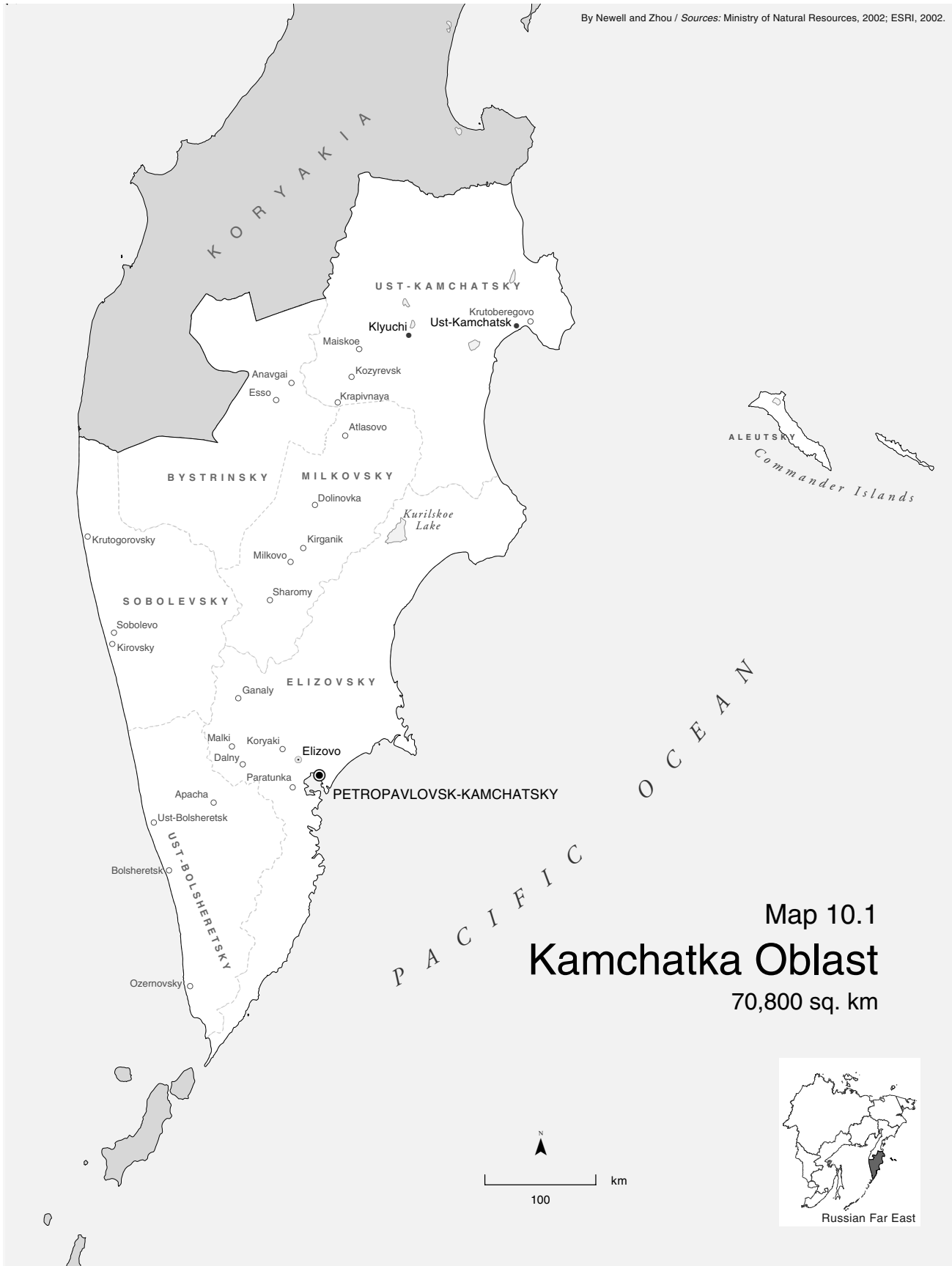


By Newell and Zhou / Sources: Ministry of Natural Resources, 2002; ESRI, 2002.



Kamchatka Oblast

Location

Kamchatka Oblast makes up the southern portion of the Kamchatka peninsula, which is located in northeastern RFE. It is washed by the Pacific Ocean and Bering Strait to the east and the Sea of Okhotsk to the west. To the north, the *oblast* borders the Koryak Autonomous Okrug, which covers the northern section of the peninsula. Kamchatka also includes the Komandorskie (Commander) Islands within its administrative territory.

Size

70,800 sq. km (17.2 million ha).

Climate

The influence of the Pacific Ocean and the Sea of Okhotsk makes Kamchatka's climate milder than continental parts of the RFE. In general, winters are long with heavy snows, and summers are short, cool, and rainy. Heavy fog and sudden changes in atmospheric pressure are common. Annual precipitation is 50–100 cm, with average temperatures ranging from -11°C in February to 14°C in July.¹

Geography and ecology

Located on the Pacific Rim of Fire, Kamchatka has 29 active volcanoes, 186 geysers, countless boiling mud cauldrons, steam vents, fumaroles, and other forms of volcanic activity. Volcanic eruptions formed the Sredinny (Central) Mountain Range, which stretches down the center of the peninsula. The Valley of the Geysers, in the eastern part of the peninsula and part of Kronotsky Zapovednik, has almost two hundred geysers, making it second in the world to Yellowstone National Park in the United States. Klyuchevskoi Volcano, in the north, rises 4,688 m above sea level. In the heart of the peninsula, between the central and eastern mountain ranges, lies the Kamchatka Valley. Feeding this broad river valley is the peninsula's largest river, the Kamchatka, which stretches 720 km. The water level of its tributaries depends on summer rainfall and melting glacial snow and ice from the Klyuchevskoi-Tolbachinsky group of volcanoes. In summer, these regions suffer from droughts, increasing the risk of forest fires. Vast lowlands define the western coast. The eastern coast is more mountainous, with steep cliffs reaching down to the shoreline in many places.

Influenced by its latitude and long oceanic coastline, wetlands, stony barrens, lava fields, coastal sands, and tundra dominate the landscape. In the north, Japanese stone pine (*Pinus pumila*) and shrub alders (*Alnus fruticosa*, *A. sinuata*) run down to the shoreline. Sparse stone birch (*Betula ermani*) forests form the typical Kamchatka landscape.

Kamchatka's most valuable forests lie in the central Kamchatka River valley. Overall, Kamchatka's natural environment remains one of the most pristine in all of Russia, if not the world.²

Flora and fauna

The *oblast* has about one thousand species of vascular plants. The main forest species is stone birch. Willows (*Salix*), aromatic poplar (*Populus suaveolens*), aspen (*P. tremula*), alders, and other trees grow in floodplains along rivers. Dahurian larch (*Larix gmelini*), Ayan spruce (*Picea ayanensis*), and monarch birch (*Betula maximovitschii*) grow in the center of the peninsula. Japanese stone pine and alder shrubs cover mountain ranges and tundra woodlands. Forty rare and endangered species of plants are found around mineral hot springs and fumaroles; four of these species are endemic to Kamchatka.

Forty-three mammal species inhabit the *oblast*, nine of which are marine mammals (excluding migrating whales and dolphins). There are also 240 species of birds, 3 species of bats, and 2 species of amphibians. About 40 birds, 12 cetaceans, and 2 terrestrial mammals are rare or endangered.

Kamchatka has one of the highest populations of brown bear (*Ursus arctos*) in the world, numbering at least 7,650. The peninsula is also one of the world's richest salmon fisheries; the rivers are spawning grounds for all species of Pacific salmon. Up to one quarter of the world's Pacific salmon population spawns in its pristine rivers. Kamchatka crab (*Paralithodes kamchatica*) flourish in the waters off the northeastern coast. Blue whales (*Balaenoptera musculus*), thought to be extinct in the 1970s, have partially recovered and now feed along the shoreline. More than 50 percent of the world's Steller's sea eagles (*Haliaeetus pelagicus*) nest on the peninsula. Other rare and endangered species include Kamchatka snow sheep (*Ovis nivicola nivicola*), gray dolphin (*Grampus griseus*), bowhead (*Eubalaena glacialis*), gray (*Eschrichtius robustus*), blue, and humpback (*Megaptera novaeangliae*) whales, Copper Island arctic fox (*Alopex lagopus mednovi*), Asian harbor

Key issues and projects

Volcanoes of Kamchatka World Heritage Site

This designation offers good possibilities for balanced development on Kamchatka. However, the five protected areas within this site are not being managed properly, jeopardizing future support from international environmental organizations (see pp. 369–70).

Forestry and protected areas

Kamchatka's protected areas should shelter valuable forests from logging, but in practice there is inadequate zoning and in some places no protection at all. Efforts and funds are focused on tourism development rather than on much-needed forest conservation (see pp. 370–72).

Gold mining

Proposed mining activities pose serious threats to the region's ecology and indigenous people's lifestyles. Particularly controversial are the developments at Aginskoe gold mine on the border of Bystrinsky Nature Park. An IUCN resolution halted funding by the U.S. government agency Overseas Private Investment Corporation (OPIC) for this mine (see pp. 361–62).

Tourism

Kamchatka has perhaps the greatest tourist potential of the RFE regions, but the development of tourism has been controversial; intensive use of charismatic places such as the Valley of the Geysers is threatening to destroy fragile ecosystems of global significance (see pp. 372–73).

Rampant fish and wildlife poaching

Illegal fishing costs Kamchatka hundreds of millions of dollars a year in lost revenue. Kamchatka's huge brown bears are regularly killed by poachers to satisfy the Asian market for bear organs (see pp. 368–69).

Energy development

With immense natural energy sources, Kamchatka could become a model of sustainable energy use. Local experts fear that some current and planned energy projects are being developed irrationally (see pp. 362–63).

seal (*Phoca vitulina steinegeri*), whooper swan (*Cygnus cygnus*), Bewick's swan (*C. bewickii*), gyrfalcon (*Falco rusticolus*), peregrine falcon (*F. peregrinus*), Nordmann's green-shank (*Tringa guttifer*), spoon-billed sandpiper (*Calidris pygmaeus*), Aleutian tern (*Sterna kamtschatica*), osprey (*Pandion haliaeetus*), white-tailed eagle (*Haliaeetus albicilla*), and Steller's sea eagle.

Largest cities

Petropavlovsk-Kamchatsky (pop. 256,000) is the administrative center, a hub of the RFE fishing industry, and a nuclear submarine base. Nearby Elizovo (pop. 46,000) is the site of Kamchatka's international airport.³

Population

384,200 as of January 1, 2001.⁴ The population is steadily decreasing as a result of economic decline; the Russians and Ukrainians who were once encouraged with high-paying jobs and good perks to come to Kamchatka are now returning to European Russia. In 1998, 13,440 people left the *oblast*, resulting in an overall decline of 5,801; in 1999, the decline was about the same, 5,962.⁵

Political status

Kamchatka's current administration has been in place since 1991, developing close ties with local business interests. Kamchatka Oblast and the Koryak Autonomous Okrug were once a single administrative unit. In 1990, they became independent administrative regions, but Petropavlovsk remains the gateway to the entire peninsula. The *okrug* and *oblast* have much in common in terms of economy and ecology; cooperation between their governments could result in mutually beneficial strategies for sustainable development.

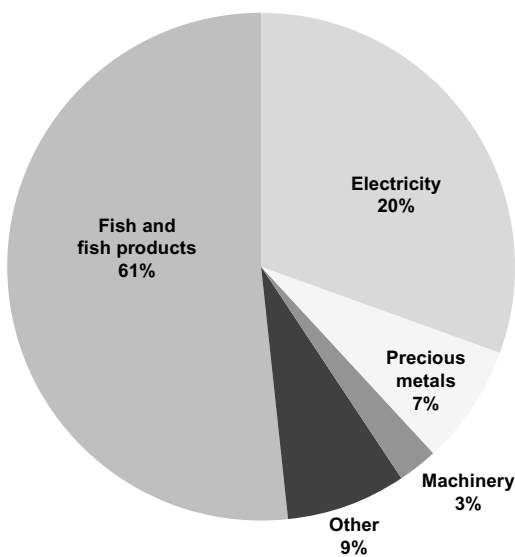
Natural resources

Kamchatka has significant deposits of gold, silver, platinum, nickel, copper, and other mineral resources. Coal and brown coal deposits total 273 million tons. There are sixteen natural gas deposits in western Kamchatka with up to 70 billion cu. m of gas reserves. Gas reserves on the Okhotsk shelf adjacent to Kamchatka are estimated at 732 billion cu. m. Oil fields, with confirmed reserves of 360 million tons, were also recently discovered here. The fisheries in Kamchatka's rivers and in surrounding seas are some of the richest in the world.

Main industries

Fishing, particularly for pollock, salmon, and crab, is by far the most important industry. The fish-processing and timber industries are in decline. Development of tourism could become more promising with an improved infrastructure to support it. Kamchatka's substantial geothermal resources are minimally developed. See fig 10.1 for the total industrial production in 1999.

Figure 10.1
Industrial production in Kamchatka Oblast, 1999



Source: Goskomstat, 2000.



Nearby volcanoes provide a dramatic backdrop to the city of Petropavlovsk-Kamchatsky.

Infrastructure

The remote location of the peninsula creates difficulties in supplying regular shipments of fuel, food products, and equipment. Petropavlovsk is the main port. Much of the peninsula is accessible only by air; Kamchatka's only major road goes from Petropavlovsk up the middle of the peninsula, forking and heading out to Ust-Kamchatsk in the northeast and Esso to the central-west (Bystrinsky Raion). International airlines serve the airport in Elizovo, but hotels and services to support tourism are underdeveloped.

Foreign trade

Kamchatka's economy is relying more and more on foreign trade. Reported exported fish products in 1999 amounted to \$242.3 million (3.3 percent less than in 1998), of which the United States (27.4 percent), Japan (21.7 percent), and South Korea (21.2 percent) were the largest consumers. Sixty Kamchatka enterprises are involved in the fish product trade. Other exports include machinery (3 percent) and timber (4 percent). Bunker fuel is Kamchatka's primary import, accounting for U.S.\$32.2 million in 1999.

Economic importance in the RFE

In 1998, Kamchatka accounted for 6.2 percent of industrial production in the RFE.⁶ In past years it produced as much as a third of the RFE's fish catch; in 1997, Kamchatka's portion totaled 782,000 metric tons, or 25 percent of the catch.⁷ The peninsula served the former Soviet Union as a strategic military outpost, with Russia's largest nuclear submarine base on the eastern seaboard based in Avacha Bay. Other military bases on the peninsula were used as targets for test missiles launched from other regions of Russia.

General outlook

Kamchatka needs to address its energy crisis first. Currently, it has the highest electricity costs in all of Russia, four times the national average. Fuel shortages have made regular rationing (scheduled blackouts) a daily occurrence for the past few years. Kamchatka has traditionally relied on imported fuel (oil, coal, and diesel) to fire its power stations and is now looking increasingly to domestic sources. Construction of the Mutnovsky geothermal power plant, funded in part by the European Bank for Reconstruction and Development

(EBRD), was recently completed. There are plans to build two hydroelectric power plants and to construct a 414-km gas pipeline from gas fields in western Kamchatka to Petropavlovsk. Construction of this Kamchatgasprom pipeline is proceeding despite concerns about the environmental impact and economic feasibility; environmentalists point to threats posed by its construction and fear that the pipeline could pave the way for future exploitation of the oil and gas reserves on the Okhotsk shelf.

Development of tourism in Kamchatka has helped to bring needed revenue to protected areas. Although many argue that the concept of a *zapovednik* does not include tourist activities, which could adversely affect fragile ecosystems, ecotourism does present the best opportunity for an environmentally sustainable industry employing a broad range of local people. Unlike mining, which requires outside technical experts, tourism requires locals intimately familiar with the landscape. Vladimir Putin, during a visit in the spring of 2000, suggested that tourism be expanded, remarking that he “had never seen anywhere as beautiful as Kamchatka, either in Russia or abroad.”⁸ Regional experts believe that tourism should be encouraged outside protected areas—on Kamchatka there are plenty of other breathtaking landscapes, hot springs, and other tourist attractions—while areas of particular scientific value remain strictly protected. Given the virtual withdrawal of federal funding for protected areas, these ideals are difficult to uphold.

