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Nestor Korol

THE SLAVIC INSTITUTE OF MARQUETTE UNIVERSITY

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THE SO-CALLED VIRGIN LANDS OF KAZAKHSTAN

BY

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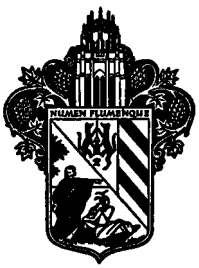

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SLAVIC INSTITUTE
MARQUETTE UNIVERSITY
MILWAUKEE, WISCONSIN

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FOREWORD

A pet project of Nikita Khrushchev is to bring under the plough the so-called "virgin lands" of Kazakhstan in order to increase the output of grain in the U.S.S.R.

The Slavic Institute is privileged to publish a paper of a living witness of this problem, of a distinguished former Soviet scholar Professor Nestor Korol. He is a former professor of Genetics of the Moscow University and a professor of plant selection of the Moscow Agricultural Institute; he holds the degrees of Doctor of Biology (1939), and Doctor of Agricultural Sciences (1941), and was consultant and head of many scientific research projects in the Soviet Union.

The present paper was delivered at the Taras Shevchenko Memorial Congress of free Liberal Arts and Sciences at Columbia University, September 9, 1961, and we are privileged to publish it in our series: Papers of the Slavic Institute.

THEODORE F. MARBURG
Professor of Economics

THE SO-CALLED VIRGIN LANDS OF KAZAKHSTAN AND ITS AGRICULTURAL VALUE.

The expropriation of a tremendous part of production—the crop and the products of animal husbandry—for the needs of the government from the kolkhoz peasants, after compulsory collectivization without renumeration, prompted them to adopt an attitude of indifference toward their work. As a consequence, the Soviet Union has been in the state of a permanent production crisis ever since collectivization was introduced. The shortage of grain has always been an acute problem. In view of the peculiar kolkhoz system in which the peasant's work is reduced to executing orders and following directives, he has lost all incentive to display personal initiative in his work processes and to try to obtain the maximum production from his labor. Regardless of how hard he may work and how good the crop may be as a result of his work, the government agencies will allow him to keep only an insignificant part of the fruit of his toil, which would enable him to live very meagerly without, however, covering other needs such as footwear, clothing, accommodations, etc. for him and his family.

As a result, the agriculture crops and the products of animal husbandry in the Soviet Union are very poor despite efforts to improve the situation. This failure is not only caused by the poor crop as a result of poor work—tilling, seedbed preparation, sowing, plant growing, indifference towards controlling weeds and pests, careless fertilization—but also by a careless attitude towards the crop and harvesting which brings about a loss of grain often amounting to 25 per cent and more.

Increased food production to cover the needs of the growing population has been achieved in the USSR by expanding the

sowing area. This expansion had already reached its limits before World War II, with all suitable land being used for agriculture including the arid steppes in the south and south-east and even the perpetual frost zone in the north. There was no more room for expansion and the time came to find other ways and means to obtain the necessary additional grain.

Despite fertile soil and proximity to the former industrial centers, (now those centers are moved to Kasakhstan and Siberia) cultivated land in some areas is characterized by extremely unstable natural moisture conditions. This is the case in the Black Sea steppes of Ukraine which lack adequate moisture but contain the richest black soil in the world. It is to the latter that attention was directed.

The situation could have easily been improved and high annual crops obtained with the help of artificial irrigation in those years when there was not enough natural moisture in the soil. Otherwise, in this area there are all the conditions necessary for a good crop. For this purpose, a gigantic irrigation network was planned after the war to supply these steppes with water from the Dnieper with the help of a dam to be built at Kakhivka. Although the dam was actually built and with it half of the work done for the construction of the irrigation network, further work to finish the project was suspended, evidently for good, five years ago. It has become a custom—and that is what is happening now—to turn to the Asian part of the Soviet Union to obtain the necessary additional grain through the expansion of the sowing area.

