CHAPTER-2
ENVIRONMENTAL CRISIS IN SOVIET RUSSIA

In Russia the components of ecosphere are seriously degraded. Renewable resources such as forests and rivers have been poorly managed. Air, water and land resources are highly polluted.\(^1\) In addition over haunting and poaching have taken a toll on wildlife. Pollution of rivers, lakes and streams, inland seas and coastal areas, as well as ground water, is highly publicized in the Soviet Union. The most common complaint is that domestic sewage and industrial waste are often processed together by municipal waste water treatment installation not having technologies appropriate to handle the industrial contaminants, resulting in very large amounts of waste water being released untreated or inadequately processed.\(^2\)

The primary cause of those effects lies in the maximizing production levels of the former Soviet Union. Economic growth was obtained by constantly boosting inputs such as natural resources. The Soviet government sought unfettered, rapid economic growth and military might - a quest that befouled both air and water, impoverished the country’s farms and poisoned the land with toxic waste and radioactive fallout.\(^3\) Environmental problems are also created by continuing environmental degradation and coupled with the weakness of current institutions responsible for environmental protection.

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2.1 Military and Industrial Complex: It's Impact on Environment

During World War II, Chelyabinsk was one of the Soviet Union's major armament production centers. Entire factories on the western side of the Urals were taken apart and reconstructed on the other side of the Urals, the Chelyabinsk province. Chelyabinsk had one of the largest tank factories in the country as well as one of the major nuclear armament plants. Due to those “strategic industries” the province was closed to visitors until 1989. Following the political and economic transformation in Russia, the tank factory now produces tractors, and the Mayak nuclear armament plant is trying to evolve into a fast breeder recycling plant for foreign spent plutonium (nuclear wastes).

The Mayak nuclear complex was one of the Soviet Union's main military production centers. During the last fifty years this complex has contaminated the Chelyabinsk region with highly dangerous nuclear and chemical wastes. From 1949 to 1956, medium and high level radioactive liquid wastes were dumped into the river system Techa-Iset-Tobol. During this period about 76 million tons of radioactive were released into the Techa river. Over 124,000 people living along the banks of the river system were exposed to the radiation. Protective measures finally began in 1956 when hydrological engineering measures aimed at immobilizing deposited radioactive substances in the upper reaches of the river were implemented. The river system is currently in the process of natural deactivation that will take a few hundred years.4

On September 29, 1957 a liquid radioactive waste storage tank exploded following a failure in the cooling system and polluted an area equal to the size of New Jersey with

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plutonium and strontium. The explosion formed a radioactive cloud over the provinces of Chelyabinsk, Sverdlovsk and Tyumen. A total area of 23,000 sq.km. was contaminated and the area is now called the East Ural Radioactive Trace, the EURT. This accident was kept secret from the outside world for military safety reasons and 10,700 people were silently evacuated.\(^5\) This accident released twice the amount of curies that were released by the Chernobyl accident (1986).

### 2.2 Chernobyl Accident: Its Impact

On 25 April, prior to a routine shut-down, the reactor crew at Chernobyl-4 began preparing for a test to determine how long turbines would spin and supply power following a loss of main electrical power supply. Similar tests had already been carried out at Chernobyl and other plants, despite the fact that these reactors were known to be very unstable at low power settings.

A series of operator actions, including the disabling of automatic shutdown mechanisms, preceded the attempted test early on 26 April. As flow of coolant water diminished, power output increased. When the operator moved to shut down the reactor from its unstable condition arising from previous errors, a peculiarity of the design caused a dramatic power surge.

The fuel elements ruptured and the resultant explosive force of steam lifted off the cover plate of the reactor, releasing fission products to the atmosphere. A second explosion threw out fragments of burning fuel and graphite from the core and allowed air to rush in, causing the graphite moderator to burst into flames. .

\(^5\) ibid.
It is estimated that all of the xenon gas, about half of the iodine and cesium, and at least 5% of the remaining radioactive material in the Chernobyl-4 reactor core was released in the accident. Most of the released material was deposited close by as dust and debris, but the lighter material was carried by wind over the Ukraine, Belarus, Russia and to some extent over Scandinavia and Europe.\textsuperscript{6}

The main casualties were among the firefighters, including those who attended the initial small fires on the roof of the turbine building. All these were put out in a few hours.

The next task was cleaning up the radioactivity at the site so that the remaining three reactors could be restarted, and the damaged reactor shielded more permanently. About 200,000 people ("liquidators") from all over the USSR were involved in the recovery and clean up during 1986 and 1987. They received high doses of radiation, around 100 millisieverts. Some 20,000 of them received about 250 mSv and a few received 500 mSv. Later, the number of liquidators swelled to over 600,000 but most of these received only low radiation doses.\textsuperscript{7}

Many children in the surrounding areas were exposed to radiation doses sufficient to lead to thyroid cancers (usually not fatal if diagnosed and treated early).

Several organisations have reported on the impacts of the Chernobyl accident, but all have had problems assessing the significance of their observations because of the lack of reliable public health information before 1986. In 1989 the World Health

Organisation (WHO) first raised concerns that local medical scientists had incorrectly attributed various biological and health effects to radiation exposure.

An International Atomic Energy Agency (IAEA) study involving more than 200 experts from 22 countries published in 1991 was more substantial. Subsequent studies in the Ukraine, Russia and Belarus were based on national registers of over 1 million people possibly affected by radiation. These confirmed a rising incidence of thyroid cancer among exposed children. Late in 1995, the World Health Organisation linked nearly 700 cases of thyroid cancer among children and adolescents to the Chernobyl accident and among these some 10 deaths are attributed to radiation. However, the rapid increase in thyroid cancers detected suggests that some of it at least is an artifact of the screening process.

So far no increase in leukemia is discernible, but this is expected to be evident in the next few years along with a greater, though not statistically discernible, incidence of other cancers. There has been no substantiated increase attributable to Chernobyl in congenital abnormalities, adverse pregnancy outcomes or any other radiation-induced disease in the general population either in the contaminated areas or further a field.

Psycho-social effects among those affected by the accident have been the major problem, and are similar to those arising from other major disasters such as earthquakes, floods and fires.

The most recent and authoritative UN report has confirmed that there is no scientific evidence of any significant radiation-related health effects to most people exposed to the Chernobyl disaster. The UNSCEAR (the United Nations Scientific Commission

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on the Effects of Atomic Radiation, which is the UN body with a mandate from the General Assembly to assess and report levels and health effects of exposure to ionizing radiation.) 2000 Report is consistent with earlier WHO findings. The report points to some 1,800 cases of thyroid cancer, but "apart from this increase, there is no evidence of a major public health impact attributable to radiation exposure 14 years after the accident.

During the long hot summer of 1967, Lake Karachay dried up and radioactive waste from the exposed lake blew over an area of 2200sq.km. Other accidents, irresponsible nuclear waste disposal and day to day operations of the Mayak nuclear-chemical facility have contaminated an area with a diameter of 400km.9

In addition of pollution from the nuclear complex, the metallurgical industry has heavily contaminated this region. The Ural Mountains are rich in iron ore, chromium, copper and nickel and the region has an enormous metallurgical industry. The amount of lead in the air in Chelyabinsk city is equal to the total amount of lead pollution in the Netherlands (population of 15millions) in 1982, before unleaded petrol and catalytic converters were introduced. Any improvement of air quality in the Urals has been due to the economic downturn and closing of factories. Hardly any investments have been made by the government to reduce pollution levels.10

To help analysts and policy makers evaluate the seriousness of environmental conditions around the country a classification that defines three states of degrading was developed: conflict, crisis and catastrophe. The first category, conflict refers to areas principally affected by a form of environmental degradation that is usually

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9 Source: Energy Information Agency, August2001
10 ibid.
reversible such as agricultural lands characterized by widespread over grazing and intensive cultivation. The second category, crisis refers to regions in which the destructive activities of the economy have so affected the local ecosystem that, even under strict protection its recovery would take decades or even centuries. Those crisis regions include lakes and rivers that have been choked with wastes and contaminated runoff such as Lake Baikal or Lake Ladoga. The worst category-catastrophe-refers to regions where conditions are so severe that specialists have written them off as irreparable. In Siberia the Kuznetsk Basin is classified as such a region.\textsuperscript{11}

Map-1 shows the distribution of sixteen critical environmental areas within the area of the former Soviet Union.

