

Next 2 Page(s) In Document Exempt

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May 1971

### POLLUTION IN THE SOVIET UNION

Many conservationists and social critics are unaware that the Soviet Union has polluted its environment as extensively and severely as any other country in the world. Some have assumed that the basic cause of pollution is the private greed of businessmen in a capitalistic economy who seek profits at the expense of the community. Others have assumed that economic planning in Communist countries would take into account the possibility of pollution and take steps to prevent it. These assumptions are contradicted by the severity of pollution in the Soviet Union.

#### Water Pollution

The Soviet Union -- in area the largest country in the world -- stretches across two continents from the North Pacific to the Baltic Sea, and has every phase of climate except the deep tropical. One of its great resources is its water supplies.

There are some 150,000 rivers and 250,000 lakes in the Soviet Union. The larger European rivers include the Dnieper, flowing into the Black Sea, the Volga and the Ural into the Caspian Sea, the Don into the Sea of Azov, the Western Dvina into the Baltic and the Northern Dvina into the White Sea. The Asiatic section is drained by the Ob, the Yenisei and the Lena, each over 2,000 miles long, which flow into the Arctic Ocean, and the Amur, which flows into the Pacific. In the European section there is an 88,000 mile inland waterway system in which canals link rivers leading to five seas: the Caspian, Azov, Black, Baltic and White. The Caspian Sea, of which only the south end is in Iran, is the world's largest lake in surface area (143,550 square miles). Other lakes are the Aral Sea (25,300 square miles), Lake Baikal (11,780 square miles), Lake Balkhash (6,720 square miles), and Lake Ladoga (6,835 square miles). The Soviet Union has abundant water resources. They are not distributed evenly -- Soviet Central Asia does not have enough rivers and streams -- but a serious water shortage is developing, not only in the Soviet Union's dry regions but also in areas where its great rivers flow. The cause is easy to find. Water pollution is by far the Soviet Union's biggest environmental problem.

The prime culprits in Soviet water pollution are factories along major rivers which dump their pollutants into the water without regard to the effects on the environment. Fish die and the water becomes unsafe to drink. The Molognaia River in the Ukraine, for instance, has been declared officially to be dead, and chemical pollutants are causing many other rivers in the Soviet Union to lose their capacity to support the water-life that is necessary to man.<sup>1</sup>

The loss of fish as a source of food and the fear of contaminated water is beginning to be felt in town and countryside. In 1968 Radio Moscow warned Soviet citizens not to drink or fish on long stretches of Russia's great rivers. Again in September of that year Radio Moscow complained that the Moskva River, which runs through Moscow, was being heavily polluted by factories that ignored anti-pollution regulations and were not being prosecuted. Ten years had passed, Radio Moscow said, since factories had been advised to use air-cooling plants instead of a water-cooling system, but water-cooling continued to be used by old factories and was even being installed in new factories. Water-cooled systems dump three to four times as much industrial effluent into water supplies as do air-cooled systems.

The danger of dumping chemical pollutants into rivers was illustrated dramatically in Sverdlovsk in 1965, when a careless smoker threw his cigarette into the Iset River and the Iset caught fire. The same year, the Chernorechensk Chemical Plant near Dzerzhinsk killed virtually all fish life in the Oka River by uncontrolled dumping of its industrial wastes. Similar offenses have been committed by factories along the Volga, Ob, Yenesei, Don, Ural, and Northern Dvina rivers, and all these major rivers are now considered highly polluted. In 1967 Soviet journals reported that 65% of all the factories in Russia were discharging their waste without bothering to clean it up, and not one river was left in the Ukraine whose natural state had been preserved.<sup>2</sup>

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1) Goldman, Marshall I., "The Convergence of Environmental Disruption" in Science, 2 October 1970. The author is professor of economics, Wellesley College, and an associate of the Russian Research Center, Harvard University. His article in Science magazine is a condensation of a paper presented to the International Symposium on Environmental Disruption in the Modern World, held in Tokyo in March 1970.

2) Ibid.

One of the worst examples of Soviet industrial pollution occurred in 1966, when a lead and zinc ore enriching plant was built along the Fiagdon River that flows near the city of Ordzhonikidze in the Caucasus. The plant was allowed to dump its wastes into the water, although, as Pravda reported, the river was the sole source of water for about 40 kilometers along its route. Since the industrial authorities felt no responsibility for insuring pure water was available, the local inhabitants were simply left with contaminated water to drink. The same lack of concern by Soviet authorities for a healthy environment can be seen in the fact that important Russian cities like Vladimir which is on the Klyazma River, Chkalov (Orenburg) on the Ural River, and Voronezh which sits on the bank of the Voronezh River near its junction with the Don River, do not have adequate supplies of drinking water.<sup>3</sup>

While industry is most to blame for the Soviet Union's water pollution, Soviet cities add to the problem by not disposing of city sewage in a safe manner. Even the most favored cities of the USSR, the Russian cities of Moscow and Leningrad, do not have enough modern sewage disposal facilities to take care of their waste. In non-Russian population centers of the Soviet Union the situation is usually much worse. The USSR's 1960 census revealed that only 40% of the cities and suburbs in the Russian half of the Soviet Union had sewage treatment facilities, while in the Soviet Union as a whole only 35% of the urban housing units were connected to any sort of sewer system. In 1969 Soviet journals reported that only six of Moldavia's 20 cities had any sewer system, and only two of those cities had sewage treatment facilities attached to their sewer systems to prevent raw sewage from contaminating the water supply.<sup>4</sup>

Far from Moscow, in Soviet Central Asia, a cellulose factory and its lumber mills are polluting one of the largest bodies of fresh water on earth, Lake Baikal. This lake, which holds one-fortieth of all the world's fresh water, is estimated to be over 20 million years old. Until the mills and factory were built along its edge in the 1960's, Lake Baikal was renowned for the purity of its water and the 1200 species of life it contained, including 700 species found in no other place the world.

3) Ibid.

4) Ibid.

Despite the protests of Soviet scientists and conservationists, when the factory opened it began to dump wastes into the lake at the rate of 60 million cubic meters of effluent a year. A few months later, scientists at the Limnological Institute reported that animal and plant life had decreased by one-third to one-half in the area where wastes were being dumped. It was easy to see that such a high rate of contamination posed a danger to the entire lake, despite its huge size. To reduce the pollution, Soviet authorities designed and built a special waste purification plant, but it has failed to stop the factory's pollution. Water coming out of the purification plant has a yellowish tinge and sometimes an odor. An alternate proposal for disposing of the waste has been rejected by the Ministry of Paper and Pulp Industries since it would cost about \$40 million. Although the problem has not been solved, the Ministry has built a second paper and pulp mill near Lake Baikal and has plans for constructing more mills along the Lake's shores.<sup>5</sup>

In addition to water pollution caused by factories and city sewage, Soviet water supplies are also being polluted heavily by its mining operations, oil wells, and ships that freely dump their waste and ballast into the nearest body of water. The shores of the Baltic and Black Sea are often streaked with oil left by Soviet refineries and tankers that ignore oil-disposal regulations. Although the Soviet government laid down strict new regulations in October 1968 for its shipping and oil fields, Soviet scientists noted little improvement had been achieved by 1970 except in Turkmenia where officials succeeded in stopping the dumping of oil effluent and cleaned up the port of Krasnovodsk.

The immense Caspian Sea, once the main source of Russian caviar, has suffered particularly from oil pollution caused by Soviet oil refineries and tankers, that have left a huge oil slick floating over the Northern Caspian. In January 1971 an offshore oil rig caught fire in the Caspian adding even more oil to that already being dumped there. In many parts of the world offshore drilling for oil is under attack by conservationists, but international experts are particularly critical of the way Soviet offshore oil rigs are allowed to operate without taking the kind of precautions that are considered mandatory in other countries.

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5) Ibid.

