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Russia (Siberia): Food Insecurity, Mining, and the Promise of Infrastructure.

Russia is not only ecologically diverse, but also culturally diverse. Russia's population is divided among 8 regions and each of these regions has their own specially cultivated crops and traditions ("The World Factbook: Russia"). This essay will focus on one province: The Republic of Sakha, also called Yakutia, located in central Siberia, where only one percent of Russians live (Crate 135). Yakutia is located between the 57° and 75° longitude and the 110° and 160° latitude. The size of Yakutia is comparable to five Frances and there are about 700,000 lakes in the entirety of Yakutia. Statistics show there is only 0.3 people per kilometer squared, according to the population over land size, and most of these people are subsistence farmers or nomadic hunter-gatherers (Kumke et al). Natural parks and other conservation lands fill about 782,000 square kilometers of Yakutia, which is about 25 % of the total land. (Borisov et al). Sakha produces the majority of diamonds and antimony mined in Russia as well as huge amounts of oil and minerals, with an estimated potential monetary value over \$10 trillion. However, most of their oil is currently consumed by Russia without any economic gain for Yakutia (Kempton 2). Although most of Russia's population lacks food security, Siberia, in particular Yakutia, has food insecurity because of barriers to market access. The Republic of Sakha experiences food insecurity because of barriers to market access, such as infertile land, lack of transportation, economic dependence on Moscow, and mining corruption.

The capital city, Yakutsk, considered the coldest city in the world, also is home to the worst highway in the world: the Lena Highway. In 2013, there will be a new railway linking this frosty city to the Trans-Siberian railway and, for the first time in its history, the world. Presently, the Yakut subsistence farmers are cut off from the cities due to lack of transportation and infrastructure and a history of coercion by the Russian colonizers. Over half of the Yakut live below the poverty line.

The Yakut

The Yakut, or Sakha, constitute thirty-eight percent of the population of the Republic of Sakha and sixty-eight percent of the total population of Yakuts, Russians, Ukrainians, Tatars, and Jews live in the main cities (Kempton 2). The Yakut language is in the Altaic family and related to Turkish ("Altaic languages" 1). Rural Yakut use a "cows and kin" subsistence method. Cows provide the basic staples for the Yakut, in the form of meat and milk. The "cows and kin" system is a interwoven care system for the cows a family has. Yakut families without cows will barter labor with a Yakut family in possession of a cow, in exchange for the meat and milk of the cow. Cows and horses are the primary food sources for the Yakut. Another group, the Lake Yessei Yakut are located just outside of the Republic of Sakha, share the same language and identity as Yakutians. Around Lake Yessei Yakut, a different sort of subsistence diet exists. The diet of Lake Yessei Yakut is composed of fishing and hunting (Argounova-Low 1). Examples of Yakutian food are hayah, horse fat, cooked intestines, and meat strips, and drinks are tea and kimus. Hayah is simply frozen butter, and kimus is a traditional Yakutian drink, which is fermented mare's milk. Meat portions are often four to six kilograms, and are served in birch bowls called kytyh. Yakutians also eat tar, frozen fermented milk, occasionally with berries, herbs, or roots (Argounova-Low 3). Studies have shown that Yakut horse meat is richer than other horse breeds, due to the plants of the region and the metabolic processes the horses have developed for their region (Abramov and L.V. Petrova 1). Yakut culture values hospitality, so guest often stop by and are encouraged to take home meat they cannot finish

because to not do so is considered rude. Kumis or koumiss, a drink made of fermented mare's milk, is drunk using a choron, which is shaped like a dipper ("Kimis"). Yakutians have a special relationship with food. They believe that food has a soul, and certain foods, especially dairy products, should go in specific dishes. Often, a Yakut family will give the first spoonful of food to the fire as a sacrifice. Children aren't allowed to eat select body parts of animals, such as bone marrow from jaw bones, because they are thought to catch jaw diseases from them. There are four food taboo groups for different people, which are grouped by women, children, pregnant women, and everyone. The typical rural Yakut subsistence family, for example the families of Viliui Sakha, use delegation of jobs based on gender. A typical Yakut family, in for example Viliui Sakha, generally consists of five to six people, not including elders. Men will generally assume the role of wood collector and hunter, while women will forage for berries as well as tend to gardens. The clans are patrilineal, and often exogamic, which means the families marry outside their clan. Clans with marriages between them organize into tribes (Delaby 1). Although there is job specialization, there is no gender discrimination, per say. Yakut families have strong ties to their elders and children, and most families are multigenerational. The official religion of the Yakut is Russian Orthodox, but remnants of the original Yakut shamanism still exist. While the Yakut have a tradition of nomadism, they also practice animal husbandry, trapping and some farming ("Yakut" 1). Most Yakut have small plots of land where house gardens are grown, as well as hay farms. Hay is harvested each summer, and families generally use each other's equipment as needed, creating "household-based subsistence production". During the Soviet era, a feudal-like farm system was implemented for effective farm centralization. After the state farm system ended, the main focus of production for the Yakut went from consumer goods to household-level production that is the focus of production today. Yakut have job opportunities for mining diamonds or animal husbandry.

