

# Environmental consequences of Khrushchev's Virgin Land Campaign in Kazakhstan (1950s–1960s)

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**Abstract.** This paper discusses issues related to environmental problems that arose as a result of the virgin and fallow lands development in Kazakhstan in the second half of the twentieth century. The authors emphasize that the level of agricultural production in the post-war years failed to meet the needs of Soviet citizens. Under these conditions, the massive plowing of land had to solve a whole range of tasks, first of all, to solve the problem of food hunger by means of a huge increase in the area for sowing grain crops. According to the authors, solid tracts of plowed soil, having a dark color, became very hot, provoking drought, which, with chronic manifestation, caused aridization of the entire steppe zone, causing significant drying up of rivers and lakes. The authors believe that large works on the virgin lands development have made serious changes in the nature of the region. Stocks of valuable hunting and game species of animals were undermined, and in some places completely destroyed. Taking advantage of the lack of control, the new settlers along with the local residents, mercilessly consumed the gifts of the environment, which gave rise to massive poaching. The methodological basis of the study was the complex use of various approaches, methods and assessments used in interdisciplinary research.

## 1 Introduction

In the very first years after the end of the Great Patriotic War, the problems of the impending food crisis in the country began to become relevant in the agriculture of the USSR. Therefore, “in 1949–1953 the average annual grain harvest amounted to only 80.3 million tons with an average yield of 7.7 centners per hectare, which was slightly more than in 1910–1914 (72.1 million tons and 7 centners). In 1953, in the USSR as a whole, only a little more than 31 million tons of grain were procured for the needs of the food supply of the population, and the actual consumption exceeded 32 million tons” [1, p. 8]. Thus, the level of agricultural production could not meet the growing needs of Soviet citizens in the face of a constant increase in the population in the post-war years. In addition, given that the food basket of Soviet people traditionally consisted of livestock and agricultural

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products (i.e., bread, potatoes, meat, etc.), solving the food problem was one of the main priorities of the domestic policy of the Soviet state. Theoretically, the solution to this issue could be in two versions, i.e., firstly, by intensifying the entire economy, which implied its transfer to market mechanisms of functioning; secondly, there is extensive version, which assumed the solution of food hunger by significantly increasing the area for sowing grain crops. To solve the problem in the short term, the second option was the most acceptable. In addition, the intensive path of economic development was quite long-term, which meant that the result from it was clear in the future. Furthermore, and most importantly, it contradicted the fundamental principles of Soviet ideology.

Therefore, it is no coincidence that the development of virgin and fallow lands in Kazakhstan, Siberia, the Volga region and the Urals became a priority task for the state in the 1950s. The gigantic plowing of virgin lands after the February-March plenum of the Central Committee of the CPSU in 1954 (it was supposed to allocate more than 40 million hectares of land for virgin lands) required the mobilization of a huge mass of labor force and material resources. The urgency of solving the problem was also due to the fact that “as a result of the post-war beggarly and half-starved existence, the collective farm peasantry fled in droves to the cities, rapidly replenishing their population (disbelief in the collective farm perspective was reinforced by the impressions of the demobilized soldiers, who, while liberating Eastern Europe from fascism, could simultaneously witness the “cultural” and prosperous life of the local peasantry in comfortable rural settlements)” [2, p. 94]. Soviet experience of agrarian policy and agricultural development in the second half of the twentieth century is useful and is of undoubted interest for choosing a rational way of further reforming agriculture in the Republic of Kazakhstan, as well as solving modern environmental problems that have arisen largely as a result of the virgin campaign by N.S. Khrushchev.