Two months after the offshore oil-rig fire in the Caspian, the Soviet press, after a long silence on the subject of pollution, revealed that one of the Soviet Union's biggest oil and gas pipelines had ruptured, spewing oil along the Ural River which in turn runs to the Caspian Sea. The break was so serious that Pravda reported on March 21 that the oil leak not only threatened fish-life in the Caspian, but also threatened fertile bottom lands of nearby collective and state farms. When the break occurred, maintenance crews hastily threw up embankments of soil mixed with snow to contain the oil but, as Pravda reported, the mixture of snow and earth could give way during spring thaws and allow the oil to flow. Some of the oil has, in fact, seeped through the ground and appeared many miles away at a truck drivers hostel in Kaleny. Since the pipeline break occurred on the west bank of the Ural River above the city of Guryev it is quite possible that the drinking water of Guryev, as well as other populous areas, is being contaminated.<sup>6</sup>

Soviet authorities are planning to lay a network of large-diameter oil and gas pipelines for thousands of miles from Siberia to as far west as West Germany, France, and Italy. Soviet scientists, however, have warned that the pipelines could be dangerous and give way in many places. The danger is particularly great in Siberia, the source of the oil and gas. A Soviet geologist, Dr. Fabian G. Gurari, deputy director of the Siberian Research Institute of Geology, Geophysics and Mineral Resources in Novosibirsk, warned in the January issue of the Soviet science journal Priroda (Nature) that the warm oil and gas flowing through the pipelines might cause thawing and sagging on the permafrost, leading to pipeline breaks and spillages.<sup>7</sup>

Closely allied to the Soviet Union's water pollution problems are mistakes that have been made in its water management. To meet the demands for raising industrial output set forth in the five-year plans (for instance, the five-year plan prepared in 1966 called for a 50% rise in industrial output), huge dams and reservoirs have been built on important bodies of water to generate electric power for expanding industry. Many of these water works also have a network of canals to supply irrigation to

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6) New York Times, 22 March 1971

7) Ibid.

farmland. In some places the effect has been a disruption of the natural environment that, while contributing to Soviet economic growth now, may in the long run undermine important economic resources.

For instance, dams and irrigation works along the Don and Ural Rivers have diverted large amounts of water that once flowed into the Caspian Sea. During the past 20 years the level of the Caspian Sea has fallen almost 2 1/2 meters. As a result one-third of the spawning beds of the Caspian sturgeon fish are now dry land. The combination of oil slicks on the surface of the Caspian, reducing oxygen in the water, and the loss of ancient spawning beds has reduced the Caspian sturgeon catch from 1,180,400 centners in 1942 to 586,300 centners in 1966. Caviar, which the sturgeon produces, used to be an important source of foreign exchange for both the Soviet Union and Iran. Now, caviar is becoming so scarce, Soviet scientists are experimenting with production of artificial caviar. The overall fish catch from the Caspian is now only one-fourth what it was forty year ago, a sharp loss that affects the economies of the Soviet Union and Iran.<sup>8</sup>

The condition of the Aral Sea is even more serious. In 1970 the Soviet press reported the Aral Sea had dropped 1 to 3 meters in the 1960s. Since the average depth of the Aral is only about 20 to 30 meters, the Aral, in effect, is beginning to disappear and some Soviet scientists fear it will be nothing but a salt marsh by the end of the century. Already, the fish catch from the Aral has been nearly wiped out -- it has fallen 80%. The fish catch from the Sea of Azov has fallen even more -- 91%.<sup>9</sup>

There has also been an increase in the incidence of malaria in the region of the Caspian Sea. When the level of the Caspian dropped due to dams built to the north, new swamps formed on the Soviet shoreline where malaria-carrying mosquitoes could breed. At the same time, a fish called the belyi amur, which had kept down the number of mosquitoes by consuming mosquito larvae, began to disappear from its old feeding-grounds near Ashkhabad, at the mouth of the Volga, as the waters receded from the shore. In 1969 the Soviet press reported the expectable

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8) Goldman, op. cit.; New York Times, 30 March 1971

9) Goldman, op. cit.; Service de Presse I. S. E., 16 February 1971

result, an increase in malaria in the area.<sup>10</sup>

In building great dams and reservoirs in dry regions of the Soviet Union, Soviet engineers have sometimes failed to take elementary precautions against water seepage and against raising the salinity of the soil, which can ruin the soil for farming. Some great Soviet dams have unlined irrigation canals attached to them to carry off some of the water to farmland. Without a lining to stop it, a considerable amount of water is seeping out of the canals along the route. This has caused a rise in the water table in many areas, which in turn has increased soil salinity, especially where the soil is very dry. Some Soviet scientists fear new deserts could be formed. They are also concerned with the way the great dams were built without provision being made for the way they can disrupt the flow of water to underground water reserves or the way great amounts of water can be lost through evaporation in broad-surfaced reservoirs in dry areas.<sup>11</sup>

#### Land and Air

The paper and pulp mills at Lake Baikal not only pose a threat to the lake but to the surrounding land as well. The construction of the mills, and towns for their workers, has involved large-scale cutting of trees, which has weakened the shoreline, allowing the flow of silt into the lake, and removed an important soil stabilizer in the surrounding forests. Just over the border from Lake Baikal is the Gobi Desert in Mongolia. Scientists report that the dunes have already started to move, and some fear that the Gobi Desert will spread into Siberia and destroy the taiga and the lake.<sup>12</sup>

Other forests are being destroyed. A well known case is the destruction of some magnificent oak and pine forest at Yasnaya Polyana, not far from the historic city of Tula. Leo Tolstoy had his summer home at Yasnaya Polyana, and the place became an internationally known tourist attraction with lovely grounds and a museum devoted to the great Russian writer. In 1955 a small coal-gasification plant was built within view of the Tolstoy museum and in 1960 was expanded to produce fertilizer and other chemicals. Now known as the Shchekino Chemical Complex, the plant has over 6,000 employees and produces a wide range of

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10) Goldman, op. cit.

11) Ibid.

12) Ibid.



chemicals, including formaldehyde and synthetic fibers. The smell drives away the tourists, while unseen chemicals in the air eat away the trees.

Air pollution in the Soviet Union, like water pollution, is largely the result of factories which emit harmful wastes into the environment. It was found in 1968 that only 14% of the factories that were polluting the air had fully equipped air-cleaning devices. Another 26% had some air-purifying equipment, but it was frequently either operating improperly or not operating at all. There have been several cases reported of factories sending dangerous amounts of lead into the air. In Sverdlovsk and Magnitorgorsk, public health officials have had to order the closing of factories and boilers to protect the community's health, but periodically there are complaints that factory managers have been able to pressure the public health officials into declaring a factory could be reopened without proper air-purifying equipment.<sup>13</sup>

A number of Soviet cities have developed serious smog problems. Leningrad has 40% fewer clear daylight hours than a nearby town, Pavlovsk. Magnitorgorsk, Alma Ata, and Chelyabinsk, with their metalurgical industries, frequently have a dark blue cap over them. In the hilly cities of Armenia, carbon monoxide in the air frequently exceeds permissible health levels. Tbilisi, the capital of the Republic of Georgia, has smog almost six months of the year, and Kislovodsk, a health resort high in the Caucasus, is becoming an unhealthy place to live. Before World War II, Kislovodsk had 311 days of sun a year. Now it is shrouded with air pollution from lime kilns in a nearby industrial city and the dust in its air exceeds by 50% the norm for a nonresort city.<sup>14</sup>

The Soviet Union has not yet begun to make a serious effort to halt this environmental disruption. Attempts by one set of governmental authorities to save the environment are often undone by another set of governmental authorities who take the side of industry, even when industry is clearly breaking the law. This can be seen in the case of what has been done to save the Georgian Black Sea coast from disappearing. At some places the sea has moved as much as 40 meters inland and there is concern that the mainline railway will be washed away. Excessive construction in the area has

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13) Ibid.

