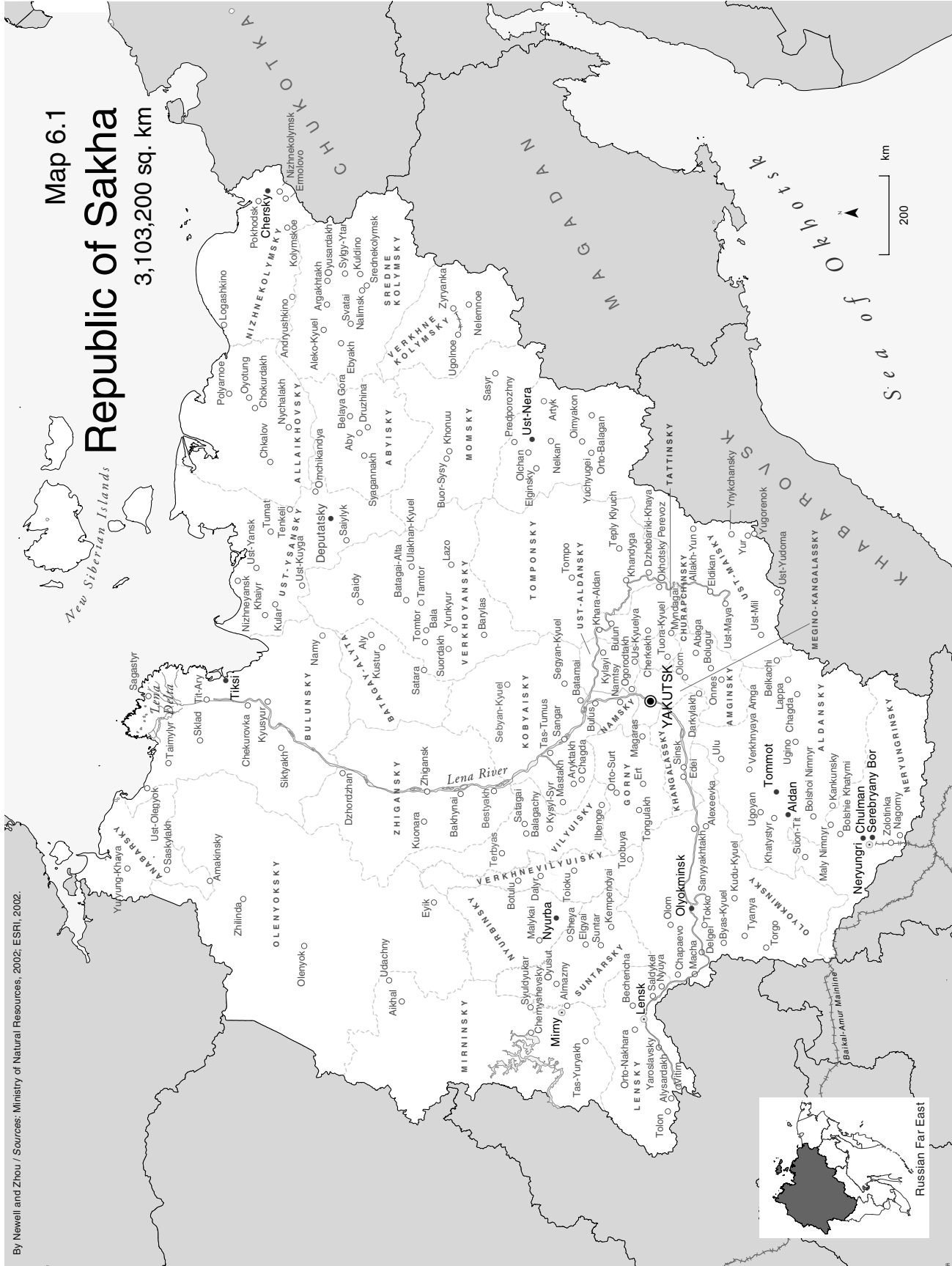


Map 6.1

Republic of Sakha
3,103,200 sq. km



By Newell and Zhou / Sources: Ministry of Natural Resources, 2002; ESRI, 2002.

