

## Overview of Environmental Problems in North-West Russia

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### 1. SOME BASIC FACTS ABOUT NORTH-WEST RUSSIA

The north-west of Russia occupies 1.7 thousand sq. km and it has a population of 14 million people. The area includes two large administrative regions; the North Economic Region (the Arkhangelsk, Vologda, and Murmansk oblasts, the Karelia and Komi republics) and the North-West Economic Region (Saint-Petersburg city, the Leningrad, Kaliningrad, Pskov, and Novgorod oblasts). The area borders on Norway, Finland, Estonia, Latvia, and Byelorussia. Inside Russia it borders on the Tver, Jaroslavl, Kostroma, Kirov, Perm, and Tjumen oblasts. The area is surrounded by the Barents Sea, the White Sea, the Kara Sea and the Baltic Sea.

The North and the North-West Economic Regions together form the North-West *Federal Okrug*, an area of Russia that means a lot to the country's economy. The City of Saint-Petersburg and Leningrad

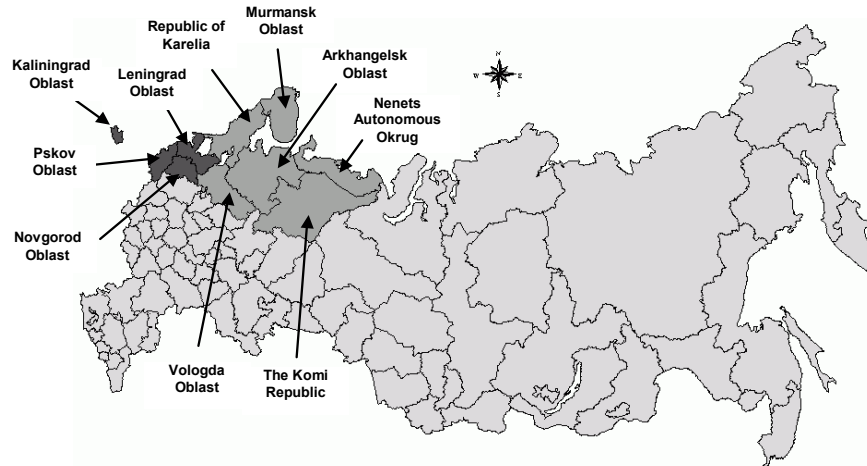
Oblast are centers for mechanical engineering, electro-technical and construction, for transport and agriculture. It has a well-developed fishing industry, ferrous and non-ferrous metallurgy, sea-transport, and electric power production. Reindeer-breeding is also of some importance in Murmansk Oblast. Arkhangelsk Oblast is a center for the forest, fishing and chemical industries; there is also a space-rocket launching site in Plesetsk. Vologda Oblast has a prominent ferrous metallurgical industry, forest industry and agriculture. In the Novgorod and Pskov oblasts there are large-scale mechanical engineering, electro-technical, chemical and woodworking enterprises. Forestry, pulp and paper, iron-ore and fishing are key industries in the Republic of Karelia. In the Komi Republic there are rich reserves of timber, bituminous coal, oil, gas and other minerals. Due to the intensive economic exploitation the environmental situation in north-west Russia is extremely severe.

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### The Russian Federation



## 2. STAGES IN THE ECONOMIC DEVELOPMENT OF THE RUSSIAN NORTH-WEST

In 1920, the Bolsheviks adopted the GOELRO Plan (state governed electrification of the Soviet Union) proposed by Vladimir Lenin as the basis for an extensive economic development of the newly established Soviet Union. In accordance with this plan the Volkhov and Svir' Hydro Power stations and the Volkhov Aluminum Plant were constructed in Leningrad Oblast and in the City of Leningrad the Kirovsky and the Izhorsky plants were re-constructed.