14) Ibid.

has loosened the soil and multiplied many times over the effects of natural erosion. Near the resort area of Adler, hospitals, resort hotels, and even the beach sanitarium of the Ministry of Defense collapsed as the shoreline gave way. In addition, building contractors have exploited the shore's pebbles and sand as a cheap source of gravel. They have hauled away as much as 120,000 cubic meters a year of beach material to use in construction elsewhere.<sup>15</sup>

The problem then was compounded by the government's decision to build a network of dams and reservoirs, which have blocked off the normal wash of new pebbles coming in with streams that feed into the Black Sea.

The dams and reservoirs have provided a source of electric power, but they have robbed the area of beach pebbles which are essential to the shorelines' ability to withstand erosion from the waves beating on the coast. In an effort to save the rest of the shore from erosion, construction close to the shore has been halted and concrete piers have been built to absorb the impact of the waves. The authorities have also had gravel material from inland mountains hauled to the seacoast to replace the gravel removed by building contractors. The building contractors, however, have found they can disregard regulations for protecting the shoreline, without being prosecuted. So they continue to haul away the pebbles and sand, and the seacoast continues to disappear.<sup>16</sup> Construction projects that support heavy industry and meet high-growth targets set by the five-year plan can nullify the regulations designed to protect the environment.

#### Prospects for Pollution Control in the Soviet Union

Soviet economic planning, which emphasizes high industrial output at the expense of all other social considerations, is at the root of the pollution problem in the Soviet Union.

Soviet economic planning as it exists in the 1970s, began in 1928 with Stalin's first five-year plan, which gave every aspect of the economy a "high production orientation." This has influenced development in a variety of ways. Quantity, not quality, of goods has been emphasized. The setting of ambitious production targets has embedded the practice of

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15) Ibid.

16) Ibid.

judging the performance of individual industrial enterprises on their ability to expand existing patterns of production rather than introduce innovations in production techniques. Innovations such as new anti-pollution control devices are not attempted since they might require the attention of the factory's best engineers and involve work-stoppages for re-tooling, both of which would divert the factory from reaching its annual production goal.

The same pressures for high production goals that absorb the energies of factory managers, also affect the willingness of administrative authorities to enforce laws against pollution. Administrative authorities know that if they enforce anti-pollution regulations, local factory output may be lowered and administrative authorities along with factory managers will be criticized. Officials in the Soviet Union, whether they are governmental authorities or factory managers, are judged almost entirely by how much they are able to increase their region's economic growth. Politically, it is easier to allow pollution to continue than to enforce laws that would even temporarily lower industrial output.

Similarly, the lack of a serious intent to control pollution is shown by the Soviet government's failure to create clear lines of authority and responsibility for enforcing pollution-control regulations. Various Soviet agencies, such as the Ministry of Agriculture and the Ministry of Public Health, have some responsibility in anti-pollution programs, but their authority is limited and overlapping. When a responsible government authority does not enforce the pollution laws, industrial managers frequently choose to break the law deliberately.

Punishment is often minimal, especially when an important industrial complex is involved. At Lake Baikal the penalty for breaking anti-pollution regulations has been only \$55 per offense, while the cost of eliminating the water pollution has been estimated to be up to 40 million dollars.<sup>17</sup> Although regulations were established for timber cutting and factory operations at Lake Baikal as far back as 1960, they have not been kept; yet more timber and factory operations are being planned for the area. Nikolai Popov, an editor of Soviet Life, has asked: "Why, in a socialist country, whose constitution explicitly says the public interest may not be ignored with impunity, are industry executives permitted to break the laws protecting nature?"<sup>18</sup>

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17) Ibid.

18) Ibid.

Basically the reason is that officials of Gosplan (State Planning) and their allies in other government offices, who see an opportunity to increase industrial output, are able to over-exploit natural resources at will. They cannot be turned out of office by the voters. They can smother the criticism of conservationists which appears occasionally in the state-controlled press. (For three months preceding the Supreme Soviet session at the beginning of 1971, articles describing pollution were apparently censored out of the Soviet press, since they became noticeably few in number.) Finally, Soviet economic planners, with so much power at their disposal, are able to galvanize the direction of Soviet economic growth on such a massive scale that they can cause fundamental disruptions in the environment before they are able to reflect on all the consequences of their decision. When Khrushchev decided in the early 1960s that the Soviet Union needed a large chemical industry, Soviet economic planners ordered chemical plants to be constructed rapidly all over the country and given maximum production targets. These plants have become a major source of water pollution in the Soviet Union and thereby are harming both the people and the economy that depends on water resources.

Another problem contributing to pollution in the Soviet Union is the uneasy relationship that exists between Soviet scientists and the Soviet state, including its economic organs. The type of Soviet economic planning, introduced by Stalin forty years ago, has had an influence on the direction of Soviet science to this day. Since factories have looked solely to raising gross output and have resisted innovations such as anti-pollution devices in production techniques, Soviet scientific research and development has looked mainly to academic success. Research institutes display little interest in the practical application of scientific development in industrial enterprises, so innovative technology, the bridge between industrial production and scientific research, has been neglected.

Writing in Pravda, 18 January 1967, the First Deputy Chairman of the State Committee for Science and Technology, Academician V. A. Trapeznikov, calculated that while the United States was spending three times more on technological development than on scientific research, the Soviet Union was spending more on research than on development. Trapeznikov has advocated a large increase in funds for research and development between 1971 and 1975, but the economic planners of Gosplan have disagreed, arguing that research and development has not been producing as much of an economic gain since 1966 as had been predicted.

Similarly, Academician A. Rumyantsev, writing in a Soviet economic journal in January 1971, complained that increased investments in the technological sciences had not produced a corresponding increase in industrial output and that scientists do not pay enough attention to economic questions. Displaying a characteristic hostility of Soviet economic planners for scientific research and development, he wrote: "The introduction of new machinery requires considerable expenditures. It is not enough to create a technically interesting design, since the economy needs not mere novelties but economically effective solutions." He could not understand why industrial hourly output per worker rose by only 70% between 1959 and 1968 when scientific personnel in the applied sciences increased 240%. He did not indicate that Soviet economic planners take into consideration any values other than increased production when they allocate funds to different sectors of the economy: "The key problem in the development of the socialist economy today is increasing the efficiency of social production in all its spheres and branches. No matter what indices we use to measure this efficiency, in the final analysis what we are talking about is a rise in the productivity of social labor."<sup>19</sup>

At the same time, Soviet emphasis on ideology, which permeates every field, including science, has repeatedly prejudiced scientific discussions and hidden the merits of scientific research. As is well known, ideology set Soviet genetics back two centuries under Stalin and halted Soviet investigation of cybernetics which Stalin termed "that bourgeois science." Today, of course, it is recognized in the Soviet Union that cybernetics, along with its data processing machines, is essential for keeping proper control of modern industrial processes and that cybernetics has a crucial role to play in predicting the environmental damage that could be caused by new factories, dams, irrigation works, chemicals, etc. In fact, the anti-scientific mentality of Soviet ideologists, as the anti-scientific mentality of Soviet economists; can be said to play an important role in allowing Soviet industry to exploit and abuse the environment.

The Soviet Union will have to acknowledge considerations other than industrial output in its economic planning if its pollution problem is to be solved; it will have to allocate adequate funds for scientific research and development, if

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19) Academician A. Rumyantsev, "Questions of Scientific and Technical Progress" in Voprosy ekonomiki No. 1, January 1971

anti-pollution techniques are to be found and applied to industry; and finally, it will have to enforce its anti-pollution laws, if it is serious about stopping its destruction of the environment.

Approved For Release 1999/09/02 : CIA-RDP79-01194A000200180001-5

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NEW YORK TIMES  
17 March 1972

## U.N. Group Offers Environment Plan, Asking 'Reorientation of Man's Values'

By GLADWIN HILL

Special to The New York Times

UNITED NATIONS, N.Y., March 16—In the first program ever propounded for worldwide action to improve and protect the environment, a United Nations body called today for "a major reorientation of man's values and redeployment of his energies and resources."