Republic of Sakha

Location

The Republic of Sakha (Yakutia) in northeastern Siberia stretches to Henrietta Island (77°N) in the far north and is washed by the Arctic Ocean (Laptev and Eastern Siberian Seas). These are the coldest seas in the northern hemisphere, and are covered in ice for nine or ten months of the year. Chukotka and Magadan form Sakha's mountainous eastern border, Amur and Khabarovsk its southern border, and Eastern Siberia its western border. The name of this republic has changed several times in recent years, and in Russia, the names Sakha and Yakutia are used interchangeably. To be consistent, Sakha is used in this text.

Size

Sakha accounts for almost one-fourth of the territory of the Russian Federation (3,103,200 sq. km) and is larger than the combined areas of France, Austria, Germany, Italy, Sweden, England, Greece, and Finland, or, five times the size of Texas. It stretches 2,000 km north to south and 2,500 km east to west.

Climate

Winter is prolonged and severe, with average January temperatures of about -40°C . Summer is short but warm; the average temperature in July is 13°C , and temperatures have reached 39°C in Yakutsk. In the northeast, the town of Verkhoyansk reaches -70°C (-83°F) and is considered the coldest inhabited place on Earth. There is little precipitation, ranging from 150 mm in central Sakha to 500 mm in the mountains of eastern and southern Sakha.¹

Geography and ecology

Forty percent of Sakha lies within the Arctic Circle, and all of it is covered by permafrost (permanently frozen ground), which limits forests mainly to the south. Sakha can be divided into five great vegetation belts that merge very gradually into one another. The islands are mostly covered with snow for up to eleven months each year and are considered arctic desert, although scattered patches of tundra vegetation grow there in the spring and summer. Arctic tundra grows along the mainland coast, and subarctic tundra defines most of northern Sakha, where lichen and moss grow into great green carpets, favored pastures for reindeer (*Rangifer tarandus*).

Tundra woodlands with scattered Dahurian larch (*Larix gmelini*) trees separate tundra from boreal forests further south. They are also the most widespread vegetation type in the intermontane valleys of northeastern Sakha. Relict patches of steppe grasslands are found

on southern slopes in this zone. Boreal forests define the fifth vegetation belt. Dahurian larch dominates—about 90 percent of the forest cover is larch,² though stands of fir (*Abies*), spruce (*Picea*), and Scots pine (*Pinus silvestris*) begin to appear in the south.

Isolated stands of Siberian spruce (*P. obovata*) also grow along the western border and in sheltered canyons of Verkhoyansk Range in the northeast. An unusual feature of the lowland forests in central Sakha is that they grow in an arid climate and depend on permafrost for moisture. Large meadows, locally called *alas*, also grow in this area.

The great Lena River watershed begins in the steep mountains that border the western shores of Lake Baikal. The river then meanders northeast and is joined by the Vitim River, followed by the Olyokma, Aldan, Amga, and Vilyui Rivers, before flowing through a wide delta into the Arctic Ocean. It spreads through Sakha like a huge pitchfork and, with its tributaries, forms the great river network that supports this immense region's ecology. The Lena River is over 4,000 km long, and the entire basin covers 2.5 million sq. km.

Mountains, highlands, and plateaus cover 70 percent of the republic. Sakha's longest mountain range, the Verkhoyansk, runs parallel to and east of the Lena, forming a great arc that begins not far from the Sea of Okhotsk and ends in the Arctic Ocean (Laptev Sea).

This great range gives rise to the hundreds of small tributaries that feed the Lena. The Chersky Range runs east of the Verkhoyansk and has the highest peak in Sakha, Mount Pobeda (3,147 m), as well as one active and many extinct volcanos. Between these two ranges lies the Yana-Oimyakon Plateau. Even further east are the spurs of gold-rich Kolyma Mountains, which stretch all the way to Chukotka, but enter Sakha only on the eastern fringes. All three major ranges are connected by the Suntar-Khayata (Misty Mountains) Range. The edge of the great central Siberian plateau is found in the west. In the remote northwestern part of Sakha lies the Popigai Meteor Crater, which is 70 km in diameter and surrounded by a circular mountain ridge. The Arctic coast and islands are flat, with hundreds of thousands of lakes. The volcanic De Long Islands in the extreme northeast are covered with ice shields. One of them, Bennet Island, which recently erupted, is the northernmost active volcano on Earth.