Somewhat later, in the 1930's, Stalin's plan for the industrialization and collectivization of the Soviet Union was adopted. In accordance with this plan massive investments were made in heavy industry in Russia's north-west, such as the Niva and Nizhne-Tuloma Hydro Power Stations (1934, 1937), the Severonickel plant (1939), the Apatite Fertilizer Refining Complex (1929) in the Kola Peninsula, the construction of the White Sea-Baltic Canal (1933), the establishment of the Vorkuta Coal Mines (1931),

and the Uchta oilfield and oil refinery (1930–1934) in the Komi Republic. An intensive forest exploitation was initiated in Arkhangelsk Oblast, the Karelian and Komi Republics. The Kondopoga Pulp and Paper Mill (1929) and the Segezha Pulp and Paper Mill (1936) were constructed in the Karelian Republic, and in Arkhangelsk Oblast the Arkhangelsk Pulp and Paper Mill (1940) was built. Huge state fishing companies were established in the Murmansk, Arkhangelsk and Leningrad oblasts. However, in this period several nature preservation areas were also established, like the Lapland (1930) and the Kandalaksha (1932) nature reserves in the Kola Peninsula, the Kniazitsky *zakaznik* in Pskov Oblast.

In the 1940's, during the Second World War, the Soviet industry and agriculture were completely destroyed. Military wastes and deposits of chemical, biological and conventional weapons were the main legacy of the war for the Russian people.

The period from the 1950's to the 1970's saw a reconstruction of the Soviet industry and the beginning and entrenchment of the Cold War. In the Kola Peninsula,

the Kandalaksha Aluminum Plant (1951), the Olenegorsk (1955) and Kovdor ore refining enterprises (1962), the Pechenga nickel plant (1946, 1965), the Paz, Kovda and Verkhne-Tuloma Hydro Power Stations (1951–1965) were all constructed in this period. In the Karelian republic the Nadvoizy Aluminum Plant (1954), and in Vologda Oblast the Sherepovets Steel Metallurgical Plant (1948–1955) were established. Somewhat later the Syktyvkar Pulp and Paper Mill (1960) was constructed in the Komi Republic, and in Arkhangelsk Oblast the Solombala and Kotlas Pulp and Paper Complexes (1961) were built. The Kola (1973, 1975) and Leningrad nuclear power stations were also constructed towards the end of this period [7:704-731].

The military also engaged heavily in construction activities during this period. For instance, the nuclear testing site on Novaya Zemlya and the Plesetsk military space site (1960) were established in Arkhangelsk Oblast. Nuclear submarines for the Soviet Northern Fleet were built at the naval shipbuilding enterprises "Zvezdochka" and "Sevmashpredpriatie" that was set up in Severodvinsk, Arkhangelsk Oblast (1946, 1954). Ship-repairing enterprises were established in Murmansk, Poliarny, and Rosliakovo. Nuclear icebreakers were acquired (1960) by the Murmansk Shipping Company in the Kola Peninsula.

### **3. THE OUTCOME OF ECONOMIC DEVELOPMENT: ENVIRONMENTAL DEGRADATION**

At the end of 1991, there were seventeen so-called ecological disaster areas on the territory of the Soviet Union [2:145]. There were more than 100 areas with a

critical ecological situation and about 300 areas in which the environment was characterized as unfavorable for living. The situation is still especially problematic in the north of Russia. The most degraded regions from the environmental point of view are the Kola Peninsula, the Jamal Peninsula, the Ladoga Lake, and the territories around Norilsk, Arkhangelsk, and Saint-Petersburg [5:132-133].

The Kola Peninsula is one of the ecological disaster areas. Here the environment has been gradually destroyed since the end of the 1930's, with an intensive degradation taking place during the 1960's and the 1970's. Several well-known polluting industrial centers were established in Murmansk Oblast. The fishing industry in Murmansk, the apatite extraction in Kirovsk and Apatity, the non-ferrous metallurgy in Nickel and Zapoljarny, the iron-ore extraction in Olenegorsk and Kovdor, the aluminum production in Kandalaksha, and the mining for rare metals in Revda are the most significant in this respect. Most of the industrial centers in the region are surrounded by belts of technogenous deserts with no vegetation. This wasteland occupies a large area around the "Pechenganickel" plant (450–500 sq. km) and the "Severonickel" plant (300–350 sq. km). Here the annual sulphur fall-out per sq. km is about 20–25 tons, the non-ferrous metals fall-out is about 5–6 tons per sq. km [1:8; 3:205; 9:6].