It said that heedless application of science and technology had produced "serious physical, economic and social imbalances" that in some cases were of crisis proportions and threatened irreversible ecological damage.

The warning, together with hundreds of recommendations for remedial measures, was set forth in a 600-page set of proposals for formal consideration in June by most of the nations of the world at the United Nations Conference on the Human Environment at Stockholm.

### In Work for 2 Years

This blueprint for international action was the product of two years of work by the 27-nation preparatory committee for the Stockholm conference, which was constituted by the General Assembly in 1968. The United States, Britain and the Soviet Union, among others, were among the planners.

Among the principal recommendations are proposals for a permanent unit in the United Nations to coordinate international environmental activities, and a global "earthwatch" system for environmental monitoring and exchanging of information.

It was also proposed that nations formally acknowledge a responsibility not to impair common resources like the oceans and the atmosphere and that affluent nations financially assist the developing countries. The proposals, said, would affect 70 per cent of the earth's population—in environmental pro-

tection.

Altogether there are more than 200 recommendations for international action, which the conference is supposed to endorse or reject, and over 300 recommendations for national-level actions that have the lower status of "suggestions."

### Subjects for Discussion

The proposals in six pamphlets, covered subject-areas agreed upon for the conference: problems of human settlements, resources, pollution, economic development, international environmental organization, and public education and information.

Some recommendations were quite general, such as one urging that "governments avoid creating barriers to international trade to offset the costs of pollution control." Others were quite specific, among them one proposing the establishment of 100 or more "Earthwatch" stations to monitor the atmosphere.

The international recommendations were addressed broadly to "governments," to the Secretary General and to United Nations specialized agencies such as the World Health Organization and the Food and Agriculture Organization.

Execution of the bulk of the international proposals, it was suggested, probably would fall ultimately to established United Nations agencies. Those agencies have been conducting many environmental activities but these have generally been piecemeal, fragmented and sometimes conflicting.

### Headed by Canadian

The Stockholm program was a distillation of 12,000 pages of material produced by the secretariat of the conference, by hundreds of consultants and by contributors from 116 nationalities. The program was directed by Maurice P. Strong, a Canadian industrialist turned diplomat.

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The Stockholm program, in contrast with the multifarious international conferences that have dealt with environmental problems in largely scientific and technological terms, views global environmental reform as essentially political.

"The very nature of environmental problems—that is to say, their intricate interdependence—is such as to require political choices," the preparatory committee said.

More than 100 of the 132 member countries of the United Nations, representing most of the world's 3.5 billion people, are expected to participate in the conference, from June 5 to 16.

### Soviet Role in Doubt

Mainland China, comprising some 20 per cent of the world's population, will be represented. It is uncertain whether the Soviet Union and the Eastern European bloc will participate. They are vexed over denial of participation for East Germany, which is not a member of the United Nations.

There has been no indication how the proposals will fare at Stockholm. Virtually all had been discussed by the preparatory committee in four long meetings over the last two years that were open to the entire United Nations membership.

Mr. Strong said at a news conference today that the Stockholm project had already "justified expectations" by accelerating to "an advanced stage of negotiation of several conventions to deal with such specific international problems as dumping of toxic wastes into the oceans, the conservation of part of man's global heritage, and the preservation of wetlands and islands for science."

Mr. Strong said he thought the Stockholm conference would be endorsement of a "declaration

of principles" constituting "the first attempt by the nations of the world to agree on standards of international behavior and responsibility" regarding the environment.

Soaring population was noted quite bluntly in the Stockholm material, but specific actions were left by implication to a United Nations conference on population, scheduled for 1974.

Also dealt with obliquely, and left largely to national action, was the rapid depletion of nonrenewable resources such as minerals.

### Confrontation Is Urged

The gap between the advanced nations that are interested in environmental reform and poor nations that consider it a luxury was dealt with largely in terms of the 1971 preparatory conference at Founex, Switzerland, which concluded that potential economic frictions resulting from environmental improvement should be confronted and negotiated through international trade organizations.

The Stockholm program rejected the notion that environmental reform was prejudicial to the resolution of other problems such as "the risk of nuclear war, poverty, discrimination, the urban crisis, the rural exodus, inflation combined with unemployment."

Mankind's growing interdependence, the report said, calls for "a more equitable utilization of the world's resources and distribution of its opportunities for a more balanced development of the world's productive capacity and significant redirection of its industrial and scientific capabilities."

"It is vital to add a new dimension to man's thinking," it added, "This is to see himself not as a separate, antagonistic, exclusive exploiter of the earth, but as the steward and wise manager of the precious and limited resources."



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LE MONDE

13 April 1972

(also reprinted in die Welt, La Stampa, and The Times.)

# La bataille pour la Terre

Par AURELIO PECCEI (\*)

**C**OMMENT parvenir à équilibrer de façon satisfaisante le développement de l'industrie et la protection de l'environnement ? C'est une des questions les plus importantes aujourd'hui posées. Une des plus controversées aussi. L'industrie — en entendant par là toute activité productrice — conditionne notre ni-

veau de vie, mais c'est de l'environnement que dépendent et la qualité de notre vie et la présence même de la vie sur la terre.

Le problème est cependant lui-même vicié par les facteurs émotionnels et par l'absence d'informations solides. Sa complexité et le fait qu'il se rattache, qu'il est mêlé à tous les autres grands problèmes auxquels l'humanité doit faire face aujourd'hui, et dont aucun ne peut être considéré isolément, amplifient la difficulté

d'opérer les choix. Nous serions inévitablement conduits à des conclusions fausses si nous considérons la question spécifique des relations industrie-environnement, hors du cadre plus vaste où elle se situe : celui des réponses et des initiatives de la société devant les mutations d'un monde qui évolue très rapidement. Et nous serions voués à une totale inefficacité si, l'Europe étant la première dans nos cœurs, nous péchions par esprit de clocher en limitant nos

vues à la société européenne seule.

Le propos étant ainsi éclairé, j'estime qu'il convient de rectifier l'opinion très largement répandue selon laquelle c'est l'industrie qui est responsable de la dégradation massive de l'environnement humain. Incontestablement, il y a dans les zones industrielles une concentration malsaine de pollution et de débris qui contaminent notre air, notre sol, nos rivières et les eaux côtières.

## La présomption de l'homme

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Pourtant, l'industrie est seulement le bras séculier, l'instrument de production, de la société dont elle ne fait que servir les objectifs. Et c'est contre la société dans son ensemble que doivent être formulées les accusations qui sont proférées hautement contre elle par tout le monde. Non que l'industrie soit irréprochable : elle est en position dominante, et elle en profite, trop souvent, pour exploiter la crédulité de consommateurs sans défense et pour flatter leurs toquades collectives ou leurs faiblesses, sans guère se soucier des intérêts réels de la communauté ou de la salubrité publique. Mais ce sont là abus qu'une meilleure application des lois ou l'intervention de l'*ombudsman* suffiraient à faire disparaître.

Ce qu'il nous faut chercher à comprendre et analyser, ce sont les facteurs déterminant l'activité industrielle, autrement dit, les motivations et les orientations de la société qui, c'est le drame, sont en plein désaccord avec les nouvelles réalités du monde, notamment si l'on pense à l'environnement.

La principale force motrice de la société moderne, dérivée, dans ses deux versions, capitaliste et socialiste, de la tradition judéo-chrétienne,

semble être une foi illimitée en ses propres possibilités et réalisations scientifiques, technologiques, industrielles et en leur développement ultérieur. Cette présomption, qui intoxique, vient de la conviction que l'homme est non pas une parcelle de la nature mais le maître de la terre et qu'il peut exploiter son royaume à son gré. Elle a fait un héros de l'*homo faber*, capable de transformer la pénurie en abondance, et elle a repoussé l'*homo sapiens* à l'arrière-plan. Tous les peuples se sont ainsi laissés prendre au mirage d'une expansion économique sans limites. La glorification et la poursuite des valeurs matérielles, placées plus haut que tout, et symbolisées par le P.N.B. et l'indice de consommation *per capita*, sont les symptômes de ce syndrome de la croissance, dont la conséquence la plus redoutable est l'érosion continue — comme l'a montré le récent rapport du M.I.T. (1) — de la capacité dévolue à notre petite planète, finie, surpeuplée et, probablement, déjà bien malade, d'entretenir la vie. On doit donc s'interroger sur l'équilibre écologique d'où découleront les possibilités de survie de notre système humain.