Geologically, mainland Sakha is very old, and its complex and diverse geological structures are rich in minerals. In the western part of the republic is one of the most ancient portions of the Earth's crust, the source of its massive diamond reserves. Sakha is well known throughout Russia for its mineral wealth. Besides diamonds, it has gold, tin, natural gas, and oil. The full extent of its mineral resources is not completely known.

Key issues and projects

Sakha's diamond industry

Alrosa Corporation and government agencies are all angling to capitalize on Sakha's immense diamond reserves, estimated to be the world's second largest (see p. 244).

Natural gas exports

Japan, China, and South Korea are all potential consumers of the region's oil and natural gas, which would be transported by pipeline (see pp. 253–54).

Japanese investment in coal mining

Russia and Japan, with government financing and support, began joint coal-development projects in 1974 in the Neryungri region (see pp. 251–52).

Foreign investment in gold mining

Canadian and Irish mining companies are investing millions of dollars to exploit gold reserves (see p. 249).

Flora and fauna

The fauna includes 64 species of mammals, 285 species of birds, 4 species of amphibians, 2 species of reptiles, 43 species of freshwater fish, and some 4,000 species of insects. Polar bears (*Ursus maritimus*) den and hunt in Arctic regions. Each year over thirty thousand geese migrate to the wetlands between the Yana and Kolyma Rivers, and between two and three hundred thousand ducks migrate to the region between the Kolyma and Alazeya Rivers.³ Siberian cranes (*Grus leucogeranus*), sandhill cranes (*G. canadensis*), Ross's gulls (*Larus roseus*), geese, and other waterfowl nest on the left bank of the Khroma River and along the lower Indigirka and Alazeya Rivers. The Siberian crane is the unofficial national symbol of Sakha (the official symbol is the horse). The population in Sakha is one of just two isolated nesting populations; the other is in the lowlands of the Ob River and is almost extinct.⁴ Sakha's *Red Data Book* contains sixteen species of mammals and fifty species of birds. Between 70,000 and 80,000 moose (*Alces canadensis*), 50,000 snow sheep (*Ovis nivicola*), and 250,000 wild reindeer live in Sakha. Sakha's flora includes 1,831 species of vascular plant, 526 species of moss, more than 550 species of lichen, and more than 510 species of mushroom. Many plants are rare or endangered. Among them are 67 endemics and subendemics, including some that grow in very limited areas.

Largest cities

Yakutsk (pop. 194,000), the capital and industrial center, was founded in 1632. Built entirely on permafrost, it has developed some manufacturing and food industries. Neryungri (pop. 76,000) in the south is the center for coal mining and has a large thermal power plant. Mirny (pop. 29,000) is the center for Sakha's diamond industry. Aldan (pop. 26,400) is in the gold mining region. Lensk (pop. 31,200) is a major river port located on Sakha's northern coast.

Population

The population of Sakha is 976,400.⁵ The main ethnic groups are Russian, Yakut, and Ukrainian. Native people include Evenks, Evens, Dolgans, Chukchi, and Yukagirs. In 1920, indigenous people made up 90 percent of the total population, but rapid expansion of the mining industry brought many Russians and Ukrainians to the territory. By the late 1980s, indigenous people's share had shrunk to about 33 percent of the population, but with a decline in industry, they now comprise 40 percent.⁶

Political status

Sakha is one of the Russian Federation's twenty republics. Each republic has a president, council of ministers, and a two-tiered parliament. Alrosa President Vyacheslav Shtyrov, endorsed by the Kremlin, was elected president in late 2001, replacing Mikhail Nikolaev, who had been president since 1989. As a republic, Sakha has more autonomy than do other *krais* and *oblasts* of the RFE. The Republic of Sakha is divided into thirty-five districts and two municipalities. Because Sakha is a republic and not a *krai*, *oblast*, or *okrug*, its administrative districts are called *uluses* rather than *raions*.

