowadays, although the measurements of background radiation are a matter of controversy, the remaining inhabitants (mostly Kazakh, because most Russians have left since 1991) present high rates of morbidity and mortality, in particular for solid and blood cancers (Carlsen et al. 2001; Alexander 2016). As in the case of the riparian population of the Aral Sea, one observes “the residents’ failure to demand state action”, while “their political demobilization is further exacerbated by limited access to social welfare and the local emergence of free-market capitalism” (Stawkowski 2016). Around the polygon, though, the population seem to have elaborated by now its own coping strategy, which consists in claiming that one has ‘adapted’ to radiation, to the point of not being able to live healthily without it (Stawkowski 2016). This does not mean, though, that residents did not acknowledge risk or underestimate it – an attitude they apparently share with local physicians, although not with other ‘experts’ (Purvis-Roberts, Werner, and Frank 2007). Another difference between the two sites is visible in the different degree to which the Kazakhstani State machinery has engaged itself into putting a remedy to the direct and indirect consequences of the Cold War on the Aral and in the east of the country respectively: while Astana, with World Bank support, has sponsored the restoration of the Small Aral and is considering further schemes to advance the same design (P. Micklin 2016), around Semipalatinsk the cause of “cleaning up” the site is murkily bundled up with the priority to extract uranium and other valuable underground resources, or even with a new technocratic emphasis on the post-independence renaissance of science in the country, and possibilities for expressing a public memory of the trauma are somewhat hampered (Stawkowski 2016; Alexander 2016; Brunn 2011). More generally, Werner and Purvis-Roberts (2006) have noted that the emphasis which the president of Kazakhstan Nursultan Nazarbayev has put on nuclear disarmament as a founding principle of the country’s foreign policy has not led to a correspondingly high investment of resources to the benefit of those most affected by the consequences of the tests. The very recent discussions about the opening of a nuclear reactor in Kurchatov, within the perimeter of the former polygon, further contribute to the fundamental ambiguity of Kazakhstan’s current ‘nuclear culture’ (WNN 2016).

While medics, nuclear experts, and (more recently) several anthropologists have cast considerable light on the consequences of the nuclear tests that took place at the Semipalatinsk polygon, we are still lacking the kind of careful study of the decision-making process which, from the 1940s onwards, has led to the current situation. Questions of agency and historical responsibility are still largely unanswered. In this respect, the study of the Semipalatinsk polygon is lagging behind, relative to research about Soviet development policies that similarly had a significant impact on the environment and, through it, on public health. As discussed above, we know that Aral Sea tragedy was caused by an ideological parallelism between Soviet social engineering and ‘Great Socialist Construction’, as well as by a general emphasis on material output (in this case, agricultural) without the ability to account for negative externalities. Beyond these ideological premises, historians have also found that republican Soviet and Party elites played a key role in the underlying decision-making process, in particular in parallel to Brezhnev’s “trust in the cadres” policy. This will be even clearer from the cases discussed in the next section. Instead, research on the decision-making process that led to the establishment of the Semipalatinsk polygon and on its subsequent activity –in particular on the mutual relations between authorities in the Kazakh SSR and in Moscow- is still under-developed. As noted above, lack of clarity on questions of agency in the past objectively has allowed a public discourse in which the ‘fault’ for the contamination belongs to the Cold War in general, and the international community (rather than Kazakhstan itself or, even less, the Russian Federation) is supposed to play a key role to ‘clean up’ after it and compensate the victims (Werner and Purvis-Roberts 2006).

3.