A typical village will value the household as the most important relationship, because different household alliances are mandatory for surviving Siberian winter. A clan head is called a kniaz, which means "prince" literally (Crate 137-139, Savin 3-7). Recently, there has been localized progress in the establishment of widespread kindergartens for the children of the Sakha (Kotnick and Shmis 2). According to a report by Interfax, wide-scale education and healthcare funding is expected to decrease by 2015, so services from the national center may lessen. Although Yakutia is gaining investment in kindergartens and other educational resources, if Russia stops providing funding for education, these improvements will stop ("Share of Education, Healthcare Spending in Russian Budget to Fall in 2015 (Part 2)"). Lack of education hinders a person's ability to make beneficial trade agreements, and increases their vulnerability to be manipulated and cheated upon. If Yakutia's, also known as the Republic of Sakha, market access could be improved through the development of Eastern Siberian/Asiatic markets and their methods of production made more expedient, the Yakut would gain economic returns, and better food growth opportunities, which would lead to increased food security not only in Yakutia, but in Russia as a whole. Economic expansion in Yakutia would lead the Republic of Sakha to be less dependent on Moscow. This would allow the Russian government to implement economic policies on other areas of Russia that need attention. Sakha has limited arable land for a variety of reasons, most essentially the severe permafrost and soil salinization of Siberia.

Data from NASA's Terra Satellite shows the absorption of CO₂ is relatively equal to the respiration of CO₂ in Yakutia ("CERES/ARM Validation Experiment (CAVE)"). This means that the vegetation of Yakutia is decaying at the same rate of its photosynthesis, and that the land of Yakutia holds very little in the way of arable land. Yakutia also suffers from salt-affected soils in 50.3% of their cropland. In Yakutia, soil salinization is primarily found in 0.13% of Central Yakutia, an elevated platform of land, but agriculturally takes up more than half the farmland. These "salt-affected soils" develop in river floodplains, the ancient alluvial plain, and on the low terraces of Central Yakutia and are mainly composed of sodium and magnesium. Similar soil salinization areas have been found along the coast of the Arctic Ocean and in other river valleys. Studies have shown that the primary reasons for the salt-affected land are permafrost, floodwater depressions, and evaporation. Permafrost in Central Yakutia is

generally 400-600 meters thick and sometimes can be found in the taiga zone (Chernousenko and Desyaktin 17). The average temperatures vary from over 35°C in summer to below -38°C in winter (“Yatsuk”). Evaporation removes the water from the permafrost and leaves behind concentrations of salts, which then accumulate in the soil. Floodwaters generally accumulate and create depressions. When they recede, they leave behind salt deposits, which are then absorbed into the land. Since soil salinization is naturally caused by the permafrost in Yakutia, only manmade processes would be able to remedy the salinization.

Manmade remedies are not easy or ideal solutions in an environment with ancient forests and plateaus. With the advent of global climate change, it is uncertain what will happen in regard to the soil salinization in Yakutia. It likely will increase, as flooding becomes more common and the permafrost begins to melt.

Yet another barrier to successful market access is the Yakutian mining industry. Due to mining strikes at the end of the Soviet era, the Russian president of the time, President Yeltsin, promised to give Yakutia 20% of the revenue of their diamond and precious gem mining industry (Kempton 3). Yakutia has been denied their revenue by Putin in recent years (“Yakut Movement Demands Russian Leader Leave Diamond Mine in Property of Republic”). When President Yeltsin attempted to create a joint-stock diamond industry between Sakha and Russia, De Beers offered its expertise in the diamond trade. Yakutia created an independent diamond industry called Tuymaada Diamond and now have joint venture agreements with Israel, Belgium, Japan, South Korea and De Beers (Kempton 5). A quick look on Bloomberg.com shows the current price to earnings ratio of Tuymaada Diamond at -147,084,571.7545. Tuymaada Diamond’s income statement, which is reported to be 1,695,000, cannot be validated because their balance sheet records zero percent in debt to asset percentage (“TMDM:RTS Stock Quote.” 1). Tuymaada Diamond is an illiquid stock which reports good earnings but has no accounting to verify their earnings. Due to the lack of verification on their stock reports, it is highly unlikely that there will be any investment in Tuymaada Diamond. If Tuymaada Diamond hired an accounting firm, their reliability and accuracy in their reports would possibly be remedied, which would help generate the interest of global investors. Investment in Tuymaada, by investors other than those in Moscow, would aide Tuymaada and Yakutia in becoming less economically reliant on Moscow. Their global trade would increase, the Republic of Sakha would experience an economic upturn, and the Republic of Sakha could potentially extend their mining market to Asia to generate affordable imports in food and other supplies.