The virgin campaign was of an extraordinary nature, excluding any possibility of a preparatory stage. This large-scale project was not worked out either economically or technologically, as well as it did not take into account the environmental consequences for the Kazakh SSR. The virgin lands consisted of five huge administrative regions, and their area was equal to France, Belgium and Denmark combined. Major economic transformations took place here over the past virgin years. In the once deserted steppe, comfortable settlements of new state farms (sovkhozs) have grown, the composition of farmland has radically changed, over the past period in the Tselinny Krai (formed on December 26, 1960 by the Decree of the Presidium of the Supreme Soviet of the Kazakh SSR (hereinafter – KazSSR) the Tselinny Krai was formed as part of the Kazakh Republic with the inclusion of territories of Akmola, Kokchetav, Kustanai, Pavlodar and North Kazakhstan regions with the administrative center in Akmolinsk – *authors*) about 20 million hectares of virgin lands were developed, 85% of which were spring lands [3, p. 31]. In fruitful years, virgin lands provided one fourth of all grain supplies to the USSR [4, p. 1]. The growth of arable land alone on state and collective farms amounted to 340% (see table 1).

**Table 1.** Growth of arable land in state and collective farms of Tselinny Krai in the context of regions [3].

№	Name of regions	Arable land area in thousand ha		Growth of arable land by 1953
		End of 1953	End of 1963	
1	Tselinograd	1445.5	5550.2	3.9 times
2	Kokchetav	1281.7	3806.0	3.0 times
3	Kustanay	1504.6	6240.0	4.1 times
4	Pavlodar	994.4	3776.6	3.8 times
5	North Kazakhstan	1194.5	2423.5	2.1 times
	Total for the Tselinny Krai	6420.7	21796.3	3.4 times

Undoubtedly, the role of virgin lands in the economic and socio-cultural development of modern Kazakhstan is great. At the same time, virgin lands gave rise to a complex of problems, primarily environmental, the solution of which is still a topical task of the state today

## 2 Materials and Methods

The methodological basis of this study is the classical concept of the scientific method as a theoretically grounded normative means of cognizing objective reality. The work is based on the principles of methodological pluralism, historicism, consistency and objectivity. The research takes into account the modern world trends in the theory of historical science, including the postmodern paradigm and its criticism, the latest research in the field of historical discourse. The theoretical and methodological basis of the paper is the complex use of various approaches, methods and assessments used in interdisciplinary research.

## 3 Discussion of the results

### 3.1 Soil ecology during the years of virgin land development

According to the natural and climatic classification, the territory of Northern Kazakhstan (the main virgin area) belongs to the steppe zone, where the average annual precipitation is 250–400 mm, the moisture coefficient is 0.45–0.70 (a coefficient lower than 1 is considered as insufficient moisture). The harsh continental climate of the Tselinny Krai with a low amount of precipitation (200–350 mm per year) and a short growing season (100–145 days), often repeated late-spring and early-autumn frosts, with a large deficit of June moisture, and large flat areas leads to an active wind regime with dust storms recurring annually. On Kazakhstani lands, late frosts in May or premature rain in August can turn abundance into chaos in one day.

The state farms that emerged on the virgin lands were large diversified farms. Suffice it to say that, on average, one state farm accounts for 70.0 thousand hectares of all land, including 30.0 thousand hectares of arable land, 2800 head of cattle, including 813 cows, 5 468 sheep, 522 pigs and 1 579 poultry [3].

Despite the higher, in comparison with the southern regions of Kazakhstan, the degree of intensification of agricultural production, the territory of the five northern regions turned out to be very poorly equipped with a good-quality, large-scale typographic basis, and had very little research in soil, botanical-fodder, water reclamation and hydrogeological terms.

Thus, the Tselinny Krai was a rather complex region for the development of agriculture, both in terms of its characteristic climate and the structure of soils, i.e., signs of aridity and semiaridity were strongly present here. Naturally, all this was taken into account by