Natural resources

Sakha is blessed with tremendous deposits of precious metals, oil and natural gas reserves, and vast forests.⁷ It has 84 percent of Russia's diamond reserves, as well as the largest tin

reserves in Russia. It also has the largest coal reserves in Russia, between 4.4 billion and 15 billion tons, with the most extensive reserves in and around Neryungri.⁸ There are 4.4 billion tons of iron ore, mostly located in the southwest (Aldan region), as well as the only phosphate deposit in the Russian Far East (RFE). After Brazil, Sakha has the world's second-largest niobium reserves (in Tomtor), as well as many other important minerals, including zeolite, bismuth, mercury, and antimony. Gold reserves are estimated to be the third largest in Russia, although exact figures are unknown. About half of the territory has oil and gas potential, oil and natural gas reserves totaling about 253 million tons and 13 trillion cu. m, respectively.⁹

About half of all the rivers in East Siberia and the Far East that are viable as commercial sources of hydroelectric power are in Sakha. Water resources include over seven thousand rivers with a combined length of 1.5 million km. The Lena, 4,400-km long, is one of the ten longest rivers in the world, with 844 billion cu. m of runoff yearly. Groundwater reserves are estimated at 7.43 billion cu. m. Commercially feasible hydro-energy resources amount to 300 billion kW per hour annually, or about 60 million kW of power.

There are about nine billion cu. m of timber, although much of this is small-sized larch. There are also large amounts of commercial furs.

Main industries

Sakha is a natural resource colony; the processing industry is underdeveloped. Large federal subsidies keep the republic afloat. In 1999, it received about 5 percent of all Russian federal subsidies, the third largest subsidy among all Russian republics.¹⁰ Sakha is important to Moscow primarily because of its diamond industry, which produces 98 percent of Russia's diamonds and is the second-largest producer in the world.¹¹ The industry, controlled by the state-owned monopoly Almazly Rossii-Sakha, known as Alrosa, produced about U.S.\$1.5 billion in diamonds in 2000, up 32 percent from 1993.¹² Gold mining is another major industry but, since the early 1990s, loss of federal subsidies, an unstable energy supply, and high transport costs, as well as a declining resource and limited foreign investment have hit the gold industry hard. Tin is mined from the Deputatsky region in the north, which used to provide about half of Russia's annual production. Almost all the antimony used in Russia comes from Sakha. Indigirzoloto shipped its first consignment of 1,000 tons of antimony concentrate through Magadan in spring 2000.¹³ Indigirzoloto mining company used to supply the huge Kadamzhay Antimony Combine in Kyrgyzstan with 70 percent of its antimony concentrate.¹⁴

Sakha produces about 10 million tons of coal annually, 75 percent of which comes from the huge Neryungri strip mine in the south. About 142,000 tons of oil are produced annually in Sakha, and the government plans to increase production to 300,000 tons. Alrosa consumes almost half of all oil production. Electricity generation is one of the region's secondary industries. The Vilyuiskaya (hydroelectric), Yakutskaya (gas-fired), and Neryungri (coal-fired) power stations supply most of the electricity and are based in the major mining centers. The main forms of energy are coal (mined in the Neryungri, Kangalasskoe, Sangarskoe, Dzhebariki-Khaya, and Zyryanskoe reserves), gas (from the Vilyui basin), imported oil products, and firewood.

Sakha has over 44 percent of the RFE's total timber stock. The volume of wood logged has decreased steadily from between 4.5 and 5 million cu. m of timber per year in the 1980s to less than 2 million cu. m by the late 1990s. Most logging occurs near the main



Vladimir Dinets

Sakha was the first region of the RFE colonized by Russians. This ostrog (fort) in Yakutsk is probably the oldest Russian-built structure in the RFE.

transport routes and along the Lena River and nearby settlements. Farming in Sakha, mainly animal husbandry, includes raising reindeer and fur animals, as well as cattle and horses. Grain, potatoes, and vegetables are grown. Pig and chicken farming are slowly developing. Sakha is an important hunting region, mainly for fur. There is also some light industry.