MAP 1

Map 1 Environmental problem areas in the former Soviet Union (Source: Pryde, 1997)

\textsuperscript{11} D.J Peterson., “Russia’s environment and natural resources in light of economic regionalization”, Post-Soviet Geography, 36,5:6-7,1993
In Siberia two regions are particularly affected. Those are the industrial region in Kemerovo Oblast, indicated with number 12 and second the lake Baikal, indicated in number 13. Two big industries of the former Soviet Union are located in the Kemerovo blast, coal production in the Kuznetsk Basin and the iron and steel centers in Novokuznetsk. The properties that are left behind the coal production are acid drainage that has polluted local surface water resources and a lowered water table caused by mine water pumping. The environmental effects from the metallurgy are more severe than those mentioned earlier. The air pollution produced in Novokuznetsk was one of the worst in the former Soviet Union. Additionally the smelters have been responsible for widespread degradation of forests and Tundra, contamination of soil and surface water with metals, and accumulation of slag and tailings. And the most threatening fact is that hazardous waste disposal areas present a long term environmental challenge for the region. 12

Other environmental impacts in West Siberia are caused by the electro plating industry that, together with the concentration in the Ural, accounts for 75 percent of the plating waste (sludge that contains highly toxic chromium and mercury, among other components) produced by the entire country.

Soviet Russia's most important oil and gas region was in Tyumen Oblast concentrated. It accounts for two-thirds of Russian oil production. The environmental impacts that are still remaining are caused by accidents along oil and gas pipelines and the expanding network of pipelines. Oil spills have been estimated at 10 million tons annually. Consequently many rivers are contaminated (Tobol, Ob, Tom), a huge area of Taiga forest died and reindeer population declined. All in all one can say that

seven decades of energy extraction in Western Siberia led to a degrading environmental quality. The most obvious effects can be summarized by:

- direct contaminated of water bodies from spilled oil and brine along pipelines.
- heavily stressed native forests.
- deterioration of local air quality.
- altered hydrological conditions.

The ecological conditions of Lake Baikal were changed by excessive timber harvesting along the hills. Polluting timber processing Pulp mills led to the deterioration of water quality. At present the pulp mills are still operating.

*Environmental problems: health of Russia's citizen and the economy*

US, Russia and World Bank studies link an increase in respiratory and gastrointestinal illness and developmental problems among children in several Russian cities in part to environmental factors. A 1996 joint US-Russian government study found that one quarter of kindergarten pupils in one city had lead concentrations above the threshold at which intelligence is impaired, while a US government study noted a rise in the incidence of waterborne disease and environmentally related birth defects\(^\text{13}\). A Russian government report cited air pollution as contributing factor to 17% of childhood and 10% of adult illness.

Pollution is adding to budgetary strains, reducing lab and productivity through illness and absenteeism, and damaging natural resources. It is also deterring some domestic and foreign investors concerned about clean up and liability issues. A team of Russian experts has pegged overall economic losses from environmental degrading at 10 to

\(^{13}\) [www.cia.gov/nic/special_russianoutlook.html - 149k](http://www.cia.gov/nic/special_russianoutlook.html)
12% of GDP—roughly similar to estimated losses in East European countries and substantially higher than estimates of 1 to 2% in developed countries.  

### 2.3 Air Pollution

When one says, "it is necessary as air", it is at once clear that the question is about something vital important. Without it the man will not live even for several minutes. We breathe always, everywhere. But - what with? And why are the townspeople so pleased, leaving the cities for "fresh air"? And up to what degree is it "fresh" in the point 50 km away from the capital?

The quality of atmospheric air is the most important factor influencing the health, the sanitary and epidemiological situation. Now two thirds of population of Russian Federation lives in the territories where the pollution level of atmospheric air does not correspond to the hygienic norms.

Air quality is almost as poor as water quality, with over 200 cities often exceeding Russian pollution limits, and is likely to worsen. The number of vehicles on the road has increased rapidly, and their emissions will offset reductions in industrial air pollution owing to reduce economic activity and greater reliance on natural gas.

In 1989, the Russian Republic's minister of health said facetiously, "To live longer, you must breathe less". Air pollution affects a great number of people because of its mobility. Seventy million Russians breathe air polluted to five times the amount allowed unfortunately, it gets worse. “100 cities including Moscow also have air-pollution levels ten times as high as acceptable standards set by the Soviets”. Many regions are affected by coal or steel mining, refineries, and smelters including the

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14 National Intelligence Council and DCI Environmental Center.
Dnepropetrovsk-Donets Basin and Kuznets Basin, the Urals from Perm' to Magnitogorsk, the Ust'-Kamenogork (Oskemen)-Semipalatinsk (Semey) region in east Kazakhstan, and the Kola Peninsula. In the Siberian Arctic, Noril'sk, where a nickel smelter is located, is considered to be "perhaps the single dirtiest industrial complex on the planet." Equally noted are the Irkutsk-Cheremkhovo area, Kansk-Achinsk complex (East Siberia), the West Siberian Lowland, central Armenia, the St. Petersburg region, Kryvyy Rih and Mariupol in the Ukraine, northeastern Estonia, central Kazakhstan, and the list goes.\textsuperscript{17}

Table 5

Concentrations (in mg/m\textsuperscript{3}) of Nitrogen Oxides in Four Cities of the Former Soviet Union in 1989

<table>
<thead>
<tr>
<th>City</th>
<th>Mean annual concentration</th>
<th>Peak observed concentration</th>
<th>Max. permissible concentration *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donetsk, Ukraine</td>
<td>.11</td>
<td>.76</td>
<td>.04</td>
</tr>
<tr>
<td>Bishkek, Kyrgyzstan</td>
<td>.07</td>
<td>.70</td>
<td>.04</td>
</tr>
<tr>
<td>Bratsk, Russia</td>
<td>.07</td>
<td>1.83</td>
<td>.04</td>
</tr>
<tr>
<td>Tolyatti, Russia</td>
<td>.05</td>
<td>1.63</td>
<td>.04</td>
</tr>
</tbody>
</table>

*Based on air quality standard in Russia

However, factories are not the only air polluters. Transportation is responsible for more than half the pollution in many large cities. "Vehicles in the NIS [Newly Independent States] reportedly generated 68% as much air pollution as their counterparts in the United States." And the "NIS has barely 10% as many cars and its

\textsuperscript{17} Pryde, Philip R. "Observations on the Mapping of Critical Environmental Zones in the Former Soviet Union." Post-Soviet Geography. 1994, 35(1) p.41
trucks haul less than half the amount of freight.” One reason the levels are so high is that the nation has not switched to unleaded gasoline.\textsuperscript{18}

This massive pollution of the air has devastated health in the areas of the surrounding factories, as well as thousands of miles away. An example is the Lenin Steel Works which pollutes an area twice the size of Delaware. Less than 1\% of the children that reside in the surrounding area are healthy- less than 1\%! Occasionally the pollutants become so heavy in the air that residents can taste the sulfur on their tongues.\textsuperscript{19} In Nizhni Tagil, the air pollution is so thick on some days that children walking home from school get skin rashes.\textsuperscript{20} Imagine what it feels like to breathe deeply on those days. Think how it would hurt to play tag, feeling a burning sensation with every leap or bound; and being very careful what puddles are splashed in.

The density of tests of atmospheric air in Russia with the contents of harmful substances is about 6\% of total, so it is in the Altai - 29\% and in the Buryatia Republic - 246\%, in the Krasnoyarsk Territory - almost 22\%, in the Ivanovo - 20, the Kemerovo - more than 18\%, the Ulyanovsk – 16.5\% and in the Kaluga Regions - more than 15\%.\textsuperscript{21}

By the way, the high level of air pollution in these territories was observed in the last years too. Where is the most polluted air? Just there, where we live and spend the most part of our time - in the zone of living building if highways there are. Even in industrial districts (in the zone of influence of industrial emissions) it is in some cases much lower.