scientists and specialists, land surveyors, who were preparing the front for the “virgin offensive”. It should be noted that in the early years of the development of virgin and fallow lands, the land management service of the region, with the help of land surveyors and soil scientists who arrived from other republics of the country, in a relatively short time performed a huge amount of work on the selection of arable land [3, p. 34]. 69 complex expeditions (almost 1,000 people) worked directly in the Steppe. Soil surveys were carried out on an area of 100 million hectares of land. So, in the information about the work of the expeditions of the Kazakh branch of VASHNIL (All-Union Academy of Agricultural Sciences named after Lenin – *authors*) on the development of virgin and fallow lands in the Akmola region for the period July-August 1954 it was said: “Together with the specialists of the Regional Department of Agriculture, the expedition developed measures for the further use of virgin and fallow lands in the collective farms of the Akmola region for 1955–1960. All material in the form of a memo was sent to the Minister of Agriculture of the Kazakh SSR comrade Melnik G.A.” [5]. During the same period, the expeditions working in the Kustanay region reported: “A survey of the state of coulisse-strip fallows has been carried out in the collective farms of the Taranovsky and Uritsky districts, areas have been allocated to take into account their influence on increasing yields. From the beginning of the harvest, the members of the expedition carry out accounting of harvests from the sites of production experiments” [5].

Such multi-land districts of the Tselinny Krai as Bayan-Aulsky, Ermakovsky, Pavlodar and Krasnokutsky in Pavlodar region; Yermentau, Atbasar, Derzhavinsky, Yesilsky and Kurgaldzhinsky in Tselinograd region; Kyzyltusky, Leningradsky and Yenbekshildersky in Kokchetavskiy region, as well as Amangeldinsky, Arkalyksky, Kamyshinsky, Semiozerny and Oktyabrsky in Kustanay region, the area of which is 50% of the entire the Krai’s territory, received a topographic basis on a scale of 1: 25000 for the first time only in 1961–1962.

The lack of a topographic basis of the required scale and poor knowledge of the soils of the Tselinny Krai greatly complicated the work on the virgin lands selection in 1954–1956, which led to undesirable results in some cases. The land management service at that time was forced to undertake small-scale, reconnaissance soil surveys, which were carried out in accordance with the temporary methodological instructions of the Ministry of Agriculture of the KazSSR and the Institute of Soil Science of the Academy of Sciences of the KazSSR on a topographic basis on a scale of 1:100000 [3].

The poor quality of the topographic base, the tight deadlines for implementing work, the imperfection of instructions and guidance for conducting soil surveys led to the fact that the state farms and collective farms of the region, having developed 21.8 million hectares of virgin lands for the period 1954–1963, were again forced to throw those lands into the fallow since significant areas of strongly solonetzic and the highly erosive non-arable had been erroneously plowed.

The extraordinary nature of the work of scientific expeditions led to the fact that, as a result, significant tracts of both suitable and non-arable lands, soils with a light texture (sandy and sub-sandy), solonetzic and semi-solonetzic soils fell under virgin plowing, i.e., 8 million out of 25 million hectares of plowed land were solonetz and sandy soils. These lands could never give either high yields, or preserve cultivated land for a long time [6].

Since that time, a permanent process of desertification and land degradation has begun in Kazakhstan. It posed a real internal threat to Kazakhstan, over time gradually developed into a transboundary problem as a result of dust storms and the transfer of pollutants by air over long distances. The patterned application of agricultural machinery and tillage tools recommended for the Krai as a whole led to the development of wind erosion of soils and the devastation of almost one million hectares of arable land, the restoration of the fertility of which required the most serious measures. Due to soil erosion and other forms of

degradation, from 1960 to 1998 about half of the virgin lands were abandoned. The total area of desertification in Kazakhstan is about 179.9 million hectares, or 66% of its territory. According to preliminary calculations by specialists, the damage from pasture degradation, lost income from erosion of arable land, secondary salinization and other causes is about 300 billion tenge [6, p. 42]. More than 50% of all arable land in the region was subjected to varying degrees of wind erosion. The number and intensity of dust storms increases especially during dry periods and years. The harm caused by wind erosion is limited not only to a decrease in yield and death of crops, but also to a loss of soil fertility [3]. This fact, in turn, became one of the main reasons for the decline in grain production in the Krai.