This unwillingness of the koklkhoz peasants has resulted in an attempt to replace the kolkhoz system by large state farms, the *sovkhozi*, to obtain better crops and stimulate the production of animal husbandry. The attempt has failed since the maintenance cost of *sovkhoz* production exceeded that of kolkhozi by three to four times. The basic reason for this increased cost lies

in the fact that because they use hired workers the *sovkhozi* have to adhere to the labor law, to maintain an eight-hour work day. The rate for overtime, for which prior approval must be given by the trade unions, amounts to time and a half for the first two hours and double pay for subsequent hours as well as for holidays. According to the labor law, the *sovkhozi* also have to pay social security, vacation time, and the like. This law does not apply to kolkhoz-peasants, "their own enterprise," although they are subordinate to the kolkhoz chairmen and brigadiers appointed by state organs. For that reason the work day of kolkhoz-peasants is not fixed and usually lasts from 14 to 16 hours. There are neither vacations nor holidays since the kolkhoz peasants work "for themselves" and time off is taken in the winter when there is less work. There are no minimum wages guaranteed by the state since "kolkhoz are the personal farmsteads of kolkhoz peasants."

Nevertheless, despite their greater costliness, preference is given to *sovkhozi* when it comes to cultivating the deserts of the Asian part of the Soviet Union. This can be explained by the fact that the compulsory resettlement of "free" peasants and their families to organize kolkhozi in new areas would have required a great number of internal security troops, i.e. MVD troops, to surround the vast areas for decades to keep the settlers from deserting their new settlements. This, however, is almost impossible to carry out. The settlers would inevitably try to escape rather than starve in the desert. The state organs are very well aware of this fact. There are frequent cases of settlers escaping from the valleys of the Choo River, the Vakhsh River, and the Kafirnigan River. The valleys were populated about 25 or 30 years ago. Despite the fact that for decades millions of settlers perished from malaria in these valleys, new settlers were sent as replacements by the state since "among millions of people there must be individuals immune to this disease who would produce a generation that would also be immune." But, as soon

as the troops were withdrawn during the war (soldiers were needed elsewhere, not necessarily for front-line duty), the forced settlers immediately deserted these valleys.

Now, with the help of the above-mentioned troops to form a cordon around the territory, compulsory settlers are sent to the malaria-infested valleys of the Amu-Darya River in the Kara-Kalpak ASSR, an area insignificant in size if compared with the vast virgin lands. Judged by past and present experience, hundreds of thousands of troops would be required to cordon off the virgin lands for decades to come.

These were the reasons that prompted the organization of *sovkhozi* on virgin lands rather than kolkhozi. To populate the deserts of Kazakhstan and the Altai region it was decided to make use of the Party and Marxist fanaticism of the Komsomol youth. In their understanding the *sovkhoz* and not the obsolete "semi-private" kolhoz is the "new socialist form of agricultural production." It is assumed that there will always be a sufficient number of fanatic komsomol youth to work in the *sovkhozi* after the latter are equipped with the most modern machinery that can reduce the need for labor to a minimum.

The profitableness and cost of agricultural production has never played any role in the Soviet Union. Therefore, it will have no significance in the *sovkhozi* on virgin lands where the lowest standard of living and all the hardships endured by the enthusiastic and fanatic Komsomol youth were compensated for by the idea that they were "building a new socialist society." There is a considerable number of such enthusiastic fanatics and it would be a mistake to ignore this fact. The situation was similar in 1928-1933 when grain *sovkhozi* were organized on the same "virgin lands." The author observed these phenomena under similar circumstances when he was appointed by the Academy of Sciences to be senior inspector in charge of research work in agricultural experimental stations organized for the purpose of serving *sovkhozi*.