\textsuperscript{21} United Nations Environment Programme (UNEP), 2003
The waste treatment facilities applying could help to decrease the pollutions. In the Murmansk Region, for example, only 50% of industrial sources of emissions are equipped with the waste treatment facilities.\textsuperscript{22}

And there is one problem more (here it is, the social aspect in the share of "the natural decline"!): an average Russian still is not free to choose the house in which he would like to live in and the place on which this house should stand. It is expensive, he can't afford it. So he has to live there where he was lodged though the windowpanes blacken from soot during a week. But a window can be cleaned, and what about his own lungs?

Moscow keeps the first place on the emission of harmful substances of motor transport in the atmosphere (1.7 million tons or about 87% of the total emissions).

Everyone can learn the problem by himself, having studied the review of the environmental programs of the USA, Japan, China, the South Korea, India and other countries, which passed to the application of propane-butane as the motor fuel. Hundreds of circuits, calculations of economic efficiency, diagrams; research of dynamics of the motor-vehicle pool structure, the analysis of existing systems of environmental monitoring etc. testify to the reality of the formula "ecology + economy + health". Definitely, but not "at the expense".

Such themes as "the city and the automobile", "motor fuel", "kinds of gas fuel", "environmental monitoring", "the multifuel gasoline station", "the pollution-free..."
automobile", will be still actual for a long time because if even not all of us drive automobiles still we all breathe; it means it concerns or will concern everyone.\(^{23}\)

In 2000 the tests of air was carried out in 253 cities of Russia and it was found out, in 202 from them harmful substances in the air are over the limits. And 64.5 million persons live there, that is almost half of the population of Russia. And still there are regions in Russia where it is becoming simply dangerous for health to breathe, because the air is polluted in 10, and even more times than the limits are\(^{24}\).

As a rule, the air is polluted by benz-a-pyrene, nitrogen dioxide, carbon disulfide and formaldehyde. Usually carbon disulfide is emitted into the atmosphere by enterprises, and nitrogen oxide - by motor transport.\(^{25}\)

The main part of the population of Russia lives in cities and industrial centers. The reasonable question is: and what is the quality of the atmospheric air there?

If we look on federal districts (and there are seven of them in Russia) so we get such a picture:

In the Central district (18 subjects of the Federation) the air was checked in 37 cities and it was found out, that only in 2 of them it corresponds to the limits. And the most unfavorable situation is in the City of Moscow and in the Moscow Region (9.1 Million persons, what makes 66% of the city population, breathe with the polluted air here);


\(^{24}\) United Nations Environment Programme (UNEP), 2003

\(^{25}\) ibid.
In the North-West district (11 subjects of the Federation) the air was checked in 39 cities. As the result amount of harmful impurities above the permissible limits in 21 cities was observed, and a high pollution level - in 5 cities, where almost 6 Million persons live, that is about the half of the population of this district.26

The most unfavorable situation is in the City of St.-Petersburg and in the Leningrad Region (almost 5 Million persons breathe with the polluted air here).

Bad quality of the atmospheric air is also in the Nantes Autonomous Area; in the Southern district (13 subjects of the Federation) the monitoring of the air pollution was carried out in 31 cities and it was found out, that in 19 of them the harmful impurities are more than the permitted limit, and the high level of air pollution - in 10 cities where 4.4 million persons live, that is 36% of the townspeople of the district.

In two other cities the maximal concentrations exceed the permitted limits almost 10 times.

The situation in the Volgograd Region is very adverse (1.5 Million persons, that is 75% of the townspeople breathe with the polluted air).

The same situation is in the Rostov Region and the Krasnodar Territory, and the worst air quality in this region is in the towns of the Karachaевых-Circassian Republic.

In the Privolzhskiy district (15 subjects of the Federation) the air quality was checked in 47 cities and in 41 of them harmful impurities exceeds the limits. Thus in 27 cities where almost 12 Million persons (that is 52% of the population of the district) there is a high level of the air pollution. For example, in the Samara Region 76% of the urban

26 National Information Agency "Natural Resources" (NIA "Nature"), 2003
The population have to breathe with such an air (2 million persons), the same number in
the Nizhni Novgorod Region, in the Republic of Bashkortostan, in the Perm Region;
the air quality in the Kirov Region is relatively high in comparison with them;

In the Uralsky district (6 subjects of the Federation) the air was checked in 17 cities
and it was found out, that in 15 of them harmful impurities exceed the permitted limit,
and in 7 of them the maximal concentrations were exceed more than 10 times. Almost
3 million persons breathe here with high polluted air - especially in the Sverdlovsk
and the Kurgan Regions; In the Siberian district (16 subjects of the Federation)
harmful impurities over permitted limits were found in the air of 48 from 55 checked
up cities. 27

In 14 of them the pollution of the air basin exceeds the limits in 10 and more times.
Almost 9 million persons in this district (61% of the urban population) breathe with
the poor-quality air.

The situation is relatively favorable only in the Republic of Tuva, and in the Irkutsk,
the Novosibirsk, the Kemerovo and the Omsk Regions - the most adverse. And,
finally, in the Far East district (10 subjects of the Federation) 23 from 27 checked up
cities indicated the air pollution above the limit, and 5 of them - more than in 10
times.

The situation is bad in the cities of Primorie and the Khabarovsk Territories, but it is
the most adverse in the Kamchatka Region, where 81% of the urban population lives
in the zone with a high air pollution level. 28

27 ibid.
28 ibid.
At the first sight the situation is not quite logical: the industry in Russia works now not so intensively, as earlier, and the air remains dirty.

But the matter is that the atmosphere cannot be divided by borders, as the terrestrial territory. Polluting substances are transferred on long distances from one country into another. It is called Transboundary air pollution.

For example, in 2000 2.4 million tons of the oxidized sulfur and nitrogen fell out on the European part of Russia. More than half of this amount (57%) is the result of the Transboundary transfer. And mainly - from the Ukraine, Poland, Byelorussia, Romania and Germany.

Of course, "the Russian air" wanders towards other countries too. But its share in the cross boundary changes is only 11.3%. In other words, the Russian enterprises located in the European part, emitted 1.4 Million tons of harmful substances into the atmosphere, but only 160.3 thousand tons of them dropped out on the territory of other countries.

One of the most painful problems is the fall-out of heavy metals, especially of lead. 2739 tons of it fell out on the European territory of Russia (68.5 tons of cadmium as well), more than half of it has the Transboundary origin. 29

As for the lead, it is necessary to tell some words about it because the problem remains very acute. In 1997 the thorough analytical "Report on lead environmental contamination of the Russian Federation and its influence on the health of the population", also known as "The White book", was devoted to this issue (it was

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29 United Nations Environment Programme (UNEP), 2003
written and edited by REFIA. And by 2000 the joint Russian-American work "Lead in the environment and health of the population of Russia" was issued.

Alas, lead danger is a reality for now. And not only for those who live in the cities close to the accumulator plant of St.-Petersburg or near the copper-smelting industrial complex in the Krasnouralsk; in the Gus'-Khrustalniy (manufacture of a glass and crystal) or in the Pervouralsk (copper-smelting plant). In the cities of Ekaterinburg, Saratov and Volgograd, for example, motor transport is the basic source of lead delivering into the environment.

But there is also both the aviation and the space-rocket engineering; even the hunting, which is habitual for many people. Why - hunting? Because after it almost one and a half thousand tons of lead substances (!) remain in the soil (land) annually.³⁰

So, if we put it all together - it will be more than enough to kill everything alive around. Especially because of the fact that lead is not only toxic, but has the feature of accumulating in an organism (for mammals - in the brain and in the liver).

Certainly, the strategy for lead pollution control exists. But the advantage will be only when it will be implemented at least by halves. It is possible to hope the release of ethylated gasoline reduces; that doctors have learned to reduce negative influence of lead on the children health (they suffer in the first turn); that the copper-smelting industry will install new cleaning facilities etc.