Après une période marquée par un accroissement phénoménal de la population et de la production, le

système humain est toujours embrayé sur la croissance, alors que ses problèmes vitaux sont, aujourd'hui, des problèmes d'équilibre. Equilibre ne veut pas dire stagnation. Il suffit de regarder autour de soi. Dans tous les cycles et les systèmes vitaux, dans le corps humain, dans les forêts ou les océans, dans les espèces, avec leurs luttes internes ou entre elles, nulle part, rien, jamais, ne croît indéfiniment. Il y a croissance ici et déclin là, puis surviennent des forces ou des événements qui font décroître à son tour ce qui croissait tandis que se présentent de nouvelles émergences dans un mouvement continu d'adaptation mutuelle et d'ajustement à l'environnement. Cette dynamique, ce rétablissement perpétuel de l'équilibre, sont le secret et la cause de toute évolution, et hors de cela il n'y a que la ruine et l'immobilité de la mort.

L'écart entre pays sous-développés et surdéveloppés devient si radical que leurs positions sont impossibles à concilier dans le cadre de pensée et dans le système d'organisation d'aujourd'hui. Les pauvres, qui forment la grande majorité de l'humanité, vont probablement dégrader davantage l'écosystème mondial

en essayant de se développer, à n'importe quel prix pour l'écologie, et ils n'atteindront pas leur objectif pour la raison que les nations industrialisées absorbent les trois quarts des ressources naturelles extraites et qu'elles en veulent davantage. Et les riches, qui ne se sentent pas sûrs de leur richesse, parce que leurs fournitures vitales proviennent de territoires étrangers, vont essayer de contrôler et de monopoliser une encore plus grande proportion des ressources mondiales. Le conflit de buts et d'intérêts créés par cette situation invraisemblable est sans solution. Des crises et des heurts entre ces deux groupes humains et en leur sein éclateront forcément et atteindront leur summum au moment où les limites matérielles et les exigences écologiques de la planète deviendront évidentes.

Il n'est pas sage d'ignorer ou de minimiser ces défis et ces risques. Ce sont les plus grands que l'humanité ait jamais rencontrés, et c'est la première fois qu'une menace se profile à l'échelle mondiale. Sous son impact, l'humanité va avoir finalement à prendre position et à combattre, d'une façon ou d'une autre, pour ce qui sera littéralement la « bataille pour la Terre ».

CPYRGHT

*Au niveau du monde entier*

Par analogie, il serait souhaitable que la société présentât en son sein et dans ses rapports avec le milieu la même harmonie et la même poursuite de l'équilibre qui créeraient la seule condition propice à un authentique développement de l'humanité. Tel n'est malheureusement pas le cas à l'heure actuelle.

Toutes les nations, communautés et cultures sont secouées par des déséquilibres internes qui vont en s'aggravant. Dans la sphère de l'industrie, ils surviennent entre la production et

la distribution des richesses entre les besoins publics et la demande privée, entre la sauvegarde de l'environnement et l'activité économique, mais ils concernent jusqu'à la place et la fonction imparties à l'économie dans le corps social.

A l'échelle des nations, les dilemmes devant lesquels elles se trouvent sont angoissants et quasiment insolubles dans l'actuel contexte. Les choix proposés au niveau national ou régional (« *business as usual* », « *qualified growth* » ou « *zero growth* ») peuvent donner seulement

un temps de répit et indiquer la voie, mais ils ne peuvent pas modifier substantiellement notre triste condition collective ni les tendances du futur.

Pour saisir ce qu'est actuellement cette condition et ce que peut être l'avenir, il faut considérer la situation au niveau du monde entier. A notre époque, c'est sur la scène planétaire que se joue la tragédie humaine et, pour pouvoir influencer sur elle, nous avons à nous préparer, à nous familiariser avec de nouveaux concepts en ce qui concerne

les ordres de grandeur, l'approche et les conséquences à prévoir. La technologie et l'interdépendance croissante entre les systèmes naturels et ceux construits par l'homme tiennent l'humanité et l'environnement dans une sorte d'unité organique. Persister dans la poursuite de buts égoïstes, comme le font toujours les pays et les peuples, est non seulement condamnable mais illusoire, car notre commune terre nourricière n'est de toute façon pas assez vaste et pas assez généreuse pour répondre à toutes les attentes.

*Le rôle de l'industrie*

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La dure vérité, qu'il faut regarder en face, c'est que si la société n'est pas capable de se purifier elle-même du péché qu'elle a commis en sacrifiant l'enrichissement moral et culturel de l'humanité à la poursuite de satisfactions matérielles, et si elle conserve un train de vie au-dessus des moyens de son habitat terrestre, elle se condamne à être arrêtée dans son élan avant qu'il soit longtemps, ou par l'intervention de forces extérieures faisant partie du système de l'univers, ou bien par une guerre civile entre ses membres luttant pour leur subsistance. Dans les deux cas, des souffrances et des morts s'ensuivront, incommensurables et, même si notre espèce réussit à survivre, il y a peu de chances que

survive ce que nous appelons la civilisation.

Probablement, cette abomination, cette stupidité, peuvent-elles encore être conjurées. Mais, pour cela, il faudrait que la communauté mondiale modifiât complètement ses façons de sentir et de penser. A cet égard, le rôle de l'industrie peut être décisif. Evoquer la catastrophe dans l'abstrait sans considérer les conditions d'ensemble et les macroproblèmes du monde n'a pas de sens. Par contre, il est capital de chercher à savoir si l'industrie des hommes peut — sans causer des dommages irréparables aux écosystèmes de la planète — fournir la nourriture, les biens, les services et un niveau de vie politiquement et moralement acceptable à une population de

3 600 millions de « terriens » — qui seront bientôt 6 milliards, 7 milliards et davantage.

Or aider la société à prévoir à l'échelle mondiale, tel est précisément le nouveau rôle de l'industrie. Même limitée pour le moment à une étude très préliminaire de la rationalisation planétaire de la production (comment les systèmes économiques et écologiques peuvent-ils être coordonnés ; comment le développement global peut-il être atteint de manière compatible avec la préservation de la Terre), l'entreprise sera d'une difficulté et d'une complexité effroyables. Beaucoup de personnes diront qu'elle est utopique et qu'elle dépasse les possibilités humaines. Mais je crois quand même que l'industrie aura assez d'imagination pour don-

ner sa mesure dans ce nouveau rôle. Outre qu'il n'y a pas d'alternative et qu'il faut bien essayer d'organiser le monde pour qu'il subvienne adéquatement aux besoins de toute sa population, les enjeux sont si élevés que — on peut raisonnablement l'espérer — la détermination qui pousse l'homme à poser ses pieds sur la Lune se retrouvera pour planifier cette expérience sans précédent à tenter sur notre bonne vieille Terre.

La phase initiale s'édifierait autour d'une recherche similaire — portée globale, période de temps limitée, approximation rudimentaire — à celle effectuée par le MIT sur les « Limites de la croissance ». Les termes de référence devront être étudiés minutieusement.

*Un projet complexe*

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Les objectifs sont aussi simples que le projet est complexe :

a) Les concepts de l'implantation de l'industrie, de sa structure et de ses modes d'opération, doivent être révisés et réajustés de façon rationnelle sur une base mondiale en vue de répondre aux exigences sans cesse croissantes de la demande d'une société globalisée.