Only in 1963, 2000.0 thousand hectares were exposed to wind erosion in state and collective farms of Pavlodar region, including 750.0 thousand hectares which were exposed to a strong degree of wind erosion. The soil of grain crops completely damaged from erosion on an area of 254.0 thousand hectares. Irrational use of land was sometimes subjective. Often, all the tasks in the fight against wind erosion of state farm directors began to become confined to the requests to write off the areas that had lost their fertility from the arable land. Thus, it was noted in the report of the head of the Soil Protection and Land Management Department of the Regional Public Inspectorate V.S. Negovsky "On the protection and rational use of land": "You cannot really confine all tasks in the fight against wind erosion to the requests to write off the areas that have lost their fertility from the arable land, as it was in 1963 in the Pavlodar region. At the end of 1963, the Kustanay and North Kazakhstan regional executive committees made a decision to write off 104.5 thousand hectares of land from arable land. And what was discovered when examining these fields? A significant part of them can continue to be used for sowing agricultural crops, you only need to apply certain agrotechnical measures" [3].

Most of the area plowed in the 1950s was so susceptible to wind erosion that it was transferred to sheep grazing, which often took excessive forms and worsened the state of land resources, which also led to desertification [3].

Despite the measures taken, in the state and collective farms of the Pavlodar region in recent years, the harvest of grain crops and the level of grain procurement have sharply decreased. See table 2.

**Table 2.** Yields of grain crops and the level of bread procurement in Pavlodar region.

№	years	Grain crop in centners per hectare	Bread delivered to the state in million poods
1	1958	10.2	136.0
2	1959	7.4	79.4
3	1960	7.5	73.0
4	1961	6.0	48.7
5	1962	4.5	28.6
6	1963	1.7	2.0

The soil-consuming nature of agriculture led to the loss of a large volume of the upper layer of the ground, in which organic matter is concentrated. It is known that organic matter as a component of soil fertility is the most important factor in the efficiency of agriculture, which has a strong positive effect on the complex of agronomically important properties. The energetic, soil protective and ecological role of organic matter is of particular importance. Studies show that over the past 30–40 years in the chernozems of Kazakhstan, the humus content had decreased by 20–30%. Calculations show that from 1960 to 1995 chernozems of Northern Kazakhstan [7] alone lost more than 20 million tons of humus. The average annual loss of humus is 0.8–1.0 t / ha. The research results indicate that the plowing of chernozems and their long-term use without the systematic use of fertilizers, together with a decrease in the total reserves of humus, led to a deterioration in its group

composition, in particular, to a decrease in the amount of the most mobile fractions of organic matter.

Unfortunately, in most virgin areas, a farming system has developed with a negative humus balance. Crop rotations, soil cultivation and chemicalization are not subject to the main thing, namely, the provision of soil with organic matter. Not even half of the organic matter was returned to the soil, which was consumed annually with the harvest, which created a negative humus balance.

In the Tselinny Krai, despite the huge size of arable land and other agricultural lands, with their complex soil composition, there was basically no special service for protection, soil improvement and land management. Formally, in the regional administration of production and procurement of agricultural products, one could find an office with such a sign. However, there was no a single soil scientist, no agrochemist, no agronomist. The entire staff consisted of five land surveyors. Paradoxically, the country had a service for the protection of mineral resources, ponds and reservoirs, fisheries, forests, but there was no service for the protection and improvement of soils [3].

As a result of the impact of anthropogenic factors within the context of natural, irrational man's attitude to the environment, desertification, as mentioned above, had grown to alarming proportions. The consequences of desertification are especially great in the agro-industrial complex. This is primarily due to the deterioration of the drainage and irrigation systems, insufficient use of fertilizers and pesticides, and disturbance of crop rotation.

The economic and social consequences of desertification are a decrease in yields and gross harvest of crop production, a decrease in livestock and livestock productivity, as a result, a decrease in the export potential of agriculture and problems in the development of related industries, as well as an outflow of population from areas prone to desertification.