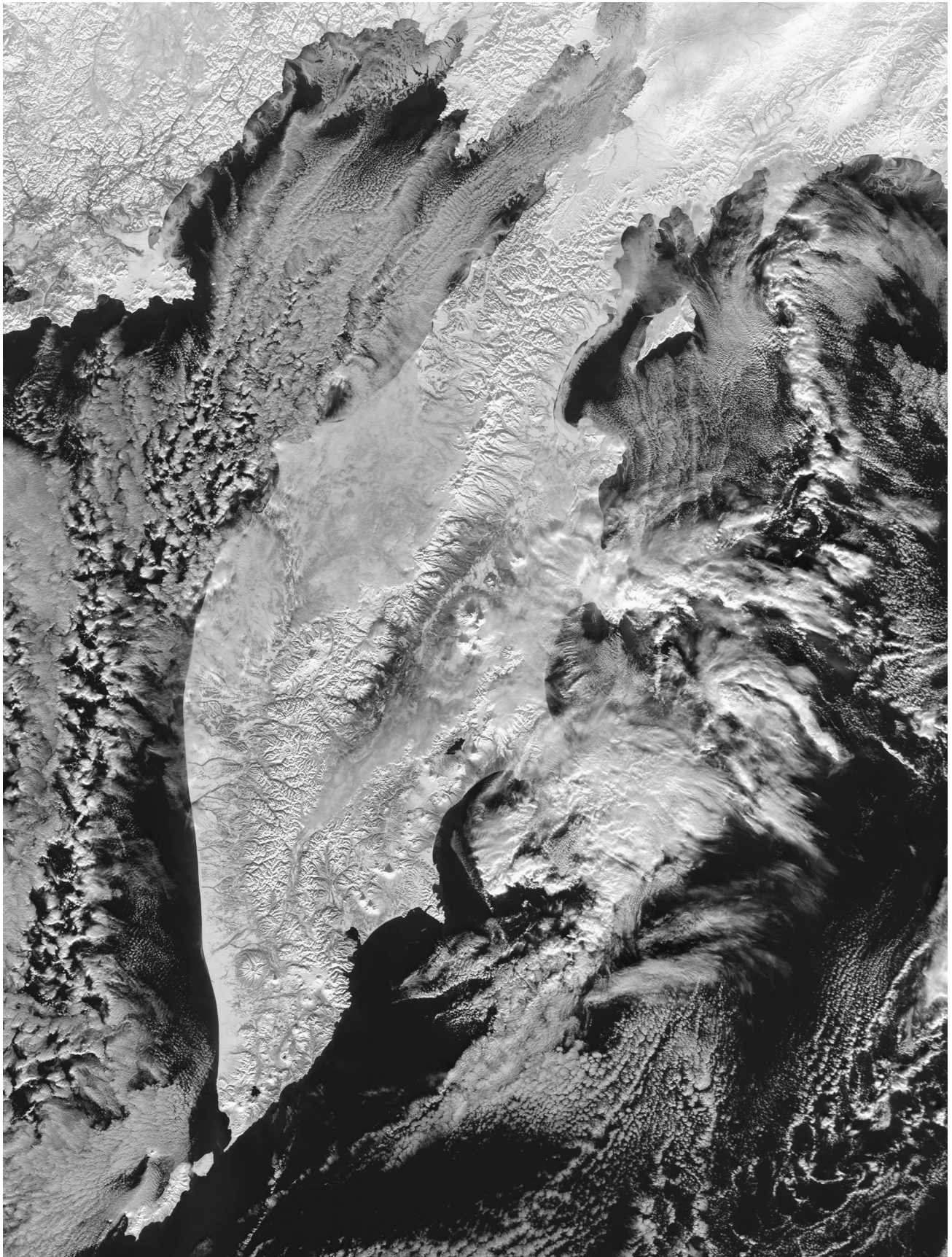
Local and international groups have strongly resisted efforts by the administration to attract foreign investment for gold mining projects. This resistance, coupled with low global gold prices, has put project development temporarily on hold, but the depressed economic conditions within the *oblast* and recent statements by government officials mean that foreign investment for gold mining will be aggressively sought when prices improve. Although protected areas cover 27 percent of the territory, the perpetual lack of financial support hampers real enforcement of park boundaries and effective monitoring of illegal

activities. Despite the large percentage of protected land, important areas, such as the conifer forests in the center of the Peninsula, which are vital to ensure healthy salmon runs and regulate water levels, remain unprotected. The decline of the fish-processing and timber industries, unemployment, and extremely high costs of food-stuffs have left many people in a desperate state, which contributes to the increase in poaching and overall criminal activity.

— Emma Wilson



Scenic landscapes of Kamchatka have made it the only part of the RFE with a well-developed tourist industry.



A satellite image of the Kamchatka Peninsula in winter.

Ecology

Olga Chernyagina, Vladimir Zykov

Despite Kamchatka's relatively pristine nature, extensive land-use practices have taken their toll. This is especially apparent in the vicinity of Petropavlovsk and Elizovo. Excessive air and water pollution, combined with the effects of climate, variability in atmospheric pressure, and the release of chemicals caused by volcanic activity have impaired public health.

In 1992, the economy entered a recession that did improve pollution levels. However, in 1997 a six-hundred-ton increase in airborne particulates (to 50,000 tons) from stationary sources was observed, a result of development of Petropavlovsk's heating grid and a decrease in the quality of fuel oil being used to supply it. Air pollution from mobile sources also increased by 200 tons to 26,700 tons per year.

Water resources are among Kamchatka's most precious natural endowments. The abundance of pure, clear lakes and the variety of mineral waters found in the peninsula's many springs know few equals around the world. Approximately 220 cu. km of runoff empties into the surrounding oceans each year, with a practically inexhaustible water supply in aquifers. The mineralized waters found in many of the peninsula's natural springs have medicinal applications.

In spite of these resources, the supply for household and commercial use is problematic. In some locales, the situation is critical because of difficulties with water treatment and the poor condition of pipelines and drainage systems in settlements with a centralized water supply. Sewage is disposed of primarily via bays and rivers. The worst polluters include the fish-processing, shipbuilding, and energy-production industries, as well as fishing fleets and military bases. Avacha Bay, near Petropavlovsk, the two rivers flowing into it—the Avacha and Paratunka—and the largest river on the peninsula, the Kamchatka River, are degraded primarily by agricultural activity and logging. Several cities and towns on the peninsula lack sewage treatment facilities. None of the settlements of the peninsula has storm drainage collection systems, resulting in large quantities of toxic runoff in nearby river systems.

Almost half of the 280,000 tons of solid waste that were produced in 1997 consists of household waste. Only 10 percent of industrial waste is recycled or reused. More than 100,000 tons of scrap metal litter the peninsula's coastlines, and about the same amount has been disposed of in Avacha Bay. The region's naval installations alone have generated more than 60,000 tons of scrap metal.

The *oblast* administration increasingly wishes to exploit mineral resources to bolster the region's economy. However, at a scientific conference, Problems and Priorities of Mining in Kamchatka Oblast, held in Petropavlovsk in 1997, delegates concluded that any mineral extraction should come within the strictest of environmental regulations because of the unique role that Kamchatka plays in maintaining the

Table 10.1
Forest stock in Kamchatka Oblast by land category, 1995

Category	Area (000 ha)
Group I	3,470.0
Group II	1,424.0
Group III	10,152.3
Total	15,046.3

Source: Kamchatka Forest Service, 1996.

ecological stability of the northern Pacific and the productivity of its marine resources.

Public interest groups in Russia and abroad have paid great attention to the problems of nature and resource conservation in Kamchatka. As a result, the Kamchatka administration and related organizations have received substantial support from influential international environmental organizations, particularly for establishing regional nature parks. A number of U.S. environmental NGOs pressured the Overseas Private Investment Corporation (OPIC) to halt its support for developing the Aginskoe gold deposit. As a result, large-scale investment in the mining company's initiative to develop the site was canceled, and continued work on exploiting Aginskoe was averted (see pp. 361–62).

Forests

Kamchatka's forest stock (as of January 1, 1998) amounts to 15,046,300 ha, or 87.8 percent of the total land area (see table 10.1). Of these, 8.95 million ha are actually covered by forest, 3,470,000 ha designated as Group I forests. These include protective strips along spawning rivers (3,448,800 ha) and along roads and green zones around Petropavlovsk and Elizovo. Forests within Group II amount to 1,424,000 ha. To regulate commercial logging and the designation of logging areas, this group was created to include coniferous forest deemed threatened by development, located in the basins of spawning rivers, and in areas that, earlier, had been included in the resources base of Kamchatles, the *oblast's* main logging enterprise. Group III forests cover the remaining area of the forest fund, 10,152,300 ha.

Kamchatka's estimated timber reserves are 510.0 million cu. m, of which 178 million may be harvested (70.26 million coniferous, 107.74 deciduous). The productivity of the forests is considered low. Stone birch forests are the most widespread and comprise four-fifths of all of Kamchatka's forests. They are dominant in the lowlands and in the middle zone of the mountainous parts of the peninsula. Dahurian larch forests occupy central Kamchatka's lowlands and extend to an



Most of the impact of tourism on Kamchatka is concentrated in Geyser Valley.

altitude of 200–300 m in the ranges. The geographic area of larch in the central part of Kamchatka, including Ayan spruce forests, is commonly referred to as Conifer Island. Silver birch forests are also widespread in the central part of the peninsula; aspen forests are much rarer there. Floodplain forests of chosenia (*Chosenia arbutifolia*), willows, and aromatic poplar stretch in narrow strips along the banks of rivers. Dwarf vegetation consisting of Japanese stone pine and shrub alder is also widespread, covering practically all the mountain ranges and forest tundra.

In spite of the low productivity, the *oblast's* Annual Allowable Cut (AAC) is set at a level more characteristic of regions with high forest productivity. Therefore, many of the less desirable species are ignored altogether, while excessive amounts of more valuable coniferous species are harvested. Of Kamchatka's coniferous forests, only 2.1 percent (350,000 ha) remains undisturbed by logging or fire. Forests in river basins, which are used extensively by salmon for spawning grounds, are most accessible for logging enterprises. In response to dwindling reserves of spruce and larch, the forest services of Kamchatka and Koryak Autonomous Okrug put forward a resolution in 1997 insisting that the AAC for both regions be cut by 30 percent. Meanwhile, as in other regions of the RFE, fires also bring enormous damage to the forests. In 1998 alone, ninety-seven individual fires were recorded, burning 37,700 ha of forest.

Flora and fauna

About one thousand species of vascular plants inhabit the *oblast*. The most widely distributed species are Japanese stone pine, shrub alder, stone birch, and rough bluejoint (*Calamagrostis langsdorfii*). Other species occur quite rarely, often in highly localized habitats. Communities in the vicinity of

mineral hot springs and fumaroles host forty rare and endangered species, four of which are endemic to Kamchatka.

Forty-three mammal species inhabit the *oblast*, 9 of which are marine mammals (excluding migrating whales), and 3 of which have been introduced: American mink (*Mustela vison*), muskrat (*Ondatra zibethica*), and Canadian beaver (*Castor canadensis*). There are also 240 species of birds, 3 species of bats, and 2 species of amphibians. In all, 53 species are listed in the Russian *Red Data Book*: thirty-nine birds, twelve cetaceans, and two terrestrial mammals. Game species include fourteen land animals, fifty-six birds, and six marine mammals. Quotas on sable (*Martes*

zibellina), river otter (*Lutra lutra*), brown bear, snow sheep, and reindeer (*Rangifer tarandus*) are strictly limited, but these are typically exceeded, due to poaching.

Sport hunters, including those coming from abroad, focus primarily on the brown bear. In 1995–1996, as part of a World Wildlife Fund program on the sustainable harvest of brown bear in Kamchatka, the Kamchatka Institute of Ecology and Nature Use (КИЭП), Kronotsky Zapovednik, and the Kamchatka Committee on Environmental Protection conducted an *oblast*-wide census of the animal. The results showed that there was a minimum of 7,650 individuals, 650 of which live within the territory of Kronotsky Zapovednik. Populations of Kamchatka snow sheep have declined considerably in recent years; the numbers now total three thousand head. Reindeer populations also are declining with each passing year.

All six species of Pacific salmon spawn in Kamchatka's rivers: chum (*Oncorhynchus keta*), pink (*O. gorbuscha*), sockeye (*O. nerka*), chinook (*O. tshawytscha*), coho (*O. kisutch*), and cherry salmon (*O. masu*). Along with the Pacific salmon, there are several other salmonid species: rare rainbow trout (*O. mykiss*) and chars (*Salvelinus*). The spawning grounds offered by Kamchatka's rivers are substantial: 1,852 rivers extending a total of 42,689 km. The entire peninsula acts as a gigantic incubator, where millions of salmon hatch and grow each year. Productivity rates have been declining since the 1950s, but catch quotas (in terms of fish overall) from river basins remain much higher here than in European Russia or Siberia.

The seas surrounding the peninsula are no less rich in fish and seafood resources. In fisheries off Kamchatka's coasts more than two million tons of fish and seafood are caught annually: Pacific salmon, walleye pollock (*Theragra chalcogramma*), Pacific cod (*Gadus macrocephalus*), saffron cod

Table 10.2
Protected areas in Kamchatka Oblast

<i>Type and name</i>	<i>Size (ha)</i>	<i>Raion</i>	<i>Established</i>
<i>Zapovedniks</i>			
Komandorsky ^a	3,648,679	Aleutsky	1993
Kronotsky Biosphere	1,308,854	Elizovsky, Malkovsky, Milkovsky	1926
<i>Nature Parks</i>			
Bystrinsky	1,333,478	Bystrinsky	1995
Yuzhno-Kamchatsky (Southern Kamchatka)	980,000	Elizovsky	1996
Nalychevsky	285,970	Elizovsky	1996
<i>Federal Zakazniks</i>			
Yuzhno-Kamchatsky (Southern Kamchatka)	225,000	Elizovsky, Ust-Bolsheretsky	1982
<i>Regional Zakazniks</i>			
Ichinsky	183,400	Bystrinsky	1994
Yugo-zapadnaya (Southwestern) Tundra	123,000	Ust-Bolsheretsky	1990
Reka (River) Udochka	99,000	Elizovsky	1983
Timonovsky	72,000	Elizovsky	1994
Oleny Dol (Reindeer Valley)	69,600	Ust-Bolsheretsky	1995
Surchinsky	64,900	Milkovsky	1994
Scientific Research Station Sobolevskaya	55,000	Sobolevsky	1976
Bobrov (Beaver)	51,000	Milkovsky	1994
Tri Vulkana (Three Volcanoes)	50,000	Elizovsky	1985
Bereg Chubuka (Chubuk's Coast)	49,100	Elizovsky	1994
Tayozhny (Taiga)	41,000	Milkovsky, Bystrinsky	1986
Nalychevskaya Tundra	15,000	Milkovsky	1972
Ozero (Lake) Kharchinskoe	10,000	Ust-Kamchatsky	1978
Nalychevsky Mys (Point)	2,500	Elizovsky	1994
Zhupanovsky Liman (Slough)	2,500	Elizovsky	1994
<i>Total^b</i>	<i>8,503,261</i>		

^a Includes 185,379 ha of land and 3,463,300 ha of aquatorial area.

^b Total includes aquatorial area.

Source: Kamchatka Committee on Environmental Protection, 1999.

(*Eleginus gracilis*), flounder and halibut species (*Pleuronectidae*), Pacific herring (*Clupea pallasii*), and hake (*Merluccius productus*). Fishing enterprises focus their efforts on the most profitable species, including certain salmon species, roe-bearing pollock, and crab. These resources are being depleted because quotas and geographical and seasonal limitations are flagrantly disregarded.

Protected area system

E. EZVEKOVA, V. ZYKOV—The first protected areas appeared in Kamchatka in the end of the nineteenth century to protect important sable habitat.⁹ The Kronotsky area received special attention in an imperial decree of 1882 to protect sable, snow sheep, and reindeer. Kronotsky Zapovednik was officially designated by a 1926 Dalkraiiispolkom (Far Eastern regional executive committee) decree and ratified in 1929 by the Kamchatka Oblast executive committee.¹⁰ Until June 1934, no money was allocated to enforce the protection regime in the area, and no rangers or research staff existed.

Today there are two *zapovedniks* in Kamchatka, one federal *zakaznik*, fifteen regional (*oblast*-level) *zakazniks*, three regional nature parks, fifty-nine natural monuments, twenty-eight forest reserves, two resort zones (Paratunskaya and Malkinskaya), and the green-belt zones of Petropavlovsk and Elizovo.¹¹ In all, protected areas occupy 27 percent of the *oblast's* total land area. In addition, sixty objects have been placed on the register of historical and recreational objects. In 1996, UNESCO designated part of the *oblast*, including the two *zapovedniks* and three nature parks, as a World Heritage site—Volcanoes of Kamchatka.¹²

Zapovedniks. One of Kamchatka's two *zapovedniks*, Kronotsky, is recognized as a biosphere reserve by the Russian government.

Kronotsky. A complete description of Kronotsky Zapovednik is provided (see pp. 353–55).

Komandorsky. A complete description of Komandorsky Zapovednik is provided (see pp. 355–56).

Nature Parks. The Kamchatka administration has established three nature parks.

Bystrinsky. A complete description of Bystrinsky Park is provided (see pp. 351–52) and so is omitted here.

Nalychevsky. The Zhupanovsky, Koryaksky, Avacha, and Dzenzur volcanoes surround the Nalycheva River valley. A few hundred hydrothermal and cold mineralized springs are concentrated in the upper reaches of the Nalycheva River. Thirty-three mammal species are found in the area. Brown bear is very common in the upper reaches of the river. The volcanic cones and cliffs of Nalycheva Point provide habitat for snow sheep. One hundred and forty-five species of birds frequent the valley. Rare species include black brant (*Branta*

nigricans), Steller's and white-tailed sea eagles, gyrfalcon, peregrine falcon, and golden eagle.¹³

The Nalycheva River provides spawning habitat for five species of Pacific salmon. This park is one of the most frequently visited natural areas in Kamchatka. Hundreds of tourists pass through the valley every year. Tourist cabins are located in the central part of the valley. Due to unstable funding, for the last few years the buildings have not been well maintained. In 1997–1998 the Kamchatka Directorate of Nature Parks used funding from WWF and the Ecological Fund of Kamchatka to build living quarters for four people, the Vladimir Semyonov Ecological Center, and some campground facilities. Funds were also used to improve the bathing areas around hot springs. Six areas for indigenous hunting and one for indigenous fishing have been designated in the park for the local indigenous population.

