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PROPOSED SIBERIAN INLAND SEA FOR IRRIGATION AND TRANSPORTATION

In the center of Eurasia, northeast of the Caspian Sea, is the Aralo-Caspian lowland, which as yet is a desert. Only on its outer edges and in the oases formed by the rivers flowing from the Central Asiatic mountains are conditions favorable for human habitation. About 3 million square kilometers are practically uninhabitable. This area is the origin of the dry, hot winds which threaten crops all over the so-called black-earth area. Because of these winds, the black-earth area is reduced to about half of that possible under more favorable moisture conditions.

By diverting sufficient quantities of water into the Caspian lowland, these conditions could be changed to a considerable degree, and the entire region transformed into a cultivated area of the first order. Accurate investigation has shown that this is possible.

A German engineer, Kurt Hiele, proposed in 1945 that water from the Black Sea be diverted into the Caspian Sea, which is 26 meters below sea level, to increase the evaporation of its surface to 150 cubic kilometers of water, which then would be distributed throughout the country in the form of rain. In 1946, a commission under the leadership of the Russian, Shirshov, proposed that water be diverted from the upper courses of the Arctic rivers into the Volga, and from there into the Caspian Sea.

However, an idea of completely different intent and scope was recently advanced by the Soviet hydrotechnical construction engineer, M. Davydov. His proposal provides for the damming up of the two Siberian rivers, the Ob' and the Yenisey, and for the diversion of that water through a canal across the Turgay watershed (tröskel) into the Caspian lowland. A watershed, broken only by the lower courses of the Ob' and Yenisey, runs across the entire West Siberian lowland and would dam up an enormous sea with a surface 70 meters above sea level if a dam were built across the chalk cliffs at Belogore below the influent of the Irtysh into the Ob'.

This sea would flood the marshy valleys of the Ob', Irtysh, Ishim, and Tobol' rivers down to the Trans-Siberian Railroad in the South. It would form

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an immense Siberian inland sea covering an area of nearly 250,000 square kilometers in which all the water of Western Siberia -- a total of over 300 cubic kilometers, or 300 billion cubic meters per year -- could be stored. By damming up the Yenisey below the mouth of the Central Tunguska, approximately as much water as drains into this river from the Sayan Mountains and Lake Baykal would flow into the Siberian inland sea. The ice-river valley in which the Ob' tributary, the Ket, flows could provide the connection.

To conduct the water from this artificial sea to the Caspian lowland, it would be necessary to dig a 930-kilometer-long canal, which from Kurgan would follow the valleys of the Tobol' and its tributary, the Ubogan, then cross the Turgay watershed, 120 meters above sea level, and follow the Turgay River to Lake Aral, the surface of which is 50 meters above sea level. From Lake Aral, another canal, 770 kilometers long, through the now dried-up Uzboy River, would channel the surplus water to the Caspian Sea, the surface of which, as previously mentioned, is 26 meters below sea level.

The canal diverting the 300-cubic-kilometer annual flow of the Ob' -- 10,000 cubic meters per second -- to Lake Aral would have to be of enormous dimensions. With a speed of flow of 1.5-2 meters per second, which hardly can be exceeded, the canal would have to be 20 meters deep and 250-330 meters wide. To construct such a canal, it would be necessary to remove 15 to 20 billion cubic meters of earth. At the highest point of the Turgay watershed, the surface of the canal, which at that point should be 10 meters below the surface at the starting point, would have to be 60 meters below the surface of the ground! This project would dwarf all other projects heretofore carried out by human hands, and one would almost be inclined to write it off as fantastic.

However, a closer look at the value of such a project, for the domestic economy if such a large area could be cultivated shows that the idea may not be so fantastic. If we compare the economic possibilities now at the disposal of nearly 200 million people with the primitive means with which the relatively small Sumerian nation 5,000 years ago turned the area of the Euphrates and the Tigris into a blossoming land, then it becomes difficult to decide which of the projects is relatively the greater.

What are the economic benefits such a canal would bring? With a water volume of 300 cubic kilometers, a surface of 200,000 square kilometers in Turk-estan could be irrigated with 1.5 meters of water per year. For comparison, the total surface of Egypt is only 35,000 square kilometers, and nearly 20 million people find a livelihood there. The area of cultivation which could be brought into being by the diversion of the Ob' River into the Caspian lowland would, therefore, be six times as large as the Nile land.

If we now consider the relatively northerly position of the Caspian lowland and assume a relatively high standard of living for its new citizens, we can figure on a population density of 200 inhabitants per square kilometer. Thus, there would be a new, rich, undeveloped area offering lebensraum for at least 100 million human beings.