### **3.2 Ecology of water resources in the virgin land years**

The issue of water resources was the urgent task in the virgin land years. The development of virgin lands required a huge workforce, which annually arrived from all over the Soviet Union to the state farms of the Tselinny Krai. It should be noted that more than 4 million demobilized soldiers and students, settlers and seasonal workers came to the development of virgin lands, often with their furniture and belongings, and sometimes even with their own livestock. That huge live mass, coupled with the created state farms, rapid housing construction, mechanization and technical equipment of enterprises, etc. constantly increased water consumption.

It was clear that the success of the development of new lands largely depended on the organization of water supply to the machine-tractor stations, collective and state farms. Each new state farm was allocated an average of 25–30 thousand hectares of virgin and fallow lands. These land tracts were usually located in uninhabited areas, often far from settlements [8].

A significant amount of good water was required to meet the needs of the new farms. The water had to be clear, colorless, odorless, with a pleasant refreshing taste. According to State standard GOST, the following salt content in a liter of water was allowed: chlorides – 300, sulfates – 100 milligrams. The allowable dry residue was 500 milligrams (half a gram).

However, in the areas of virgin and fallow lands development in Kazakhstan, there was almost no ground and artesian waters with such a low salt content. The results of chemical analyses carried out in the summer of 1954 when examining the central estates of 26 new state farms in Akmola and Kokchetav regions, showed that in the available water sources the dry residue ranges from 1 to 3 grams per liter of water.

To improve the water supply of new farms, it was necessary, first of all, to maximize the use of all fresh water resources (surface runoff, fresh upper water, deep fresh groundwater). If those resources did not cover the need for fresh water, then it was a necessity to try to get it with the help of a water supply system or a canal from a distant water source. However, such events were not carried out massively [8].

It would have been possible to fully satisfy all the needs of the economy in water when the central estates were located on large rivers, fresh, non-drying lakes and large ponds and pond-digs of long-term regulation. The main tracts of virgin lands and new settlements located on them, farm buildings were usually located at a considerable distance from rivers. In a number of cases, the water resources available here could only meet the needs of drinking and household water supply, but did not allow to irrigate vegetable crops (see Table 3).

**Table 3.** Lakes of Northern Kazakhstan.

<b>№</b>	<b>Name of regions</b>	<b>Lakes in total</b>	<b>Including freshwater (in percent)</b>
1	Akmola	130	93
2	Aktobe	251	38
3	Kokchetav	124	81
4	Kustanay	746	89
5	Pavlodar	211	37
6	North Kazakhstan	975	88

Lakes have always been sources of agricultural water supply. Small lakes were used for watering livestock, larger ones were used to supply rural settlements and sometimes for irrigation. However, the lakes in their natural state were not reliable water sources. Having a significant area and shallow depth, they lost a lot of water to evaporation. By the middle of summer, as a result of the decomposition of plant and animal organisms, the water deteriorated and became unusable.

There are a number of examples of the difficult situation in which settlements and livestock farms found themselves, using water from lakes in their natural state. Almost every year, due to the fall of water quality in the Kurzhun-Kul and Indy-Kul lakes, the newly created Baumansky, Kurzhunkulsky and Krasnoznamenny grain farms had to supply drinking water tens of kilometers from July 1, 1954. The same situation took place in other northern regions of Kazakhstan.

The contamination of the lakes was greatly facilitated by the construction of livestock farms near them. Livestock were allowed to drink directly from the reservoir without the use of water distribution devices [8]. Many state farms such as “Krasnoyarsk”, “October”, “40 years of Kazakhstan”, “Akmolinsky”, “Chelkarsky” of the Tselinograd administration; Kenbadaiksky, “Arykta”, “Kurgaldzhinsky” and named after Amangeldy of the Kurgaldzhinsky administration and others allowed pollution of fishery reservoirs, dumped manure, sheep bathing, transported pig farms for the summer to the banks of rivers and lakes, even to the resting places of virgin lands [9]. Thus, at the suggestion of the Tselinograd City Public Inspectorate to the Tselinograd Meat Processing Plant to bring all solid waste and sewage to a certain dump site, “they pushed them with a tractor into the floodplain of the Ishim River. If measures are not taken in a timely manner, then these sewages will fall into the Ishim River and will spread the infection. They are already decomposing, and once they get into the water, they will infect it and infect fish and cattle with foot and mouth disease” [3].