One of the difficult international problems facing regional governments in north-west Russia is the atmospheric transfer of polluting substances across the national border. As a result of the sulphureous gas pollution emitted by the "Pechenganickel" and the "Severonickel" plants many lakes have been oxidized and the vegetation is dying on Norwegian and

Finnish territory. However, according to the Murmansk hydro-meteorological center at the Russian-Norwegian border post Borisoglebsk, polluting substances are mostly transported from the west and north-west to the east and south-east, rather than in the other direction, 24 % compared to 16 % [4:12]. Scientists are seriously concerned about the transport of polluting substances to the Arctic area. According to observations made by Murmansk hydro-meteorological center on the scientific icebreaker "Otto Schmidt" the volume of sulphureous gas and sulphur that is transported from the countries of western Europe and the USA to the Arctic basin is twice as large as the volumes originating from the territory of the former Soviet Union [4:12].

Air pollution from stationary sources in the Northern Region were down by 17.5 percent in 1993 compared to 1988. At the same time the region's share of the total air pollution in the Russian Federation increased from 8.8 to 11.1 percent, which indicates that the rate of fall-out reduction in the Northern Region was lower than that of other economic regions. Vologda Oblast and the Komi republic have severe air pollution problems with almost equal shares (28 % and 27%) of the total air pollution in the Northern Region. The share of Murmansk Oblast of the total industrial air pollution in this region is almost 20 percent, the share of Arkhangelsk Oblast is 17 percent, and that of the Karelian republic about 8 percent. In the North-West Region Leningrad Oblast accounts for 85 percent of all pollution emitted to the air. The share of Novgorod Oblast is 10.5 and that of Pskov Oblast about 5 percent [6:39; 10:11-12].

The environmental situation in Murmansk Oblast is typical for the regional centers

of northern Russia. The number of cars is increasing; today emissions from cars account for 50 percent of the air pollution. In addition there is the pollution from ninety-two boiler-houses and heat and power plants in Murmansk. Until recently there were no sewage treatment facilities, and the facilities constructed during the last years are already obsoleted. This means that the pollution of the Kola Gulf is continuing. The fishing and transport fleets as well as the military vessels of the Northern Fleet also contribute to this pollution.

The bio-resources of the Barents Sea, the White Sea and the Norwegian Sea are close to disaster. Biological deformation of the marine ecosystem is a consequence of unrestrained fishing. Fish resources have been depleted due to the fishing practices of the Soviet Union, Norway and other countries. Another serious problem is the pollution of the northern seas that is transported with the Gulf Stream. Foreign ships as well as vessels belonging to the Russian Northern Fleet and various merchant fleets continue to dispose sewage, scrap and oil wastes in the sea. On average, each fishing vessel throws about 500 tons of waste per year overboard, of these 10-20 tons are oil wastes and up to 2 tons is scrap of different kinds.

Gas and oil extraction on the sea shelf endangers the northern seas. Gas reserves on the shelf are estimated to 7 billion tons; on the Kolguev Island alone 100,000 tons of oil per year is already being extracted. Water pollution not only depends on accidents on oil rigs, but also on imperfect or defunct equipment. As a consequence the oil slicks around the Kolguev Island have increased to some tens of kilometers.

A serious environmental danger both to the Russian North-West and to adjacent regions is caused by various radioactive wastes from sources such as the nuclear testing sites on Novaya Zemlya, marine and civilian atomic vessels (those in operation as well as those waiting to be dismantled), and the Kola and the Leningrad nuclear power stations. People in the north of Russia are seriously worried about radiation safety, even if most of the time the radiation level in the region is not higher than the natural level. In recent years the radioactive wastes from the atomic icebreakers have been deposited in temporary storages on the land belonging to the state enterprise Atomflot. There have been fire incidents on the "Rossia" and the "Sibir" icebreakers. In the 1980's 11,000 containers with solid radioactive waste material were dumped in the Barents and the Kara Seas, liquid radioactive wastes were just poured out in the water.