Ces exigences seront exprimées en objectifs qui ne peuvent, à l'heure actuelle, qu'être présumés arbitrairement et préliminairement.

b) Que l'un des buts principaux de la communauté des hommes, dans le monde, est d'assurer un niveau de vie décent à tous ses habitants ;

c) Que, l'égalisation du niveau de vie des différents groupes humains ne pouvant être envisagée dans un avenir prévisible, les industries doivent

considérer qu'il leur incombe de fournir un support matériel pour la satisfaction des autres besoins primordiaux de l'humanité : éducatifs, culturels, spirituels, artistiques et scientifiques.

d) Que les activités productrices doivent être poursuivies de manière à ne pas épuiser ou affaiblir la capacité d'entretenir la vie que détient notre planète, et de manière à protéger l'écologie humaine dans le présent et pour l'avenir ;

e) Que les ressources non renouvelables doivent être allouées, utilisées et recyclées de manière à ne pas créer de problèmes insolubles pour les générations futures, qui ont autant de droits que nous sur ce patrimoine commun ;

f) Que les possibilités de formation et d'emploi doivent être fournies à la plus haute proportion de travailleurs potentiels sur une base mondiale équitable ;

g) Que les industries doivent

considérer qu'il leur incombe de fournir un support matériel pour la satisfaction des autres besoins primordiaux de l'humanité : éducatifs, culturels, spirituels, artistiques et scientifiques.

Ces objectifs sont, tous les six, fondamentaux, mais ils sont néanmoins incompatibles si l'on prétend satisfaire lequel d'entre eux au maximum. La recherche initiale à entreprendre aurait pour but d'explorer les possibilités de les coordonner, en utilisant différents jeux de données, pour les intégrer, à la longue, dans une combinaison ou des combinaisons cohérentes. Celles-ci indiqueraient, avec une approximation grossière, les résultats qui pourraient être obtenus dans le monde réel par des choix politiques et stratégiques appropriés.

cherche, mais ce que l'on commence à distinguer, dans les brouillards de la situation précaire où l'on erre aujourd'hui, c'est la nécessité de l'entreprendre. Le temps presse, car l'industrie doit relever le défi avant que toutes les forces ne soient déployées à travers le monde, tous les esprits mobilisés, pour la bataille de la Terre. A l'intérieur de l'industrie, je pense que l'entreprise privée doit prendre la tête du mouvement. Cela pour deux raisons : d'une part, en beaucoup d'endroits, elle subit la pression de l'opinion publique et, d'autre part, elle possède — à un degré bien supérieur à celui que l'on trouve dans l'entreprise publique, opérant, de nos jours, dans les cadres nationaux — la fibre internationale et l'ouverture d'esprit sur les réalités mondiales, qui sont indispensables.

THE NEW YORKER  
19 June 1971

CPYRGHT

## OUR FAR-FLUNG CORRESPONDENTS

### THE POLLUTION OF LAKE BAIKAL

**L**AKE BAIKAL, a four-hundred-mile-long body of water in southeastern Siberia about twenty-five hundred miles east of Moscow, is thought to be between twenty-five and thirty million years old, and hence the oldest lake on earth. With a maximum depth of more than five thousand feet, it is also the world's deepest body of fresh water and its largest in volume, containing an estimated fortieth of the planet's fresh water—though one Soviet geographer gives the unlikely figure of twenty per cent. The lake is fed by three hundred and thirty-six rivers but is drained by only one, the Angara, which flows out of Lake Baikal's southwestern end to run a thousand miles northwest to the Yenisey—which, in its turn, runs another fifteen hundred miles to the Arctic Ocean. Because a large part of Lake Baikal's watershed area is surfaced with rock, its water is between twenty-five and fifty per cent lower in mineral content than that of most other freshwater bodies, and is so transparent that divers can see down almost a hundred and fifty feet. These and many of the lake's other unique attributes and resources have, for the past ten years or so, been increasingly threatened by the incursion of industry. The threat has produced the sort of confrontation between manufacturers and conservationists that has repeatedly been in the news over here. In the Soviet Union, as might be expected, the fight has been less dramatically reported than it might be in the United States, but it has been reported, and it continues—just as the apparent degradation of the lake does.

It would be hard to overestimate either the effect of Lake Baikal on the climate of the surrounding region—

largely mountainous and wooded, belonging to the Buriat Republic on the east and to the Irkutsk *oblast* on the west—or the remarkable variety of its flora and fauna. The city of Irkutsk is only thirty miles from Baikal, but, since large bodies of water are slow to change temperature, the temperature in the city may be as much as twenty degrees higher or lower than it is at the lakeshore. Moreover, though temperatures in the region fall below freezing by September or October, ice does not form on the lake until late December or early January. Also, the area is blessed with an unusually high percentage of cloudless days. Lake Baikal has an average of twenty-five hundred and eighty-three sunny hours a year, whereas, for instance, Kislovodsk, a sunny resort city in the Caucasus, has a mere two thousand such hours. The quality of the air in the lake region is memorable, too. As a visitor approaches the lakeshore, the fresh, crisp air makes breathing seem almost a new experience. As for the flora and fauna of the Baikal region, more than twelve hundred organisms have been catalogued, of which seven hundred and eight are peculiar to it. Among these indigenous species are the *nerpa*—the world's only freshwater seal, of which there are thirty thousand in the lake—and the *golomyanka*, a transparent fish that bears about two thousand live young. Lake Baikal is different in so many respects from any other place on earth that those whose lives have been touched by it are sometimes inclined to believe that it has supernatural powers. The area is venerated both by the local inhabitants and by Russian conservationists.

Until a decade or so ago, there was no significant industrial development on

the shores of the lake, which are mainly steep slopes unsuitable for anything but small settlements, but several cities and factories had sprung up on some of its tributaries—especially the major one, the Selenga River, which supplies about fifty per cent of Lake Baikal's water. Over the years, about fifty factories, including meat-packing plants and lumber mills, had been established along the banks of the Selenga, and only about ten of these bothered to treat their waste before it was discharged. Most of these factories are near the capital of the Buriat Republic, Ulan-Ude, which is about seventy-five miles from the lake's shore, and which also empties its sewage—untreated—

into the Selenga. In the fifties, the lake was beginning to show the effects of such encroachments. The catch of *omul*, the lake's prize fish, declined fifty-five per cent in twelve years, from 91,300 centners (about ten thousand tons) in 1945 to less than half that in 1957. The decline may have begun as a result of poor fishing practices, but it was exacerbated by pollution of the lake's tributaries—especially the Selenga, the breeding area for sixty per cent of the lake's *omul*.

The industrial threat to the ecology of the region was increased greatly in 1957, when the State Institute for the Design of Cellulose

and Paper Plants (or Gipproshum), under the stimulus of the State Planning Office (or Gosplan) of the Russian Republics, suggested that the enormous timber resources and pure water of the Baikal region be put to some use. The plans called for the construction of at least two factories—a cellulose-cord factory on the southern shore of the lake at Baikalsk and a cellulose plant on the Selenga. The planners announced their intentions in 1958, but not until July of 1960, after work on the plants had begun, was there any public hint of what such industrial development might mean for Lake Baikal. At that time—in a forty-eight-page pamphlet published by the Buriat Book Publishing Company, in Ulan-Ude—a local writer, B. R. Buiantuev, cautioned that establishing such factories on or next to Lake Baikal would create complications for the lake and its huge surrounding forestland. But since Buiantuev's essay was published in Siberia, and in an edition of only twenty-five hundred copies, it is unlikely that it received much attention.

As a matter of fact, a potentially effective law aimed at protecting the lake had been passed earlier that year by the Council of Ministers of the Russian Republics. Anticipating some of the difficulties that the new plants would create, the law had three major provisions: First, it stipulated that no factory could open until its officials could guarantee that a water-purification system was working and that all resulting effluents were harmless. This fact also had to be certified by various ministries and by a state sanitary inspector. Second, the law called for the enlargement of the Barguzin National Preserve, a six-million-acre forest area around the shores of the lake. Third, it banned the stripping—as against the selective cutting—of timber where the land sloped as much as fifteen degrees, and banned selective cutting as well where the slope was as much as twenty-five degrees, bans designed to prevent erosion on the lake's watershed. In addition, the law provided for a program of reforestation. All these provisions, it soon became apparent, were to be ignored.