### 3.3 Ecology of flora and fauna

The plowing of gigantic areas of virgin lands has given rise to a new problem, i.e., a sharp reduction in hayfields and pasture lands in Kazakhstan. Millions of hectares of land were taken for plowing and infrastructure development for virgin lands. As a result, the traditional type of economic activity of the local population, i.e., animal husbandry, began to experience a deep crisis, which, in turn, led to a shortage of meat and dairy / fermented milk products. The local authorities saw a way out of this situation also in the opening of the saiga antelope and game birds hunting. So, in the decision of the executive committee of the Tselinny Krai and regional Soviets of workers' deputies related to the activities of the regional branch of the society for 1964, it was prescribed: «In order to additionally attract meat products to supply the population of cities and workers' settlements, taking into account the short-term stay of the saiga antelope on the territory of the region, the executive committee of the Tselinny Regional Soviet of Working People's Deputies decided to oblige the executive committees of the rural Tselinograd and Kustanay Regional Soviets of Working People's Deputies to procure 20 thousand heads of saiga antelope and game birds in the 1964 season» [9]. In addition, it was proposed to organize «...wide trade in bushmeat, co-products and game birds in cities, workers' settlements and state farms» [9] as well as to increase additional market funds for meat at the expense of saiga antelope and game birds in cities according to table 4 [9].

**Table 4.** Additional procurement of saiga antelope meat for 1964.

<b>№</b>	<b>Regions</b>	<b>Head, thousands</b>
1	Tselinogradskaya	10
2	Kustanay	10
	Total	20

Serious damage to animals and birds was inflicted in the first years of the development of virgin lands. Taking advantage of the lack of control, the new settlers, and with them the locals, mercilessly destroyed the fauna of the virgin steppes. As a result of mass poaching, such valuable birds as bustard, little bustard were on the verge of disappearance, the number of black grouse, gray and white partridges, marmots, the hunting of which was completely prohibited, has significantly decreased. Both ordinary residents and officials were violators of ecological culture. Thus, “the workers of the Kustanay fish factory Mishukov, Fomkin, Bobrik, Tunkalov, Zhelyantsev, headed by their director Gennady Nikolaevich Svechnikov, who, by the nature of their work, must protect and increase natural resources, have become ardent poachers. Using public transport, during the entire autumn of last year they exterminated saiga and wild boars with the aim of profit. Moreover, despite the fact that they were caught red-handed, they still remain unpunished” [5].

In spite of the fact that the annual stocking of fish with more productive fish species was carried out in new reservoirs, the number of fish did not increase in many rivers and lakes, but on the contrary decreased. There are several reasons for this. Firstly, as a result of unfavorable meteorological conditions in recent years, the surface runoff of flood and rainwater has sharply decreased, which has led to the shallowing and drying up of a number of lakes of great national economic importance, abounding in the recent past with rich reserves. Secondly, some of them dried up or turned into swamps as a result of systematic pollution and the construction of blind dams on flowing water bodies. Thus, “due to inept management and indifference to the natural resources of the leaders of the Tainchinsky and Krasnoarmeisky districts of the Kokchetav region, Lake Chagly, with an area of 80 thousand hectares, has now been turned into a swamp. The same fate, if timely measures

are not taken, awaits Lake Kopa, on the shore of which Kokchetav city is located” [3]. Thirdly, sewage from most industrial enterprises in cities was discharged into the lakes.

The most important water sources of the region, i.e., the Tobol, Ishim, Irtysh and Nura rivers, were heavily polluted with chemical and mechanical impurities, which was not surprising. In the region there were about 200 industrial enterprises working without treatment facilities, of which 130 were enterprises of the Tselinny Council of National Economy. Industrial enterprises daily dumped 150 thousand cubic meters of water polluted with various industrial waste into rivers and lakes, many of which, with certain processing, could be widely used in the national economy.