Although it is esteemed now that the normal average yield of spring wheat (winter wheat and rye cannot be cultivated at all in these areas) per hectare will be ten centners, the best crop never exceeded six centners per hectare on these "virgin lands" in 1928-1935, even in the best parts of this territory and under the most favorable conditions. In good years the average crop in grain *sovkhozi* on this "virgin land" in the best agricultural districts amounted as a rule to three or four centners, and as an exception to five centners per hectare. Even the fact that only one additional centner of grain was obtained for one centner of seed did not lead to the discontinuation of this obviously unprofitable agricultural enterprise. Only a complete fiasco, the failure to obtain a crop even equal to the amount of grain sown for a number of years, compel the state to renounce the further cultivation of land and to stop wasting money and seed. Now, based on previous experience, we can expect a similar end to the present venture.

The virgin land is a typical arid desert with scant flora in the form of scattered shrubbery every .5-1 meter. The soil is cracked in various directions with clefts of some tens of centimeters and more wide and up to two meters deep. When the author was stationed in this area, the arid top layers, the so-called "virgin soil," was upturned with the help of powerful tractors. The new layer of dry earth, hard as a rock, was broken up with the help of various agricultural machines and tilled until it was suitable for sowing. The seeds, if they sprouted at all, wilted and perished as a result of the lack of moisture and nourishment in the soil.

Just as unfavorable for agriculture as the lack of moisture are the continuous strong winds in this area. In the winter the winds turn into dusty snowstorms and into dust storms in the summer. It is a well-known fact that the deserts of Kazakhstan and the adjacent Singkiang are a year-round birthplace of winds. These winds, lasting frequently for two weeks and more, acquire

such force that not only the tilled layer but also the loose layer of topsoil are completely blown away together with clods of earth to the undercrust and carried off by the gale winds. After such storms there is nothing left. In different years and in various areas of Kazakhstan and southern Siberia, including the Kulunda steppe, this has put an end to the grain *sovkhozi* and the agircultural experimental centers organized to service them.

The geographic location of Kazakhstan in the center of a tremendous continent with the axis of extreme barometric pressure traversing its northern part makes its climate generally extraordinarily windy, dry, and continentally severe.

In 1933-1935, after a series of failures, several *sovkhozi* (the Severny, Suvorovsky, etc. *sovkhozi*) in Kazakhstan and in the Altai territory (the Pospelikhinsky, Aleysky, and other *sovkhozi)* were transferred to state animal husbandry organizations. Some *sovkhozi* (Kulunda No. 5, etc.) were transferred to GULAG (the Main Administration of Concentration Camps of the NKVD) and the inmates continued to cultivate the land without obvious results. The greater part of the *sovkhozi* (the Kustanai *sovkhoz* and many others) were simply abandoned. After a windstorm on the tilled land of the *sovkhozi* even the puny plants that grew before the organization of *sovkhozi* failed to find nourishment in the bare, dead, lower layers of soil. Therefore, these *sovkhozi* failed to interest the animal breeders because they were an inadequate source of fodder for the cattle. These abandoned *sovkhozi* have now been turned into "virgin and fallow lands."

The abortive attempts to settle farmers in these areas date back to pre-revolutionary times. A government measure to populate these "virgin lands" came to a most disastrous end in 1898 when only one crop had been harvested in eleven years. During the other ten years, the seedlings perished because of the dry winds and lack of precipitation. The difference between the attempts of the government to populate these deserts consists in

the fact that before the revolution the tzarist government tried to organize large individual privately-owned farms, while after the revolution attempts were made to organize large state-farms of 100,000 to 150,000 hectares and even more: for instance Chaglinsky sovkhoz was large as 350,000 hectares, Cherlaksky sovkhoz 190,000 hectares etc. (a hectare equals 2.47 acres) known as *sovkhozi.* But the results were similar—the settlers either ran away or died from starvation.

No changes have occurred there since that time. There was no construction undertaken, such as, for instance, an irrigation network for artificial irrigation. Nothing has been done or probably could have been done to break the winds and storms with the help of artificial afforestation. The only change that prompted yet another attempt to transform the desert into an agricultural area was due to the "achievements" of Michurin. "Thanks to the Michurinite achievements, vast areas of previously unsuitable lands now can be classified as suitable for farming."[1] No reference is made to the nature of these achievements.