Infrastructure

The infrastructure is unbalanced and underdeveloped. Sakha relies heavily on the Lena River and its tributaries to transport goods and people. Most transport is seasonal; traffic is shipped along the rivers during the short summers and driven along their frozen surfaces in winter. Shipping cargo is costly, particularly to remote villages and small cities, forcing the Sakha government to stockpile food and other supplies.¹⁵ In summer, goods are often shipped through the Arctic Ocean and up the mouths of the Yana, Indigirka, and Kolyma Rivers. This is reportedly the cheapest way to import supplies from the United States. Raw material exports out of Sakha are limited by the lack of links between its capital, Yakutsk, and the Baikal-Amur Mainline (BAM) and Trans-Siberian Railroad. The only permanent rail link runs from the BAM to the town of Tommot, about one-half of the way to Yakutsk. All roads leading out of Yakutsk remain unpaved. The road network

totals 25,000 km, but paved roads account for only about 11 percent. Small quantities of cargo travel by way of a winter road to Magadan. Airplanes are necessary to cover large distances within the republic, but service is spotty. Air travel to and from the republic is more regular, with frequent service to Moscow and a weekly flight to Vladivostok. Helicopters are being used increasingly to reach remote settlements.

Foreign trade

In 2001, exports totaled about U.S.\$1.3 billion, most of which was diamonds. Coal and timber are exported by rail or ship primarily to Japan. Logs used to be sent to Japan via the Lena River and then transported from Tiksi, on the Arctic Ocean, to Nakhodka (Primorsky Krai) by ship. Since the 1970s, Japan has traded coal extraction and transportation machinery for Sakha's high-quality coking coal. Major imports include consumer goods,

foodstuffs, mining and construction equipment, and oil products. Due to a constant fuel shortage, oil products worth about U.S.\$200 million are imported into Sakha annually. There are more than thirty companies operating in Sakha with foreign capital. The region saw about U.S.\$140 million in foreign investment in 2001. Leading investment sectors are gold mining and oil and gas development. French-based companies invested U.S.\$100 million of the total investment.¹⁶

Economic importance in the RFE

With the largest economy in the RFE, Sakha supplies 27 percent of the total GNP, 98 percent of Russia's diamonds (in 2001), and 23 percent of Russia's gold production. Vilyuiskaya is the largest power station in the RFE. The republic, which occupies 49 percent of the total land area of the RFE, has:

- 42 percent of all coal reserves.
- 43 percent of all tin reserves.
- 79 percent of all iron reserves.
- 62 percent of all natural gas reserves.
- 31 percent of all oil reserves.

General outlook

The republic has the largest economy in the region, contributing about 27 percent of the RFE's gross regional product. About 75 percent of Sakha's annual revenue comes from its diamond industry.¹⁷ Alrosa plans to increase revenues to U.S.\$2 billion by 2005, mostly through expanding the diamond cutting industry.¹⁸ The move to expand the production of semifinished diamonds is supported by the Sakha government, which sees the development of a diamond processing industry as a key to stabilizing the economy. According to an agreement with the Russian Federation, the republic retains 20 percent of the jewelry-grade diamonds and 11.5 percent of the gold produced, and so the Sakha government would like to process these resources within the region. In 2001, Rus-Almaz, based in St. Petersburg, and the Sakha government opened a new diamond cutting plant, Aurora Diamond, in Yakutsk. The new plant has the capacity to process 84,000 carats of diamonds per year.¹⁹

To diversify the economy, the Sakha government has heavily subsidized the gold mining industry and is providing incentives to attract foreign investment. The government reportedly wrote off 126 million rubles in taxes due from gold mining companies in 1999 on the condition that they upgrade capacity and close down unprofitable operations. As a result, production increased in 1999 to 15.2 tons, up from 12.7 tons in 1997.²⁰ Expecting the start-up of the Nezhdaninskoe gold mine and expanded production from the Kuranakh gold mine, the government hopes to increase gold production to 20 tons.²¹ Both of these ventures involve foreign companies. The government also plans to issue more licenses to groups of small prospectors (*artels*), which are major producers with an increasing market share. Major gold producing companies in Sakha include Indigirzoloto and Aldanzoloto. To increase production, new technologies, but not necessarily environmentally friendly ones, are being introduced. The government also has ambitious plans to export some of Sakha's vast natural gas resources to Korea or China by pipeline. This project, however, will need massive infusions of foreign capital, possibly as much as U.S.\$23 billion, and so far investment has been limited to feasibility studies. Yakutugol, Sakha's coal monopoly,

operates all of the mines but is on the verge of bankruptcy. So the Sakha government has offered shares of Yakutugol to Japanese companies and is looking for foreign investment to develop the vast Denisovskoe, Chulmikanakoe, and Bolshoe Tokko coal deposits.