³⁰ ibid.
The problem of lead is close to the existing in Russian problem of mercury. Though from almost 70 tons, which fell out from the atmosphere onto Russian territory, only 3.5 tons belong to the Russian sources, what makes only 5%. Other 95%, as they say, are brought by the wind - that means Transboundary pollution again.\textsuperscript{31}

For the sake of justice it is necessary to say, that the neighbors are not guilty in all of our troubles with the air quality. For example, about 80 tons of benzo-a-pyrene fell out on the European part of Russia in a year, and more than 66 of them (that is 83%) - is a share of our own Russian sources.

\textbf{2.4 Water Pollution}

If without air a man can survive for only several minutes, than without water - only several days. Besides we not only drink water or use it for cooking; without it the whole modern city life is not conceivable either. And many rivers are not only the basic source of drinking water supply (these are reservoirs of the first category), but also a favorite place of recreation, summer holiday, bathing, then it is clear why their sanitary state should excite us. Although, it improved a little in comparison with 1999, it still remains unsatisfactory; as for the microbiological parameters - no improvements took place at all.

Water pollution is the most serious concern. Less than half of Russia's pollution has access to safe drinking water. While water pollution from industrial sources has diminished because of the decline in manufacturing, municipal wastes increasing threaten key water supply sources, and nuclear contamination could leach into key

\textsuperscript{31} ibid.
water sources as well. The head of Russia's entire drinking water supply to official standards could be as high as $200 billion.  

Some bodies of water contain enough chemicals that they do not ripple or freeze. They may be yellow, red, or black from hydrocarbons, oil, sulfur, and iron oxides. "Pink foam lines the beach. Greenish-brown sewage hugs the shore before it merges into a ribbon of reddish water, then into the dull slate-blue of the deeper sea." The Baltic Sea once was a beautiful, shimmering body of blue water. What has happened to it? The sediment now contains 1,000 times the natural occurring levels of lead and cadmium.

The Aral, which was once the world's fourth largest sea has lost 40 ft. of water and is now the sixth largest. This has caused local temperatures to increase by 3 degrees Fahrenheit. The two rivers that were feeding it, the Amu Dar'ya and Syr Dar'ya, were diverted for irrigation. The sea's life support had been severed. The starvation was slow but extreme. "Since 1960, the Aral sea's surface area has been cut in half and it's volume has decreased by 73%. In the deltas 75-80% of all animal species have become extinct...Since 1960, 30,000 square kilometers of former sea bottom have turned to desert". Can there be worse?

Yes. The Volga River provided much of the caviar that the Russians are famous for. The catch of sturgeon has decreased by 60% in the last ten years. This is due to the massive amount of pollutants that it absorbs ("30% of the nation's toxic effluents" and the fact that the water was slowed and disrupted by hydroelectric dams. The

35 ibid.
Caspian, the sea which receives the Volga River, absorbs 17 cubic km of effluents and sewage yearly.

Lake Baikal, however, seems to top them all. It holds one-fourth of the world’s fresh water or 80% of the country’s fresh water. Three-fourths of the 2,500 fish and plant species are unique to this lake. It also is home to a factory that produces 200,000 tons of cellulose fibers a year and its fumes have killed approximately 86,000 nearby fir trees while polluting an area 23 miles wide. The Dnepropetrovsk-Donets Basin and Kuznets Basin have extremely polluted waters due to the coal mining and steel production. Near Kyshtym, the water was contaminated by three radiation accidents in the 1950s and 1960s. The facts continue; a phenol spill at a herbicide plant leaked into Ufa’s drinking water in 1990 and petroleum products in the Ob River have been found at a concentration ten factors higher than local legal levels (Green, E. 593). Still today the water is astoundingly unhealthy. In 1990, only 30% of the water was treated to Soviet standards “which is why half of all tap water is unfit to drink, and a third of the underground reservoirs are too contaminated for drinking use”. The people themselves are slowly dying along with the fish, wildlife, and vegetation. Russia's water is in danger. If it goes, the people go.

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40 ibid
The level of pollution of the Volga, the Oka, the Kama, the Don, the Northern Dvina, the Neva, the Tobol, the Irtysh, the Ob' and the Tom' rivers, water reservoirs of the Northern Caucasus and the Prikaspijskaya lowland is high.

The quality of water in the first category reservoirs in the Arkhangelsk Region is still extremely unsatisfactory. For example, in the mouth of the Northern Dvina which is intake of drinking water for the City of Arkhangelsk - 100% of CCO (Chemical Consumption of Oxygen) tests exceed the permissible limits.\textsuperscript{42}

As for the Northern Dvina and the Vychegda there is one more trouble here - the microbial pollution exceeds the norm up to 70 times because of the dumping of crude sewage! Bathing in such rivers, as well as consumption of drinking water from them, will not have a positive effect on health not only of the man, but also on the health of any kind of living nature.

But the northern rivers have "colleagues" by misfortune also in the Penza Region - for example, the Sura and the Kolysheyka. Both of them are sources of water supply, and both are polluted by the same reason - dumping of the crude sewage by the communal domestic sewerage. In the Cheboksarskoye water reservoir the most widespread polluting substances are phenols and mineral oil products (besides the crude sewage. Here, by the way, a pair of figures can be cited for obviousness: annually 147 million cubic meters of sewage are dumped, and only - 10 million cubic meters are normatively cleaned).\textsuperscript{43}

The Beauty-River - Volga was called the queen of the rivers by our ancestors for providing foods and drinking water, but now it has unsatisfactory water quality. And

\textsuperscript{42} Russian Ecological Federal Information Agency (REFIA), 2003
\textsuperscript{43} ibid.
this quality, can be able by satisfactory in case the high level contain of oil products, phenols, iron. Due to the Tatarstan Republic and the Nizhni Novgorod Region dump the crude sewage into the Volga, sanitary - chemical and microbiological parameters became even worse, especially in the Ulyanovsk Region.

The data collected by experts reveals that the rivers promptly turn to ditches. Not only this fact is frightening, but also the amount of the poisoned reservoirs from which water is taken for the population in the Kirov, the Vladimir, the Nizhniy Novgorod Regions, in the Khanty-Mansi Autonomous Area, in Kalmykia and Tatarstan Republics, in the Samara, the Tomsk, the Tyumen, the Vologda, the Novgorod Regions, in Karelia, in the Moscow, the Bryansk, the Ryazan Regions (the regions are enumerated according to the reduction of the level of the pollution).

Thus in the reservoirs of some of the above enumerated regions the increased concentration of salts of heavy metals is also registered. And the increased concentration of ammonia, phenol, methanol etc. is registered in the river of Tom because of the sewage dumping by the enterprises of Kemerovo.

St.-Petersburg tops this list of polluted city. The Neva river has 26 inflows and many of them - the Izhora, the Slavyanka, the Okhta and others rivers - are very much polluted. It turns out, that the Neva is both a source of drinking water supply, and a recreational zone, and at the same time it receives sewage water.

A bad water quality by microbiological parameters is observed in the Ivanovo Region, in Dagestan Republic, in the Kemerovo Region, in Khabarovsk Territory, in the Arkhangelsk, the Ryazan and the Kirov Regions and in others.

44 United Nations Environment Programme (UNEP), 2003
If the worst parameters of microbial pollution of the first category reservoirs are in St.-Petersburg, so a difficult situation with the second category reservoirs (which are not used for drinking water supply) occurred in Moscow. The reason is dumping of not disinfected sewage though they also went through mechanical and biological cleaning. The complicacy is in the fact that it is also dangerous to apply traditional disinfectants because they are required in such an amount that they can change the hydro chemical conditions.

But in Russia, unfortunately, the water can leak from room taps in flows - with necessity and without it: one just forgot to turn it off. The life is inconceivable without water - this is an axiom. We not only drink it, but also we use for pouring, in economic needs, in the industry - everywhere. And seldom have we reflected - how it is, where it comes from, how much it remains in the nature?

Waters are subdivided into surface (rivers, lakes), underground and sea waters.

The Russian Federation takes the first place in the world on the stocks of fresh water in lakes; more than 20% of the world resources are concentrated here. The average perennial resources of river drain of Russia makes almost 4270 km³ per year (10% of world river drain, the second place in the world after Brazil), that is about 30 thousand m³ per inhabitant in a year.45

About 26 thousand km³ of fresh waters are in Russian lakes. Fresh underground waters with total operation stocks of about 30 km³/year are reconnoitered. And potential resources of underground waters exceed 300 km³ per year.