Yuzhno-Kamchatsky (Southern Kamchatka). The park's territory encompasses several active and extinct volcanoes, including one of Kamchatka's most active, Mutnovsky, and an abundance of geothermal activity. Fifty-nine mammal species inhabit the park. Snow sheep, brown bear, and sea otter are the most valuable; other animals typical of Kamchatka such as fiery fox (*Vulpes vulpes kamchatica*), sable, river otter, wolverine (*Gulo gulo*), American mink, and Arctic ground squirrel (*Spermophilus parryi*) are also represented here.¹⁴

The park boasts one of the largest populations of peregrine falcons on the Kamchatka peninsula; it also has at least twenty nesting pairs of Steller's sea eagles, and some ospreys and golden eagles. About two hundred nesting colonies of seabirds can be found on the Pacific shores and on islands near shore. Among these colonies is one of between five thousand and six thousand pairs of long-billed murrelets (*Brachyramphus perdix*), the largest in Russia, and large colonies of slaty-backed gull, murre (*Uria aagle*, *U. lomvia*), tufted puffins (*Fratercula cirrhata*), and pelagic cormorants (*Phalacrocorax pelagicus*).

Eight hunting areas exist in the park. A tourist camp belonging to the aviation-tourism company Krechet operates in the vicinity of Khodutka hot springs. The joint-stock company, Friod, manages an experimental water pumping facility in Russkaya Bay and studies the underground and surface waters here.

Zakazniks. Only the federal *zakaznik*, Yuzhno-Kamchatsky is described here. See table 10.2 for a list of the regional *zakazniks*.

Yuzhno-Kamchatsky (Southern Kamchatka). The gem of this federal *zakaznik* is Kurilskoe Lake, which is surrounded by a group of active volcanoes (Kambalny, Ilinsky, Diky Greben, and Kosheleva). In the fall, the lake shores and the rivers in the area teem with hundreds of brown bears, which feed on the massive salmon runs. Steller's sea eagles nest within the lake watershed, as do hundreds of whooper swans

and many ducks. A sea otter population of 1,500, breeding grounds for hundreds of seals, and a coastal population of snow sheep make this an area of worldwide significance. Rare birds such as yellow-billed loon (*Gavia adamsii*), black brant, lesser white-fronted goose (*Anser erythropus*), osprey, golden eagle, and Aleutian tern are also found here. Poaching, especially of sockeye salmon and brown bear, is a serious threat. The *zakaznik* does not have the necessary funds to deal with this problem. An increase in tourism is also one of the concerns of the staff; *zakaznik* regulations explicitly prohibit recreational activities. Development of tourism is taking place without an adequate impact assessment. Such an assessment is particularly necessary for the tourist hotel already being built in the buffer zone of Kurilskoe Lake (see p. 373).



Vast wetlands of Kamchatka.

Biodiversity hotspots

1. Bystrinsky Nature Park (forest)

Located in the heart of Kamchatka Peninsula, Bystrinsky Nature Park falls within Bystrinsky Raion. Indigenous Evens, Itelmens, and Koryaks live in the park, practicing traditional subsistence activities such as fishing, hunting, gathering of berries and mushrooms, and reindeer herding. Two settlements, Esso and Anavgai, are located within the park. An *oblast*-administered protected area, the park was established by governor's decree in August 1995. In 1996, the park was included in the UNESCO World Heritage site, Volcanoes of Kamchatka. There is also a zoological *zakaznik*, Ichinsky, with a land area of 183,400 ha.

In the park there are several peaks exceeding 2,000 m; the seismically active Ichinsky Volcano, at 3,607 m, is the highest summit of the park. The park's largest river, Bystraya River, serves as the headwaters for the Kamchatka River, the peninsula's longest, and for several important spawning rivers on the western side of the peninsula, including the Tikhaya, Bystraya, Icha, Tigil, and Sopochnaya Rivers. Large wetlands are located in the headwaters of the Rassoshina, Sopochnaya, Yamme, Tkhonma, and Saichik Rivers and in the valleys of the Icha, Tvayan, Ozerneya, and Oblukovina Rivers.

All of the ecosystems found in central Kamchatka are represented in the park in their virgin state and serve as important baselines for analyses of similar regions where anthropogenic effects are more pronounced. The high biodiversity of these ecosystems and the mosaic of ecological communities within them, resulting from the area's volcanic activity and numerous hot springs, add to the park's value for conservation and tourism.¹⁵

This territory is home to sizable brown bear, snow sheep, and sable populations. The density of introduced muskrat, American mink, and Canadian beaver is unusually high. Three bat species (*Myotis daubentoni*, *M. brandti*, *Eptesicus nilssoni*),

Siberian lemming (*Lemmus sibiricus*), wild reindeer, and Kamchatkan marmot (*Marmota kamtschatica*) are among the rare species that inhabit the park. All species of Pacific salmon can be found in the park's rivers, as well as Arctic grayling (*Thymallus arcticus*) and Dolly Varden (*Salvelinus malma*).

Initial studies of the territory's vascular plants illustrate its distinction: A wide variety of arctic alpine species inhabit the high plateaus and terraces, and relict cryophilic and steppe species are found in insular populations among the jagged cliffs. The park forms the southern extent of many species' geographical distribution. Fifteen are found nowhere else in the *oblast*. Japanese stone pine and shrub alder are the primary vegetation; at elevations below 600 m, stone birch appears. Alpine tundra (shrub species and lichens) dominates the mountain peaks. Tall stands of Ayan spruce and Dahurian larch (part of Kamchatka's Conifer Island) grow on the slopes of the Sredinny Ridge, the park's eastern boundary.

Threats. The boundaries of the park lie almost exactly over one of Kamchatka's richest gold deposits. The administration redrew the park's boundaries to allow extraction at the Aginskoe and Baranyevskoe sites and reduced the size of Ichinsky Zoological Zakaznik to make room for mining at Aginskoe. Along the park's southwestern boundaries the Shanuch River nickel-copper deposit is also pending development, with mining interests lobbying for yet another border modification. At the same time, the park's forests and tundra ecosystems are continually being scorched by fire.

The planned mining activity threatens the park's bio-resource potential, which serves as the foundation for the subsistence economies of the native peoples living in the area: Evens, Itelmens, and Koryaks. The land's status as a regionally administered protected area provides only a minimal degree of protection, insufficient to stave off the threat posed by mining interests. At the same time, the territory is an important stabilizing influence for adjacent ecosystems due to the headwaters that rise here.

Another potential hazard is development of uncontrolled tourism. If planning is conducted without a preliminary appraisal of the park's carrying capacity for tourists, including detailed inventories of the flora and fauna inhabiting the park's most unique and attractive ecological communities, the threat posed to the park's biodiversity will increase exponentially. Judging by the growth of tourism in Nalychevsky, another of the *oblast's* regional nature parks, there is certainly cause for concern.

Existing protection measures. Bystrinsky Nature Park has no financing or staff. A joint program, People and the Park—Social and Ecological Priorities, was conducted by KIEP with Cambridge University. The results of their joint expedition, Project Kamchatka '98, include findings on the administration and regulation of natural resources in the park, prospects

for the continued development of the park and its meaning for local residents, an appraisal of local needs and experience in land-use planning, and the conclusions of a study on the biodiversity of the park's flora.¹⁶

Recommendations. When the park was created, many ideas of and suggestions from several scientific organizations were not taken into account; the territory was initially envisioned as a federally administered protected area rather than one having only regional status. The western slope of Ichinsky Volcano was not included within the park, nor were most of the largest hot springs on the peninsula, along the Kirevna River. Also ignored were alpine Ayan spruce stands. At the same time, a number of areas that had already been significantly altered by human activity were unjustifiably included in the park. Also ignored were recommendations to establish a zoning pattern that takes into account both traditional (native) land use and conservation priorities. Now Bystrinsky Nature Park exists only on paper: Zoning issues remain unresolved, and the local population is unaware of the location of its boundaries. Therefore, the following measures are essential:

- Change park borders to incorporate a number of ecologically valuable areas and acquaint local residents with the new boundaries.
- Resolve the socioeconomic problems of the area. Conditions must be created so that local and native residents can continue to rely on natural resources for subsistence economies. To accomplish this, the natural characteristics and resource base in the park and for Bystrinsky Raion as a whole must be evaluated.

2. Conifer Island (forest)

G. LAZAREV—The only tall coniferous stands found on Kamchatka are located primarily in the Kamchatka River basin in the central part of the peninsula. This region is commonly referred to as "Conifer Island," so named, originally, by a German botanist, Karl Ditmar, who visited this part of Kamchatka in the eighteenth century.

The Kamchatka River basin is wedged between two mountain ridges, Sredinny and Vostochny (Eastern), with maximum elevations exceeding 2,000 m. The northern part of this region is characterized by considerable volcanic activity, and includes the highest active volcano in all of Eurasia—Klyuchevskoi (4,688 m). The climate is continental. A rain shadow area caused by the two mountain ridges results in minimal annual precipitation and relatively small amounts of snow. May and June are the region's driest months.

The Kamchatka River basin has been influenced by volcanic activity for a long time. The soils are volcanic and layered with ash. Soils in coniferous stands are characterized by a lack of podzol¹⁷ and are highly permeable. Ayan spruce and Dahurian larch predominate at the northeastern extents of their geographical distribution. These forests are generally

relict in nature, having been preserved during Pleistocene glaciation. Modern climatic conditions are unfavorable for their natural regeneration.

These forests have a unique value for regulating water levels in Kamchatka's rivers. Because of the region's extended snowmelt, the seasonal permafrost in the soil lasts well into the growing season, which helps to conserve moisture. As the frozen earth thaws, the moisture is released into the area's headwaters at a slow and stable rate. During the dry months of May and June, this slow release of moisture after it has been thoroughly filtered through volcanic soils provides clean water for the Kamchatka River and its tributaries, which are used extensively as salmon spawning grounds.

Many of the coniferous and birch-dominated stands in the Kamchatka River basin are difficult to reach and therefore minimally impacted by human activity. They represent typical ancient forests. They also host a variety of taiga species not found elsewhere on the peninsula.

In general, the forests of Conifer Island are the only source of timber on the peninsula. Commercial harvesting of these resources first began in 1930, with fire a frequent occurrence. Between 1953 and 1993, 3,300 individual fires were recorded, consuming as much timber each year as was logged for commercial use. Because of the natural climate in the region, forests in this part of Kamchatka regenerate very slowly after fire and other disturbances, with no known successful attempts at artificial regeneration. For these reasons there has been a steady decline in the amount of forest cover, a 300-percent reduction from 1.2 million ha sixty years ago to less than 350,000 ha (of which 125,000 ha are protected Group I forests) in 1996.

Threats. The natural complex once evident at Conifer Island no longer exists. The forests that do remain are found either in isolated fragments, in degraded remains of logging areas, or as immature stands on old burn areas and logging sites. At least 200,000 ha of mature coniferous forest are now irrevocably transformed into secondary birch or aspen communities, sometimes peppered with the occasional larch. Roads, fire, logging, and other human depredations have degraded another 200,000 ha. Because of the unfavorable economic climate, commercial logging has declined considerably. Plans are afoot, however, for future widespread commercial logging, exclusively for export. Because of the key role that the area plays in maintaining the hydrological stability of the river, this logging would bring with it irreversible damage to the Kamchatka River basin—and the entire Kamchatka region—in the near future.

Existing protection measures. At present, three portions of Conifer Island are included within protected areas: Bystrinsky Nature Park, Kronotsky Zapovednik, and Tayozhny Zakaznik. Commercial logging is prohibited in these areas. Harvesting is also prohibited within 1 km of spawning riv-

ers in Group I forests, but the Kamchatka administration's Committee on Natural Resources is trying to narrow these water-protection zones.

Recommendations. The following actions should be taken:

- Bolster air patrols to help protect these forests from fire. This must be the top priority; in recent years these patrols have operated with almost no funding.
- Designate the forests of Tayozhny Zakaznik and Bystrinsky Park as Group I forests.
- Establish a series of small, protected areas covering forests representing each type of larch, spruce, and birch community found in the Kamchatka River basin. The remaining ancient forests in the region should be set aside as federally administered *zakazniks* and natural monuments to prevent their being logged.
- Continue to study the forest ecosystems of Kamchatka; this work has been brought to a halt by the closure of the Experimental Forestry Station once operated by the Far Eastern Forest Research Institute.
- Resolve a variety of socioeconomic problems besetting the residents of villages in the Kamchatka River basin, where economic activities in the past focused on timber harvest.

3. Kronotsky Biosphere Zapovednik (volcanic, forest, and wetland)

V. MOSOLOV, L. RASSOKHINA—Kronotsky Zapovednik is located within eastern Kamchatka's volcanic belt, whose influence on the territory's topography, flora, and fauna is readily apparent. Here the full diversity of volcanic activity is found—from twelve active volcanoes, to postcaldera formations and a multitude of thermal springs. The RFE's greatest prevalence of glacial alpine landscapes is here as well; glaciers, including some of the peninsula's largest, cover 14,000 ha of the *zapovednik's* territory. The *zapovednik's* area includes 640,960 ha of forest, 16,847 ha of wetlands, 484,327 ha of open dry range, and 166,720 ha under water, including 31,720 ha under rivers and lakes and 135,000 ha within the three-mile ocean buffer zone.¹⁸ The *zapovednik* has a dense grid of rivers and creeks, about 650 m per 100 ha. All of the rivers drain into the Pacific Ocean. There are numerous small lakes. One of the largest lakes in Kamchatka, Lake Kronotskoe, covers 242 sq. km. All together, there are about eight hundred bodies of water within the reserve.

A number of unique natural objects can be found in the *zapovednik* that have great scientific, recreational, and aesthetic value. The famous Valley of the Geysers is a collection of volcanic phenomena whose scale and localization are rare: twenty large geysers, over two hundred thermal springs, and a multitude of mud pots, thermal vents, and other volcanic formations. The volcanic influence and thermal activity change the vegetative dynamics and affect the seasonal concentrations of brown bears and the bird-nesting sites.

Another uncommon spot in the *zapovednik* is the so-called Valley of Death at the foot of Kikhpinych Volcano. Here, a high concentration of volcanic gases (carbon monoxide, hydrogen sulfide, and carbon dioxide), a lack of wind, and an abundance of naturally occurring heavy metals in the upper layers of the soil cause a variety of insects, birds, and mammals to perish when they enter the vicinity. The massive Uzon Caldera (108 sq. km) is also unique on a global scale for its geological, mineralization, and microbiological processes. Vast thermal vents, hot springs, mud pots, and warm underground watercourses create a variety of highly specialized biological communities.

The *zapovednik*'s Kronotskoe Lake basin hosts a rare stand of tall conifers (part of Kamchatka's Conifer Island). The canopies of these relict forests of Dahurian larch are home to a number of communities more typical of dark coniferous taiga. The lake also serves as habitat to a number of remarkable fish species, including two endemic species of char and land-locked sockeye salmon. Islands in the lake support a number of slaty-backed gull (*Larus schistisagus*) colonies, and large numbers of swans winter in those parts of the Kronotskaya River that do not freeze over.

The *zapovednik*'s flora include 745 vascular plant species representing 303 genera and 86 families, a full representation of the flora found in eastern Kamchatka. Six hundred seventy-nine species grow in pristine habitats, the other 49 are weedy species growing near human dwellings and along trails and roads.¹⁹ Sixteen are endemic to Kamchatka, and one species is found nowhere else on the peninsula. The largest protected population of Steller's sea eagle and one of the largest populations of Aleutian tern live here. Sixty mammalian species inhabit the *zapovednik*, including nine cetaceans.

In recent years, the role of the protected area in preserving many animal species has become much more important. For example, the largest brown bear population of the peninsula (comprising 15 percent of all brown bears in Kamchatka) inhabits Kronotsky; this virtually guarantees the continued health of Kamchatka's bear populations, despite increasing pressures from hunting. Also, thanks to relatively little snow in the winter, alpine tundra areas on volcanic foothills in the *zapovednik* serve as winter pasture for up to 90 percent of the peninsula's wild reindeer population and snow sheep populations remain stable and high despite severe declines elsewhere in Kamchatka. The largest protected population of sable on Kamchatka also inhabits the *zapovednik*.

The climate of the territory is unstable and considered unfavorable for timber production. A large amount of precipitation is characteristic, along with strong winds, frequent fog and cloud cover, and a relatively high average annual temperature. Winters are snowy, spring is cold and dry, summer is short and cool, and autumn is mild. The *zapovednik*'s lands are home to the entire diversity of natural communities typical of the peninsula as a whole: tundra, forest, and coastal meadows and associated flora. Forests are dominated by stone

birch, Japanese stone pine, and shrub alder interspersed with large marshes. Isolated patches of conifer forests include Dahurian larch near Lake Kronotskoe and groves of Ayan spruce in the Kamchatka River valley. Kamchatka's only grove of Sakhalin fir (*Abies sachalinensis*) grows near the southern border of the *zapovednik*.

According to the *zapovednik*'s regulations, a few areas are designated for "limited resource use by the staff," where berries and mushrooms can be picked, fuel wood can be collected, and vegetables can be cultivated. Limited licensed fishing of salmon for food is allowed on the Chazhma, Kronotskaya, Bogachyovka, and Olga Rivers and in the Semyachik Estuary.²⁰

Threats. Because of exploratory mining from 1940 to 1970 in the center of the *zapovednik*, protected ecosystems have experienced some degradation. The long-lasting presence of military stations in the area also took its toll, and damage caused by tourism since 1976 is visible. Budget cuts have caused a significant decline in patrols and staff, and now the *zapovednik*'s borders are virtually unenforced. Poaching is expected to increase unless the protection of the *zapovednik* is improved. A result of insufficient funding, the monitoring and research system that had been in place since the 1970s is practically gone. Although recreational development is in direct contradiction to the federal regulations and status of a *zapovednik*, ecotourism development was organized in the *zapovednik* to help supplement the budget. There is one helicopter tourist route to the Valley of the Geysers, where a boardwalk trail is maintained. Not more than eighteen hundred people can visit the valley each year. Visits are forbidden from April to May for about one month during the breeding season of bears and other animals. Nonetheless, overuse by tourists, particularly along the well-trod path through the Valley of the Geysers, and the construction of a visitor center along this route without a preliminary environmental impact assessment, threaten this fragile ecosystem. Other threats include logging in the Kamchatka River basin, interbreeding of domesticated reindeer with their wild counterparts, and commercial fishing and the hunting of marine mammals in Kronotsky Bay. In all, careless expansion of human activity threatens the preservation of these unique ecosystems, which, once destroyed, can never be regenerated.