With a harsh climate and lack of arable land, Sakha is highly dependent on other regions in Russia and abroad for basic foodstuffs and consumer goods and will probably never be self-sufficient. However, timber, gold, oil, and diamond processing industries could slow down the rapacious resource exploitation that now occurs and stabilize the economy by providing jobs. If Sakha, like other regions in the RFE, continues simply to extract raw materials, the rivers will continue to be poisoned and fragile forests will continue to be overlogged. If the railway from Amur Oblast to Yakutsk is ever completed, raw materials will be exported even more rapidly.

In the extremely cold, dry climate, the forests grow slowly and trees are small, so large areas must be logged to obtain timber. Unable to import timber because of high transport costs, small logging ventures are cutting Group I protected forests along the northern river basins (particularly along the Indigirka and Kolyma Rivers) for building materials and

firewood. Despite their relatively moderate scale, logging ventures are significantly damaging because of the destructive clear-cutting and heavy logging near settlements and transportation routes. Recent studies have highlighted the importance of boreal forests in mitigating climate change, and the preservation and sustainable use of the forests in Sakha should be an issue of global concern.

The government, one of the few in the RFE to develop a comprehensive ecological program, has ambitious plans to ultimately protect 25 percent of Sakha (an area about the size of France). The international community should support these efforts. A major step would be the preservation of Sakha's biodiversity hotspots, in particular the protection of Bolshoe (Greater) Tokko Lake, which is threatened by plans to mine coal for export.

— *Josh Newell*



Vladimir Dinets

Verkhoyansk, Sakha – considered the coldest inhabited place on earth.

Ecology

Alexander Isaev

Permafrost covers all of Sakha and leaves its imprint on the region. Depths of this permanently frozen soil vary from between 30 and 50 m in southern Sakha to 500 m and more (the world's deepest) in central and northern Sakha. Because permafrost soil temperature at a depth of between 5 and 10 m remains constant at -10°C and lower, it has a cooling effect on the ecosystem. Depending on climatic and soil conditions and vegetation type, the upper layer of soil thaws in summer to a depth of between 0.4 and 2.0 m. In summer, the vegetation above ground, such as trees and brush, has elevated temperatures, while the underground roots remain at temperatures that are low, but still above zero.

Sakha consists of five natural zones: arctic desert, arctic tundra, subarctic tundra, subarctic tundra woodlands, and boreal forests, locally called taiga. Forests cover 47.4 percent (257 million ha) of the territory, but the extent of forest cover varies by region: 32 percent in the northeastern region, 78 percent in the northwestern region, 77 percent in the central region, and up to 93 percent in the southern region. Total forest area is almost 260 million ha, including 150 million ha of unbroken, or old-growth, forest. Timber reserves total more than 9 billion cu. m, including 6 billion cu. m of mature and overmature timber reserves. Conifers make up 97 percent of total wood resources. Dahurian larch accounts for 79 percent of the forests, with the remainder primarily Scots pine, Siberian spruce, East Siberian fir (*Abies nephrolepis*), birch (*Betula*), and aspen (*Populus tremulae*). Siberian pine (*Pinus sibirica*) and Siberian fir (*Abies sibirica*) grow in the southwest, while Ayan spruce (*Picea ayanensis*) and stone birch (*Betula ermanii*) grow in the mountainous southern regions. In river valleys, aromatic poplar (*Populus suaveolens*), chosonia (*Chosenia arbutifolia*), and willows (*Salix*) grow. There are significant areas of Japanese stone pine (*Pinus pumila*), primarily in the mountainous regions. In the southern part of the tundra belt, scattered stands of Japanese stone pine and Dahurian larch grow along the rivers.

In the north, the forests are mainly found along river valleys, sometimes almost all the way to the coast. High in plant and animal diversity compared with the surrounding regions, the northern river valley forests of the Indigirka and Kolyma River basins and adjacent tributaries are very productive, considering their northern latitude. The main threat is logging. Almost all of these forests grow in protected Group I zones along rivers. Lack of firewood and timber for building in the cold northern regions has forced locals to log these protected forests. In the past, wood was imported from other regions, but the high cost of fuel and transport has made this practice prohibitively expensive. Other important forest zones include:

- Larch forests of the Olenyok region.
- The mountain larch forests of the northern taiga region near the Yana and Kolyma Rivers.
- The pine and larch forests of the Lena-Baikal region.
- The central taiga of the Aldan region.