Another diamond company, ALROSA, has gained most of the mining industry from Tuymaada in recent years, creating a diamond monopoly. ALROSA mines \$1.6 billion worth of precious stones each year (Aris 1). ALROSA was also created by Yeltsin in 1993, as an attempt to privatize for a better state budget (Aris 1). They now mine 20% of the world’s diamonds and mine largely in the Republic of Sakha (Aris 2). The Republic of Sakha only receives 32% of their economic shares, and local Yakutians only gain 8% (“RUSSIA: ALROSA Challenges De Beers on World Market.” 1). A majority of ALROSA mining is located in Mirny, Yakutia, 700 kilometers away from the closest railways (“RUSSIA: ALROSA Challenges De Beers on World Market.” 2). However, ALROSA is currently being federally investigated for embezzlement of \$5.5 million and offshore banking schemes (Aris 4).

New Infrastructure and Innovation

Some remedies for increasing agricultural production could be increasing funding for N. I. Vavilov All-Russian Scientific Research Institute of Plant Industry, hereinafter nicknamed VIR, construction of a railway through Siberia and Asia, validation of Tuymaada stock revenue, and prosecution of ALROSA. The VIR is centered in St. Petersburg with experimental stations in various parts of Russia and the globe. Since scientists and technicians are highly underpaid at the VIR, early retirement to allow better wages for remaining scientists is encouraged. This is not a safe solution, though. There is concern among officials at the VIR that recruiting younger scientists will be unsuccessful because of the bad wages. However, the management of the VIR should not only be a concern to Russia. The VIR has been curating

seeds since 1894, which is longer than any other seed bank in the world (Strobel 1-3). The main goal of the VIR is to “maintain the supply-and-delivery stream of genetic resources essential to feeding present and future generations offering us a critical modicum of food security in the face of global climate change...” (Nabhan 13). This important institute provides a valuable collection of plants for agriculture throughout Russia. If funding for genetic research could be acquired, the institute could begin to experiment with cold-resistant, hearty grains. The Land Institute in the United States has already embarked on genetic experimenting for the creation of perennial grains, such as wheat, rice, and others (Glover and Reganold 5). Although it is highly doubtful that a grain able to withstand Siberia all year round could be developed, the development of perennial grains, or semi-perennial grains could further extend Russia’s, as well as Yakutia’s, agricultural production season. The introduction of small-scale rural farming families to better semi-perennial or cold-resistant crops would allow a market for food exports and imports to appear between Asia and East Russia. Also, research from T.J. Flowers of the University of Sussex has tried to find gene technology to make seeds adaptable to salt-saturated land. This research has found that some strains of plants, like sorghum, rice, and tomatoes, have more salt-resistant genes than others). This trait is multigenetic and helps minimize the plant’s intake of sodium (Flowers 3). Flowers suggests to develop salt resistant crops, farmers use halophytes, hybrid crops for salt resistant genes, and breed for yield rather than tolerance. Halophytes are plants that grow in high salinity areas already, such as brackish water. Field studies particular to Yakutia should be sponsored by the government to test the fertility of genetically modified grains. If farmers were educated in Yakutia on how to hybrid their crops for better yield and salt tolerance, grain would be able to become a trade-able commodity in Yakutia. Flowers advises that the grain used to hybrid should be in its fourth generation so that it is genetically stable. If Yakutian farmers could be given the education about and the means to hybridization of salt resistant and cold resistant grains, grains could become a source of local industry for the Republic of Sakha. The subsistence farmers would be able to trade their now marketable grains for much needed utilities which they currently lack. Also, an extended farming season in Yakutia would encourage infrastructure to be built, because families would need help with their market farming and would invest in farming technology. The more farming technology bought, the more crops are able to be grown, which becomes a cycle of economic growth. Seed innovations that increase agricultural productivity would also help in developing local cottage industries. In recent years, the economy of entire Russia has shifted towards the bartering system (Nikova 64). People, especially people with a lower socio-economic status, now trade food and goods in return for housing and communal utilities (Nikova 64). The Land Institute highly encourages support from federal programs to ease the transition of farmers to perennial crops (Glover and Reganold 4).