Existing protection measures. Between 1979 and 1982 a full inventory of Kronotsky's vascular plants was conducted, and the *zapovednik*'s mammals and birds were inventoried between 1978 and 1984. From 1982 to 1991, complex research was undertaken on the relationships between predators and ungulates in the *zapovednik*. Over the past ten years, a survey of nesting sites for Steller's sea eagles has been compiled, and monitoring of its population continues. From 1990 to 1994, a geobotanical inventory was conducted, including a full classification of the flora of the territory. The larch forests near

Kronotskoe Lake were evaluated in 1986, and an appraisal of conditions for rare plant species was carried out in 1990. The winter migrations of ungulates have been monitored annually since 1967 and an enormous amount of valuable data accumulated. Because of the multitude of unique natural objects in the *zapovednik* resulting from the area's volcanic activity, Kronotsky Zapovednik was included as part of Kamchatka's World Heritage site.

Recommendations. The following actions should be taken:

- Return the *zapovednik*'s protection regime to its earlier strength by increasing available funding.
- Reconstruct ranger stations.
- Establish airborne patrols.
- Hire new ranger staff.
- Organize an operative team to handle poaching and other illegal activity.
- Provide adequate patrols of the *zapovednik*'s aquatoria.
- Plan and create a buffer zone along the *zapovednik*'s southern and western boundaries.
- Finance monitoring efforts.
- Increase monitoring at the Valley of the Geysers, including careful control of tourist use.
- Finance environmental education to increase awareness and appreciation of the *zapovednik* and its mandate.

4. Komandorsky Zapovednik (marine)

A. BELKOVSKY, O. CHERNYAGINA, E. IVANYUSHINA, N. TATARENKOVA—The Commander Islands are located where the Bering Sea meets the Pacific Ocean between the Asian and North American continents. Geographically the archipelago is a continuation of the Aleutian Island chain. The grouping consists of two large islands, Bering Island and Medny (Copper) Island, two smaller islets, Toporkov (Puffins) and Ary Kamen (Murre's Stone), and a series of reefs and outcroppings spreading about thirty miles into the Pacific Ocean and southern Bering Sea. The islands are volcanic in origin, with their highest point (Mount Steller on Bering Island) reaching 744 m. Bering Island's shoreline consists of flat reefs with steep dropoffs into the sea, intermingled with sand and gravel beaches. Steep cliffs with a very narrow littoral zone form the shores of Medny Island. The climate is maritime, with winters relatively mild and summers short and cool. The average annual temperature on land is 2.5°C. The sea bottom off the shores of the islands varies from shallow lagoons to deep trenches, with the maximum depth exceeding 6,500 m below sea level. Warm, deep-water currents wash the coastline and the oceans remain ice-free almost all year round.

The total area of the reserve includes 185,379 ha of land and 3,463,300 ha of waters in the Bering Sea and the Pacific Ocean.²¹ Komandorsky Zapovednik was created to preserve and monitor the natural processes in the pristine conditions

of these islands, the location of which, between the Bering Sea and Pacific Ocean, makes them significant as a bridge between ecosystems. Therefore, the marine and terrestrial ecosystems found here are of great biogeographical importance. Preservation of the traditional lifestyles of the Aleuts living here is also a goal of the *zapovednik*.²²

About sixty bird species nest in the Commanders; approximately one hundred more use the islands as stopovers on their migratory routes. Of note is the intermingling of American and Eurasian species, and the high overall bird populations. The bird colonies on Medny Island and the southern portion of Bering Island are especially valuable as baselines for research on marine ecosystems of the northern Pacific as they have been minimally affected by anthropogenic influences. Rare species include the Copper Island arctic fox, sea otter (*Enhydra lutris*), gyrfalcon, peregrine falcon, and emperor goose (*Anser canagicus*). The shores teem with about three hundred thousand marine mammals.

Approximately 480 vascular plant species inhabit the archipelago, with a low degree of endemism. Thirty-five of these species have been introduced. Maritime quillwort (*Isoetes maritima*) and pink lady's slipper (*Cypripedium macranthon*) are rare. Mountain tundra covers most of the islands. Some grasslands also occur, but trees or shrubs are sparse.²³ The islands are, however, rich with a variety of species found nowhere else in Russia. The diversity of marine biotopes and the extent of the continental shelf provide habitat for a variety and high productivity of marine microorganisms.²⁴ Many marine taxa were first discovered in the Commanders, and in many cases, the groupings exist nowhere else on the planet. It is probable that much more needs to be learned about the benthic communities in the archipelago. The fauna of the Commanders include walrus (*Odoboenus rosmarus*), sea otters, two species of eared seals, three species of true seals, and a wide variety of cetaceans—virtually all of the fauna characteristic of the northern Pacific. So many species are found here probably because fishing and hunting have been sharply restricted since the late nineteenth century. At various times there have been prohibitions on the hunting of sea otter, Northern fur seal (*Callorhinus ursinus*), and arctic fox (*Alopex lagopus*) and a variety of other terrestrial and marine protection regimes. A fur seal rookery here has never been seriously hunted, one of only a few such breeding grounds in the world to have mostly been spared exploitation by humans. For this reason the Commanders may harbor the only ecosystems throughout all of the North Pacific that remain in their natural condition.

Threats. The introduction of the red vole (*Clethrionomus rutilus*), Norway rat (*Rattus rattus*), American mink, and reindeer on Bering Island has disturbed the ecological balance on the islands, where previously the arctic fox was the only land mammal. Ticks brought over with domestic and introduced

wild animals probably caused a recent pandemic that nearly killed all of the foxes on Medny Island. Exotic species now comprise 17 percent of the archipelago's bird species and up to 10 percent of its vascular plants.

Currently the *zapovednik* has insufficient financing and materials, which hinders attempts by the staff to protect spawning grounds, bird nesting colonies, and marine mammal breeding grounds. Entire populations of a number of species, including Aleutian Canadian geese (*Branta minima leucopareia*), bald eagle (*Haliaeetus leucocephalus*), Steller's sea eagle, spectacled cormorant (*Phalacrocorax perspicillatus*), and Steller's sea cow (*Hydrodamalis gigas*) have been extirpated by hunting; others, like chum and coho salmon, are newly threatened.

Illegal and semilegal fishing in nearby waters exacerbates the problem, resulting in the removal of hundreds of tons of biomass—in recent years this activity has been particularly focused on such fragile species as halibut and perch. Poaching of both marine and terrestrial fauna in general, all the illegal hunting of rare birds, the pollution of harbors, and cattle grazing are the gravest threats to the islands, even within Komandorsky Zapovednik. Disputes have risen between the *zapovednik* staff and indigenous Aleuts over the regulation of traditional subsistence activities such as hunting of seabirds, gathering of their eggs, and hunting of sea mammals for food.²⁵

Ignoring federal laws, Russia recently granted Japan exclusive salmon fishing rights to waters that include the thirty-mile no-trawl zone surrounding the islands. Although prohibited in most parts of the world, the use of drift nets

would be allowed and could severely affect the salmon stock and the variety of marine mammals inhabiting the area.²⁶

Existing protection measures. *Zapovednik* staff, in cooperation with specialists from the Kamchatka branch of Glavrybvod (Kamchatrybvod), monitor marine mammal rookeries, spawning grounds, bird colonies, and the adjacent waters. They also fulfill the role of environmental inspections in a broader area since the *raion's* environmental inspectorate was liquidated several years ago. Because of a lack of funding and personnel, the effectiveness of these efforts is far from sufficient.

Recommendations. The following actions should be taken:

- Resolve problems of cooperation between *zapovednik* staff and native Aleuts inhabiting the islands; develop and implement guidelines for subsistence use of the islands' natural resources.
- Provide funding to relocate residents of the town of Nikolskoe (Bering Island) who wish it. According to a recent survey, up to 50 percent of the population is prepared to leave.
- Resolve other socioeconomic problems that have resulted in increased poaching.
- Improve technical provision for the *zapovednik* and other local nature-protection agencies; needs include a seagoing vessel, an all-terrain vehicle, motorboats, radio communications, and other essential items.
- Continue research on the flora and fauna of the Commander Islands and publish existing materials; provide stable funding for the *zapovednik's* science staff.



Vladimir Dinets

The Copper Island Arctic fox (*Alopex lagopus mednovi*) is one of the most critically endangered mammals in Asia.

5. Avacha Bay (wetland and marine)

O. CHERNYAGINA, N. KLOCHKOVA,
V. RIVKIN, O. SELIVANOVA—Avacha Bay is an inlet of the Pacific Ocean on the southeastern coast of Kamchatka Peninsula, connecting with the ocean through a long but narrow channel. The bay measures 13 km from north to south and 17 km from east to west, totaling 262 sq. km. Two large rivers, the Avacha and the Paratunka, and forty-five streams less than 10 km in length empty into the bay, producing an annual outflow of 6 cu. km into the Pacific, with maximum rates observed in June and minimums in March. In the central portion of the bay, silt composed of coarse sand and gravel has been deposited to a depth of 20 m.

Volcanic mountains ranging in elevation from 400 m to 500 m form the southern, southwestern and eastern shores of the bay; the northwestern shore is a low wetland at the mouths of the Avacha and Paratunka Rivers. Small coves are scattered along the shoreline, some—Rakovaya, Krashennnikova and Petropavlovskaya—making fine natural harbors. In general, the bay is considered among the world's best because of its size, degree of protection, and navigability. The wetlands in the northwest are an important habitat for waterfowl.

The bay and the rivers that empty into it form an important spawning ground for Pacific salmon migrating on the peninsula's southeastern coast. In past years, high biological productivity and diversity characterized the bay, which is inhabited by practically all the marine and coastal flora and fauna found in southeast Kamchatka.

Threats. The aquatorium of the bay is threatened by degradation because of industrial, household, and agricultural effluent from developments along the shoreline. For some time the bay was able to withstand these influences, but over the years harmful substances have accumulated in the sediment at the bottom. The effects of this on the bay ecosystem are becoming increasingly manifest. The eastern shoreline has been degraded irreversibly, with significant declines in biodiversity and the extirpation of marine biota.

Every year in the summer and autumn, an oxygen deficiency of between 20 and 30 percent is noted in the bottom waters of the bay because of the biochemical oxidation of organic substances and pollutants entering the basin with untreated wastes. Analyses by the Center for Monitoring of Environmental Pollution show a steady decrease in dissolved oxygen over the past five years. In October 1993 a severe shortage of oxygen in the water caused a broad spectrum of bottom-dwelling organisms to perish, and in Krashennnikov Cove, 3,600 dead Kamchatka crabs were discovered scattered along the coastline.

The amount of petroleum products in Avacha's waters has been shown to be stable for the past several years, totaling on average between two and four times allowable concentrations. The worst pollution occurs along the eastern shore of the bay, where most fishing and commercial ports, as well as naval facilities, are located.

In general, the greatest accumulations of pollutants are found in the seabed at the bay's deepest portions in the center. From time to time, this causes the amount of oxygen in these areas to approach null, with occasional appearances of hydrosulfuric zones. With Petropavlovsk's harbor now handling international shipping, the volume of pollutants and oily bilge in the bay is expected to increase, as will the probability of accidental discharge. But improvements in waste-treatment facilities around the bay are not expected, so the water quality of the bay will decrease in spite of projected declines in industrial output.

Long-term water quality analyses indicate population declines for a number of marine organisms in the bay, including algae, bristleworms (*Polychaetae*), and sea urchins (*Echinoideae*), as well as changes in their geographical distribution and marked deviations in their reproductive cycles. These data represent important indicators of changes in water quality and other factors in the bay's overall environmental health.

Research on chemical accumulations in kelp (*Phaeophyceae*) taken from Avacha Bay, conducted by O. N. Selivanova (КИЕР) in 1998, has shown that specimens growing in areas of the bay with higher concentrations of industrial and household pollution can accumulate substantial quantities of toxic substances without showing external damage. Selivanova has strongly recommended a moratorium on seaweed harvesting in the bay because the toxic accumulations substantially exceed acceptable norms.

The largest nuclear submarine base of Russia's eastern seaboard is located on Avacha Bay. Radioactive waste from leaking decommissioned submarines anchored in the bay may also be harming the bay's flora and fauna. Recently the Russian government announced plans for the Ministry of Atomic Energy (Minatom) to "facilitate ecological rehabilitation of hazardous objects in Kamchatka" and other parts of Russia.²⁷

Existing protection measures. Hydrochemical observations have been conducted at Avacha Bay since 1961, with eight readings taken each year between April and November. Since 1994 these measurements have been reduced to two or three per year because of shortage of funds. Two meteorological stations conduct visual monitoring for oil slicks on the water's surface. This level of observation is insufficient to make accurate determination of trends in Avacha Bay's water quality. At the initiative of two Japanese organizations (Committee on the Study of Kamchatka and the Japanese Association for Cooperation among Cities and Ports), a compilation of studies describing the dynamics and conditions in Avacha Bay was published in 1999.

Recommendations. The following actions should be taken:

- Increase the capacity of existing treatment facilities and construct new ones.
- Expand sewage and drainage systems.
- Construct an effective system for bilge collection and treatment.
- Implement biorecultivation methods for removing toxins from the bay, including the harvesting and subsequent disposal of kelp as a means of accumulating and disposing of toxic substances.
- Properly dispose of the industrial and agricultural wastes that accumulate on the shoreline.
- Remove oil slicks from the bay's surface using booms and pumps and make these oil wastes available to

Petropavlovsk's central heating and power plants. On smaller slicks, employ oil-dissolving bacteria and micro-organisms.

- Systematically monitor pollution in Avacha Bay. The estimated cost of sufficient monitoring is approximately U.S.\$52,000 per year.
- Research the Avacha Bay ecosystem and publish the accumulated studies of the bay's biodiversity.

Economy

Evgeny Shirkov

Kamchatka's economic livelihood is based on fishing, which, with its related industries, constitutes 80 percent of the economy. Forestry and food production (except seafood) play a supporting role. Joint ventures are becoming an important component of the economy. Energy production could become a significant industry. Kamchatka's high seismic activity means there are opportunities to tap thermal energy. The most accessible of these sources of underground heat could provide 10,000 gigacalories daily; some are capable of producing 1,400 MW of electric power. The *oblast's* energy requirements have usually been satisfied by imported fuel, but work has begun to develop the capacity to generate hydroelectric and geothermal power. Only a small proportion of the energy needs are met now by these alternative sources, but their share can be expected to increase in the future. Kamchatka's thermal and mineral waters are also important sources of boron, arsenic, lithium, and cesium. If tapped, these sources would be cost effective even with the expenditure of considerable funds to protect the environment.²⁸

Kamchatka's rivers are also a potential source of energy, with flows reaching 172 billion kWh a year. Power stations could be built in Penzhina Bay (in the Koryak Autonomous Okrug), which experiences the highest tides on the peninsula. Wind energy potential makes it possible to produce fifteen million kWh of cheap energy annually, which could supply remote fishing villages and reindeer herding camps.

Kamchatka is geologically rich, with significant deposits of gold, silver, platinum, cobalt, nickel, mercury, and other minerals. Dozens of these deposits are protected within the Federal Resource Fund, and none of the precious metal deposits has been exploited thus far. Placer mining is prohibited in Kamchatka. In recent years, significant foreign investments have been made for the study and exploration of mineral resources.

The shelves of the Okhotsk and Bering Seas are rich in hydrocarbon resources, but have not been well explored. According to the latest data, coal and brown coal deposits in Kamchatka total 273 million tons and estimated reserves

total more than 20 billion tons. There are sixteen natural gas deposits in western Kamchatka, with up to 70 billion cu. m of gas reserves.²⁹ Gas and gas condensate on the shelf adjacent to Kamchatka are estimated at 732 billion cu. m. Several oil fields with a projected stock of 360 million tons were recently discovered here.³⁰

The exploitation of these resources is just beginning and, because of modern extractive technologies, the existing legal base, and the state's inability to monitor resource use, represents the primary threat to Kamchatka's ecology.

Kamchatka is extremely rich in mineral water resources, with over three hundred known springs, many of which are thermal, and is the only part of the Russian Federation where such resources are concentrated. Fresh and mineral waters represent an important export potential and an environmentally sound direction for economic specialization in the interregional and international market. The rivers, lakes, and oceans in and around Kamchatka are rich not only in salmon. More than 60 percent of all the marine biological resources of Russia are concentrated here, including commercially valuable crab, herring, codfish, and flounder.

Kamchatka has been a part of Russia for over three hundred years, but industrial development of the region began only recently. Much of this development has already been destructive and inefficient. The first and most infamous exploitation was the rapacious hunting of the Steller's sea cow that led to its extinction. Local populations of seals, sea otter, walrus, and whales have still not recovered from massive hunting campaigns in the eighteenth century. Dahurian larch growing on Conifer Island in the Kamchatka River valley has practically been destroyed by overlogging.