Nothing was done to create a kind of agricultural crop that would demand a very small amount of moisture while the climatic, meteorological, and soil conditions in northern Kazakhstan and in the Altai territory have remained the same. Many years of study of the climate and the meteorological elements as well as of the soil in these areas have shown the unsuitability of the area for agricultural purposes in its present state.

There is no more land available either in Kazakhstan or Siberia that could be used for farming without irrigation or afforestation. The areas suitable for this purpose were populated rather densely long ago. A new stream of settlers would only prove detrimental to the farming activities of the local population.

The boundless territories of Siberia are just as deceptive as the vast areas of northern Canada, while the endless regions

[1] Djangaliyev, A.D. and Bielov A.A., *Uspiekhi Michurinskoy Nauki v Kazakhstanie,* Alma-Ata, 1950.

of Kazakhstan have just about as much agricultural value as the Sahara desert in Africa or the Gobi in Asia.

Any reference to "virgin lands" applies, in fact, to the northern strip of land in Kazakhstan running from the west to the east along its northern border with Siberia, and the continuation of this territory farther in the east between the eastern bank of the Irtysh River and the western bank of the Ob River within the administrative borders of Siberia (Altai territory).

Although Kazakhstan occupies a tremendous territory—2,852,380 square kilometers (2.59 square kilometers equal one square mile)—half of its territory, 1,431,560 square kilometers, is desert land.[2] This desert stretches far beyond the borders of Kazakhstan towards Turkmenistan in the south, occupying nine-tenths of its total territory, (435,950 square kilometers)[3] reaching into Uzbekistan where it occupies an area of 375,660 square kilometers[4] extending into Kirghizia, (98,680 square kilometers)[5] and stretching into Tadjikistan.[6] In the east, the desert extends to the southern part of Siberia and in the west toward the European (western) shores of the Caspian Sea from the mouth of the Volga River to the mountains of Dagestan.[7]

The total desert area in the Soviet Union completely unsuitable for farming comprises 13.2 per cent of the entire territory of the Soviet Union and amounts to 2,734,850 square kilometers.

From the standpoint of agriculture, this desert is of no significance, but as far as mining is concerned, it is a source of tremendous reserves of various kinds of minerals and extremely valuable metals. The only branch of agriculture feasible here would be extensive animal husbandry with several hectares of

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[2] *Kazakhskaya SSR za Tridtsat Liet Sovietskoy Vlasti,* Alma-Ata, 1948.
[3] Karpov G. and Shkolnikov D., *Turkmenskaya SSR,* Moscow, 1945.
[4] *Materialy po Rayonirovaniyu Sredniey Azii,* Vol. 1-3, Tashkent, 1926.
[5] *Dvadtsat Piat Liet Kirghizskoy SSR* (Sbornik Statiey), Frunze, 1951.
[6] Bardier, V.M., *Tadjikistan* (Geographichesko-Ekonomich. Ocherk), Stalinabad, 1936.
[7] Mynbayev, K.M., *Pustynia Betpak-Dala,* Alma-Ata, 1948.

pasture for undemanding coarse-wool sheep, goat, and camel. For more demanding animals, such as fine-wool sheep, dairy cattle, and horses there is not enough pasture in this desert, since pastures occupy a very small percentage of the total area. The soil of the desert is solonets—containing a very high percentage of salt and soda—solonchak, and fine sand. Only lightly solonized soils are suitable for cultivation of cereal crops under conditions of using enormous amounts of water for artificial watering during the growing period of crops. The flora consists of *Salsolaceae* plants and wormwood which is completely burned by the sun by the end of spring. Even the larger areas of fertile soil in this desert cannot be used because of the lack of irrigation. Only in valleys of a few rivers are these fertile oases used for agriculture yielding fairly good crops.