New warnings, in a book by two writers named O. Serova and S. Sarkisian, emanated from Ulan-Ude in 1961, but again few people outside that

remote provincial city seemed particularly interested. Until December of that year, most Soviet citizens remained unaware that factories that could pollute the lake were being planned. Then Gregory Galazy, the director of the Limnological Institute of the Academy of Sciences, in Siberia, issued a public warning about what was happening. In a letter to the editor of the newspaper *Komsomolskaia Pravda*, Galazy described how the plan for industrial development of the lakeshore had been born, catalogued the chemical and biological changes that the new industries would inflict on the lake, and warned that the liquid waste from the plants could not only destroy some of the lake's unique marine life but might also adversely affect the water supply of Irkutsk. Galazy went on to suggest a number of ways of averting the threats to the lake. First, he urged that the factories treat and reuse their water. But if that should prove to be too expensive, he wrote, the factories should build a forty-two-mile-long sewage bypass to the Irkut River, which does not flow into Lake Baikal. Finally, Galazy suggested that it was still not too late to abandon the whole project. He proposed that cellulose and pulp operations be transferred to the city of Bratsk, about three hundred miles up the Angara. Since a paper plant was already being constructed at Bratsk, all that would have to be done would be to expand it. The Angara's water at Bratsk was almost as good as the water of Lake Baikal itself, he said, and there would be plenty of electric power available, for an immense hydroelectric plant would soon open nearby. Whatever happened, Galazy pleaded, no waste water from the cellulose factories should be permitted to flow into Lake Baikal.

A month later, the economic weekly *Ikonomicheskaja Gazeta* printed a cautionary article, but thereafter little was heard about the impending danger for three years, until 1964. Then the debate exploded in the pages of *Literaturnaja Gazeta*, with an attack by the writer Oleg Volkov, who has since come to be known for his outspoken defense of Russian ecology. *Pravda*, *Izvestia*, and *Komsomolskaia Pravda* soon joined in, but it has been *Literaturnaja*

*Gazeta* that has continued to press the issue with the most persistence.

IN the Soviet Union, protests like those over Lake Baikal are usually directed by one government agency against the actions of another. When a government newspaper decides to publish a letter to the editor, or when it commissions a writer to write such an attack, this usually indicates the existence of an interagency squabble. Such campaigns are common in the Soviet Union, but just how the decision is made to launch them is not clear. Many instances of ecological destruction never get into the press. Moreover, there are no independent conservation groups like our Sierra Club or Audubon Society to seek out abuses. When this kind of debate does surface, therefore, the implication is that either the potential consequences are far-reaching or bureaucratic feuding has become particularly intense.

In this country, it is frequently pointed out how much private enterprise and private greed have done to destroy the environment, but in the case of Lake Baikal it was, of course, public officials running a public agency who were similarly responsible for proposals to exploit irreplaceable resources. From the state planners' point of view, it was an ideal situation for low-cost mass production of high-quality cellulose and paper products. N. Chistiakov, the first deputy minister of the Ministry of Timber, Paper, and Woodworking, and E. Kuznetsov, the chief of the Cellulose, Paper, and Carton Administration of the Ministry, explained in an article in *Literaturnaja Gazeta*, in April, 1965, "We are for the preservation of the lake, but we are also opposed to underutilization of its huge wealth—its water and timber." There remains the question of whether it is possible both to preserve the lake and to exploit its resources, and if a choice has to be made, it is not hard to predict on which side the officials in the Ministry of Timber, Paper, and Woodworking will be.

As for the governors of the Soviet regions and republics, they are no more concerned with conservation than officials in Moscow are. Under the country's system of five-year economic-development plans,

Approved For Release 1999/09/02 : CIA-RDP79-01194A000200180001-5

which prescribe specific production and purification standards. An administrator's success is judged in terms of increased production. There is no space on performance charts for grading a governor on his maintenance of the quality of the air or water in his domain. Moreover, governmental and managerial officials in the Soviet Union tend to resist the allocation of funds for conservation, because this usually means that there will be less money available for expanding productive capacity. When the managers of a paper plant at Bratsk were asked why a new waste filter had not been installed, one of them replied, "It's expensive. The Ministry of Timber, Paper, and Woodworking is trying to invest as few funds as possible in the construction of paper and timber enterprises in order to make possible the attainment of good indices per ruble of capital investment. These indices are being achieved by the refusal to build purification installations." Both factory managers and political officials suffer if funds are diverted from production to conservation, and as a result of this identity of interests government officials in the Soviet Union are more apt to ignore damage to the environment than officials in societies where, along with private enterprise, there is a degree of public accountability.

It is true that most American corporate officials would prefer fewer rather than more pollution controls, because such controls make production more costly and normally less profitable, and these executives have not been especially timid in making their sentiments known to our government officials. But industry's wishes are not all that an American mayor or governor has to worry about. He also has to consider the demands of conservation groups like the Audubon Society, voter pressure groups like the Council for a Livable World, and constituents whose health is endangered by oil spills and polluted air and water. There are, of course, outspoken conservationists and suffering citizens in the Soviet Union, too, and they are often supported by the Soviet press, but for the most part they have no power to influence the government. What counts above all else is increased production.

AS it became clear that no one was protecting the lake, a public outcry arose, leading to the formation of various investigative bodies. It is hard to list all the organizations that investigated the Baikal issue at one time or another, but reference has been made in the Soviet press to at least four major national groups that opposed the opening of the cellulose plants and six smaller bodies, mainly local, that approved. (And, as has happened in similar situations elsewhere in the world, the testimony of at least one of the approving experts was discredited when it was brought to light that he had served as a consultant for the Ministry of Timber, Paper, and Woodworking for a fee of a hundred thousand rubles a year.) Yet while the commissions labored, so did construction workers on the sites of the plants. The commission reports fell off the presses like so many drops of the effluent that would ultimately issue from the plants—but, unlike the effluent, the reports were to have no effect. Despite all the protests, no one in a position of power took any action to save the lake. Everyone agreed that it was being threatened, but everyone also pleaded helplessness. When the fish catch diminished, for example, authorities in the Ministry of Fishing Industry complained that they had no power to prohibit the discharge of sewage into the water. Only the sanitary inspector could do that, they said, and, for whatever reason, the sanitary inspector did not do it. As for the waste from the cellulose factories, the authority to regulate such discharge was vested not in the Ministry of Land Reclamation and Water Management but in the Ministry of Timber, Paper, and Woodworking. That was like giving our Atomic Energy Commission control over the radioactive discharge from atomic-energy plants—which, by and large, it has. Critics predicted, furthermore, that the Ministry of Timber, Paper, and Woodworking would end up transferring the responsibility for the discharge of waste into the lake to the plants themselves. Such confusion and buck-passing made it all the easier for the factory managers to get their plants operating.