The modern development of commercial fisheries in Kamchatka follows this same destructive path. The development of mineral and energy resources is under way and may come to mirror the sad experiences of the United States and Japan, where there are virtually no healthy natural populations of Pacific salmon.³¹ Salmon fishing has always been important to Kamchatka's economic development, and the future of the region depends on it. Development of the mineral, energy, and recreational industries must be weighed against their potential effect on the fishing industry. The development of agricultural lands, road construction, the lack or insufficient use of purification facilities in commercial enterprises and villages, as well as numerous geological expeditions, have also harmed salmon habitat.

With expanded resource use, the risk of ecological damage increases because of ignorance about proper technologies and prevalence of seismic activity in the region. A proper legal base for resource use and monitoring is currently lacking, in part because of poor leadership in natural resource management. The planned exploitation of raw hydrocarbon materials in the Okhotsk and Bering Seas³² practically guarantees serious oil pollution in these areas and irreparable harm to their ecosystems.

Other industries such as forestry, energy production, construction, agriculture, and transportation have been developed on a smaller scale, as subordinates to the fishing industry. But they have, nonetheless, contributed substantially to the deterioration of the ecology of the peninsula. Forestry, in particular, has not only undermined the stock of larch in the Kamchatka River valley, but also destroyed a considerable area of salmon spawning grounds in its basin. The total area of coniferous forest unaffected by commercial logging and forest fires amounts to just 350,000: 2.1 percent of the area of the forest fund.³³

The economic crisis that has resulted in a dramatic decline in production in every branch of Kamchatka's economy has, on the one hand, reduced industrial and agricultural pollution of the environment and, on the other, substantially increased the illegal harvesting of valuable fish and game.

Resource management and environmental protection in such a vast and diversified territory require efficient tools for remote control and monitoring, adequate means for early response, and appropriate tools to permit the evaluation of strategic decisions. Unfortunately, the state of the economy and administration in Russia cannot ensure these requirements. Practical legal, methodological, technical, and financial assistance on the part of international institutions is needed to assist Kamchatka's economy to move toward environmentally safe and sustainable development in the future.

Fishing

s. VAKHRIN—According to experts' estimates, poachers in Kamchatka today catch as much fish as licensed fishermen catch legally. Fish-protection agencies are ill equipped to confront these unlawful activities. The administration of the fishery industry is not particularly concerned about the state of the fish stock: If there are no salmon, we can catch other fish; if not in the rivers, then in the sea.

In the mid-1950s, a new fleet of medium-sized fishing trawlers (with freezers and refrigerators) started to arrive in the RFE. In just two years, they managed to inflict irreparable damage to the fish stocks of Kamchatka's coasts. So the fishing fleet moved to the coasts of America to fish perch and flounder, destroying those stocks as well. The fleet then headed for Hawaii to fish *pristipoma* and, after destroying that, went to the coasts of Antarctica to catch krill, the main food of whales.

Only after the introduction of the two-hundred-mile economic zone in the late 1970s did the Far East fleet once again return to its own shores. In Kamchatka's waters fishermen discovered gigantic concentrations of pollock, a fish that was previously considered inedible and used only for fertilizer or as an additive to chicken fodder. This fish saved the Russian fishery from disaster, but in gratitude, the industry began overfishing both the Russian roe-bearing pollock in the Sea of Okhotsk and the American nomadic pollock in the Bering

Sea. The stock of the latter is now approaching a dangerously low level. Yet another target of the Russian fishing industry is the Kamchatka crab, which is highly valued on the Japanese market and facing wholesale destruction wherever it is found. It is harvested in quantities approximately twice as large as those officially permitted.

The main threats that the fishing industry presents to the environment and ecosystems include:

- The destruction of reserves of such valuable food products as salmon and pollock.
- The reduction of sea mammal population as a result of the depletion of the food that these animals eat; in the past ten years, Steller's sea lion (*Eumetopias jubatus*) populations have decreased tenfold.
- The pollution of the sea by oil products and biological waste.

Currently, hundreds of Russian and foreign companies are harvesting fish and seafood products in Kamchatka's waters. The main companies fishing Kamchatka's salmon (up to 130,000 tons a year) are stock companies, formed as successors to formerly state-run collective fishing enterprises.

Those species most valuable in terms of foreign currency (sockeye salmon, roe-bearing pollock in the Sea of Okhotsk, and Kamchatka crab) are aggressively targeted. The main fishing regions of the RFE—Primorsky, Sakhalin, Kamchatka, and Koryakia—survive in periods of the energy crisis thanks only to their fishing resources.

Deterioration of the fish reserves could have extremely harmful consequences for the economy of Kamchatka and the Koryak Autonomous Okrug. This has already happened once, in the 1950s, and forced the closure of dozens of canneries and collective fishing enterprises and the abandonment of several fishing villages.

The government is doing nothing to preserve stocks of pollock, Kamchatka crab, and salmon. There are limitations on the catch of certain species in particular areas, but these rules are violated each year. Fish protection agencies such as the Federal Fisheries Committee and the Special Marine Inspection Service within the Committee on Environmental Protection, and regional inspections by the Federal Border Service today are unable to counter the threat of destruction of the resources in Kamchatka's waters.

Agriculture

v. ZYKOV—Two types of production represent agriculture in Kamchatka: reindeer breeding, a traditional economic activity of indigenous peoples, and land cultivation and animal husbandry. Reindeer breeding has clearly defined geographic limitations related to the availability of fodder; these areas are mainly found within Bystrinsky Raion, although there are places for pasturing in other *raions*. Land cultivation and animal husbandry account for 90 percent of the gross

agricultural output. The central region produces 70 percent of the gross output in agriculture, with the main products being potatoes, cabbage, fodder products, milk, eggs, meat, and cultivated mink.³⁴

As of 1998, agricultural lands belonging to enterprises, organizations, and citizens amounted to 82,400 ha, of which 57,300 ha included plowed fields, 6,700 ha hay fields, and 18,400 ha pasturage. By comparison, in 1993 these figures stood at 349,000 ha, 64,000 ha, 71,000 ha, and 214,000 ha, respectively.³⁵ In general, the agricultural value of Kamchatka's lands is low. Most of the land is too wet and too acidic, in need of drainage and liming.

The area of unused land is annually expanding in the *oblast*, primarily because of lack of funds for buying seeds, fertilizers, and lubricants for machinery. The remoteness of some enterprises from the center makes it difficult to sell products owing to high transport costs. Declining animal husbandry output is a result of the industry's dependence on imported fodder, for which prices have drastically increased. Livestock producers cannot find customers at the suggested prices.

Timber

E. OGULIA—The density of Kamchatka's forests is low in comparison to other RFE regions. In mature forests the density is critically low, the result of a quarter century of exploitation, which underscores the need to preserve and restore forests. Larch, spruce, and stone birch forests are most valuable from a commercial standpoint. Kamchatka's forests are not particularly valuable for their timber (except for larch), but they all perform indispensable ecological functions such as regulating the water flow of salmon spawning rivers, preventing soil erosion, and providing protection from wind. The forests in the central part of Kamchatka, in particular, perform these critical ecological functions. However, following intensive logging, erosion, sandstorms, and changes in climatic indicators are occurring.

Kamchatka's forestry industry has never received any loans or investments for its development. Commercial logging in Kamchatka began in 1928, and during World War II, 200,000 cu. m were logged annually, rising to 500,000 cu. m in the 1950s. The coniferous forests near Kamchatka River and its tributaries were the first targets, especially the high-quality larch trees. With resource depletion, loggers often returned to previously logged areas, and consequently, many areas were subjected to two or three rounds of logging. For more than thirty years, the main logging enterprise in Kamchatka was Kamchatles, OAO (open joint-stock company) Kamchatlesholding, which consisted of several *lespromkhozes* (LFXs) and one timber transit base. On average, Kamchatles has logged between 550,000 and 600,000 cu. m annually in coniferous forests. But in the 1970s and 1980s, the company was logging up to 1,000,000 cu. m in these

forests. Prolonged exploitation depleted the forest resources and, consequently, forced the closure of villages dependent on logging activities, such as Kravcha, Shchapino, Bystry, Krapivnaya, and Nizhne-Kamchatsk.

Logging practices have always been poor. Logging enterprises have never used the timber resources fully, passing over small trees, coniferous trees with defects, and the entire stock of larch. The volume of timber abandoned at logging fields is outrageously high, protection of young trees has not been ensured, and there is high danger of forest fires as a result. There have been some changes for the better. Government authorities have outlawed the transporting of timber by river, prohibited logging in Group I forests, ended the use of aggregated logging machinery and introduced selective logging methods, and created factories to process firewood and scrap wood.

The timber stock in Kamchatka's forests has decreased drastically, and in the past twenty years alone, the volume of coniferous trees capable of being exploited has declined by more than 10 percent. While coniferous forests have been the focus of activity, stone birch forests have long been cut to supply firewood for the *oblast's* internal needs. Kamchatlesprom was the main producer of firewood, but today the company has practically ceased to operate.

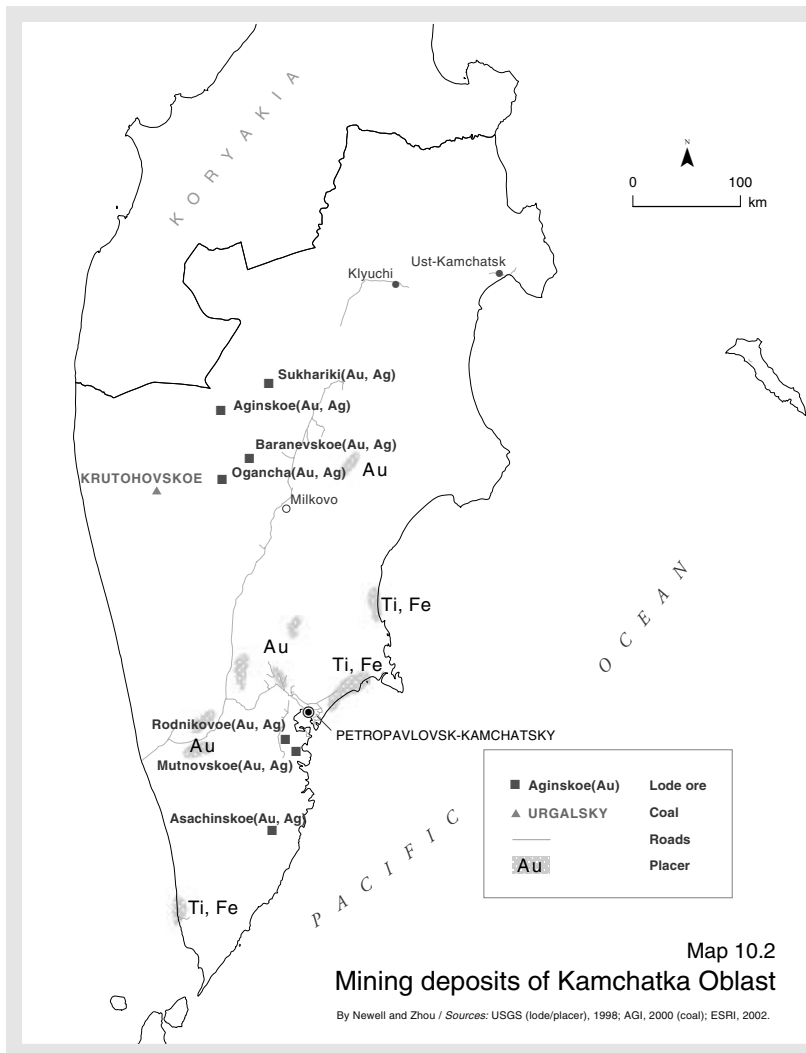
Kamchatka's Forest Service, with the support of the *oblast's* administrative bodies, has on many occasions recommended reducing the volume of logging for internal needs to a maximum of 500,000 cu. m, terminating the export of timber (on the average 100,000 cu. m a year), and ending supply to other *oblasts* (40,000–50,000 cu. m a year go to Chukotka).

Russia's current economic instability has drastically changed the logging practices in the *oblast*. Since 1994, logging volumes have fallen dramatically because of high energy costs, increases in transport costs, and the insurmountable tax burden. The main logging enterprise has practically dissolved. *Lespromkhozes* have become stock companies, but are barely surviving. Actual production of timber in recent years has ranged from 140,000 to 420,000 cu. m, which amounts to 9.7 percent to 22 percent of the AAC. Certain villages such as Kozyrevsk, Atlasovo, and Maiskoe are in an extremely serious situation following collapse of the industry and resulting unemployment. In many settlements, logging remains the only functioning industry that can support the community.

Further development should focus not only on timber extraction. Preservation of forest cover quality should be the main goal throughout the peninsula.

Mining

V. ZYKOV, O. CHERNYAGINA, E. WILSON—Among the riches of Kamchatka are the wealth and diversity of its mineral resources: ore and alluvial gold, silver, platinum, nickel, copper, and tin. In addition, Kamchatka has mineral raw materials



a letter to OPIC recommending that it reconsider its decision. An IUCN resolution in 1996 recommended that international financial institutions not invest in any of the Kamchatka gold mines that are close to the World Heritage sites. As a result, OPIC withdrew its support for Aginskoe mine and changed its policy toward World Heritage sites, pledging not to support potentially destructive industrial activities not only within but also adjacent to the sites.

In early 1998, Kinross approached the Canadian Export Development Corporation about export finance for the same project that OPIC had rejected in 1996. The Canadian government asked UNESCO and IUCN for their scientific opinion on whether the proximity of the proposed mine to Bystrinsky Nature Park would pose an environmental risk to the park and was advised that it could. Due to falling gold prices, it seemed as if there would be no further development of the proposal.

However the Ministry of Natural Resources, which Putin has given authority over environmental matters, is now calling for the regional government to shift the park's borders once more, this time about 50 km northward, in order to allow for exploitation of the rich mineral reserves in the south of the park. If the plan goes ahead, Kinross Gold and other mining developers would be allowed to

that if mined, would develop a local construction materials industry. However, the main plans for Kamchatka's mining industry center around gold mining, particularly developing deposits with high concentrations of gold ore (varying from 10 to 43 g per ton). The development of alluvial gold deposits in Kamchatka is prohibited.

Gold. There are five main gold reserves on Kamchatka: Aginskoe, Balkhachskoe, Baranevskoe, Sukhariki, and Ogancha. Three of these are in Bystrinsky Raion, which is considered a gold province by geologists. The Aginskoe gold mine, close to the southern border of Bystrinsky Nature Park, has been the source of considerable controversy, as the boundaries of both Ichinsky Zakaznik and Bystrinsky Nature Park were changed by gubernatorial decree (in 1994 and 1996, respectively) in order to accommodate the mine. Aginskoe mine was to be exploited by Kinross Gold Corporation (Toronto, Canada), which had shares in the Kamchatka-based joint venture Kamgold, while the U.S. Overseas Private Investment Corporation (OPIC) had agreed to provide political risk insurance. In 1996 international environmental organizations wrote

explore within the park's present boundaries. Furthermore, the Ministry of Natural Resources opposes the inclusion of Bystrinsky Park in the UNDP Global Environment Facility (GEF) program for conservation of Kamchatka's biodiversity, claiming that revenues from resource exploitation would be much more than the funds generated by the UNDP project for the local area. The question is where these funds would go.

Today the economic situation in Bystrinsky Raion is so critical that many local people would now welcome gold mining if only because it would provide them with much-needed employment. The head of Bystrinsky Raion administration, Gennady Devyatkin, who is in favor of developing the district's gold reserves, estimates that 220 jobs will be created by opening Aginskoe mine, with priority going to residents of Bystrinsky Raion and neighboring Milkovsky Raion. However, many of these will be jobs for which local residents do not have the necessary skills and which are more likely to be taken up by incoming specialists, e.g., from Magadan. The only road to the mine is directly from Milkovo, and it is expected that jobs for drivers and mechanics will naturally go to residents of Milkovsky Raion. For the same reason, service

industries (laundry, cleaning, mechanical servicing, and so on) are more likely to develop in Milkovo.

It is unlikely that even direct “bonus” payments into the local budget will improve the local economy. According to local reports, the last gold bonus received by the Bystrinsky Raion administration was used partly to pay off local “budget” salaries (which should be the government’s responsibility), and the rest of the money was invested in a bank that subsequently went bankrupt.

Over one-third of the population of Bystrinsky Raion is of indigenous origins (mostly Evens with some Koryaks and Itelmens), and is currently suffering the effects of the collapse of reindeer herding and the withdrawal of federal subsidies. Gold mining threatens spawning rivers that are vital to the indigenous residents, many of whom have now moved away from their settlements and returned to a traditional lifestyle of fishing and hunting in the forest and tundra. Mining also threatens reindeer pastures used by the last remaining herds and hunting grounds used by native and nonnative hunters alike. Given the acute economic crisis in the *raion*, people are looking more and more to renewable natural resource use—fishing, hunting, gathering of nontimber forest products—simply in order to survive.

Energy

E. WILSON—Kamchatka has traditionally relied heavily on imported fuel (oil, coal, and diesel) to fire its power stations, despite the potential for alternative energy use, including wind, hydro, and geothermal power, that at present makes up only about 2 percent of the region’s energy production. With the collapse of central control over fuel distribution, Kamchatka has suffered greatly from the huge costs of importing fuel, and there is an increasingly urgent need to find local solutions to the energy crisis. In the spring of 1999, there were periods where people were receiving only two hours of electricity every forty-eight hours.