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45 ibid.
There are more than 2000 water basins with the volume over 1 million m$^3$ each in Russia, 37 large systems operate, which redistribute the inter basin drain.

At the same time the territorial location of the main water sources is economically adverse: the bigger part of them is situated in the European North, in Siberia and in the Far East where only about 1/5th of the population of the country lives and the smaller part of industrial and agricultural potential is concentrated.

The rivers are the basic water resources for Russia. It seems to be much. So where came "the water problem" from? The matter is that 90% of the river drain comes to basins of Pacific and Arctic oceans, while 80% of Russians (accordingly, both the basic industrial and agricultural potential) are located absolutely in the other place - in the basins of the Caspian, Black and Azov Seas. And the total annual volume of the river drain is there less than 8%.46

Besides in 2000 the drain of many large rivers decreased - the Don, the Kuban', the Terek and others. It is connected both with economic activities, and with evaporation, - after all the surface of the Tsimlyansk and Krasnodar water reservoirs is very big.

How much water and for what purposes does Russia need?

In 2000 the total water consumption for all needs made almost 86 km$^3$. By the way, it is less, than in the previous year because both industrial recession continues, and the irrigated areas decrease.

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46 National Information Agency "Natural Resources" (NIA "Nature"), 2003
And, nevertheless, the industry consumes water most of all (57.9%); for economic and drinking needs comes 20.3%, for irrigation – 13.7%; the least - for agricultural water supply – 2.1%; the left 6% - for the other needs. 47

However, it is necessary to take into account here, how much of precious water is simply lost. Only by transportation – 8.5 km$^3$ per year! This is a whole sea.

Among them are also those 15% of submitted water, which are lost because of the worn out pipes, bad armature and imperfect technologies. It will turn out, that it would be possible to supply the whole city quietly.

For the completeness of the picture it is necessary to say, that in 2000 the volume of sewage also increased (basically by the household and local communal services). Water treatment facilities there are either overloaded, or they are not present at all. Telling the truth, here the situation is softened by the fact that the weight of the polluting substances got less. For example, in 1998, 6.4 thousand tons of mineral oil products were dumped, and in 2000 – 5.6 thousand tons. The same situation is with the iron compounds.

Having checked up in 2000, 1195 water objects in Russia, the experts came to the conclusion, that their rivers are polluted by mineral oil products, phenols, compounds of metals, ammonium and nitrite nitrogen most of all. In other words, all that what factories and plants, enterprises of rural and municipal services dump.

The water protection activities are mostly not financed.48 Therefore in the Volga River itself the water is polluted and in its inflows is extremely dirty. It is natural to a

47 United Nations Environment Programme (UNEP), 2003
48 ibid.
greater or smaller extent the numerous water reservoirs - the Ivan'kovskoye, Uglickskoye, and Rybinskoye etc. are polluted in the same degrees.

If the Rybinskoye suffers from "Severstal" and "Rybinsk motors", so the Cheboksarskoye water reservoir - from sewage pulp-and-paper, chemical and a petroleum-refining industry. The water in the Volgogradskoye and the Saratovskoye water reservoirs is polluted and extremely polluted. And the Lower Volga river? Only the accidents on the Astrakhan gas-condensate industry complex brought the delta of the river to the edge of an ecological disaster. And besides there are the bulk-oil bases in Astrakhan, the acid rains because the sulfur dioxide is constantly emitted into the air.

As for the Oka river and its inflows so the reasons of almost 20 exceeding of limits for mineral oil products and of almost 3 exceeding of limits for phenols are clear: this is the "merit" of the enterprises of the Moscow, Kaluga, Oral, Tula, Ryazan, Vladimir, Ivanovo Regions.

It is guilty to sneer, but if the industry worked at full capacity, the channel of Oka would be filled with a liquid with a minimum quantity of water in it.

It is enough to look at water parameters of the Kama River and the Kamskoye water reservoir: the copper compounds exceed the limits in 63 times, the nitrite nitrogen - in 19 and the six-valet chrome - in 26; it is evidently. 49

Nevertheless the water in the Dnepr river remains very polluted too; and the waters of the Don river basin are already officially "extremely dirty" (only mercury compounds are here in the concentration of about 4-15 times exceeding the limits), what is no

49 ibid.
surprise if one knows about the activity of Rostsel'mash company, Novolipetsk and Taganrog metallurgical plants, the enterprises of the chemical and coal industry.

The pollution of the Kuban' river by copper compounds exceeds the limits from 5 up to 20 times, and by iron - up to 4 times.\(^5\)

Unfortunately, there are almost no clean rivers among the big ones at all. The Yenisei river is disfigured by copper compounds, zinc, iron, mineral oil products and phenols (main polluters are the "Sibtyazhmash" company, the "Krasnoyarsk factory of synthetic rubber", the chemical industry complex); in the lower flow of the Ob' river, at the city of Salekhard, the impurity by mineral oil products exceeds in 125-142 times the limit.

The Tom', the Irtysh and the Tagil rivers are not in a better condition; moreover - some rivers (for example, the Pyshma, the Tura) have also chronic pollution by arsenic compounds.

Oil-phenol-iron-copper-manganese water of the Kolyma river today has a small difference on structure from the water of the Amur and the Ussuri rivers, the Okhinka river on Sakhalin (where there is "the dirty record" indeed: the maximal contents of mineral oil products exceeds up to 640 times the permissible limit). Certainly, in such a comparison (640 times) the water condition in the Ural, the Lena and the Terek river and the rivers of Kola Peninsula can seem simply paradisiacal though even here are often such estimations as "extremely dirty".

The underground water reservoirs are also exposed to the pollution. Such cases are not single and not dozens, but - thousands (being more true - 2633 sites and 1940

\(^5\) Russian Ecological Federal Information Agency (REFIA), 2003
from them that is 74% - on the European part of Russia). 330 sites of the underground
waters are polluted more than in 100 times of the permissible limits.\(^{51}\)

And finally, as far as Russia is a sea power; and it is simply interesting to learn about
the water condition not only in the southern seas. The dumping of sewage into the
Baltic Sea became a little smaller - due to the capacity reduction in the Amber
industry complex in the city of Kaliningrad. But 10, 22 Million m\(^3\) in 2000 is not such
a significant reduction in comparison with 10, 23 Million m\(^3\) in 1999. Especially if
one takes into the account the residual phenomena, accumulation of deposits etc.
Besides, having reduced the dump of nitrogen, on the spot the dump of phosphorus
increased.

Seven enterprises only of the Republic of Karelia dump the sewage into the White Sea
at once (in the whole 1.82 Million m\(^3\)). The same polluting substances, but in smaller
amounts: suspended - 170 tons, nitrogen - almost 28 tons, sulfates - 60 tons, and
chlorides - 120 tons. The most intensive pollution of waters of the White and the
Barents Seas is from the agrochemical and non-ferrous companies and also from the
fleets and the coastal enterprises of the Ministry of Transport of Russia, the Ministry
of Defence of Russia, the State Building Committee of Russia and the State
Committee of Russia for Fishery.\(^{52}\)

In 2000 82.44 million m\(^3\) of sewage were dumped into the Kola bay, from which
normatively clean - about 6 Million m\(^3\) (6.3%).

\(^{52}\) ibid.
Seawaters of the East-Siberian, the Chukotskoye and the Beringov Seas are used for fishery, navigation and industrial water supply. In 2000 4.7 million m$^3$ of drains were dumped here, therefore the quality of the coastal seawaters, naturally, worsened.

In Far Eastern Seas - the Okhotskoye and the Japanese. Into the Okhotskoye Sea - both directly, and through the rivers – 28.09 million m$^3$ of sewage were dumped, including polluted - almost 19 Million m$^3$. In total 39.5 million m$^3$ of water were allocated into the Okhotskoye and the Japanese Seas in 2000.