The Russian Navy has temporary storages of radioactive waste in Andreev Bay, in Motov Gulf and close to Severodvinsk in the White Sea. These storages do not meet modern safety requirements. The question of the salvaging of the "Komсомоlets" atomic submarine sunk in the Norwegian Sea on April 7, 1989, is still not resolved.

The forest resources mean very much to the economy of Russia's North and North-West Regions. Forest harvesting levels are still very high in the Karelian and the Komi republics as well as in the Arkhangelsk and Murmansk oblasts. According to official data, the annual allowable cut (AAC) in Murmansk Oblast in the 1980-1990's should be 613,000 cub. m. But in 1988, actual cuts were up to 1.2 million cub. m of wood. In 1991, cuts were just slightly smaller. Harvesting

(removal of wood) in Murmansk Oblast has remained about 580,000 cub. m per year. Clear-cutting is still the predominant harvesting method. Forests often die because of fires caused by human misconduct. Because of pollution from industrial enterprises nearby forest lands are dying. This is happening around Cherepovets in Vologda Oblast and Vorkuta in the Komi republic. [4:15]

The environmental situation in the City of Saint-Petersburg and the Leningrad region, where the largest part of the population in north-west Russia lives, is severe. The fall-out of radioactive cesium-137 after the Chernobyl tragedy in 1986 and an accident in the Leningrad nuclear power station in Sosnovyi Bor in 1992 have increased the radiation hazard. High levels of ground and air pollution caused by sulphur, fluorine, nitrates, organic substances and heavy metals have been registered everywhere in Saint-Petersburg and Leningrad Oblast.

The pollution of open waters, especially the Imandra and Ladoga lakes, and the Neva, Northern Dvina, and the Pechora rivers continues. Accidents with oil pipelines and oil rigs due to corrosion are the most important reasons for the pollution of the Pechora river. According to the Public Committee for the Rescue of the Pechora, there were 51 accidents in 1986 alone. In 1991, there were already about 600 accidents, which means a more than tenfold frequency increase [4:16]. Rivers continue to be polluted by different kinds of enterprise waste, but there is still no money for purification measures and introduction of new low-waste technologies.

#### 4. ENVIRONMENTAL PROBLEMS IN RUSSIA'S NORTH-WEST AT THE TURN OF THE CENTURY

In the year 2000, in accordance with a Decree issued by President Putin, all Russian regions (or "Subjects of the Federation") were grouped together to form new "macro-regions." Through this reform seven new so-called *Federal Okrugs* were created [8:20]. The following eleven regions were merged to form the *North-West Federal Okrug*.

- The Republics of Karelia and Komi;
- The seven *oblasts* of Arkhangelsk, Vologda, Kaliningrad, Leningrad, Novgorod, Murmansk, and Pskov;
- The City of Saint-Petersburg (which has the status of *federal city*); and
- The Nenets National Okrug (which is a part of Arkhangelsk Oblast).

The ecological situation in the Karelian republic is considered to be relatively stable, even if air pollution caused by emissions from industrial enterprises was 3.3 percent higher in 2000 compared to 1999. The increase was due to the rising production levels of the largest enterprises in the republic: the Pitkjaranta cellulose plant, the Nadvoitski aluminum plant, and "Segezhabumprom" (a paper manufacturer). As might be expected, the industrial centers of the republic (Kostomuksha, Kondopoga, Petrozavodsk, Segezha, Pitkjaranta and Nadvoitsy) have the highest levels of air pollution. Together they account for 68 % of the total air pollution in the region [10:11].