With its immense natural energy sources, Kamchatka could become a model of sustainable energy use among Russian regions. Since 1995, the regional government has been implementing its Program for Converting the Kamchatka Regional Electric and Heat Supply System to Non-Conventional Renewable Energy Sources and Local Types of Fuel. However, Kamchatka experts fear that energy projects are being developed irrationally, without proper assessment of their economic feasibility within the overall economic framework of the sector and without due attention to environmental considerations. Instead, it appears that personal and political interests unduly influence projects. The high level of monopolization in the energy sector compounds this, which is a major concern of both the World Bank and the EBRD, both of whom are investing in energy development. Most of Kamchatka’s energy production is still controlled by the regional energy monopoly, Kamchatkaenergo.

Natural gas fields have been discovered on Kamchatka’s western coast. In 1999, a project to develop two gas-condensate fields (Kshuuskoe and Nizhne-Kvachinskoe) where reserves are estimated at 15 billion cu. m of gas and 450,000 tons of condensate was prepared. The project, to cost U.S.\$162 million, is to produce 750 million cu. m of gas a year and build a 414-km gas pipeline to Petropavlovsk; the gas would supply the capital for twelve years. The pipeline will cross about 150 rivers that are between 20 and 70 m wide and many smaller rivers. Experts fear that the pipeline construction will irreversibly damage salmon stocks and will degrade the pristine ecosystems on the western part of Kamchatka. The economic feasibility of the project is unproven. There is also concern that the construction of the pipeline is the first step toward the development of gas fields on the shelf of the Sea of Okhotsk, off Kamchatka’s coast.³⁶

The gas pipeline project was rejected by the EBRD for not satisfying the strict economic and ecological demands of the bank. A federal *expertiza* (environmental expert review) is currently in progress. Local experts completed a public *expertiza*, which will be reviewed as part of the federal *expertiza* process.

Development of Kamchatka’s offshore oil and gas fields is favored by Moscow but not by the former Kamchatka governor, Vladimir Biryukov; he recalled the signature of one of his deputies on an interregional document approving offshore exploration. This stance, however, earned him enemies in Moscow. There is growing support locally for oil and gas exploitation.

Kamchatka’s other major energy project is the Mutnovskaya Geothermal Power Plant. Mutnovsky is one of four major hydrothermal fields in central and eastern Kamchatka that has been studied with a view to exploitation. The EBRD has approved a U.S.\$99.9 million loan to the Russian Federation, to be lent to Geoterm, the project company. The total cost of the project is U.S.\$150–176 million, according to the EBRD project summary document. In spring 2000, contracts were signed for construction and bore work at the site. The project is intended to diversify Kamchatka’s energy base, reduce the need for imported fuel for power stations, reduce the cost of power generation, decommission environmentally damaging fuel-fired power stations, and develop the first independent power producer in the region.

The World Bank is reported to be proud of the Mutnovsky project as an example of ecologically sound energy development. Local environmentalists also favor the project as being less environmentally destructive than other energy options for the region. Although the landscape around the site itself has already been destroyed beyond repair, environmentalists point out that the Mutnovsky site is mostly tundra and lies beneath several meters of snow for most of the year. The gas pipeline, in contrast, would damage countless spawning rivers, and offshore oil and gas exploitation would

threaten the valuable fisheries and marine ecosystems of the Kamchatka shelf.

Independent international consultants have carried out an environmental study for the Mutnovsky project. The study identifies actions to be taken during project implementation, and these actions form the basis for an Environmental Action Plan that is a legal requirement of the project. Geoterm is obliged to report on the implementation of the plan, and it will be monitored by the EBRD with the assistance of project consultants. It is Geoterm's responsibility to implement and finance environmental measures. However, according to local ecologists, this is not being done adequately. The access road, transmission line, and two blocks of the power station have already been constructed on the Mutnovsky site without completion of baseline research into the flora of the area. This contradicts both Russian law and the EBRD's own strict environmental standards.

Given that the Mutnovsky project apparently does not have enough money for adequate environmental research, ecologists question the granting of tax relief by the federal government to the gas pipeline project and not to the Mutnovsky project, and feel that political interests are being given a higher priority than are economic and ecological considerations.

There are also two projects under way to build hydroelectric power plants on the Tolmachova and Bystraya Rivers. The residents of Bystrinsky Raion, however, already enjoy a relatively consistent supply of electricity and heat for most of the year, thanks to their hydroelectric power and thermal heating systems.



The Kamchatka administration hopes to greatly expand production of geothermal power.

Toward sustainable development

Robert Moisseev

Current resource use is unsustainable. The preservation of the ecology will depend upon limiting economically inefficient and destructive activities. Planned models of sustainable development in Kamchatka have included small-scale projects and larger ones with a considerable impact on the environment, such as the proposed Aginskoe gold mining and processing plant.

Socially and economically, Kamchatka changed dramatically in the 1990s, with the changes in public life, the organization of the state, the system of property, foreign economic relations, demographic tendencies, and so on requiring new principles and approaches to nature use. The fishing, mining, and energy industries should shift, albeit gradually, to sustainable resource use. The most important ecological, economic, and social problems should not be decided independently of one another. This need is well known, but financing and political will have been lacking.

The development of protected areas has become an accepted conservation tool. Almost one-third of the territory of Kamchatka is under some form of protection. Many assume that this policy will make it possible to preserve natural complexes and restore degraded areas. Many also assume that protected areas zoned for recreational use will help restore and develop Kamchatka's economy. But there is a serious

lack of infrastructure and recreational facilities for an efficient tourism industry. Efficient management of the protected areas depends on scientific feasibility studies and project designs as well as on strict compliance with ecological requirements.

The idea of diverting Kamchatka's energy industry away from diesel, fuel, and coal to local, cleaner sources of energy is important in the effort to shift the region toward a new model of nature use. These cleaner sources of energy include renewable geothermal energy, wind energy, hydroelectricity generated from small rivers, and to a certain extent, natural gas. Toward these ends,

construction has begun on the Mutnovskaya geothermal station and the Tolmachevsky and Bystrinsky hydroelectric stations and the development of the natural gas fields in Sobolevsky Raion. These sources will allow Kamchatka's energy industry to become sustainable and reduce its dependence on imported fuel.

The lower electricity and heating costs of local sources may also contribute to economic growth and increase the competitiveness of goods and services produced in Kamchatka. Calculations by various institutions, however, are inconsistent and show that not all types of local energy resources can be more economically efficient than those used now. This issue requires additional study.

There is an urgent need for a comprehensive development program that focuses not only on institutional but also on regional economic efficiency and takes into account all positive and negative effects on natural, social, and economic complexes. Then, the energy program could be adopted as a full-scale model for sustainable development.

Indigenous peoples

Robert Moisseev

Archaeological evidence shows that people have been living on southern Kamchatka for over ten thousand years. When Russians first arrived at the end of the seventeenth century, indigenous Itelmens and Ainu lived in the far south near Cape Lopatka. For an economy based on hunting and gathering, Kamchatka was rather densely inhabited. Small communities dotted the coasts and river valleys; many of them were not more than a day's walk from one another.

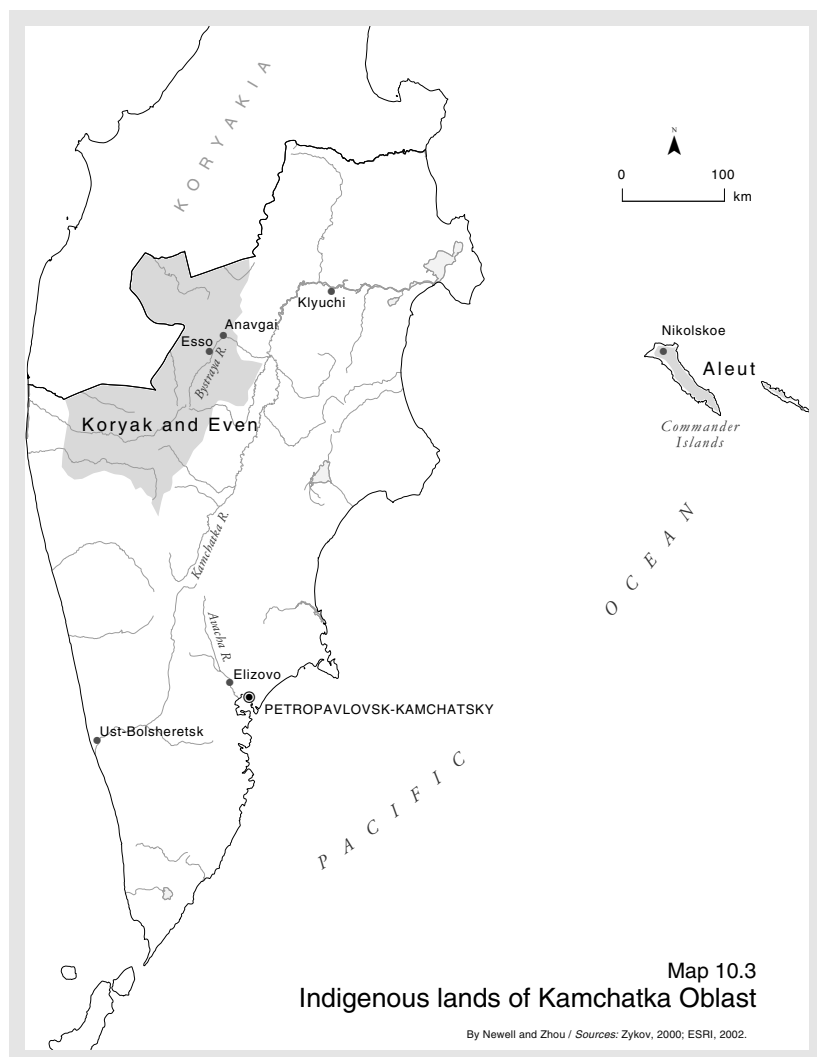
In the first decades of the seventeenth century, the Russian empire pursued a brutal colonial policy in Kamchatka, collecting *yasak* (fur tribute) and violently suppressing uprisings. Kamchatka's indigenous population decreased significantly, and settlements became scattered. By the 1730s, the population in southern Kamchatka had decreased so dramatically, and the volume of *yasak* fallen so drastically, that softer

methods of governance began to be used.

The Itelmen population stabilized at about 1,500–2,000 people. Periodically, mortality rates increased as Russians inadvertently introduced diseases. Itelmens were often resettled as families left regions ravaged by disease or were moved to new settlements required for the organization of regular transport and communication. By the beginning of the twentieth century, Itelmens and Ainu in the south of Kamchatka had been assimilated into the Russian population, not only through mixed marriages but also through mutual exchange in the social sphere, particularly in economic activities.

The indigenous population learned new types of economic activities from the Russians such as gardening, animal husbandry, and poultry breeding. New types of fishing nets, steel traps, and firearms were used. Other introductions were social; separate huts for nuclear families gradually replaced the large communal homes. This practice of living in separate homes on individual plots of land contributed to social stratification. Descendants of Russian settlers in turn took on a way of life based on fishing and hunting borrowed largely from the indigenous population and developed dog breeding, sledding equipment, and methods of storing food.

Little research has been conducted on these processes of cultural, economic, and linguistic exchange, but it is known that



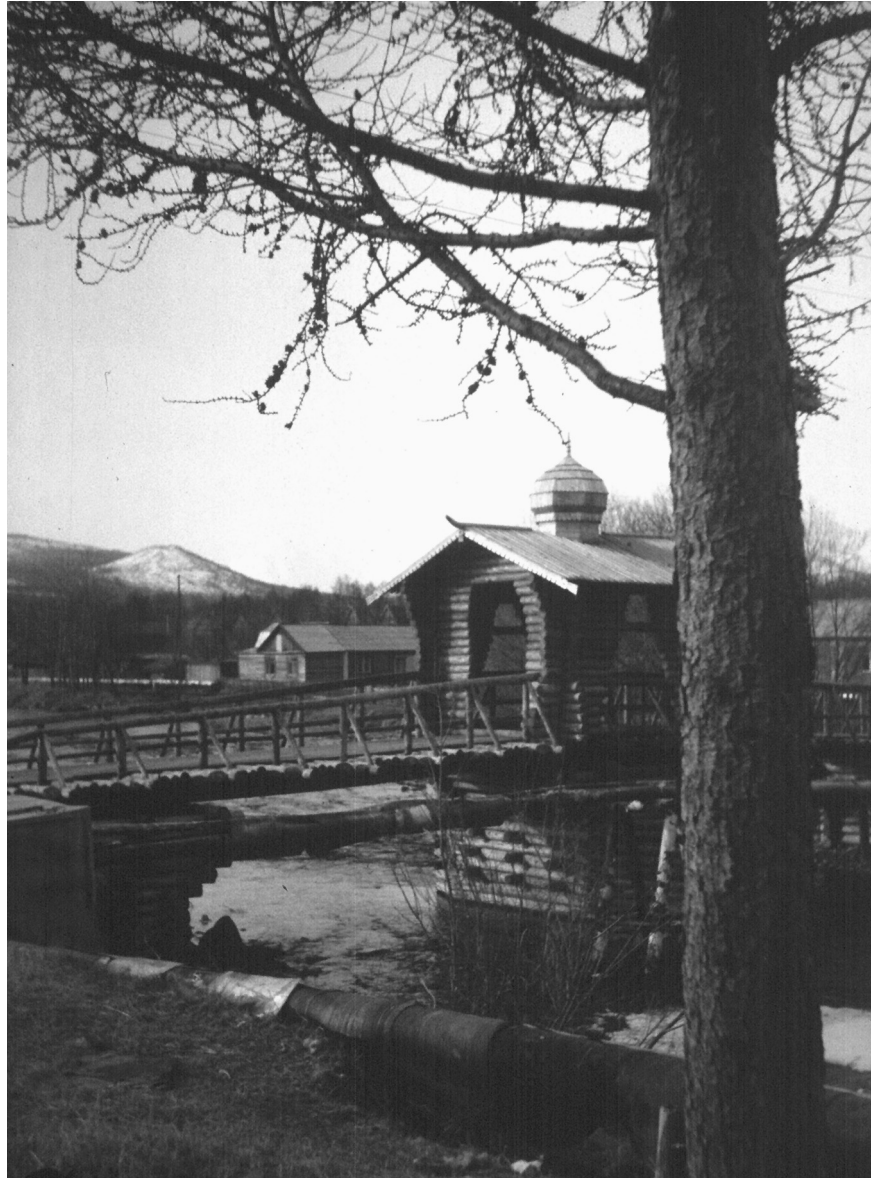
Map 10.3
Indigenous lands of Kamchatka Oblast

By Newell and Zhou / Sources: Zykov, 2000; ESRI, 2002.

a particular Kamchadal dialect of Russian developed among this mixed population.³⁷ Nineteenth-century census data referred simply to a single tribe of Kamchadals, who were in fact, separate Itelmen tribes as well as the new mixed population. Ainu living on the southern tip of Kamchatka were most likely fully assimilated; after 1897 they were rarely mentioned in the census data or other literature.

The Soviet era saw radical changes in the social and economic conditions of indigenous people, who were targeted by special policies. From 1930 to the 1980s, Kamchatka's population increased tenfold, mostly by immigration from European areas of the USSR. The indigenous population increased in absolute terms, but at the end of the twentieth century they comprised only 1 percent of the population overall. The importance of traditional activities for indigenous peoples has decreased dramatically. The Soviets set up state management of the economy and a system of social services based on state subsidies, which eventually led to a decline in traditional pursuits such as hunting and fishing. They also developed a boarding-school educational system that separated children from their families for months at a time. Soviet collectivization consolidated small villages into a few large ones, resulting in the displacement (physically, socially, and psychologically) of almost the entire native population.

Mobility among all people in the former Soviet Union has led to great ethnic heterogeneity. Kamchatka is home to many different minorities, including people identifying themselves as "indigenous peoples of the Russian North," but only Itelmens, Aleuts, Koryaks, and Evens are considered indigenous to what is now Kamchatka Oblast. Today, some of the natives live in small villages, where they form the majority, and they continue to practice traditional subsistence activities. Others live in cities and towns, but they form a small percentage of the population, are regularly discriminated against, and do not continue traditional ways of life. With the shift to a market economy, the resources for survival have decreased more rapidly among the indigenous peoples in Kamchatka than among the population of the more industrialized regions of the country.³⁸



Kamchadal chapel in Esso.

Vladimir Dineits

Kamchadals. The politics of ethnic identity among indigenous people of the Russian North are complex. In the 1920s the definition of the term *Kamchadal* as an ethnicity was ambiguous, as illustrated by written material from that time. In 1925, according to the Far East *Oblast* statistical authority, "Kamchadals, who belong to the American group of Paleo-Asians and who number 5,716 in Petropavlovsky Raion, are united into one group with the Russian population since they differ from the latter neither ethnographically nor anthropologically and have long ago assimilated into the Russian population. Currently, the term *Kamchadal* means all persons who were born and have remained for some time in Kamchatka. The term no longer applies to the indigenous population and merely characterizes a resident of Kamchatka as compared to an outsider. The mixed Russian population

of Anadyrsky, Gizhiginsky and Okhotsky Raions also calls itself *Kamchadal* although it has no relation to the ancient Itelmens.³⁹ The indigenous peoples of Kamchatka and descendants of ancient settlers were, particularly as a result of mixed marriages, practically identical in many ways: Their way of life, dialect, and attitudes toward nature and even some anthropologic features were quite similar. However, both of them differed greatly from the Russian newcomers, and they retained many of these distinctions up to the end of the twentieth century.