The similar story is to note in the Primorie Territory. The enterprises of the Vladivostok and the Nakhodka cities dumped in a year almost 480 million m$^3$ into Japanese Sea; thus about 337 million m$^3$ of them - polluted waters. After viewing the same figures, the reader can believe that the modern water treatment facilities are a dream both for the named seas, and everyone who lives at their coasts: the reason is that into these seas almost 100% sulfates are dumped (i.e. without cleaning), chlorides and boron, about 90% chrome and aluminum, 80% phenols, nitrates, copper each etc.

Certainly, the southern seas are of special interest for an ordinary Russian, especially in the summer period. Everybody wants to have a rest - healthy, careless, and guaranteed from troubles. Average annual pollution of the Black Sea - within the limits of the norm though the maximal concentration of petroleum hydrocarbons were marked (up to 2.8 in the territory of the city of Novorossiysk, up to two - by Anapa city).

The Azov Sea is not getting cleaner too; in 2000 16 thousand tons of sulfates, 9 thousand tons of chlorides, almost 141 ton of phosphates were dumped into the Taganrog bay.
As for the Caspian Sea it is difficult for it to remain even relatively clean because the clearing installations in Derbent are destroyed, in Kaspiysk are overloaded and in Izberbash are not completed. As a whole from 55 million m\(^3\) of communal and household sewage almost 40% are dumped without clearing into the sea, and the others - not enough cleared.

### 2.5 Waste products

Solid waste generation has increased substantially due to adoption of western style consumption patterns. Russian municipalities, however, lack management expertise and landfill capacity to cope with disposal problems. Hazardous waste disposal problems are extensive and growing. Russian officials estimate that about 200 metric tons of the most highly toxic and hazardous wastes are dumped illegally each year in locations that lack effective environmental or public health protections or overnight.\(^{53}\)

Nuclear waste and chemical munitions contamination is so extensive and costly to reverse that remediation efforts are likely to continue to be limited largely to merely fencing off affected areas. By 2000 more than 2 billion tons (!) of toxic waste (in depositories, storage devices, burial grounds, landfills, dumps, etc.) was accumulated in Russia. Apparently, almost all the volume of the toxic waste has an industrial origin (about 95%); among the industry branches the waste is most of all generated in the metallurgy, in the chemical and petrochemical manufactures, in the coal industry.

In Russia there are about 3000 accounted burial places of toxic waste (with the total square of 22000 ha). The industrial wastes are placed very frequently without special

engineering facilities because of the insufficient quantity of the landfills. It is very dangerous for the environment.

In 2000 more than a half of the toxic waste is generated in 6 subjects of the Russian Federation: in the Kemerovo Region, the Krasnoyarsk Territory, the Chelyabinsk, the Orenburg and the Vologda Regions, in the Republic of Bashkortostan.

In 2000 the number of the technogenic emergency situations decreased in Russia. In 1999 there were 856 of them, and in 2000 - 606 (that is on 29.2% less). In the result 976 persons perished and 2958 persons suffered, and the significant damage to the environment was caused.

The increase of the failure rate on the main trunk pipelines is marked - 48 failures (and in 1999 there were 43).  

The principal causes of the failure rate are the same, as earlier, - the very long operating time of technical devices and facilities, and the violation of the technological regimes.

The low technical level of the equipment, fluctuation of the qualified manpower and a catastrophic shortage of means for procurement of the modern technical equipment threaten very much the population and the environment.

2.6 Loss of Bio-Diversity

Loss of Bio-Diversity is also a considerable threat to the Russian environment, more so than the deforestation of the Brazilian rain forests. Russia contains almost 60% of

54 United Nations Environment Programme (UNEP), 2003
the world's boreal forests, and 5 million acres are cut per year in Siberia, alone.  

Endangered species are being affected because of this. For example, the habitat of the Siberian tiger is shrinking as Hyundai moves in to clear cut, an eastern logging operation in the Bikin River Basin that was made possible by a thirty year concession by regional Russian authorities. Why has it not been stopped? One reason the Russians aren’t moving quickly to prevent this massacre is money. The wood is valuable and brings in large amounts of capital, capital that is scarce and badly needed.

2.6.1 Deforestation

Some generations of Russians have grown under vigorous sounds of the song "The country my native is wide! Many woods, fields and rivers are in it...". Since then the country became not such wide as it was.

The wide varieties of plant species of Russia are 11 400 species of the vascular plants; 1370 - moss-likes; more than 9000 algae, about 3000 species of lichens, more than 30 000 - mushrooms. 1363 species have various useful properties, 1103 species from them are used in the medicine.

It is necessary to note that by some evaluations, the volume of commercial catching of wild-growing plants makes about 50% of the total biological stocks.

The general wood stock in the forest fund makes almost 82 billion cubic meters; in 2000 only in the forests managed by the Ministry of Nature Resources (MNR) of Russia, more than 18 000 forest fires (the damage was 3387 million rubles, about 183

57 National Information Agency "Natural Resources" (NIA "Nature"), 2003
thousand ha young growths were lost, 38 802 thousand cubic meters of standing woods were destroyed) occurred.

Certainly, the forests always burned and were sick in all the countries; but almost everywhere one tries to help them - in pest control, in protection from fire. The works for reproduction of the forests are extremely limited in Russia now, because of the shortage of the budget.

It is the question not only about forests. In the North, for example, during a quarter of century the area of lichen tundra reduced in two times. Moreover, it is observed the degradation of 25% of the reindeer pastures. One of the reasons is the activity of the resources-extracting companies.

The vegetation in the taiga natural zone also has degraded. But the most serious problems now there are in the steppe and semidesertic natural areas. The steppes are the unique world natural ecosystems created during thousands of years. And we have now about 70% land in the Central Black Earth territory, that is ploughed up, as much, if not more, - in the Volga, the North Caucasian, and up to 40% - in the East-Siberian and the West-Siberian regions. 58

Certainly, one will be impossible both to keep the natural ecosystems and simultaneously to use them as arable or forage land. But that's just the point, half of these lands have the productivity less, than 5 centers crops from a hectare. Moreover - because of the anthropogenic pressure the biodiversity in these territories is reducing.

Nevertheless the steppes are practically completely ploughed up in the Krasnodar and the Stavropol Territories. In the result the vegetation of the North Caucasian territory

58 ibid.
degrades; the xenophile forests are under threat of full destruction (their fragments remained only on slopes of mountains near the cities of Anapa, Gelendshik and Novorossiysk).

Russia is a country of forests (it is enough to say, what in our territory there are 22% of all the forests of the planet). It is almost 1.2 billion ha. But the significant part of Russian forests within the twentieth century was so intensively exploited that now it is exhausted. Therefore now it is possible to use really only about 55% of the forests. 59

In order to know the optimum volume of forest cutting, there is a scientifically proven norm - rated wood-cutting territory. For 2000, it made about 511 million cubic metres, and really it was cut down only 118 million cubic metres, that is 23%.

It is one of the positive moments in the forest management that within 2000 almost 25 thousand ha of protective afforestation were created. Thanks to it, in particular, both the agriculture won, and the soils became more fertile.

The Forest Code of the Russian Federation orders to carry out arrangements on hydro-forest-melioration. As well as the direct afforestation, it raises efficiency of the lands. But, as it frequently happens by us, the code remains the code, but the finance does not suffice again. As the result in 2000, only 1.5 thousand hectares of the forest were drained (for the comparison: in 1996 – 8.4 thousand hectares). In Russia there are now altogether 220 million hectares overhumidificated and swamped soils in the forest (as a whole, the hydro-forest-melioration is carried out on 100.4 thousand ha from them). 60

59 ibid.
60 Russian Ecological Federal Information Agency (REFIA), 2003
A significant theme is the reproduction of forest resources. The forest-recovery (planting, crop etc.) was carried out in 2000 on the territory of almost 973 thousand hectares, including crop and planting of the forest - on 263 thousand ha. In general, since 1994, the areas of forest-recovery arrangements exceed the areas of the entire cutting down almost in two times.

It is possible to help the forest to renew naturally, it is possible to grow and plant some breeds. But cutting it the level of the ability of the planted cultures to take root is very important. In 2000 it was grown and put into the category of economically valuable plantings on the territory of almost 2 million hectares of forest (1.6 billion pieces seedlings and saplings were grown in the wood nurseries). By the way, it also demands significant expenses - even for that simple reason, what 70% of the wood nurseries are in the conditions of low natural fertility soils. It is necessary to add also climatic problems to all this - especially in the North, in Siberia and in the Far East.