The Semipalatinsk polygon is different from most other sites of environmental degradation in the Kazakh SSR in that it is not related to development policies, but primarily to the Cold War and the armament race. In this respect, the only other similar site is the Baikonur space base in the centre of the republic: as in Semipalatinsk, a portion of territory has been fenced off for the benefit of the “industrial-military complex” – an argument that we find in Olzhas Suleymenov’s rhetoric. The consequences for human health are more modest: even now, residents of Kyzyl-Orda would lament the anomalous sand-carrying whirlwinds that reach their city a short time after every launch, while the Karaganda Ecomuseum (one of the first NGOs in the country to foster ecological awareness in the general public) displays ‘space rubbish’ that has fallen on the steppe. What the Semipalatinsk polygon has in common with the Aral Sea tragedy, though, is the fact that the cause for the degradation is perceived as belonging to the past, at least as far as Kazakhstan is concerned: for the polygon this is very clear, while in the Aral Sea this impression depends on the relative success of Kazakhstani efforts to re-fill part of what is left of the basin (P. Micklin 2016). In both cases, the search for responsibility for what had happened is largely limited to the past or, for the most recent developments on the Aral Sea, fault is to be found outside the boundaries of Kazakhstan. This intellectual operation is evidently more arduous for the other category of environment-damaging activities mentioned in the introduction: what if the factories, mines, plants that produced high level of air pollution and contamination of water and soil before 1991 are still in operation, and still represent an important component of the national economy, for instance by supplying energy or attracting foreign investments? This section is going to discuss a few symptomatic cases of this kind.

The first case is that of Ust-Kamenogorsk in the east of the country. The area was one of the first to witness the exploitation of underground mineral resources, with the discovery of the first copper ores and the establishment of the Ridder lead, silver (and later zinc) mines as early as the late 18th century (Peck 2003, 10). The Altay region was also one of the first where the Russian imperial government actively promoted the arrival of peasant settlers, in order to create a food supply basis for the mines themselves. Through time, the exploitation of the region’s many polymetallic ores intensified, first with foreign capital and then, under Soviet rule, thanks to the State’s impulsion. With another locality in the Altay region of Kazakhstan, Zyryanovsk, Ust-Kamenogorsk was responsible for two-thirds of the Soviet production of rare metals just before independence. At the same time, both Zyryanovsk and Ust-Kamenogorsk were among the 68 Soviet cities with the highest air pollution, which was distinctly associated with non-ferrous metallurgy. In the second half of the 1970s, lead in Ust-Kamenogorsk’s air was fourteen times higher than the maximum permitted concentration, but in nearby Leninogorsk it was 30-40 times higher, and on specific days this could peak by a factor of ten (Pryde 2009, 95). The same was true for water pollution: the concentration of heavy metals (copper, but also zinc and other substances) in the rivers of the Irtysh basin and in the Irtysh itself was the highest in the republic. The only exception to this sad primacy was chrome, the concentration of which in the western Ilek river was 60 to 230 times higher than in the east. This was due to the exploitation of polymetallic ores in Aktyube, which was itself initially linked to the availability of forced labour from the nearby GULag camp (Mnatsakanian 2002).

This long-term situation knew a sudden acceleration in 1990, in what represent the still under-studied closest Kazakhstani equivalent to the Chernobyl disaster in Belarus in 1986. Ust-Kamenogorsk did not only host non-ferrous smelting facilities: the Ulba plant (which is still active, as explained below) was responsible for a sizeable proportion of the Soviet production of nuclear fuel, which including the processing of beryllium. On 12 September, a blast at the plant generated a “poisonous cloud” and massive fallout of contaminated particles. Although in principle beryllium was not radioactive but ‘merely’ toxic, foreign observers interpreted the episode as a nuclear incident. Surely the measures taken to reduce contamination after the blast were quite dramatic: roads should be ‘washed’ four times a day, street-sweeping was blocked, and fears were expressed that road traffic may contribute to the spread of pollutants. Local authorities declared Ust-Kamenogorsk a disaster area and Nursultan Nazarbayev, at the time president of the Kazakh SSR, asked for this status to be recognised by Moscow, for all those damaged to be indemnified, and for a commission with foreign participation to be established to ascertain the situation (Clines 1990; Mnatsakanian 2002, 121). Although there is basically no research on this episode, its public health consequences, and above all its political significance, a few striking resemblances with Chernobyl can be highlighted: first, the suddenness of the incident and the fact that it was related to some sort of productive (rather than military) activity; second, and more significant, Nazarbayev’s requests appeared framed as a compensation from the ‘centre’ to the affected ‘periphery’, defined in national terms. This was similar to what had occurred in Chernobyl: instead, the protests surrounding the Semipalatinsk polygon had assumed an “internationalist” tonality, even when the parallel with Chernobyl was made to emphasise the seriousness of the damage (Schatz 1999).