By the middle of the twentieth century, the term *Kamchadal* referred to a variously defined and shifting population. Many people in Kamchatka and elsewhere in Russia now regard this term as not referring to indigenous people. This may be one of the reasons why Kamchadals were excluded from the List of the Indigenous Peoples of the North. In the 1980s, Kamchadals residing in Kamchatka gained official inclusion in the List with the provision of corresponding benefits, but in the late 1990s, the *oblast* administration instituted policies to “delete” Kamchadal as an ethnic category in official records.

On March 24, 2000, however, by a decree of the Russian Federation government, the Kamchadals were added once more to the List of Indigenous Minorities (Small-Numbered Peoples) of Russia, together with fourteen others, twelve of which live in Siberia, the Russian North, or the Russian Far East.⁴⁰ Difficulties arise with the identification of persons who refer to themselves as Kamchadals, particularly in connection with rights to natural resource use, as Kamchadals today reside mainly in agriculturally and industrially developed areas of Kamchatka.

Other indigenous groups. In 1825, Aleuts from the Aleutian Islands were resettled to the previously uninhabited Commander Islands to expand the Russian fur trade and bolster Russian claims to sovereignty over the islands. Today, 277 Aleuts people live in the only settlement on the Commander Islands, Nikolskoe on Bering Island.⁴¹ The Commander Islands and the thirty-mile marine zone around them were declared a *zapovednik* in 1993. This has not only placed considerable limitations on the Aleuts’ capacity for subsistence use of natural resources but also has complicated the development of transportation. The best prospects for the Aleuts lie in implementing projects of nature protection and economic activities that link their interests with those of the *zapovednik*.

In the first half of the nineteenth century, Evens from the Okhotsk region migrated to the Bystraya River basin, where they now continue to fish, hunt, and herd reindeer. Evens are one of the main indigenous groups living in the villages of Anavgai and Esso in Bystrinsky Raion, but they now comprise only 30 percent of the total population in both villages, with fewer in Esso and more in Anavgai. A few families also live in the revived traditional villages of Lauchan, Tvayan,

and Kekuk. In 1998, there were 813 Evens living in Bystrinsky Raion as well as 155 Koryaks and 23 Itelmens. In total the indigenous population of Bystrinsky Raion amounts to 1,009 people, or 37 percent of the *raion’s* population.

Reindeer breeding had been an important economic base for the Even population, but in the 1990s, reindeer herds decreased to fewer than half their previous numbers. Other important resources have also decreased. Unemployment is on the rise. Nearly all of the territory of Bystrinsky Raion was included in Bystrinsky Nature Park when it was established in 1995 and included in Kamchatka’s World Heritage Site in 1996, but this has had little impact on the *raion’s* economy and the living conditions of the indigenous population. Planned development of the Aginskoe gold deposit in the mountainous part of Bystrinsky Raion will harm the regions of the traditional nature use of the indigenous peoples and their reindeer breeding, hunting, and fishing. The main problem for Bystrinsky Raion is to find economically sound, socially fair, and ecologically justified possibilities of combining the development of traditional use of nature by indigenous peoples with the new types of economic activities. Conservation activities, tourism, and recreational activities are planned for the nature park. In this regard, public supervision of the ecological and economic feasibility of proposed mining projects and the link between these interests and those of the indigenous peoples and the development of the park require special attention. Most people in Bystrinsky Raion support the planned UNDP project for sustainable development in western and central Kamchatka. The indigenous population has the best knowledge of the landscape and should be included in further development of Bystrinsky Nature Park.⁴²

The indigenous peoples of Kamchatka are active in the Russian Association of Indigenous Peoples of the North (RAIPON), and they have established filial organizations in their respective *raions* and villages. Beside the *Oblast* Association of Indigenous Peoples of the North in Petropavlovsk-Kamchatsky, the following *raions* have local organizations: Elizovsky, Milkovsky, Aleutsky, Sobolevsky, and Bystrinsky. RAIPON filials are active in the following towns: Elizovo, Ust-Bolsheretsk, Klyuchi, Vilyuchinsk, and Sosnovka. The native commercial enterprises of Pimchakh and Aleskam operate in Elizovsky Raion. In addition, public organizations to advocate for the interests of Kamchatka’s indigenous peoples in cultural and public development have been created. Such organizations include “Kamchatka-Ethnos,” the Center for Traditional Culture; the Public Compensation Fund for the Peoples of the North; the native’s women’s organization Aborigenka Kamchatki; the Kamchatka branch of the International Fund for the Development of Minority Peoples and Ethnic Groups; the youth organization Ethno-Initiative; the ethno-ecological club Zavina; and Eyek, the Public Organization of Lawyers and Physicians of the Indigenous Peoples of the North.

Legal issues

Olga Manzhos

Ten regional governmental agencies in Kamchatka are engaged in environmental protection. Their powers include the regulation and protection of the use of natural resources, natural sites, and natural complexes.⁴³ Regional branches of several federal-level agencies are established in Kamchatka, including the Hunting Service, Committee on Land Resources, Ministry of Natural Resources, Authority on Hydrometeorology and Monitoring of the Environment, and Glavrybvod. Some of these branches address problems specific to Kamchatka.

Glavrybvod. The difficulties that Glavrybvod faces in fulfilling its duties are connected with the inadequacy of the existing legislation, its irrelevance, and its inconsistency. The proof can be seen in the new law entitled On the Exclusive Economic Zone (EEZ), which omitted Kamchatrybvod from the list of protective agencies, although it is included in all other listed legislative acts.⁴⁴

Kamchatka Special Marine Inspection Service. This agency is the Kamchatka branch of the Special Marine Inspection Service, a division of the Ministry of Natural Resources. To increase the efficiency of the Inspection Service's monitoring activities, it is necessary to solve the issue of regular and sufficient financing for leasing vessels and aircraft used to protect the EEZ and shelf, to bring the adopted federal law On the Exclusive Economic Zone of the RF in line with the Constitution and the Water Code, to expedite the consideration and adoption of the new Fishing Rules, and to prohibit issuing of permits for scientific fish quotas to organizations if their programs have not passed an *expertiza*. In practice, scientific programs often mask commercial activities, so it is necessary to create a uniform information system for identifying violations.

The participation of mass media during the annual proceedings of the intergovernmental commissions on fishing should be encouraged. In addition, a division dedicated to monitoring marine pollution should be created. The need for such a division has become acute recently with the increase in the number of owners of small vessels, the fishing industry's reliance on an obsolete fleet, and the consequent increase in the potential threat of environmental pollution by oil products and abandoned vessels, as well as numerous cases of oil spillage and the discovery of abandoned vessels, which require qualified investigation and urgent action. Fines paid for the violations contribute to funding for the activities of the Federal Border Service (FBS).

Regional Inspection of Marine Biological Resources. This agency is a unit of the FBS. It was established in 1998 to pro-

tect, monitor, and regulate the use of marine bioresources and their habitats in the internal marine and territorial waters, the Russian EEZ, and on the continental shelf. Previously, Glavrybvod performed all of the functions of the FBS. The FBS is engaged exclusively in the protection of marine fish resources. Most of the staff moved to the FBS from former divisions of Kamchatrybvod and from Spetsmorinspektsia.⁴⁵

General issues

One of the main legal problems affecting the quality of monitoring and, consequently, protection of natural resources is the lack of coordination among the nature protection laws and an excessively strict division of powers and responsibilities among the agencies.⁴⁶ Kamchatka's industry is so dependent on fishing that the activities of the three last-mentioned agencies are especially important. A coordinated legislative system regulating the activities of these bodies is urgently needed.

According to officials from the now-dissolved Kamchatka Committee on Environmental Protection, the main obstacles to environmental protection are the inadequate coordination of activities by the state supervisory services, the lack of a unified and consistent regional policy related to the federal policy on ecology, the lack of coordination between governmental agencies in regions bordering the Okhotsk and Bering Seas and between the nature protection agencies of Kamchatka Oblast and the Koryak Autonomous Okrug, and the insufficient and uncoordinated provision of scientific information.⁴⁷

An efficient legal mechanism of economic and ecological relations between the Russian Federation and Kamchatka must be developed. The law On the EEZ of the Russian Federation serves as a good example of how the center infringes upon the interests of the periphery, in this case, Kamchatka.

Moscow has secured for itself an exclusive right to use all natural resources situated on the continental shelf. This is a direct violation of the constitutional rights of the entire population. There is some danger that the government will ignore the protests of the population and the governor against offshore oil drilling and will begin extraction. This problem could be solved or mitigated by concluding an agreement between the federal executive bodies and Kamchatka Oblast. The provisions of the agreement could specify and complement the norms of federal laws without contradicting them and would temporarily solve the problems of the existing legislation.

It is necessary to specify legal norms establishing procedures for collecting penalties for environmental pollution. It is high time that criminal liability be introduced for rule violations and for the inappropriate use of funds earmarked for nature-protection activities.

Special attention should be paid to the liability of enterprises that avoid conducting an *expertiza* and those that

finance and construct facilities without first obtaining a positive *expertiza*. Because this review process is often ignored on direct instruction of relevant authorities, officials making decisions about the initiation of certain economic activities without conducting the *expertiza* should be held liable.

Kamchatka's economy has always been based on the development and use of biological resources. At present, hundreds of foreign and Russian companies harvest fish and other products in waters adjacent to Kamchatka. There is great pressure on the fish reserves and fishing regulations are violated each year. The protection agencies have no opportunity (under current legislation) to confront this powerful force, and at the governmental level, nothing is done to protect these reserves except to acknowledge the fact that the resources are being depleted.

There are many places in Kamchatka in need of a certain degree of protection. But economic problems are often at the forefront, and environmentally destructive projects that have not passed an *expertiza* are being implemented and financed.

The Tayozhny Zakaznik is a typical example: Its status was not extended in time to protect it from logging. Certain representatives of the *oblast* administration justified the felling of unique trees by citing problems of unemployment, lack of funds in the budget, and so on. The agreement between the Kronotsky Zapovednik and the aviation-tour company Krechet for excursions into the Valley of the Geysers is another notorious example of illegality. This deal contradicts existing legislation, and the agreement should be recognized as null and void in the court.

On September 29, 1997, the administration passed a regulation to the effect that the use of mineral resources and raw materials should be considered one of the main directions of development of the economy and adopted a plan to develop the mining industry in Kamchatka.⁴⁸ This is premature. There is no law On the Insurance Deposit for the Use of Mineral Wealth, there are no inspectors to supervise the operations of such enterprises, and there are no sufficiently clean technologies for mining gold in fragile ecological areas.

One of the biggest problems is noncompliance with existing nature-protection legislation. The nature protection prosecutor's office and nature protection organizations do not fulfill their obligations to the full extent. The section of the Penal Code entitled Economic Offenses is not viable and needs improvement. A major step forward would be the adoption of the Ecological Code, which would be a compendium of the entire nature-protection legislation. The law On State Inspectors should be adopted, and the involvement of as many citizens, especially young people, as possible in inspection activities should be encouraged. The level of air pollution is increasing in Elizovo and Petropavlovsk, as road transport develops. The law On Air Protection has been developed but has not been enforced.

Perspective

Geoffrey York

Russian poachers rip roe from salmon

2000: The windswept waters of Kurilskoe Lake are the site of an astonishing annual phenomenon: Asia's biggest salmon spawning run, where 1.7 million salmon fight their way up rivers and creeks, attracting the attention of hundreds of giant brown bears and rare sea eagles as they pass. However, this phenomenon is now attracting a more ruthless predator: organized criminal gangs of knife-wielding poachers, flown in by helicopter and capable of devastating an entire river with just two weeks of illegal slaughter. This summer's spawning season in Russia's Far East has barely begun, and already the poachers are brazenly harvesting their prey. Scattered around creeks are hundreds of dead salmon, their bodies slit open, their roe ripped out. "Not even twenty-four hours after the salmon run began, the poachers were already here," said William Leacock, a researcher from the Wildlife Conservation Society, a New York-based environmental group that is trying to protect the area from poachers. On the first day of the spawning season that began on July 21, he saw hundreds of discarded salmon corpses near the creeks around Kurilskoe Lake, on the southern tip of Russia's remote Kamchatka peninsula. He fears much worse may yet occur. In previous summers, he said, he has seen tens of thousands of salmon killed for their eggs. "It could reach a threshold where the population breaks," Mr. Leacock said.

Poaching is one of the fastest growing threats to the ecological wonderland of Kamchatka, a lush peninsula of wild rivers, forests, erupting volcanoes, hot springs, rare birds, dozens of endangered species, and even a spectacular valley of geysers. About one quarter of the world's Pacific salmon population spawns in its pristine rivers. It is one of the world's greatest unspoiled wildernesses—but its survival could be in peril. Illegal fishing and poaching is believed to cost Kamchatka as much as U.S. \$7 billion a year in lost revenue. As many as one hundred fishing companies can be licensed on a single river. Organized gangs harvest the salmon illegally for their red caviar, a delicacy that sells for U.S. \$22 a kilogram in Russian shops. Poachers in massive numbers, too, slaughter other animals. Hundreds of Kamchatka's huge brown bears—the same species as the North American grizzly—are killed by poachers every year to satisfy the bear-organ market in Asia, where Chinese and Koreans pay thousands of dollars for the animals' gall bladders for medicinal use. According to some estimates, the bear population in Kamchatka has dropped by 50 percent since the 1960s, the result of excessive hunting and poaching. Nobody knows how many bears still roam the Kamchatka wilderness (estimates range from 6,000 to 25,000), but poachers are killing as many as 2,000 annu-

ally. More than three hundred bears will also be killed legally this year by trophy hunters, including wealthy Americans and Canadians who pay as much as U.S.\$13,000 for the privilege of bagging a bear. As many as one thousand bears will be shot legally by local hunters. "There's been a dramatic decline in the size and age of the bears killed," Mr. Leacock said. "If it continues, the population is going to be decimated [*sic*]." Kamchatka is such a spectacular and unique region that five of its nature reserves have been designated as a UNESCO World Heritage Site. Yet an impoverished Russian government lacks the staff to protect it. Only two federal park wardens, each armed with a shotgun, guard the salmon wealth of Kurilskoe Lake. They live in an isolated compound behind an electrified fence designed to keep out the bears.

A new project to help Kamchatka's nature reserves is being launched by the UNDP, which hopes to raise as much as U.S.\$15 million for a plan to strengthen the management of four protected areas, including the Yuzhno-Kamchatsky nature park, where Kurilskoe Lake is located. The Canadian International Development Agency has spent U.S.\$100,000 on studies to support the UNDP project, and several Canadians are at the forefront of the planning. "Kamchatka is an amazingly untouched place, but there are so many threats to it," said Paul Grigoriev, an Ottawa-based consultant to the UNDP project. Because of the post-Soviet economic collapse, poaching is often seen as an acceptable means of economic survival. Even local government officials are sympathetic to small-scale efforts. "We can't reproach people for poaching," said Kamchatka's deputy governor, Sergei Timoshenko. "The economic situation here is very difficult. People have to poach to support their families." Large-scale organized poaching, though, is a different story. By blocking rivers with nets, poachers can strip an entire year's salmon run, weakening the diversity of the salmon and reducing their long-term capacity for survival.

"It's a rich resource, but it's under unprecedented pressure now," said Jeffrey Griffin, a UNDP consultant. "The poachers are a real threat to some salmon runs. They're taking away the salmon's ability to reproduce." Gangs of poachers sometimes hire a Russian aboriginal person as a frontman, allowing the exploitation of salmon quotas that are supposed to go to aboriginal people. The illegal poaching brigades have taken on the atmosphere of fear that comes with reputations of power and ruthlessness.

"Poaching is a very big business," said Olga Chernyagina, a leading environmental activist in Kamchatka. "It's easy for them to take a helicopter and fly it to any river. Few people know the details because it's a criminal business. I'm afraid even to talk about it." Russia's federal fishing regulators are almost powerless to combat the poaching. They have only two helicopters to watch Kamchatka's fourteen thousand rivers, and officials say they need a major increase in the number of fishing wardens. With salaries of only U.S.\$50 or \$60 a month, many wardens are unable to resist the tempta-

tion of bribes. "It's hard to fight the poachers," said Vladimir Rezvanov, director of the federal fish-protection department in Kamchatka, Kamchatrybvod. "They have a well-organized system. They come in by helicopter, strip out the caviar and throw away the fish. Sometimes we feel helpless and discouraged when we see we can't improve the situation." The Russian government has admitted the penalties imposed on poachers are too lax. The basic fine for an individual is 83 rubles, less than U.S.\$5 an infraction. There can also be a "damage recovery" fine, but this too tends to be small unless the poacher is caught red-handed. In the first half of this year, 972 fishing infractions were recorded in Kamchatka, but only about U.S.\$6,300 worth of fines were collected. Likewise, the maximum fine for killing a snow sheep is about U.S.\$150, even though a ram's head can fetch up to U.S.\$10,000 on the black market. "Clearly, such legislation does not inhibit poaching, but rather inadvertently condones it," a Canadian UNDP consultant concluded.

Perspective

Bruce Rich

World Heritage on Kamchatka

The official designation of five protected areas on Kamchatka by UNESCO in 1996 as the World Heritage site, Volcanoes of Kamchatka, offers greatly enhanced prospects for balanced, environmentally and socially friendly economic development. However, this potential will be realized only if communities and government officials in Kamchatka work together to maximize the opportunities it presents.