In richer countries (for example, in Canada, on the Scandinavian SPeninsula) special greenhouse complexes are built for these purposes - the cultivation in the protected ground makes both the process less laborious, and has a positive effect for the planting material.

Unfortunately, annually burning forests is the norm in Russia. Because not always the centers of the fire are found out in due time. And it is, in its turn, the result of the fact that the means for full-scale air patrolling are not sufficient again: (only 40 percents of the necessary volume are allocated from the budget). Now the groups of the forest aviation have 100 airplanes.

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61 ibid.
In 2000, the most part of all forest fires arose in the Republics of Komi, Buryatia, the Khabarovsk Territory, the Amur, the Arkhangelsk, the Irkutsk and the Chita Regions. Certainly, the very fact of the loss of the forest is an irreplaceable loss. But if we transfer the damage from fires into the language of figures it made 3387 million rubles in 2000 (that is, 38 802 thousand cubic metres of wood are destroyed on a root, and the young growth was lost on the territory more than 183 thousand hectares).

Fires are a terrible danger for the forests but it is not a single one. The consequence of the fire is drying up of the forests. Besides there are a drought, superfluous humidifying, storms etc. (about 34 thousand hectares of standing woods died because of it).

The destruction of forests from anthropogenic impact goes on; by the way, it increased in 1.7 times because of this reason in comparison with 1999. The drying up of the standing woods because of the diseases (especially in the Central region and in the Western Siberia) was revealed on the area of about 6 thousand hectares.

On the third place (after fires and adverse weather conditions) is one more reason - damage by the dendrophile insects among which there are various silkworms (Siberian, pine, the nun, unpaired), saw-flies, brown-tail moth, chafers etc. The forest perished because of it on the area of more than 20 thousand hectares (most of all - in the Central region).

This problem gets a special value because the centers of such diseases, insects and mouse-species of rodents are acting on the huge area (8401.6 thousand hectares). Their sudden growth took place just in 2000 - mainly due to mass duplication of the Siberian silkworm in Yakutia (the Republic of Sakha).
Siberian silkworm increased in comparison with 1999 more than in 36 times (it is almost 6263 thousand hectares).\textsuperscript{62} For the last time this phytophagan was observed on such significant area in 1870. Now not a smaller alarm is also caused by the outburst of the mass duplication of a printer-bark beatle in the Central region of Russia.

But on other territories the number of the centers was a little reduced. For this purpose the Service of the forest protection carried out arrangements on the general area of almost 756 thousand hectares (about 538 thousand hectares is processed by biomethods and about 218 thousand ha - by chemical methods).\textsuperscript{63}

However, in addition to insects-wreckers, the forest suffers actually from mushroom, bacterial and virus illnesses - the root sponge, the necrosis-cancer, the tree-stem rot and the butt rot. The general area of the disease centers of the forest makes now 976 thousand hectares and only during 2000 increased on 9.4 thousand hectares. All this demands sanitary - recreation arrangements because the area of the infected forests is steadily increasing, and such unique plantings as only one in Russia chestnut groves of the Krasnodar Region, are struck with the cancer.

\textbf{2.6.2 Endangered Species}

The territory of Russia is great - over 17 million square kilometers. The natural environment is very diversified. Therefore the significant part of the world biodiversity is in our country. Let's ponder over the figure - 1513: there are so much species of vertebrates in Russia. Namely: 320 species of the mammals, 732 species of birds, 80 species of reptiles, 29 species of amphibians, 343 species of fresh-water fishes 9 species of cyclostomes.

\footnotesize
\textsuperscript{62} ibid.
\textsuperscript{63} ibid.
Besides about 1500 species of sea fishes live in the seas washing our country.

As for the fauna of invertebrates it counts up to 150 000 species, from which 97 percents are insects. And many of these species exist only by us, they are not present anywhere more in the world. The scientists name such species andemics. 64

2.6.3 The Hunting Animals (Game Species)

In Russia one is allowed to hunt 60 species of mammals and 70 species of birds. According to the data of the state accounting of the hunting resources, the number of the hunting animals is stabilizing. The registered fluctuations are caused by changes of the weather-climatic conditions. For example, in 1999 these conditions were extremely adverse - the snowy winter, May frosts, a strong summer drought. It caused the reduction of the livestock of some species of animals.

Relatively stable one can consider the state of the populations of the wild reindeers, mammals now there are even greater amounts of them in some areas, than it was in 80th years.

The good state of the livestock of valuable fur species of animals - the number of the sable and the beaver is growing in spite of the fact that their extraction much more increased.

The heath-cock population caused alarm five years ago were restored at last.

One of the most mass objects of hunting in Russia remains waterfowl - especially in the Southern, the Ural and the Far East Federal districts. During last years their

64 National Information Agency "Natural Resources" (NIA "Nature"), 2003
extraction makes about 6.6 million individuals. But it is much lower than the allowable limit and has not an adverse effect on the state of population.

The livestock of the hunting animals is kept, in particular, because the state control is strengthened and the struggle against the poaching became more effective. Only in 2000 it was revealed more than 58 thousand cases of infringements of hunting rules. It is the biggest parameter for the last 10 years.

A positive role play also garn-preserve - there are now more than one thousand of them; their general area makes almost 44 million hectares. In the most part of the garne-preserves the density of animals is much higher, than in adjacent territories. And in the course of time the animals from the garne-preserves pass normally to adjacent territories.

2.6.4 Sea Biological Resources

In the tsar Russia the best catch (about 0.8 million tons) was achieved in 1913. Then in the USSR the catch of the Russian Federation itself increased due to the development of the sea and oceanic fishery and reached its peak in 1987-1989 years (about 8.5 million tons).

After the dissolution of the USSR and transition of Russia to the market economy the catch of fishes reduce abruptly. The peak of falling is 1994 (3.7 million tons). In 1995 the increase of the catch was already observed up to 4.3 million tons. The growth proceeded till 1997, beginning from 1998 the recession renewed again. During the USSR-times the share of Russian Federation in world fishery made 10-12% and now the share of Russia makes a little more than 4% of the world catch. In 1998 Russian
Federation occupied 4th place in the world according to the level of the fish catch and the sea products extraction and gave the pas to China, Japan and the USA.\textsuperscript{65}

In 2000 in the Barents Sea the catch of crashes and haddocks decreased distinctly (from 80 to 58\%). As for the general estimation, the commercial stock of fishes here grows though the common allowable catch is limited with 435 thousand tons. After five years depression (1994-1998) the growth of stocks of capelin began and goes on. In 2000 the quota of 149 thousand tons for its catch was allocated, and it was really caught only 95 thousand tons. The reason is that it appeared difficult to renew the purse catches quickly after the interruption. The stocks of the salmon in the rivers of the Barents-Sea basin decreased for 15-20 percents that are caused by the excessive catch of this fish during the previous years. The Baltic Sea. The catch of the cod here made about 4.5 thousand tons in 2000, what, by the way is about 85\% from the allowed catch.

In 2000 the general permissible catch of fishes in the fresh-water reservoirs of Russia made more than 111 000 tons. As well as in the other years, the main part (more than 41\%) - are small fine-mesh fishes; the bream and white-fish species (16\% each); very little sturgeon and salmon species. It is not surprising, because the stocks of the valuable species of fishes (the sturgeon, the salmon and the pikeperch) are reducing, as well as the stocks and the number of the predatory fish species, such as the pike, the turbot, the catfish.

The too much intensive human activity (not only the catch, but also the development of industry) resulted in the state that the populations of the commercial species of fishes also decreased in such lakes as the Ladoga, the Onega, the Ilmen and the

\textsuperscript{65} www.green nature.com.
Beloye. Though as a whole in the Russian water reservoirs the commercial species fish populations are on the enough high level.