It is instead in its post-Soviet legacy that one can find a similarity between the polygon and the Ust-Kamenogorsk blast of 1990: in both cases, the memory of what had happened in the Soviet period has been sidelined in favour of a more general nuclear agenda that privileges disarmament and high-tech industry (both largely directed to a foreign audience) to a thorough local ‘clean-up’. In Ust-Kamenogorsk, this means that the same Ulba plant entered in 2009 in a partnership with the French group Areva (which had already been participating in the extraction of uranium at Muyunkum for five years) to produce nuclear fuel. In both cases, the French side owns 51% of the shares (NuklearForum Schweiz 2004; NuklearForum Schweiz 2009). More recently, the Ulba plant is handling the establishment of the IAEA’s low-enriched uranium bank. These measures are surely useful now that demand for nuclear fuel (and for beryllium for electronic components) is fledging. To add a further layer of symbolic significance, the Ulba plant is also where all the metallic coins in circulation in Kazakhstan come from. Ust-Kamenogorsk’s nuclear legacy is thereby turned into a bright future, despite the residual palpable fears of the residents (Uatkhanov 2016; Urankayeva 2016).

How does this outcome compare with other sites where the legacy of Soviet industrial development policies is still continuing, at the expenses of the environment, but no major accident occurred and no (or only recent) link to the nuclear question exists? One can consider two examples, namely the Balkhash lake and the homonymous city, on one hand, and the industrial area of Karaganda and Temirtau, on the other. In both these cases, problems of pollution have continued to exist across the 1991 divide but, unlike the case of the Ulba plant, attempts to modernise the local industrial landscape have been far less successful. While one may argue that Ust-Kamenogorsk’s bright future lies on paper only, even such a moderate claim would sound implausible for these further two sites.

Historian Kate Brown (2001) has presented the industrial city as the physical embodiment of measures to control people’s lives through the imposition of a rigid spatial ‘grid’, whereby ethnic categories were reinforced, hierarchies of social exclusion were reproduced, and the efficient mobilization of forced labour was ensured without obstruction. Brown argues that this kind of spatial organization bears strong resemblances with other sites of rapid industrialization based on the exploitation of underground resources and the pouring of settlers into a supposedly ‘empty’ land, for instance the city of Billings in the American state of Montana. This powerful thesis somewhat neglects the fact that the very existence of Karaganda, unlike Billings, was premised on coercion. Karaganda was the center of the homonymous camp (KarLag), the economic activity of which revolved around the extractive industry and around agriculture (to feed the workers of the latter) (Khlevniuk 2004). While copper and coal ores around Karaganda were known well before the Bolshevik revolution, it was with Soviet accelerated industrialization that production took off, particularly at during WWII, when a steel mill was built, iron extraction started, a rain link northwards was established, and coal started to be used not only for smelting copper, but also for power generation for ferrous metallurgy. A fundamental factor for the development of the Karaganda basin overall was the availability of forced labour allowed to compensate for the higher costs related to logistic constraints which had marred earlier development plans. Some any detainees and forced settlers of the Karaganda area moved on to the Virgin Lands (see below), some stayed in the area after the closing of the GULag in the second half of the 1950s, to be employed in the mines. In addition, Karaganda’s coal had the relative advantage of being located close to where electricity was needed for smelting. This made their exploitation desirable, even when, from the 1950s onwards, the USSR switched to the “coal-by-wire” program. The latter entailed the construction of coal-burning power plants as close as possible to the sources of fuel, for instance in Aksu, not far from the huge open-pit coal mines of Ekibastuz. In any case, the cost per KWh in Karaganda remained much lower than in the rest of the USSR, and even than elsewhere in Kazakhstan (Peck 2003, 15–17, 43, 51, 184).

Continuous industrial development meant that Karaganda was the second city in Kazakhstan in terms of population on the eve of independence – and the first for concentration of nitrogen dioxide and formaldehyde (Mnatsakanian 2002, 121–22). In the post-independence period, the odd traveler could (and can) smell the legacy of the forced-pace growth of heavy industry in Karaganda – and apprehend its socio-political underpinnings by looking at the urban landscape. If the situation has improved, it is not because of greater investments in devices for capturing gases and particulates, but rather because of the sharp decline of the metallurgical and coal industry in the area. A more subtle, often-forgotten environmental legacy of the same phenomenon, though, is represented by the accumulation of billion cubic meters of coal tailings, which represent a continual source of pollution and ‘crowd out’ land that could be destined to other usages. No quick fix is possible for coal tailings, the costs of which are likely passed on to the next generations (Peck 2003, 193).