As a result of intensive and systematic pollution, water in the Tobol river, which was below the town of Rudny, Ishim river – in the area of the city of Petropavlovsk, where untreated wastewater from dozens of enterprises of the North Kazakhstan region was discharged, became almost unusable for economic purposes.

In 1960, a researcher N. Lobacheva wrote in her brochure “The harmful effect of wastewater on the fish population of reservoirs”: “Recently, the Irtysh River has been heavily polluted. In August 1955, the Omsk Oil Refinery was put into operation. The treatment facilities on it were completely ready, but were poorly exploited. As a result, oil from the overfilled emergency barn went to the Irtysh. Consequently, 30–40% of oil got into the river. Due to water pollution with oil and other wastes, sterlet and other fish acquired a specific smell and taste. This water could not be used for drinking, for watering livestock and even for watering fruit and vegetable gardens” [3].

In the 1960s newly built enterprises and those that previously existed in Pavlodar and Semipalatinsk regions began to additionally discharge 250 million cubic meters of untreated wastewater into the Irtysh. The magnitude of this disaster was not always quantifiable and fully understood by people. For example, the pollution of the Volga-Caspian basin caused a loss to the country’s fisheries. It was reflected in a huge amount of 230 million rubles per year [3].

The restoration of a destroyed species of plants and animals, for the creation of which nature has spent hundreds of thousands of years, cannot be done by human labor, i.e., no science can create a species identical to the disappeared one. Nature in the process of its creation, even with human intervention, does not go backwards.

The ever-increasing economic activity of man on the virgin lands and the impending danger of the disappearance of rare and valuable species of animals and plants, and, finally, just hasty, and sometimes not thoughtful exploitation of natural resources, forced people with greater persistence to raise issues of nature protection and especially in preservation areas.

For a long time, elementary rules of the reserve regime were systematically violated on the territory of the Naurzum State Reserve. As a result, striking qualitative and quantitative changes took place in the natural complex, i.e., many species of animals and plants disappeared, while the number of others fell catastrophically. If bustards and little bustards were in considerable quantities in the reserve before the beginning of the virgin lands development, in the 1960s there was no bustard at all, and little bustards were very rare, there was not even a trace of snow hare and white partridge.

In 1940, there were about three thousand black grouses in the Naurzum pine forest, whilst in the 1960s there were no more than 200 of them. During the war years, hundreds of tons of fish were caught from the lakes of the reserve; since the development of virgin lands, such lakes as Aksuat and Sary-Muin had been completely deprived of fish [3].

On the territory of the reserve, which had all-Union significance for its uniqueness and scientific and economic value, cattle were grazed, reeds were mowed, the steppe rivers Kara-Su, feeding Lake Aksuat, Sary-Muin and Zharkul, were systematically overwhelmed. As a result, in 1961 the Bolshoy Aksuat lake completely dried up, which had never

happened in the history of the Naurzum Lakes. Moreover, the water that the protected lakes lost was used irrationally by the state farms, since it was discharged mainly on barren salt marshes and solonetz. The dams on the rivers were blind, without bottom outlets [3]. Irreparable damage to faunal wealth was caused by the construction of blind dams on rivers that supply water to lake systems. The latter dried up, fish disappeared, birds disappeared, animals, dammed rivers spilling over the steppe, forming swamps and salt marshes.

The growth of material well-being and the improvement of the working conditions of virgin lands caused an even greater attraction of the general public to hunting sport. In the Tselinny Krai, as in many regions of the country, over the past decade, there was a general decrease in the number of many species of game and hunting animals. That phenomenon was explained mainly by human influence. The rapid development of agriculture, the development of tens of millions of hectares of virgin lands, the intensive development of fisheries, the development of industry – all this radically changed the conditions for the existence of animals, and in a number of places led to their direct displacement from their original habitats.