The indirect effects of the irrigation project are obviously more difficult to determine, but they, too, must be of very great significance. The 300 cubic kilometers of water evaporating from the irrigated fields cannot simply disappear without a trace; they would have to increase considerably the moistness of large areas. The moisture-laden masses of air will, to the extent they are moved by the winds to the west, south, or east, strike against the mountains bounding the lowland and deposit a large part of their moisture on the slopes in the form of rain. The masses of air moving to the northwest, north, and northeast, no longer hot, searing winds, will not scorch the crops of the black-earth region lying in their path.

- 2 -

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In the entire border area of the lowland, therefore, the quantity of rainfall would increase considerably. The enormous glaciers of the Central Asiatic mountains would grow, the volume of water in the rivers would increase, and the oases watered by these rivers would appear further out in the desert. The great evaporation from the Mediterranean Sea alone is responsible for the fact that the Sahara Desert area did not spread further than it did. This evaporation, in turn, is made possible by an annual flow of over 2,000 cubic kilometers from the Atlantic through the Straits of Gibraltar.

But let us return to the Caspian lowland. The exact future extent and scope of the climatic changes effected by the irrigation project are still difficult to appraise. How important they would be, however, can be shown by a comparison between the proposed addition of 300 cubic kilometers of water from the Ob' with the mere 150 and 50 cubic kilometers now being emptied into Lake Aral by the Amu Dar'ya and Syr Dar'ya rivers. The evaporation of this total future volume of water would absorb enormous quantities of heat (600,000 calories per cubic meter), thereby lowering the extremely high summer temperatures. Condensation of this water vapor would, in turn, warm up the new rain areas considerably. An additional 300 cubic kilometers from the Yenisey would increase the effects even more.

During the winter, the higher degree of humidity of the air would dampen the radiation of heat from the ground, thereby mitigating the cold. The extreme continentality of the Central Asiatic climate would also be made less severe as regards the winter temperature. The result, therefore, would be not only that several hundred thousand square kilometers would have been irrigated, but also that an area of several million square kilometers would have become more suited to human habitation. Also, some of the moist air would blow into Mongolia and alleviate its desert character.

The newly diverted water is to be used primarily for raising the level of Lake Aral, while the level of the Caspian Sea -- because of, among other things, its important oil harbors -- is simply to be maintained. For the actual irrigation, the salty, muddy water of the Amu Dar'ya, Syr Dar'ya, and Volga is to be used primarily.

Only after a further expansion of the irrigation installations and a corresponding influx of new inhabitants are the waters of the Yenisey to come into consideration. The canal must gradually be expanded to double its size, and the irrigated area then increased to 400,000 square kilometers. Water from the Black Sea could also be admitted through the Manych Canal. The effects of all these measures could transform the area into a cultivated region of the first order, with a population of several hundred million, just as Bernard Shaw foresaw when he prophesied that organized collective labor could convert Central Asia from a desert into a center of civilization.

The construction costs of the canal are estimated at 150 billion kronor (one krona equals .19 US dollar). This sum is enormous, but it could be obtained if the Soviet Union would have its rearmament expenditures; the canal could be built in 5 years without lowering the standard of living of the people.

Nor would it be necessary to build the Ob' Canal at one time to its full dimensions. A canal with the dimensions 10 x 100 meters would be sufficient to conduct about 50 cubic kilometers of water to the Caspian lowland at about a third of the cost just mentioned. The dam at Belogore should, however, be finished. In that way, the Siberian inland sea would be filled to a height of 70 meters above sea level, for which a 15-20 year period would be necessary. Only when this was done would the emptying of water into the Caspian lowland begin. The irrigation installations in Turkestan, begun a few years ago, could be used well in advance.

- 3 -

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Once all this was done, it would be possible at a relatively slight cost (for locks, etc.) to develop an enormous network of waterways: a great north-south waterway from the Northern Arctic Ocean to the Caspian Sea, from which one could go by way of the Manych Canal through the Black and Mediterranean seas to the oceans of the world; and an east-west waterway through all of Siberia from Lake Baykal to the Urals. The latter could be connected to the great Volga network by means of the projected Tobol'-Karma Canal.

How valuable such waterways could be is shown by the constantly increasing traffic on the North American Great Lakes, where already the Sault Sainte Marie Canal -- before it is finally expanded -- accommodates tonnage three times as great as that passing through the Suez Canal. As in America, the Siberian waterways could be used for the transport of vast quantities of iron, coal, wood, and textiles, and in the south, for cotton. These are now transported at great expense over great distances by rail. Siberian natural resources could be utilized, thereby, on a heretofore undreamed-of scale.

Undoubtedly, many great technical difficulties would come up in the realization of the plans -- particularly because of the northerly location. However, experiences gleaned from smaller, similar projects in semi-Arctic area prove conclusively that the difficulties would not be insurmountable. The project is not fantastic; it can be carried out.

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- 4 -

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