While it would be tempting to identify the centre of a GULag camp as large as France as a major site of environmental degradation, too, the situation in Karaganda was not (and *is* not) as bad as in nearby Temirtau. In Karaganda on the eve of independence the rate of capture of air pollutants was 81.5%: this was probably an optimistic estimate, but nonetheless in line with the republican average and higher than on the oil fields of the West. By contrast, the Temirtau blast furnace did not possess any filters *at all* – and accounted for only one half of the total air pollution (Mnatsakanian 2002, 121). Temirtau, the name of which literally means “Iron Mountain” in Kazakh, swelled up into a major industrial centre in the post-war period, thereby gaining the status of “city” (with all the perks that went with it in the Soviet hierarchy of consumption and investments) and becoming the second steel-producing site in the whole of the USSR. As in Karaganda, pollution was driven by quick-pace heavy industrialization, which in Temirtau revolved around the entire cycle of production of steel: before WWII, there were no steel mills in the Kazakh SSR, while the first one - evacuated to Shymkent to save it from the German advance – could roll steel out of pig iron, but not smelt iron ore to obtain the latter. Again, as in Karaganda metallurgy was accompanied by the production of electrical energy from coal. What was radically different was the sheer dimension of air pollution: total gas and particulate emissions in 1989 were almost four times greater in Temirtau than in nearby Karaganda, and far higher than anywhere else in the republic, including the coal-mining center of Ekibastuz in the East. Mercury and phenols contaminate not only the Nura river, but also underground waters, to the point that no local source can be used to provision the city of Temirtau (Mnatsakanian 2002, 122, 125).

As in Karaganda, the end of the Soviet economic system – premised, as explained below, on the “soft budget constraint” – and the privatization of industrial assets in the 1990s led to a reduction of output. In 1995, the government conferred the Karaganda Metallurgical Combinat (Karmet), which controlled the coal mines in Karaganda as well as the steel plant in Temirtau, to a company controlled by Lakshmi Mittal. This happened after two failed attempts to involve other Western companies and at moment when output had hit rock-bottom, Karmet was heavily indebted, and workers on several of its sites were protesting or going on strike to receive arrear salaries and better work conditions. In these conditions, Mittal got away with a very good deal; additionally, while post-Soviet privatization ‘packages’ usually included guarantees for the workers and securities for the activities that had depended on a combinat in the Soviet period (*e.g.* flats, sanatoriums, kindergartens), Mittal could lay off a substantial proportion of employees and transfer responsibility for those parallel activities to the not-so-well off municipality. Only at the beginning of the years 2000s Mittal took back control of some services, including a hotel, the hot water system, and the tramway (itself a symbol of Temirtau’s Soviet glory). In this context of severe social precariousness, the city has been plagued by social problems of all kinds, including drug addiction: the sad primacy in air pollution of the 1980s has been replaced by the highest rate of HIV-positive population in Kazakhstan (Peck 2003, 114–16).

In turn, the dramatic urgency of such social issues has been masking the gravity of environmental problems and of their effects on public health. A pioneering study by Xeniya Prilutskaya (2016) has shown that the population of Temirtau, while generically aware of the risk posed by air pollution and contamination of water and soil, is unable to articulate such threat in a scientifically informed way. The mechanisms for the transmission of this sort of information having broken down, residents are left in a vulnerable position and are largely alienated from the providers of specialist knowledge, and in particular from “ecologists” by profession. For instance, residents of Temirtau have never heard about the potential presence of dioxin in the soil and, consequently, in the food chain. Rather than empowered, they have been often patronized and even stigmatized for their supposed ignorance. In this respect, the situation has not significantly improved across the independence divide: through the 1980s and into the early 1990s a more open discussion of the environmental consequences of industrial decisions (*e.g.* establishing a new slag-processing plant) left the citizens with the impression that ecological questions did not have a clear-cut, easy solution. In short, if before *perestroika* people were left in the dark, as a consequence of it they were simply more puzzled (Prilutskaya 2016). Forced to cope with economic instability, lack of trust, and soaring social problems of various kinds, Temirtau residents have elaborated their own coping strategies: as their fellow citizens close to the Semipalatinsk polygon, they claim to have developed some sort of “immunity” to pollutants (Stawkowski 2016). Yet, Temirtau residents enjoy far lower visibility and have had little if no opportunity of posing as ‘victims’ with a right for moral or monetary compensation (Werner and Purvis-Roberts 2006). As in many post-industrial sites, the choice is between unemployment (or emigration, followed by possible unemployment) and the tolerance of a ‘domesticated’ threat on human health (Prilutskaya 2016).