The rest of the Kazakhstan territory consists of semi-desert pastures with a sharply pronounced seasonal climate covered with plants only in certain periods of the year, in the spring, summer, fall, or winter. An area of 442,572 square kilometers (44,257,200 hectares) is suitable or conditionally suitable (provided an irrigation system was built) for agricultural purposes.[8] This area comprises considerable expanses of solonets and solonchak soil as well as fine sands and a great variety of various sizes of lakes with salt and bitter-salt water, therefore unsuitable for drinking or irrigation.[9] For that reason the area that could be used for agriculture is, in fact, reduced to 26,560,000 hectares, of which 14,000,000 hectares stretch along the southern foothills of Kazakhstan at its southern border and are rather densely populated by farmers. Another narrow strip of land in northern Kazakhstan which is suitable for farming is wedged into the neighboring regions of Russia and is also

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[8] Zankovich, F.J., *Prirodnye Usloviya Razvitiya zemliedeliya Kazakhstana*, Alma-Ata, 1940.

[9] Borodin, I.A., *Selsko-Khoziaystvennaya Baza Promyshlennosti Tsentralnogo Kazakhstana*, Alma-Ata, 1946,

rather densely populated by farmers who came there 60 to 80 years ago. Here are figures for the population per square kilometer (100 hectares): in the Aktiubinsk region (south western part in the spurs of the Urals)—16 to 20 persons; North-Kazakhstan region (Petropavlovsk)—16 to 18 persons; Kokchetav region (extreme north-west)—15 to 16 persons; Pavlodar region (extreme north-eastern part)—25 to 30 persons.[10]

Farther towards the south of this narrow strip the desert begins. This area of Kazakhstan bordering on the semi-desert is known again as the "virgin lands," and, according to a project by the new initiators, it is to be converted into an additional granary, if not for the entire Soviet Union at least for Kazakhstan. The latest Soviet literature on these regions shows to what extent this area is unsuitable for farming in regard to weather, climate, and soil conditions. Studies have shown that precipitation here is absolutely inadequate even for the most early growing crops, such as millet which requires even less water than sorghum. Only accidentally in some years precipitation is regular during the season, most of it during the growing season. The reason for this is that Kazakhstan is located in the center of a tremendous continent far from seas and oceans. Favorable conditions occur only once within five or six years or more.

Previous attempts have proved unconvincing while the demand for bread in the Soviet Union remains so acute that the production cost of its attainment is being completely ignored. Two years ago, 250,000 tractors (3,750,000 mechanical horse power) were sent into the desert—"virgin lands"—of Kazakhstan with a corresponding number of agricultural machines and equipment at the expense of supplies for the original agricultural regions of the USSR. There have been 350,000 Party and Komsomol members of both sexes dispatched to the "virgin lands;" 24,000,000 hectares of unfit (for agriculture) desert

[10] *Trudy Konferentsii po Izucheniyu Proizvoditelnykh Sil Kazakhstana* (Izdaniye Akademii Nauk SSSR), Leningrad, 1932.

land was plowed and sowed. As in previous attempts to transform this desert into an agricultural region, the greater part of the growth on the 24,000,000 hectares of tilled land died for lack of precipitation. The remaining part hardly yielded an harvest big enough to cover the seed amount used up. Of the 350,000 Party and Komsomol members sent, only 150,000 remained in all. Others, following the example of their non-Party predecessors, have dispersed or died.

After the failure to cultivate the "virgin lands," in the period 1928-1933, the new initiators' optimism concerning this undertaking destined to founder has diminished, yet they still anticipate two good harvests in the next five years:

"The question may arise, whether we are doing well in cultivating the virgin lands in regions afflicted with droughts. If only two years of good harvest would be forthcoming out of the five years—one medium, and two fail harvests—then . . . we can have cheap bread." [11]

How the following individual administrative regions of the northern part of Kazakhstan—areas known as the "virgin lands"—are suitable for agriculture in respect to their climatic, meteorological, and soil conditions is seen:

1) Aktiubinsk region: Precipitation-Aktiubinsk 199 mm.; Irgiz: 177 mm.; Uil: 125 mm. Precipitation occurs usually at the end of summer. In the summer, rain drops frequently evaporate in the air before reaching the ground. In the winter and summer, the strong east and southeasterly winds of gale force continue for weeks. The vegetation period lasts for 120 to 125 days. Summer temperature reaches 35 degrees Centigrade, and drops in the winter to about 30 degrees Centigrade below zero. The soil is light chestnut soil, grey soil, solonets, solonchak, and sand.[2, 8, 9, 10]