In general the fish stocks of the water reservoirs in the European part of Russia are used most intensively - about 80% of fishes from the water reservoirs are caught here. And the share of the water reservoirs of the Ural and the Western Siberia makes up to 70% of the common catch of the river fishes.\textsuperscript{66} There are places where the state of the sturgeon species is also estimated as critical - these are the basins of the Ob', the Irtysh, the Yenisei, the Lena rivers. The reasons are in the unmanaged catch and in the negative anthropogenic influence.

In some rivers the salmon population can be saved, but in the whole the problem can be solved only through the reconstruction of the existing salmon fish-breeding factories. Otherwise the salmon will not become the object of the commercial catch.

Into the natural water reservoirs hundred millions pieces of the young fish of the fine-mesh fishes are let out by factories annually - the sazan, the bream, the pikeperch. And the catches indicate the high efficiency of the artificial reproduction of their stocks. Due to the activity of the Tsimlyanskiy fish-breeding factory the commercial shoal of the white silver carp is generated in the Tsimlyanskiy water reservoir. The commercial stocks of the herbivorous fish species appeared in the Krasnodar, the Volgograd, the Saratov and other water reservoirs.

In 2000, 58 cases of the volley pollution of the water objects were registered by the fishery protection services. One of the pitiable results is the lost fish. By the way, the

\textsuperscript{66} ibid.
damage from this volley pollution was more than 60 million rubbles.\textsuperscript{67} Besides, the natural factors also have the negative influence on many reservoirs. For example, in the Primorie Territory because of the cutting down of the forest the silting of the spawning places took place in the water-security zones (up to 200m from the river depending on the river category).

Because of the water pollution in the Nakhodka, the Amurskiy and the Ussuriyskiy bays the stocks of the red-eye, the flounder, the hexagrammidae, the smelt, the navaga, the Pollack decreased. Besides the Kamchatka crab does not approach to the polluted coast any more, spawning places of the herring reduced, and the lost habitats of the Chlammis and the trepang are not to be restored at all.

Fatal influence on the fish reproduction makes the oil-and-gas extracting activity in the Ob' river basin. The pulp and paper mills on the coast of the Ladoga and the Onega lakes and of the river Yanis-Yoki do not promote to the fish duplication too. Due to the dirty sewage the stocks of the whitefish decreased, the spawning places and the wintering holes of the bream became smaller, and the fish itself began to have a specific - not that of the fish! - smell. Because of the regular dump of sewage by the Lyaskelskiy pulp-and-paper mill the spawning places of the salmon in the river Janis-Joki are completely destroyed.

\textbf{2.7 The Red Books (Lists)}

"The Red Book is the list of the rare and being under threat of disappearance organisms; the annotated list of species and subspecies with the indication of the

\textsuperscript{67} United Nations Environment Programme (UNEP), 2003
previous and modern distribution, the peculiarity of reproduction, measures for protection of these species which are already implemented and are necessary."

Unfortunately, there are not so few similar "Red Books" - international, national, local; about animals, plants, soils etc. - and the number of them continues to grow. Initially the Red Book was created for the registration of the species, which are under threat of disappearance, and also for attraction of the public attention for taking urgent measures for their protection. The initiator of creation of the Red Book was IUCN - the International Union for the Conservation of Nature (Now World Conservation Union), which published the first Red List - the International one. Its main purposes, as well as those of any Red Book, is the inventory of the data and gathering of scientifically proved information about the state of the rare species; attraction of attention to the importance of that part of the biodiversity which runs the danger of disappearance; the influence on the politics of the environment protection and the relevant decision-making; ensuring of the actions for protection of the rare species.

In Russia the practice of keeping of the Red Books for preservation of the rare and the endangered species exists on two levels - on the federal one (the Red Book of the Russian Federation) and on the Territorial one (the Territorial Lists of protected species and the Red Books of the subjects of the Russian Federation), which mutually supplement each other.

The Red Book of the Russian Federation and the Red Books of the subjects of the Russian Federation are (as a rule) official. This is the main difference between our national principles of preservation of the rare species listed in the Red book, and the traditional foreign norms which basically have a recommendatory value as it is, for example, concerning the Red List of IUCN.
For the first time the Red Book was founded in the USSR in 1974, and the first Red Books of Russia appeared in the 80th: in 1983 - the volume "Animals", 1988 - the volume "Plants". 68

Today the Red Book of the Russian Federation contains the data describing the state and conditions of existence of a rare species (distribution, number, limiting factors), and the list of measures, which are necessary to be taken for its preservation. Nowadays in the territory of Russia the protection of the rare species of animals is conducted according to the list authorized in 1997 and published in the Red Book of the Russian Federation (Animals) in 2000.

The Red Book contains the basic section including 415 species and subspecies of animals and plants, among which are: 65 mammals, 123 birds, 21 reptiles, 8 amphibious, 43 fishes and fish-shaped and 155 invertebrates, 95 of them - insects. This very section is legal, and special protection measures are taken towards the species from this part.

The basic legal document in the field of protection of the rare species of plants in Russia is till now the Red Book of RSFSR (Plants) issued in 1988. Procedure of the coordination and the approval of the new register of plants of the Red Book of the Russian Federation comes to an end now, this book includes 112 species of angiosperms, 3 species of gymnosperms, 23 species of filicals, 1 specie of horse-tails, 44 species of mossies, 25 species of lichens, 17 species of mushrooms, 22 species of sea algae, 5 species of fresh-water algae. 69

69 Ibid.
The first regional Red Books have started to be issued in 80th years of the last century: in 1981 - in the Republic Northern Ossetia-Alania, in 1984 - in the Republic Bashkortostan.


Concerning the legislative status Red Books are subdivided into two groups - issued in according with the rules of law (official) and without those (scientific). The last do not provide legislative protection of the species brought in them.

One of the main lacks of all Territorial Red Books is their rarity and inaccessibility. Many of them are issued in a small circulation, in the "gift" variant, and remain almost inaccessible not only for the wide reader, but also for experts. Some books are even absent in the central libraries.

The basic document which regulates the protection and the use of the rare and endangered species is either the special adoption of the list of these species which are subject of the special protection, or the decision on the including of these species into the Red Book of the subject of the Federation.

The work on the management of extraction, trade and transportation through the customs house of the animals who are under threat of disappearance was carried out and continues to be carried out (together with the Ministry of Internal Affairs, the
Federal Security Service and the State Customs Committee of Russia). This list is determined by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).  

As an example we can tell that for 1999-2000 years the specialized inspection "Tiger" revealed 1230 violations of environmental regulations and withdraw more than 330 units of firearms in the Primorie Territory. Besides, more than 900 hunting and fishery tools, 16 tiger and leopard fells, 56 kg of a ginseng, 18 000 fur animals fells, 1500 kg of the trepang, many tons of fish and meat of the wild animals are withdrawn from the illegal circulation.

2.8 Soil Erosion and Contamination

Soil erosion and contamination is the essence of yet another predicament. Tons of pesticides used by farmers have left residues on food and have contaminated the air, water, and soil. Pesticides were found in 42% of dairy products and residues were found in mothers' milk. Moldova, the Kalmyk republic, the Fergana Valley shared by Uzbekistan, Kyrgyzstan, and Tajikstan suffer from soil erosion, chemical contamination, and industrial pollution. Soils filled with pesticides are often washed away with acres of eroding topsoil, filling rivers with contaminated silt, and altering delta ecosystems. Oil accompanies the stew of chemicals; in fact, "920,000 barrels of oil are spilled a day. This is equivalent to an Exxon Valdez spill every 6 hours". In Noyabrsk, some oil spills have covered 400 hectares within the last decade. Also, in most homes and offices, utilities are not metered which leads to increased waste.

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70 Russian Ecological Federal Information Agency (REFIA), 2003
Basically, “More than 20% of Russia’s 450 million acres of arable land is unusable because of chemical contamination, over irrigation, or erosion”.

In common parlance, sustainable development means proper utilization of the natural resources and preserving these resources for the future generation. For that a proper environmental management and structure requires to monitor the utilization of the resources. Russian Federation being the inheritor of the former Soviet Union, it has all the responsibility to maintain the environment and its resources for the well being of all its citizens. Being a vast country of resources and varied topography, Russian government has been evolving an environmental management structure.