Another site which is still bearing the consequence of Soviet industrial development strategies is Balkhash. As it is known, the homonymous lake is one of the largest in Eurasia and it possesses two different levels of salinity in each of its halves, which allowed for an incredibly rich and diverse flora and fauna and – historically – a locally important fishing and muskrat hunting industry. The main inflow of the Balkhash lake is the Ili river. In the Soviet period, decision-makers had to balance two conflicting priorities: on one hand, non-ferrous (copper) metallurgy in the city of Balkhash on the northern shore; on the other hand, the usage of water from the Ili river for irrigation and hydroelectric power. Copper ores were discovered close to Balkhash as early as in the late 1920s, although proper exploitation started only later, after the completion of a railroad that made the evacuation of black copper possible, and in particular with WWII: in this, the trajectory of Balkhash was similar to that of Karaganda and other localities (Peck 2003, 40). Plans to expand irrigation on the Ili for the production of grain and rice also started in the early Soviet period, to become a priority after the deportation of Koreans in 1937 (Chida 2016).

Ferrous and non-ferrous metallurgy, together with the concentration of an urban population of workers in need for drinking water, required abundance of fresh water. In this respect, not only fish and muskrat reserves, but also the industrial development of Balkhash would be negatively affected by projects that would shrink the inflow, reduce the volume of the lake, and increase salinity. Historian Tetsuro Chida (2016) has projected the debates on the expansion of establishment of the Kapchagai reservoir and hydro-power station (in operation since 1970) on the backdrop of two concurrent wider dynamics: first, the generalized skepticism about “gigantism” and a more cautious approach to the idea of “transformation of nature” in the post-Stalin period; second, the circumstance that development plans of this kind were crucial for the establishment and preservation of local power structures under Brezhnev. As for the construction of the Medeu Dam to protect Alma-Ata from mudfloods (Elie 2013), one of the keys of Dinmukhamed Kunaev’s political success as a first secretary of the Kazakhstan CP was his ability to present himself as a patron of (modestly) beneficial construction projects. In the case of the Balkhash basin, though, Kunaev’s ability consisted more in balancing contradictory interests: the expansion of agriculture around Kapchagai *versus* the need for fresh water in Balkhash city (Chida 2016).

This fundamental tension between incompatible priorities, combined with the partial recognition of the need to account for their ‘negative’ consequences and with the “trust in the [republican] cadres” that marked the Brezhnevian period, led to a no-win situation: the Kapchagai hydropower station was never efficient and by the mid-1980s less than one-half of its generators were working. At the same time, the Kapchagai reservoir never filled up completely, the programmed water release scheme failed, in the end the newly irrigated surface was much less than forecast, and rice production was never comparable to the one on the Syr-Darya. From another viewpoint, though, salinity increased (to the point that experts considered the possibility of building a dam between the two halves of the lake) and Balkhash city became dependent on a pipeline for its drinking water (Chida 2016). The reduction of the volume of water in the Balkhash lake led to a diminution in biodiversity and greater concentration of pollutants.