2) Kustanai region: precipitation during the year in Kustanai is 250 mm., in the center of the region it is 120 mm., in

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[11] Khrushchev N.S., *Otchetny Doklad Ts. K. CPSU XXth Syezdu*, Moscow, 1956.

the south it is 90 mm. Most precipitation occurs in the winter. There are strong winds all year round. In the summer, the winds are southeasterly, in the winter southerly. In the winter they carry snow and dust, in the spring and summer there are dust storms. Vegetation period has 120 to 122 days. The temperature reaches 30 degrees Centigrade in the summer and drops to 28 degrees Centigrade below zero in the winter. The spring is very short, a mere two or three days. The summer is extremely dry. The soil is black soil, light chestnut soil, sands, solonets, and solonchak soil. There are a great number of lakes and marshes with salt and bitter-salt water. The ground waters of springs, streams, and artesian wells are mostly salty or bitter and Salty.[2, 8, 10]

3) North Kazakhstan region: precipitation during the year is 280 mm. in Petropavlovsk. Precipitation is evenly distributed over the season. Thanks to the even surface of the land and the absence of slopes and impervious soil, melted snow is gathered in lower areas forming lakes and ponds which serve as a source of water for men and animals. They are southeasterly and southerly winds all year round. In the winter they carry snow and dust, while in the spring and summer they turn into dust storms. The vegetation period last for 117 to 120 days. The summer temperature reaches 35 degrees Centigrade and drops as low as 40 degrees Centigrade below zero in the winter. The summer is hot and dry. The spring lasts merely three to five days. The change from summer to winter is rapid, it takes one or two days; there is no fall. The land consists of blacksoil, and light and dark chestnut soil.[4, 7, 8]

4) Kokchetav region: precipitation during the year amounts to 200 mm. in Kokchetav; 225 mm. in Borovoye; 200 mm. in Makinka (Kolutonovsky *sovkhoz*). Most of it, 3/5ths, occurs in the second half of June and up to July 1. After that, the most humid month is September. Strong winds blow throughout the year in the directions of the east, south-east, south, and

south-west. In the winter, in spring, and in the early part of the summer they are heavy storms that completely blow away the loose and loosened layers of soil. The vegetation period is 120 to 122 days. Spring begins in the middle of April. The change from summer to winter is also harsh and takes about 1 or 2 days. There is no snow in the winter, which begins in the early part of October. Summer temperatures reach 35 degrees Centigrade and drop to 45 degrees Centigrade below zero in the winter. There are innumberable lakes with salt and bittersalt water. Throughout the region, there is a shortage of sweet water. All activities revolve around the few streams, rivers, and springs. The land consists of black soil, light and dark chestnut soil on gravelly sub-soil, and pebble layers.[2, 4, 8, 9]

5) Akmolinsk region: precipitation during the year: Atbasar—225 mm.; Akmolinsk—200 mm.; south of Akmolinsk —120 mm. At times precipitation is uneven; most of it occurs in July and August when it is of no use to the crops, and there is a minimum in February. There is no snow in the winter. The summers are very hot and dry. In the southern part of the region, raindrops often evaporate in the air before reaching the ground. There is absolutely no dew. The winds are very strong throughout the year, their direction is east, south-east, south, and southwest. Storms rage throughout the winter and summer, completely blowing away the loose and loosened top layers of soil. The vegetation period is 120 to 124 days. Summer temperatures reach 35 degrees Centigrade and winter temperatures drop to 45 degrees below zero. There is a considerable change in daily temperatures during the growing season, including sudden frost in the midst of the summer, in June and even in July. Spring and autunm are not very pronounced. The change from the summer to winter takes about 1 or 2 days, and from winter to summer about 2 or 4 days. There is a shortage of sweet water in this area. Small rivers that flow into the Ishim (basin of the Ob River) are fed by melted snow and dry out completely in the