The concept of World Heritage originated in 1972 with the promulgation by UNESCO of an international treaty, the Convention Concerning the Protection of the World Cultural and Natural Heritage. Under the treaty, nations agree to identify sites on their territory that are of "outstanding universal value" from a cultural or natural perspective and that will constitute a world heritage "for whose protection it is the duty of the international community as a whole to cooperate." Nearly all the countries of the world (157) are now parties to the convention. Currently there are 721 sites on the UNESCO World Heritage List, of which 554 are cultural, historical sites, 144 are natural sites (such as Kamchatka), and 23 are so-called mixed cultural and natural heritage sites. National governments submit nominations of sites to the UNESCO World Heritage Committee in Paris, which, together with other international organizations and scientific bodies, evaluates the nominations according to their scientific value.

There are four major criteria for selecting World Heritage natural sites. They should:

- Be outstanding examples representing major phases of the earth's history.
- Be exceptional examples representing ongoing ecological and biological processes.
- Contain the most important natural habitats of endangered species of universal value.
- Contain superlative natural phenomena or areas of exceptional natural beauty.

The Volcanoes of Kamchatka site is one of the few that fulfills all of these criteria.

There is great competition among nations and regions to have sites selected for World Heritage designation, because inclusion makes an area an international focus of attention for tourism and, in some cases, attracts financial support from international development and environmental organizations. It also entails a great responsibility and commitment on the part of local and national authorities to conserve the site and to ensure that the economic development that the designation can foster is environmentally and culturally sustainable. If inappropriate development or poor management endangers a site, the UNESCO committee can declare that the site is "in danger," which creates considerable international embarrassment for the government concerned. This occurred in the United States several years ago, when Yellowstone National Park was declared a World Heritage Site in Danger because a proposed gold mine would have posed environmental threats to the park.

Whether tourism and international support materializes depends on whether local communities and authorities can cooperate to effectively manage, protect, and develop the sites. Currently the five protected areas constituting the Kamchatka World Heritage site are not being managed and developed coherently. This has come to the attention of the UNESCO committee and other international and foreign observers. It is widely known that the helicopter company Krechet effectively controls access to the crown jewel of the World Heritage site, Kronotsky Zapovednik. Both the head of the Kronotsky Zapovednik and the former governor of Kamchatka, Vladimir Biryukov, are reported to have close links to Krechet and the company's tourism business. Direct business interests inside any World Heritage site on the part of those responsible for administering it poses an important potential conflict of interest that can undermine international confidence in site management.

Russian law requires an *expertiza* before any infrastructure is developed in protected areas. It appears that construction of tourist infrastructure in Kronotsky Zapovednik, Yuzhno-Kamchatsky Zakaznik, and Nalychevsky Nature Park has occurred without these reviews, i.e., illegally. This suggests that the officials responsible for the construction are not sufficiently concerned with their obligations to preserve and protect the natural environment.

WWF—Germany has raised significant funds for the Kamchatka World Heritage site, but there are questions about how much has actually come to Kamchatka to support real conservation activities. In Nalychevsky Park significant amounts—contributed in part by WWF—have been expended to set up a museum and other facilities, including rather elaborate changing cabins at several hot spring sites, all near the helicopter pad where foreign and elite Russian tourists fly in and out. But other facilities in the park, for example at the overnight resting spot near the pass on the trail that leads back to Petropavlovsk, used more by local hikers, have been allowed to deteriorate to a lamentable condition. There appear to be no investments in management plans or conservation in the two other nature parks, Bystrinsky and the Yuzhno-Kamchatsky Nature Park. The three nature parks were all established according to scientific criteria to protect important watersheds and to develop programs of rational resource use and management. So far it appears that a kind of tourist Potemkin Village has been built in Nalychevsky Park, while a small amount of the money spent there could have been used to clean up other sites in the area that in the summer peak tourist season at times resemble a rural slum.

There are also proposals to create new nature parks on Kamchatka, for example around the Kirinsky and Klyuchevskoy volcanoes. The creation of these parks could in the future be a welcome addition to Kamchatka's system of protected areas, but it would probably be counterproductive to proceed while the existing protected areas lack adequate coordinated management and protection.

Perspective

Emma Wilson

Recommendations for forests and protected areas

Kamchatka's forests are vitally important for preserving the ecological balance of the peninsula and have a special role to play in mitigating floods and protecting salmon spawning grounds. A major concern is to preserve Kamchatka's conifer forests of larch and spruce. These are found only in the center of the peninsula (Conifer Island), make up less than 6 percent of the total forest cover, and have decreased in area by over two-thirds in the past sixty years.

There are varying levels of concern among local experts. According to the head of the protected areas department at the Kamchatka Committee on Environmental Protection, Yuri Nechitailov, the situation is not critical at present given that commercial logging—the main threat to Kamchatka forests—is decreasing every year. However, the economic

situation is so severe that Gennady Lazarev, the director of the Experimental Forestry Station (EFS), believes that people will let their forests be cut at a moment's notice for a quick profit and therefore efforts should be made to provide legal protection for these forests now through creation of protected areas. The head of the Kamchatka Forest Service, Alexei Avramenko, is concerned at the frequency of forest fires and sees an urgent need to provide adequate protection for all forests against the threat of fires (with air patrols, rangers, communications, fire-fighting equipment, and so on).

The timber industry today has collapsed into a number of small private logging ventures. In 1998, they cut 169,000 cu. m over an area of 1,914 ha. (In previous years as much as 1 million cu. m. were logged annually.) Forest regeneration, paid for by a tax on the logging enterprises themselves, covered 5,413 ha in 1998 (over three times the area logged). In recent years only 10–11 percent of the Annual Allowable Cut (AAC) has actually been taken, but experts believe the AAC is too high and should be reassessed. As the more accessible forests have been logged, commercial firms are trying to soften the legal requirements for logging. The water protection zone has been reduced in stages from 5 km to 1 km, and now efforts are being made to reduce it to 500 m. The AO (joint-stock company) Kamchatlesholding (formerly Kamchatles) tried to contract the EFS to provide a scientific justification for logging forests in the water-protection zone. EFS refused the contract. Kamchatlesholding has now practically fallen apart.

Forest specialists agree that export of Kamchatka timber should be banned. The industry should, however, be able to provide sustainable yields for Kamchatka's internal consumption, and should aim for more local processing. Recent plans by Kamchatka industrialists to build a huge wood-processing plant for plywood seemed to be a good idea, but the proposed plant was intending to use 70,000 cu. m of birch wood annually, which would pose a serious threat to Kamchatka's birch forests. The plywood factory failed to pass an *expertiza*, so the threat has been lifted for the present.

Kamchatka's system of protected areas (PAs) has an important role to play in the protection of the forests, though many agree that it is far from fulfilling this role adequately. Today 27 percent of the territory of Kamchatka is set aside in PAs, and the new Klyuchevskoi Nature Park will make it 31 percent. However, ecologists argue that the focus should be not on the number of PAs created, but on the quality of actual protection provided by PA status.

Passions are quickly raised on Kamchatka when the discussion turns to PAs and forest protection. Despite the creation of the Kamchatka Directorate of Nature Parks to control and manage the Kamchatka nature parks, the Kamchatka Forest Service still bears the entire responsibility for protecting all Kamchatka forests, both inside and outside PAs. However, the forest service does not have enough funding to protect the whole region effectively. Meanwhile, funds

that are coming into the region for forest protection and PA support, such as the WWF program Protection of the Forests of Kamchatka, are being used almost exclusively to develop tourism infrastructure in the nature parks, notably in Nalychevsky Nature Park, rather than to strengthen the protection regime within the PAs or to increase the capacity of local fire-fighting and fire-prevention services. Specialists suggest that Bystrinsky Park be made into a federal-level national park, so that money would be channeled through the Federal Forest Service and control will officially remain with the Kamchatka Forest Service.

The lack of properly determined park borders or zoning within the parks means that all kinds of activities are permitted as if no PAs existed at all. The head of the Kamchatka Forest Service, Avramenko, exclaims: "They're called protected areas! They don't even provide normal protection, never mind special protection!" The scientific justifications for the zoning and borders were determined long ago for the parks by the КИЭР and the Kamchatka Committee on Environmental Protection, but these remain on paper and have not been made legally binding. The parks directorate prefers to put money into tourism than into confirmation of boundaries and zones. Kamchatka ecologists believe it is wrong to place such undue emphasis on tourism within PAs, when there are many equally attractive tourist destinations outside the PA system, and when the priority in PA creation in Russia is the protection of the natural ecosystems.

The legislative framework for forest protection is inadequate. For example, land has still not been officially allocated to Nalychevsky Nature Park for long-term use due to inconsistencies between the law on PAs and the national forest code. The Russian Federation Forest Code was passed on January 22, 1997, but local specialists agree that it cannot possibly embrace local specifics. There is no regional forest code for Kamchatka, although there is such a code for Khabarovsk Krai, Sakhalin Oblast, and Leningrad Oblast.

Despite initial hopes, international intervention has not provided much real support for forest protection on Kamchatka. The Volcanoes of Kamchatka World Heritage nomination has created a focus on protecting "not forests but rocks" in the words of one local ecologist. "Why create a protected area around a volcano? A volcano will not go anywhere. If it erupts, then we will not be able to do anything about it. How can we protect the Klyuchevskaya group of volcanoes? This is not the right way to go about setting up protected areas. We need to determine what are the real priorities for protection."

Recommendations. The following actions should be taken:

- Protect the old-growth conifer forests of Conifer Island that have remained, setting aside these territories as soon as possible so that they are legally protected against future threats from logging companies.

- Create smaller (properly protected) PAs, rather than large PAs that provide no real protection to natural ecosystems.
- Ensure that the existing PAs provide adequate protection, including delineation of boundaries and proper zoning within the PAs as a priority.
- Survey the forests to reassess the AAC, using new methods and technology.
- Break the monopoly on tourism and helicopter transport in PAs.
- Develop tourism outside PAs rather than focusing so heavily on tourism within PAs.
- Direct financial and technical support for forest protection through the Kamchatka Forest Service rather than through the PA structure.
- Reduce the export demand on Kamchatka forests by working with the Japanese and Koreans to reduce their consumption of Kamchatka timber.
- Develop small, sustainable local timber-processing ventures.
- Develop a regional forest code for Kamchatka.

Perspective

Emma Wilson

Tourism and the *zapovednik*—a natural monopoly?

Ecologists in Kamchatka argue that tourism and the concept of a *zapovednik* are incompatible, and there should be no talk of developing tourism in Kronotsky State Biosphere Reserve, one of the oldest *zapovedniks* in Russia.

The Russian system of *zapovedniks* was developed under the Soviets, when, as nowhere else in the world, there was guaranteed state support for science and nature protection. Huge areas of land were set aside for strict protection and regular inventories made of the territories and their natural populations. According to the federal law On Specially Protected Areas, the goal of a *zapovednik* is “the preservation and study of natural processes and occurrences, the gene pool of flora and fauna, specific species and communities of plants and animals, typical and unique ecosystems.”⁴⁹

The question today is how such a system can survive in the market economy where there are no comparative models to draw experience from elsewhere in the world. Given the withdrawal of state support for science, where can funds be found to support such a system?

Using Western models for protected areas, tourism seems to be an obvious option. By law, however, tourism is not allowed in *zapovedniks*, nor is any other type of activity that contradicts the goal of the *zapovednik*. According to one scientific researcher, “In order for a *zapovednik* to survive, you

can develop mass tourism there, but then you won’t be able to call it a *zapovednik*—it will lose its status. It will be on the level of our nature parks where tourism and hunting and everything else is allowed.”

Scientific researchers in the *zapovednik* try not to use the word “tourism,” preferring instead to talk of “ecological education” or “ecological excursions,” which are permitted by law. This generally refers to scientific exchanges, visits from amateur ornithologists, and so on. In theory the ecological education department in Kronotsky Zapovednik could organize this type of activity and ensure that money generated by these activities is used for scientific research and conservation. In practice, the way that tourism (or “ecological education”) has been developed in Kronotsky Zapovednik is clearly outside the framework of Russian legislation, and indeed threatens the World Heritage status, which Kamchatka protected areas enjoy.

Kronotsky Zapovednik has sold its soul to the helicopter company Krechet, which has the monopoly on all travel to and from the nature reserve, as well as on virtually all major tourist activities on the peninsula. Relations between the helicopter company and the nature reserve originated at the dawn of *perestroika*. The joint-stock company Sogzhoi (which gave birth to Krechet) was established on the basis of the former State Resource Enterprise (*Gospromkhoz*) in Elizovsky Raion, where the *zapovednik* is situated, and on the personal friendship between the director of Sogzhoi, A. G. Kovalenkov, and the director of the *zapovednik*, S. A. Alexeev. With the helicopter firm’s proximity to the *zapovednik*’s headquarters in Elizovo, and special favors that were granted (allowing urgent helicopter trips on credit, and so on), the *zapovednik* became dependent on the firm.

Today the dependency is irreversible. Although S. A. Alexeev has been removed from the director’s post, it is said that the new director, Valery Komarov, is a puppet, placed there by Kovalenkov. An agreement has been signed between the *zapovednik* and Krechet that gives the helicopter company “priority rights” (in practice, exclusive rights) to activities within the *zapovednik* for a period of ten years. If any other helicopter company, for example, wants to fly into the famous Valley of the Geysers, it has to obtain the consent of Krechet.

There is considerable controversy about this agreement. The scientific advisory council—a body of scientific researchers from the *zapovednik* and independent scientists that should approve all that happens in the *zapovednik*—amended the draft agreement with the firm, but claims that it was signed without any of their amendments. Alexeev, who was still director at the time, claimed that it was not his signature on the final agreement. The scientific advisory council is concerned that the activities in the *zapovednik* are going ahead without consideration of their recommendations. In 1999, two researchers from the *zapovednik*, one of whom has worked there for twenty years, were removed from the council without being told the reason.

Krechet wants to develop mass tourism in the *zapovednik* and wants to have full control of this very lucrative business. Krechet constructed all the paths and bridges in the Valley of the Geysers. Now the firm has built two houses there, for scientific researchers and forest rangers, as well as a visitors' center, which is leased to Krechet for a period of ten years or so—all without the environmental expert review (*expertiza*) that is required by law. Building materials were apparently just flown into the reserve, and the director, Alexeev, pretended he did not know anything about it. It was no trouble for Kovalenkov to pay the fine for building on land without obtaining an environmental expert review.

Now ecologists are concerned about how excursions into the Valley of the Geysers are being carried out. During the tourist season, there are generally two excursions per day, which is a total of forty people. The helicopter flies in, the tourists walk around the valley, and then they all have lunch. All the food is prepared and cooked there in the valley, then all the dishes, glasses, pans, and flatwares are washed there, and generally the visitors all use the toilets. A pit has been constructed to contain the dirty water, and it is treated, but if that pit were to overflow, all the wastewater would flow down the slopes of the valley into the unique Geyser River. Ecologists are afraid that the ecosystem will not be able to withstand this increased volume of dirty water. Previously, research groups and visitors would fly in, bringing a picnic with them, and then fly out again with all their waste; dirty dishes would be washed at home.

At present, access to the Valley of the Geysers is limited, but Kovalenkov, as head of Krechet, is now talking of abolishing the “quiet month,” which is the springtime period when bears mate in the valley and visitors are banned. Last year officials, including the governor, ordered the quiet month to be interrupted as some tickets had already been sold to a foreign tour company for dates within this period.

There is no way to stop people from visiting the Valley of the Geysers now. So far, access is only by helicopter. But there is talk of reopening the foot route. There is also talk of allowing tourism in other places within the *zapovednik*—Burl'yashchy Volcano, Uzon Caldera, and Kronotskoe Lake (for licensed fishing.) Krechet is now looking to “develop” Kuril'skoe Lake in the south, which is also part of the World Heritage Site. Researchers fear the impact of increased tourism on the fragile ecosystems of these places. Scientists who have worked in Uzon Caldera, for example, believe that it should remain a scientific laboratory, and access should be

denied to tourists. There are other equally interesting places on Kamchatka, such as Mutnovsky Volcano. As one researcher commented, “Uzon is unique from a scientific point of view, not so much from a tourism point of view. How can you explain to a tourist just how long it took for that fern to grow that he has just trodden into the ground?” But there are plans to construct seven buildings in Uzon Caldera, including a visitors' center.

What are the alternatives? There are other sources of income apart from tourism. The UNDP GEF biodiversity program is just being developed for Kamchatka, with a protected-area component that includes Kronotsky Zapovednik. There are other international scientific and conservation grant programs, though these are never going to provide a sustainable source of income. There are possibilities for getting money from the regional administration. The federal government also has money—it is just a matter of getting it to spend it in the right way. It has also been suggested that the *zapovednik* develop its own production activities (e.g., small-scale timber processing) away from the territory of the reserve to create an income that would be fed directly into scientific research and conservation.

There is a form of tourism that causes minimal damage to the natural environment: cruises. These are expensive for tourists, but increasingly popular. Small boats bring passengers from the cruise liner to about 300 m from the shore, where they watch birds and other wildlife through binoculars and enjoy the wonderful coastline views, without stepping on land or disturbing the bird colonies.

The *zapovednik* staff complain about their dependency on Krechet, about losing profits from tourism and control over management of the nature reserve, but find it difficult to oppose the agreement. They are, apparently, afraid to act individually for fear of losing their jobs, yet find it impossible to act collectively. The agreement could be changed; the reserve could make a stand against monopolization. Legal experts believe the agreement could be protested on legal grounds. Instead, the *zapovednik* remains stuck in an irrational relationship of dependency, within a nature conservation system that involves a whole network of dependency relationships, including nature protection regulators and the regional administration. In a local newspaper article Kovalenkov is described as “a good business man, a strong boss, whose only problem is that he can't follow the law.” And it is this businessman who has a disturbing amount of control over tourism and conservation on Kamchatka.