As anticipated in regard to Ust-Kamenogorsk, the smelting of non-ferrous ores is responsible for a huge share of air and water pollution in Kazakhstan, and the Balkhash combinat (which handles copper, zinc, and lead) is no exception. After the Baykal lake and the Volga and Kama rivers, in 1969 lake Balkhash was the object of one of the first large campaigns against water pollution (Moor-Stahl and Allaman 2000, 33). In 1989, the city had the highest concentration of particulates in the whole of the republic, while the concentration of copper in water was between 38 and 238 times higher than the limit (Mnatsakanian 2002, 122). Copper, zinc, and lead powder still floated on the water of the lake in large amounts more than one decade later (Kozlova 2006). Around Balkhash, smelting plants, ores, and subsidiary activities (including provision of basic services to local communities) are owned by the copper-producing corporation Kazakhmys. The latter is controlled by Samsung and gathers together all the copper-related activities which this South Korean giant of electronics had acquired throughout Kazakhstan up until 1997 (Peck 2003, 89–90). As it happened elsewhere, pollution temporarily declined in the 1990s because of the diminution in output; later on, Kazakhmys made efforts to install capturing systems (Reuters 2012). The attention of Balkhash’s residents and activists, though, has been captured for the last decade by another question, namely the possibility of opening a nuclear power plant to generate electricity for the area south of the lake (Kozlova 2006; WNN 2016).

4.

Environmental issues in Ust-Kamenogorsk, Balkhash, Temirtau, Karaganda, and elsewhere ultimately originate from the same problem, which we have hinted at before: the inability of the planned economy to take into account negative externalities. As it is true that environmental problems in the USSR were not substantially different from those of other industrialized countries, including the US (Goldman 1972; Pryde 2009, 292), it is also true that this inability is not as such a characteristic of the Soviet system only, but a shortcoming to be observed in policy-making worldwide. In the USSR, though, this was a clear-cut consequence of considering land, air, water as “socialist property”, which made it impossible to consider costs related to their degradation. The idea of an “environmental tax” was considered in the 1970s, but soon discarded. “Socialist property” –which meant, in practice, State property- perpetuated and reinforced the “delusion of abundance” which some observers identify as a trait of Russian views on nature already before 1917 (Moor-Stahl and Allaman 2000, 59).

This theoretical shortcoming had even more serious effects when the damage to the natural environment did not result from something that could be instrumentally measured, for instance as air pollution or water contamination, but simply from its depletion. The degradation of rangeland because of over-grazing (Robinson, Milner-Gulland, and Alimaev 2003; Mirzabaev et al. 2016), soil erosion (deflation) as a consequence of the Virgin Land campaign (Pryde 2009, 198–202; Josephson 2013, 152), and salinization in the south of the republic are all part of the environmental legacy of Soviet policies in the Kazakh SSR, although their economic consequences ‘only’ translate into loss of productive capacity. Pollutants could not, after all, be ignored: the diminution in the productive capacity of the land because of over-usage, by comparison, was more difficult to grasp and conceptualize. Even when this was possible, the theoretical underpinnings evoked above meant that, legally speaking, these phenomena could be considered only as violations of “State property” on land and water, in the same category as unauthorized buildings or the neglect of field boundaries (AN KSSR 1988). Even after the USSR had embraced the international notion of “biosphere” in the 1970s, the measurement of the degradation of flora and fauna in the steppe –and, hopefully, their protection- posed specific problems: in the USSR, natural reserves and monitoring ‘stations’ were set up where the density of species was the highest, which privileged mountain and forest environments rich in water against the steppe and deserts. This made phenomena such as desertification not only difficult to handle with the toolbox of Soviet economics, but also hard to acknowledge and measure (Filonov 1986; Gunin and Neronov 1986).

In line with the bulk of studies on the functioning of the Soviet planned economy in general, one may argue that this deficiency was aggravated by several entangled circumstances: first, on the demand side, the fact that in a planned economy prices do not send any significant ‘signal’; second – and related, but from the supply side -, the focus on output measures in *material* terms, rather than in value (which would have been difficult, given the absence of meaningful prices); third, the soft budget constraint, which allowed State-run companies to disregard costs of production, too (Gregory and Stuart 2000). (The cost of labor, in particular, was long made meaningless by the presence of the GULag and, consequently, the availability of forced workers.) In addition, secrecy about the plan and compartmentalization in the definition of input-output plans (*i.e.* the waste of sector A could not become a raw material for sector B) represented further obstacles to environment-savvy economic decisions (Moor-Stahl and Allaman 2000, 62). While an inquiry on the continuity of budgeting and planning practices in Kazakhstan across the independence divide goes well beyond the scope of this survey, some similarities exist in the importance of symbolic and ideological considerations in the decision-making process. This is particularly clear in the way the legacy of the Semipalatinsk polygon has been handled and, by contrast, in the way ‘nuclear culture’ plays into plans for the future industrial development of Ust-Kamenogorsk.