With the growth of the population, the number of hunters rapidly increased, their armament and equipment with various types of transport improved, which allowed hunters to enter into the most remote, once isolated lands.

If, in the 1950s, in the Bayan-Aul district of the Pavlodar region, there were 1500–2000 argali heads, then in the early 1960s there were only 1000–1200 of them due to poaching [3]. Mass and large-scale poaching took place in the south of the region during the period of extermination of the saiga antelope there. At the regional meeting on nature conservation, Deputy Chairman of the Tselinny Regional Branch of the Kazakh Society for Nature Conservation M.I. Naryshkova noted in her speech: “Last year, herds of saigas did not appear at all on the territory of the Tselinograd region. Saiga perishes in places of lambing” [10]. During the haymaking period in the Turgai, Amangeldinsky districts of the Kustanay region and the Kurgaldzhinsky district of the Tselinograd region, there were thousands of vehicles from all regions of the Krai for the procurement of forage [10, p. 60]. Every third car was armed, despite the fact that at this time it was a closed season. The extermination of animals caused great damage to the state natural resources, cut off transport from the main work, breaking it and putting it out of action.

Thus, by the beginning of the harvesting campaign, half of the 500 vehicles in the Amangeldy motor depot were disabled exclusively during the saiga chase. During this period in the Saryuzen state farm from a vehicle fleet of 96 cars, only 10 were working, the rest, mostly new cars, were incapacitated. The same situation was in the state farm of the XXII Party Congress, i.e., 88 out of 100 cars were broken.

At the time of solving the crime, 23 saiga carcasses, 444 legs, 8 barrels of salted meat, many heads and skins were found on the public transport of the director of the Kustanay fish factory Svechnikov and his accomplices [10]. The wild boar population was destroyed very quickly. Due to the introduction of a large number of equipment, high-speed tractors, they were fired at them directly from the tractor even at a small first frost [10].

973 violations of the total number were revealed by employees of the State Hunting Inspection, 320 cases were discovered by public hunting inspectors, 64 by forest guards, 15 by the police. 21 thousand rubles of fines and claims were recovered from violators, 487 shotguns and 64 small-bore rifles were seized.

In general, the problem of the environmental consequences of the virgin campaign by N.S. Khrushchev is topical for Kazakhstan, since it requires huge financial costs and efforts of scholars from different scientific fields for its solution. The complex impact of the virgin and fallow lands development on the ecology of modern Kazakhstan is considered in the works of Kazakhstani researchers [11–14].

## 4 Conclusion

It is well known that Virgin Lands Campaign did not solve the rather difficult task set before it, i.e., to solve the food problem in the USSR. At the same time, assessing the social and economic results, it should be emphasized that, in general, positive aspects prevailed for the Kazakh SSR in the process of developing virgin lands. Indeed, Virgin Lands Campaign turned Kazakhstan into a region with an extensive social and industrial infrastructure, became a place for the emergence of new cities and settlements, an extensive infrastructure. However, at the same time, it led to a deterioration in the state of the environment, generated a lot of environmental problems in the region, having become an area of environmental crisis. Solid tracts of plowed soil, having a dark color, became very hot and provoked drought, which, with chronic manifestation, caused aridization of the entire steppe zone, causing significant drying up of rivers and lakes, and, consequently, the entire global desertification. Mass plowing also affected the state of the fauna of the steppe zone. Stocks of valuable hunting and game species of animals were undermined, and in some places completely destroyed. The totality of the environmental and socio-economic consequences of the virgin lands development shows that the modern structure of land use needs fundamental changes. As a result, the steppe landscape was completely destroyed and replaced with an agricultural one, with all the ensuing consequences. The steppe type of vegetation on zonal soils has become the rarest in the country [15]. Some survived populations of steppe plants, which once dominated over vast areas, degraded not only under the influence of overgrazing, which was the result of a chronic shortage of pastures, but also as a result of permanent anthropogenic impact. Unfortunately, during the virgin land epic not a single new reserve was created, meanwhile the acting ones were forced to survive

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