One other remedy, construction of an Eastern Siberian/Asiatic railway system, would increase market access to Yakutia by supporting imports and exports for Yakutia without relying on a transaction with Moscow. A model for this railway would be the Afghanistan-Uzbekistan railway. The Afghanistan-Uzbekistan railway, worth \$180 million, has generated trade and furthered market access throughout Afghanistan and Uzbekistan (“Uzbekistan Railways to Help Build Afghan Railway Sys.” 1). The train route has succeeded in providing 1.6 million tons of humanitarian relief goods for Afghanistan, as well as diminishing transport costs and boosting trade (“ADB-FUNDED UZBEK RAIL PROJECT RO ACCELERATE REGIONAL TRADE” 1). It travels through underdeveloped districts to help them set up markets for cotton, horticulture, marble, oil, and gas (“ADB-FUNDED UZBEK RAIL PROJECT RO ACCELERATE REGIONAL TRADE” 1). If such a railway was designed to run through Yakutia to stations throughout East Asia, local trade would be generated and there would be less isolation for market exports. There are already three primary railways in Russia (“Transportation and Infrastructure.”). The Trans-Siberian railway runs across Russia, and covers about seven time zones (“Trans-Siberian Railway”). The Trans-Manchurian railway connects part of the Trans-Siberian railway to Northeastern Chinese provinces (“Trans-Siberian Railway”). The Trans-Mongolian railway travels eventually to Beijing (“Trans-Siberian Railway.”). While these railways are beneficial for trade and do provide transportation opportunities, their routes are arguably out of date. The Trans-Siberian railway, for

example was finished in 1916. While there hasn't been considerable development in Sakha, Yakutia has experienced mild demographic expansion. These already-existing railways don't fully accommodate the changed structure of Yakutia. If another railway could be created exclusively for Siberian city transport that connected to Asia, trade and market opportunities would rapidly increase for the Yakut.

As for the corruption in the mining industry, if Tuymaada Diamond hired an accounting firm, their reliability and accuracy in their reports would possibly be remedied, which would help generate the interest of Western investors. This would allow the republic of Sakha to experience an economic upturn, and could extend their mining market to Asia to generate affordable imports in food. The People's Front Yakutia, an organization for the people of Yakutia, recently appealed to Putin to release the government's control of ALROSA ("Yakut Movement Demands Russian Leader Leave Diamond Mine in Property of Republic." 3). They claim "they [the People's Front of Yakutia] will resort to decisive measures.... to fully halt the activities of the stock company ALROSA on the territory ALROSA" ("Yakut Movement Demands Russian Leader Leave Diamond Mine in Property of Republic." 3). If prosecution of the illicit activities of ALROSA is implemented and succeeds, more diamond companies will develop, which creates a better free market for the Yakutians.

Conclusion

On a local level, the development and funding of the VIR would help the Yakut by introducing healthier grains into their staple diet. Yakut horses have more fatty acids than other breeds (Abramov and Petrova 2). This fat can be proven to increase the amount of cholesterol and fat in Yakutian families (Abramov and Petrova 2). If staple grains were introduced into the Yakutian meat and dairy diet, it would provide a new source of food for the Yakutians and could also help feed livestock. This food solution can be implemented right away with the already existing research of the Land Institute and the backing of the Russian government. As soon as the research from VIR is brought to Yakut, immediate changes in agricultural harvesting and seed technology can be instilled in future farming generations. The construction of a railway between Asia and Siberia would affect local Yakutians by bringing new goods to the Republic of Sakha, as well as forcing local governments to manage stations and assume responsibility from Moscow for economic revenue. With Tuymaada recognized as a valid company, the Republic of Sakha would gain more Western investment into their diamond trade, improving local life by trickle down from mining revenue and if ALROSA is indicted with embezzlement, the ALROSA monopoly will be forced to make changes in their monopolistic business enterprises. All of the remedies to the barriers to market for the Yakutians would also allow the Republic of Sakha to gain economic independence from Moscow.

Food insecurity exists throughout Yakutia primarily because of limited arable cropland, isolation from bad transport systems, diamond mining dependence on Moscow, and mining corruption. Due to "salt-affected" soils, half of cropland in Yakutia is infertile (Chernousenko and Desyaktin 17). If seed technology could be developed to maximize the produce of arable land and extend the farming season by the creation of almost perennial seeds, more people would receive adequate nutrition during winter. Some seed technology already does exist, due to the VIR institute. If funding was found, field work and educational programs could be implemented to help the farmers of Yakut grow better crops. The construction of a railway, as modeled by the North Afghanistan- Uzbekistan railway, would increase trade and open markets throughout the Republic of Sakha. This would expose the Yakut to more imports and bigger market avenues, which in turn would increase trade. To gain economic self-reliance, Tuymaada diamond would have to verify their stock returns, probably with an international accounting firm. ALROSA would have to be found guilty of embezzlement and suspicious offshore banking investments, to enable the Yakut government to repose their own diamond mines. Lobbying for ALROSA and Tuymaada diamond should be curbed by the Yakut people, in order to make an immediate change. Although Yakutia is only a region of Russia, its economic success for its local people as well as its worldwide relations, is directly related to the food security of the globe at large.

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