Industrial enterprises in the Republic of Komi emitted 835,900 tons of polluting substances to the air in 1999, which was

6 % less than in the previous year. The republic occupied the 6<sup>th</sup> place among the most polluting regions of the Russian Federation in 1999. The industrial sector causes 90 percent of the total air pollution in the region. The burning of gas, which is related to the oil extraction works, causes a severe environmental problem for the republic, since large amounts of hydrogen sulphide is released to the air. Water pollution in the republic is mainly caused by the pulp and paper plant "Syktyvkar LPK" (which alone causes up to 70 percent of the total water pollution in the region) as well as by the coal and oil industrial enterprises, the housing and communal services in the cities of Vorkuta and Syktyvkar. A priority task is to reduce the industrial and municipal waste, which is mainly produced in the cities of Syktyvkar, Vorkuta, Inta, and Ukhta [10:12].

Air pollution is also a severe problem in Arkhangelsk Oblast. This is mainly pollution from pulp and paper enterprises, such as "Kotlas CBK" in the village Koriazhma, "Arkhangelsk CBK" in Novodvinsk, and "Solombala CBK" in Arkhangelsk. The cities of Arkhangelsk, Novodvinsk and Severodvinsk are still large producers of most types of industrial and municipal wastes. To find environmentally sound ways to dispose of this waste is an urgent problem for the regional authorities [10:13].

Emission of pollutants to the air in the Nenets Autonomous Okrug amounted to 8,150 tons in the year 2000, which meant an increase by 3 percent compared to the previous year. Polluting substances are emitted to the air without any purification, since none of enterprises has the technology required for purifying gas. There are also no sewage treatment facilities in the okrug that meet modern stan-

dards. About 2,700 ha in the okrug has been turned into wasteland due to the deposition of industrial wastes.

In 1999, the industrial enterprises in Vologda Oblast spewed out an incredible 637,200 tons of polluting substances to the air. Industrial sectors, such as non-ferrous metallurgy, energy, and gas, together with industrial plants, such as "Severstal," the regional branch of "Severgazprom," the thermo electric power station in Cherepovets, "Cherepovets azot," "Sokol CBK," and "Ammofos," account for a significant share of the air pollution in the region. Most of the industrial and municipal waste is generated in the industrial centers of the Oblast, in Vologda, Cherepovets, Sokol, and Veliki Us-tug [10:14].

The total air pollution in the City of Saint-Petersburg in 1999 amounted to 62,900 tons, which was almost 5 percent less than in 1998. The level of polluting substances (calculated as the volume share of polluting substances emitted by stationary sources) was close to the average level for all of Russia (72.4 and 76.7% respectively). The share of the transport sector is close to 80 percent of the total air pollution level in the city. The main sources of pollution among the enterprises are the Pervomaisk thermoelectric power station (TPS), the Juzhnaya TPS, TPS-15, and "Izhorskie zavody" that together account for more than 30 percent of the total air pollution in the city. The volume of polluted sewage water emitted to open water has increased. Saint-Petersburg is the second worst polluter in this respect in the country. The main source of water pollution is city's sewage system. More than one billion cu. m. of polluted sewage water are annually poured out into the Neva and Neva Bay through this system (corresponding to

more than 75 percent of the total volume of sewage water) [10:16].

Leningrad Oblast also has a high level of pollution. The Kirishi oil refinery plant and the Kirishskaya thermo electric power station together account for more than 45 percent of the total air pollution coming from 350 industrial enterprises and housing and municipal service producers in the region. The main sources of water pollution are pulp and paper enterprises, energy, defense, and chemical enterprises, as well as housing and municipal services. The "Svetogorsk paper plant," "Sias` CBK," and "Slantsy" together account for 30 percent of the total water pollution in the oblast [10:18].

During the last few years the level of the air pollution in Novgorod Oblast has remained stable. The industrial enterprises and the continuously increasing transport activity are the main contributors to air pollution in the region (21 % of the total pollution volume emanates from Velikii Novgorod and 15 % from the Krestetskii district). Sewage treatment has been a pertinent problem in recent years. Most of the treatment facilities use obsolete technology and they do not have sufficient capacity. Illegal forest harvesting is a serious problem causing great damage both to the forest industry and to the whole region.