What on the other hand seems to have survived the 1991 divide is the emphasis on technical-scientific knowledge as the most important (if not the only) way to identify, manage, and solve environmental issues. As in the Soviet period, environmental questions are the purview of engineers and natural scientists or, at the most, economists. In the *Kazakhstan 2050* strategy, “Ecology” is still articulated as “management of natural resources” and most ‘actions’ refer to punctual construction projects (Strategy 2050 2016). The emphasis is on technical solutions, which are perceived as politically neutral and as possessing a higher epistemic status than decisions involving social scientists, or founded on the participation of ‘laymen’. This approach is quite clear if one looks at the capital Astana. The new city is presented as energy-savvy and ecologically sound. The official discourse presents its growth as natural and “organic” (Melnikov 2016). All this represents a departure from the “mechanicism” of the Soviet period, but only on the surface: the city is environmentally friendly because it is “smart”. Digital computation has replaced the machine, but the solution to the problems of human society in relation to the environment is still a *technical* one. A similar emphasis is to be seen in the “Future Energy” theme of the 2017 Expo, where issues of sustainability are formulated with no or very little regard for crucial social questions, such as equal access to energy itself (Expo-2017 2016). As recent studies on “smart cities” in India show (Datta 2012; Datta 2015), Kazakhstan is not alone: indeed, that “smartness” is an international trend, including in countries that Kazakhstan regards as models, represents a further layer of legitimization, on the top of the delusions of neutrality and epistemic superiority mentioned above (Fauve 2015).

Last but not least, the legacy of the Soviet system is also visible in the way one of the typical questions of USSR politics is articulated and responsibility (or simply agency) is attributed. All in all, one keeps on asking: “who is guilty?” The continuities, however, are not just in the question *as such*, but also in its political and practical consequences – or lack thereof: first, as it happened already in the Kazakhstani variant of de-stalinisation (Wojnowski 2016), criticism of individuals rarely turned into a criticism of the systemic underpinnings of their behavior and choices. Furthermore, the identification of the ‘guilty’ part does not necessarily lead to a solution or improvement of the problem at hand. For example, Prilutskaya (2016) has found that, together with the emergence of less unambiguous notions about ecology, in Temirtau residents gradually shifted the blame from the factory management to “experts” (including the Society for the Protection of Nature) during the *perestroika* period. Still, her findings confirm to what extent such “experts” are alienated from the citizenry. From another viewpoint, studies on the Semipalatinsk polygon discussed above (Schatz 1999; Werner and Purvis-Roberts 2006; Stawkowski 2016) show how responsibility has been shifted to the ‘outside’ (in the past, outside Kazakhstan). This, in the end, is not very different from Olzhas Suleymenov’s “internationalization” of the Semipalatinsk question in the late 1980s: by stating that nuclear experiments did not happen *only* in the USSR, they ended up having *nothing* to do with the way decisions were taken in the USSR. More recently, if the responsibility for what happened belongs to an outside “nuclear club” or Cold War actors, then the ‘solution’ is nuclear disarmament – although this has very little bearings on the residents’ situation. The third and last shortcoming of a focus on individual guilt derives from the number and gravity of environmental issues at hand. This sad over-abundance made (and still makes) it easy to shift responsibility by pointing at something else, which is more urgent or closer to everyday experience. In 1988, how could someone worry about pesticides and heavy metals in water, when 21 per cent of tap water in the Kazakh SSR was at risk of fecal contamination (AN KSSR 1988, 4–5)? For the same reason, “experts” blame Temirtau’s parents for letting their children play near car exhausts, thereby avoiding saying much about industrial pollution (Prilutskaya 2016). To sum up, asking “who is guilty?” in a context in which knowledge of the problems themselves among the public is imprecise and accountability is fuzzy is unlikely to lead to solutions, but rather to further patronizing, mere inter-institutional battles, or political ‘sublimation’ of the issues at hand.

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