Forest fires are increasingly frequent, especially in the hot, dry summers. Between 1978 and 1987, 131,000 ha of forest were burned. However, between 1988 and 1998, as many as 8,500 fires have burned an estimated 2.5 million ha, resulting in the loss of almost 40 million cu. m of timber. Between 800 and 1,000 forest fires are recorded annually, burning an average of more than 250 ha each. In the record year of 1996, fires raged over an area of more than 500,000 ha. About half of the fires are caused by lightning and one-third by human error; about one-tenth are planned burns.

Edible and medicinal plants abound in Sakha's forests. Some of the most familiar types include berries (two arboreal species, ten bushes, five small shrubs, and five grasses), nut-bearing plants (two species of pine), twenty species of leafy grasses, and two species of birch. There are also more than one hundred species of edible mushrooms. In addition, more than twenty species of plants were known to our ancestors as "famine" foods. Medicinal plants include seven species of trees, twenty-six species of bushes and shrubs, more than fifty species of grasses, six species of mushrooms, and ten species of lichens. Of these, more than thirty species are presently used to make medicine.

Large numbers of waterfowl, such as several species of swans, geese, and ducks, as well as cranes and shorebirds, nest here. Over half of the Bewick's swans (*Cygnus bewickii*) in Sakha, as well as sandhill cranes, eiders (*Somateria*) and other waterfowl, nest between the Kolyma and Konkovaya Rivers. Little curlews (*Numenius minutus*), Siberian white cranes, hooded cranes (*Grus monachus*), and black storks (*Ciconia nigra*) nest between the Lena and Kolyma Rivers.

Protected area system

L. SHMATKOVA—The government established the Olyokminsky and Delta Leny Zapovedniks in 1984 and 1996, respectively, and a number of *zakazniks*, but these territories occupy less than 2 percent of Sakha's total area, and thus have not adequately protected the region's ecosystems and biodiversity. Decades of destructive diamond and gold mining have destroyed over 25,000 ha of land, and today these areas are still devastated. The Sakha government, however, recognizes the necessity to protect ecosystems for biodiversity conservation and use by indigenous peoples, as well as to encourage sustainable development. In 1994, the government decreed that 25 percent of Sakha would be protected to preserve pristine areas and to ensure that some natural resources remain untapped for future generations.²² This decree has served as

a predecessor and, in some cases, a catalyst for the creation of similar networks of protected areas in other regions of Russia. It appeared considerably ahead of the Pan-European Biological and Landscape Diversity Strategy, which was adopted by the European Union in October 1995. This strategy is considered to be the main European contribution toward fulfilling the goals of the UN-sponsored Agenda 21, which has become the cornerstone of sustainable development efforts in many regions worldwide.

To establish a network of protected areas, the republic first created the legal foundations for such territories.²³ For the first time in the Russian Federation, protected areas were given names in the Yakut language: *Ayan ayilyg* (national nature parks), *Erkeyi sirder* (national resource reserves), *Uluu tuolbeler* (protected landscapes), and *Ayilba meneler* (natural