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summer. The inhabited areas are the basins of the Ishim and Nura Rivers which have a considerable amount of water. There is no life beyond the basins of these rivers. The ground waters are very deep and mostly salty, bitter-salty, bitter, and sulphurous. There are a great number of large and small lakes with bitter salty, salty, and sulphurous water. As a result of the low shores and strong winds, these lakes constantly change their outlines, form a new locality, and flow into each other, flooding new areas. The soil is black soil, all shades of chestnut, solonets, solonchak, and fine sands.[2, 7, 8, 9]

6) Pavlodar region: precipitation during the year in Pavlodar—231 mm.; Lebiazhye—120 mm.; Semiyarskoye—90 mm. Precipitation is uneven. Mostly, it takes place in January and February. There are strong winds and storms, southeasterly, southerly, and south-westerly in direction all year round. The vegetation period is 120 to 125 days. Summer temperatures reach 35 degrees Centigrade, winter temperatures reach 45 degrees below zero. The change from winter to summer and from summer to winter is very harsh and takes place within 2 or 3 days. There are sharp drops in temperature during the day and night, and there may be freezing temperatures in the midst of the summer. The ground waters are very deep and often unsuitable for drinking in view of the high salt content. Sweet water is in short supply. There is a great number of lakes with salt and bitter salt water from which salt is obtained and this is a quite important industry. The soil is of various shades of chestnut, solonets, solonchak, and fine sands.[2, 4, 7, 8, 9]

7) Kulunda steppe (Altai territory) stretches from the north-east to the south-west from the left bank of the Ob River to the right bank of the Irtysh River and from the Karasuk River (flows into the Ob) in the north-west to the Altai Mountains in the south. This area is 200 kilometers wide and 350 kilometers long. It occupies about 90,000 square kilometers. A great number of bitter salt and salt water lakes are scattered

throughout the area, particularly in the west, north-west, and south-west. Some of these lakes are rather large, such as Kulunda, Kuchuk, Topolnoye, Gorkoye, and the like. The salt content is so high that it is the basis for industry, the extraction of table salt (Burlinskoye Lake and others), Glauber's salt (Kulunda, Kuchuk, etc.), and soda (Petukhovskoye, Mikhailovskoye, etc.)

The steppe is traversed by some minor rivers which flow into the lakes that have no outlets and by the solonized marshes. These rivers are characterized by a small gradient and often change their course, which makes farming more complicated. All rivers that have no outlets flow in the south-west direction and belong to the Ob River basin in north-eastern direction.

Characteristic elements of this steppe surfaces are the so-called *grivy* (ridge-chain) which consist of low (40 to 60 meters high) and fairly narrow (0.5 to 1 kilometer) ridges that stretch from the north-west to the south-east. They determine the direction of all rivers in this area. The surface between these ridges is usually marshland or is occupied by a chain of lakes.

There is a shortage of sweet water, but more can be found to the north-west of Slavgorod (lakes Bolshoye, Topolnoye, Krivoye, Peschanoye). Farther south, the ground waters and the wells are mostly salty or bitter salty.

The precipitation during the year is as follows: Slavgorod—350 mm.; Krasno-ozerskoye—300 mm.; Blagoveshchenka—225 mm. The growing season lasts between 118 and 122 days. Spring arrives in the first part of May, winter in the second part of September. Summer temperatures reach 28 degrees (centigrade) below zero. In the summer the winds are dry, but get very strong in the winter and continue two weeks and more as storms. The soil consists of a thin layer of sodden blacksoil and meadow gley, light grey soil on shingle sand and pebble stones, solonets, and solochak soil and solonized marshes. The wild flora consists

of *Salsolaceae* plants, reed, and scouring rush. The ridges are covered by conifers and deciduous trees.