In Pskov Oblast the Pskov thermoelectric power station in Dedovichi is the largest contributor to the pollution coming from stationary sources. In the city of Pskov the main sources of pollution are mechanical engineering enterprises, a cable factory, and the car factory "Pskovauto." In Velikie Luki there is a locomotive repair plant, a furniture plant and other industrial enterprises. Auto transport is still the main source of air pollution in the re-

gion – it accounts for 60 percent of the total air pollution. In 1999, the first depositories for solid wastes were set in operation in Dedovichi and Palkino [10:20].

Despite the reduced emission of some polluting substances the environmental situation in Kaliningrad Oblast has not changed significantly in the last 5–10 years. The reason is the industrial recession and the implementation of environmental projects. Auto transport is still the largest source of pollution (156,700 tons) corresponding to 81 percent of the total pollution in the region (and to 86 percent in Kaliningrad City) in 1999. The situation is deteriorating because there are no facilities for the purification and deposition of industrial wastes in the oblast.

Environmental problems differ between the various regions in Russia. That is why the environment can only be rescued through active environmental protection activities taking the endowments of natural resources and the economic specialization of each region into account. This increases the role of regional governments in the design and implementation of effective regional environmental policies, which should be based on carefully worked out federal and regional environmental legislation.

## **5. SUMMARY AND CONCLUSION**

During the transition period (1988–2000) the economic crisis in Russia has contributed to a relative improvement of the environmental situation in the country. Industrial production decreased dramatically with an accompanying reduction of industrial pollution. Most state owned enterprises were privatized. In this period Russia also signed many international en-

vironmental agreements and began introducing western industrial waste minimizing technologies. The Kursk accident (2000) in the Barents Sea was a totally unexpected and shocking experience for Russia, demonstrating the shortcomings of the Russian attitude to radiation safety and environmental preservation in general.

Since 2000 the Russian economy has been growing and Russia has important international support (both moral and financial) for solving existing environmental problems. Recently there has also been a small increase Russian state and private investments in environmental protection.

Only some of the administrative units belonging to Russia's North-West Federal Okrug are actually trying to deal with all their environmental problems. To this group belong some relatively well-off regions with a comparatively favourable environmental situation, like the Novgorod and Pskov oblasts. A few other more or less well-off regions, like the Nenets National Okrug, the Kaliningrad and Vologda oblasts (with the exception of the Cherepovets district) might also be said to belong to this group. In other oblasts, like Leningrad and Arkhangelsk, where the environmental problems are more acute, as well as in regions like Murmansk Oblast and the Komi Republic, where there are territories classified as "ecological disaster areas," the regional administrations are forced to concentrate their efforts on solving the most dangerous environmental problems.

The environmental problems in Russia's North-West Federal Okrug that are most severe today and that receive (or should receive) most attention are the following:



- The disposal of military and civilian nuclear wastes, especially in Murmansk, Archangelsk, and Leningrad oblasts and on the island of Novaya Zemlya;
- Air pollution from industrial enterprises, especially heavy metals in Murmansk Oblast;
- Soil pollution, especially soil acidification (the "acid rain" problem);
- Forest degradation;
- Water pollution, the pollution of rivers and lakes, especially the rivers Neva, Severnaya Dvina, and Pechora, and the lakes of Ladoga and Imandra; and
- The pollution of seas, especially the Gulf of Finland and the Barents Sea.

While much is already known about the qualitative and quantitative aspects of these environmental problems not that much is known about their possible solutions. To effectively deal with the problems new initiatives must be taken both in the sphere of research and in the politi-

cal sphere. Since much is still unknown both concerning the complexity of the environmental situation and the possibilities to find and implement solutions to the problems an international research collaboration is called for to come up with a reasonable (and legitimate) ranking of the most serious environmental problems and to generate implementable measures for their solution.

As part of such a strategy we would like to propose a long-term (3–5 year) international multidisciplinary research project entitled "Regional Environmental Policies in the Russian North-West and the Nordic Countries – A Comparison." Based on a comparison and analysis of previous environmental policy work in Russia and the Nordic countries this project would aim at identifying and formulating implementable regional environmental policies for north-west Russia in a participatory policy-formulating framework.

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