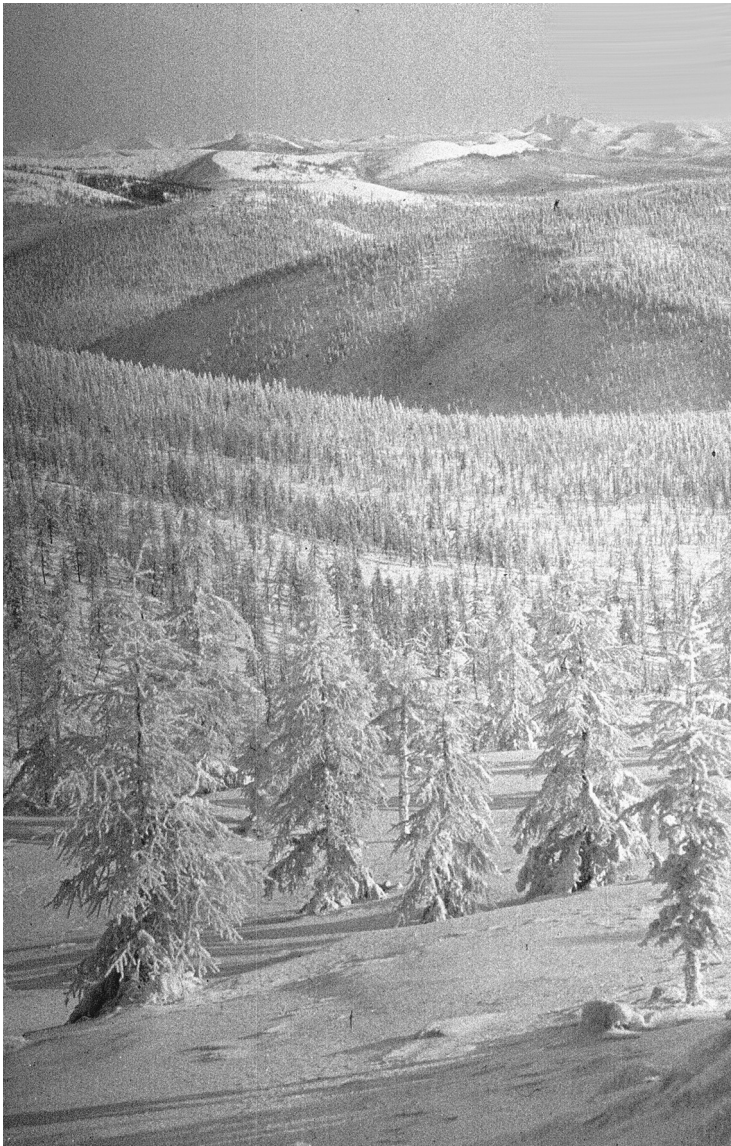
monuments). In addition to new laws, standard guidelines were developed to clarify the functions of the reserves.

As a result, the republic's present protected area system (*Yityk kere sirder*) combines federal-level protected areas (*zapovedniks*), republic-level areas (national nature parks, resource reserves, and *zakazniks*), and an array of district-level (*ulus*) and municipal territories into one system. The system includes two *zapovedniks* (Olyokminsky and Delta Leny), four national nature parks (Lenskie Stolby, Sinyaya, Momsky, and Ust-Vilyuisky), forty resource reserves, forty-three reserved territories, a few protected landscapes, a few dozen natural monuments, and twenty-six lakes of unique national significance (see table 6.1.) This network protects 587,000 sq. km, or about 18.9 percent, of the republic. The protected territories conserve habitat for some 17 species of mammals, 54 species of birds, and 311 species of vascular plants, all of which are listed in the Sakha *Red Data Book*. In most cases, ecological corridors, such as buffer zones along the river, connect these protected areas.

The Sakha Ministry of Environmental Protection is responsible for the overall administration of the network. Individual protected areas are administered by the protected-area department within the ministry, by district-level committees, and by directorates for each *zapovednik* and national park.

Zapovedniks. As in other areas of Russia, *zapovedniks* are administered by the federal government. In Sakha, indigenous groups have a number of problems with the *zapovednik* system, as it contradicts their traditional notions of land use. Whenever proposals for new *zapovedniks* arise, indigenous peoples are some of the strongest opponents.

Olyokminsky. This *zapovednik* lies on the western Aldan highlands and protects part of the Olyokma River and its tributaries.²⁴ The area encompasses low-elevation mountains, with the highest reaching 1,166 m. The *zapovednik* protects taiga forests composed of Dahurian larch (53 percent), Scots pine (25 percent), Siberian pine (14.5 percent), and other species (7.5 percent). The mountaintops are rocky, with moss and lichen vegetation. This region has both Yakutian and Transbaikalian floras. Of 650 species of vascular plants, 67 are endemic or rare. Notable plant species include *Rhododendron adamsii*, *Anomonastrum calvum*, and *Rosa jacutica*. There are 40 mammal species, 2 reptile species, 2 amphibian species, 180 bird species, and 18 fish species. Moose, musk deer (*Moschus mosciferus*), reindeer, sable (*Martes zibellina*), and Siberian weasel (*Mustela sibirica*) are commonly seen; Eurasian lynx (*Felis lynx*) and wolverine (*Gulo gulo*) are less common. Rare birds



Dahurian larch (*Larix gmelini*) is the dominant tree of Sakha forests.