The eastern parts of the Kulunda steppe in the Ob valley, as well as the south-western and central parts along the Barnaul-Semipalatinsk railroad, are rather densely populated—over 20 persons per square kilometer—by farmers. The inferior areas in the north-west, west, north, and towards the south from the Barnaul-Semipalatinsk railroad to the Altai Mountains is less populated, and where Oirots and Kalmyks lead a nomad life with their herds. These areas are good alpine pastures, but are unsuitable for farming.

"The cultivation of the arid Kukunda steppe and its neighboring arid woodland steppe is an important problem." [12] The irrigation network of Alei, built by prisoners, serves only 11,000 hectares intended for the cultivation of sugar beets.

That is what the "virgin lands" of Kazakhstan and the Kulunda steppe are like. How suitable these lands are for agriculture is obvious if we compare them with all central agricultural regions of Ukraine and with the eastern part of the State of Montana which would seem similar to the Kazakhstan and Kulunda steppe "virgin lands." However, there are essential difference between the first and the last regions as far as precipitation is concerned. In Kazakhstan and in Kulunda steppe, three-fourths of precipitation occurs in the autumn and winter; in eastern Montana, the same amount of precipitation occurs in the spring and summer, i.e. in the very midst of the season of crop growth. Just how suitable these "virgin lands" of Kazakhstan and Kulunda steppe are for agriculture is evident with regard to climatic and meteorological conditions. Besides, the winds in Montana are not as dry as those in the "virgin lands" of Kazakhstan, and coupled with the precipitation in Montana during the growing season, create very favorable conditions for

[12] Korobkov, N., *Sotsialisticheskoye Preobrazovaniye Altayskogo Kraya*, Barnaul, 1948.

Climatic and Metereological Conditions of the Agricultural Regions[9 13 14]

Location:	Annual Precip.:	Temp. in Centigrade: Jul.	Jan.	Lowest recorded Temperature in Many Years:	Growing Season Days:
Ukraine:					
Tarnopol	571	18.9	-5.4	-27.3	173
Kamenets Podolsk	568	19.4	-5.4	-31.6	177
Kiev	590	19.3	-6.0	-30.0	172
Uman	553	19.9	-5.9	-32.9	179
Kirovograd	468	20.1	-5.8	-32.4	173
Poltava	465	20.6	-7.3	-31.9	178
Kharkov	514	20.2	-7.7	-36.8	171
Virgin Lands: (of Kazakhstan and Siberia)					
Petropavlovsk	280	35.0	-40.0	-66.9	120
Kokchetav	200	35.0	-45.1	-64.7	120
Pavlodar	231	35.1	-46.3	-60.3	120
Atbasar	225	37.4	-48.2	-64.5	121
Kustanay	250	31.7	-45.1	-62.8	120
Aktiubinsk	199	36.6	-40.9	-63.2	120
Blagoveshchenka	225	28.0	-42.7	-64	122
Montana (Counties):					
Poplar (Roosevelt)	322	21.8	-4.5	-52.1	124
Mildred (prairie)	306	21.7	-2.2	-45.4	132
Garland (Custer)	300	21.5	-1.8	-46.3	129
Jordan (Garfield)	301	22.4	-2.1	-50.2	124
Foster (Big Horn)	294	21.7	-1.7	-45.6	122
Melstone (Musselshell)	299	22.2	-1.4	-46.7	122
Flatwillow (Petroleum)	302	21.2	-1.4	-44.8	127
Harlowton (Wheatland)	297	17.7	-1.6	-40.5	117

[13] *Klimat Ukrainy*, Kiev, 1952.

[14] U.S.A. Department of Agriculture: *Agricultural Yearbook 1941.*

the growing of cereal crops. In Kazakhstan and Kulunda steppe, however, these conditions are nonexistent.

An increase in food production in the Soviet Union seems possible only by intensifying farming in general and the cultivation of land in particular. However, the twenty-five years of kolkhoz experience have shown that an intensification of agriculture can be achieved only when the farmer is personally interested in his product, the land, and when the equipment is privately owned. Then he can display personal initiative which stimulates the interest in obtaining a maximum return from the products of his toil.

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