A recurrent criticism by the conservationists at Baikalsk and on the Selenga could perfectly well have been built elsewhere. Initially, the Ministry of Timber, Paper, and Woodworking had insisted that Baikal's "exceptional ultra-pure water" was necessary for the plant at Baikalsk because it was impossible to make "super, super cellulose cord" for aircraft tires without it. Challenging the whole rationale for building the Baikalsk factory, the editors of *Komsomolskaia Pravda* noted that in the mid-sixties, once it was well under construction, the Ministry had decided to change the kind of cellulose to be produced, as well as the very purpose of the plant. Somewhere along the way, it seemed, the need for "super, super cellulose" had diminished, and the Ministry had decided that the factory would also make paper—a product that does not require exceptionally pure water. "In this way, the original insistence on the need to build the factory directly on Lake Baikal underwent a qualitative metamorphosis," the editors of *Komsomolskaia Pravda* pointed out. "And what remains?" they asked. "A nearly completed factory that, with a little scientific effort, could have been built in another region of the country and thus could have spared Lake Baikal." The production plan for the Selenga plant underwent a similar change. After construction had been started, the Ministry decided that the plant should produce not only cellulose, as originally planned, but also cardboard for heavy cartons, which in no way required especially pure water. At least, said the critics, if the use of such water was essential for some products, the two plants could have been combined into one, thus localizing the area of pollution. Next, the conservationists charged that the production of "super, super cellulose" cord had been a misbegotten notion in the first place. They said that nylon cord was superior to cellulose cord and pointed out that factories producing "super, super cellulose" in Canada had closed down for lack of demand. They also asked how American factories that did not have water comparable to that in Lake Baikal could produce high-quality cellulose. Such arguments are

parently had little effect. As recently as August 23, 1970 the New York Times carried an article that quoted a Russian official as saying that the United States was indirectly responsible for the pollution of Lake Baikal because the United States was the only other country in the world that made such strong cellulose, and it refused to sell it to the Soviet Union.

Even the economics of the Lake Baikal projects came under fire. Conservationist critics have insisted that the Ministry of Timber, Paper, and Woodworking purposely understated construction costs for the plants by as much as twenty-two million rubles (\$24,420,000)—a third of the total cost—in order to win initial approval. Production plans, it was said, were similarly fuzzy. For example, the planners had failed to ascertain whether the timber supply would be adequate for more than twenty-five years and had ignored the fact that the Baikalsk factory was sixty miles away from its prime timber supply. Since the end of 1966, when the factory went into operation, erratic deliveries of timber have forced it to suspend production several times. Also, the cellulose made at Baikalsk requires further processing at another plant, thousands of miles away in the Urals—where, say the critics, the Baikalsk plant could perfectly well have been located in the first place.

The Ministry was further castigated for its belated recognition that the entire Baikal region is in a highly active seismic zone, and that the site chosen for the Baikalsk plant was directly on the fault of the zone. The Selenga plant is somewhat better situated in this regard, but even so it is only sixteen yards away from the epicenter of a quake recorded a few years ago, so it seemed a distinct possibility that both factories could tumble into the water. Major earthquakes occurred in the area in 1862, 1950, 1957, and 1959, and there were smaller shocks in 1960 and 1961. During the 1862 quake, an area of land about the size of Boston collapsed into the lake. In its initial planning for the factories, the Ministry of Timber, Paper, and Woodworking seems to have ignored the likelihood of earth-

quakes—to say nothing of its having ignored what the debris from two such factories would do to the lake's water.

Throughout the debate, officials of the Ministry maintained that the discharges into Lake Baikal by the factories would be carefully treated to protect the quality of the lake. No expense would be spared, they promised, to construct the most advanced treatment plants in the country, if not the world. Unfortunately, however, the treatment system put into use at Baikalsk was so new that it had never been tested under actual production conditions; indeed, according to one critic, it was tested "by simply using a model with two hundred litres of artificially polluted water." Furthermore, the system relied in part on the use of a bacteria culture to purify the effluent from the factory, and it is difficult or impossible for such cultures to survive in the below-freezing weather that prevails in the Lake Baikal region for eight months of the year. Also, the cultures, which feed on pulp waste, die if production is interrupted—as it has been, because of the erratic timber deliveries. Not only did the Ministry fail to test the treatment process thoroughly but—in direct violation of the 1960 law aimed at protecting Lake Baikal—it went ahead with the construction and opening of the Baikalsk factory before all the plans had been finally approved by the Ministry of Health, the Ministry of Fishing, and the Ministry of Land Reclamation and Water Management. Moreover, it seemed, the Baikalsk plant had started operating before the staff of the treatment plant had been properly trained.

Some of the defenders of Lake Baikal noted further that even if the treatment plant were operating properly and at full capacity, the effluent would at best be only ninety-seven per cent pure, and the plant would be able to process only two-thirds of the emitted waste. And even though the water that would emerge under these conditions from the last stage of treatment would be drinkable by human beings, it would be yellowish, would have a slightly unpleasant odor, and could still taint Lake Baikal. Anyway, said the conservationists, if the treated water really turned out to be all that it was claimed to be, it should be recycled and

used instead of new water drawn from the lake. An unplanned form of recycling was taking place anyway, the critics pointed out. Because of the peculiar nature of Lake Baikal, it seems, water-flow patterns in the vicinity of the Baikalsk plant are circular. Thus, the water from the discharge pipe works its way back around to the intake pipe, which is only two or three miles away, and the quality of the water the plant uses has already been lowered. As a result, the Ministry of Timber, Paper, and Woodworking has had to provide for supplementary treatment, making the plant still more costly to run.

SO far, everything that has happened indicates that there will be damage to Lake Baikal even if the treatment facilities operate properly. Several Russian scientists—including Galazy, from the Limnological Institute—who visited the Baikalsk factory in 1968, reported some dismal findings. Valentine Kostylev, the manager of the treatment plant, was quoted as complaining that its filter had been malfunctioning for two years. Galazy reported that during one visit he made the treatment plant's oxidizing machine was inoperative, the plant's pipes were blocked up, and the aerator had broken down. In fact, he said, it had been necessary to reconstruct the whole treatment plant, at a cost of four million rubles (\$4,400,000 at the official rate). In the meantime, waste had been shunted to storage pools about eleven yards from the lakeshore, and then, in the form of black slime, had begun percolating into the lake at a rate estimated by Galazy at thirty-four and a half litres a second. This apparently had been going on for most of the year (and, at last report, continued on into 1970). Although he quoted Kostylev as saying that he, Galazy, had "come just at the wrong time," it apparently would have been impossible for him to have come at the right time. The black slime that was flowing into Lake Baikal, according to Galazy, consisted of fatty acids, methane, and organic sulphides. Between 1967 and the middle of 1968, the Baikalsk plant had dumped three hundred and eighty-three tons of these toxic substances into the lake. As a result, islands of alkaline sewage had been observed floating on

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or just below the surface of the lake, at distances of nine to thirteen miles from the plant's outlet pipe, for as long as two months. These islands—one of them eighteen miles long and three miles wide—poisoned not only the water but the air around the lake as well. The effect of such toxins is not hard to imagine.

The office of the Limnological Institute at Lake Baikal reported that animal and plant life near the Baikalsk treatment plant had been reduced by a third to a half.

In late 1970, I was in the Soviet Union and had a chance to talk with Deputy Minister Chistiakov. I must say that I came away impressed with the depth and sincerity of his concern over the conditions at Lake Baikal. He showed me the daily reports he received about the quality of the water being discharged at the Baikalsk treatment plant, but, hard as he tried to reassure me that ultimately the lake would not suffer, the best he could do was insist that when the treatment plant was properly operational it would fulfill the prescribed norms. The purity of the lake's original water, however, was higher than those norms.

Since the treatment plant has proved so faulty, conservationists have been seeking other ways to save the lake. For the most part, they have fallen back on Galazy's suggestion of a decade ago—rerouting the effluent over the mountains to the Irkut River. The Ministry of Timber, Paper, and Woodworking continues to resist this proposal, because the forty-two-mile pipeline would cost the equivalent of forty million dollars—an expenditure that would probably make the whole operation far too costly. In any event, such a pipeline would alleviate the problem of pollution only from Baikalsk, because the plant on the Selenga would be too far away to connect up to the same pipe. Accordingly, most critics feel that the opening of the Selenga plant, due any day now, should be postponed. However, it is considered doubtful that Lake Baikal could be preserved even if the conduit to the Irkut River should be built and the Selenga plant converted to some less noxious use.

Only if both factories should be dismantled, industrial activity around the lake abandoned, and the entire shore allowed to revert to forest would there be much chance of halting the degradation of Lake Baikal. Even then, the ecological balance in the lake basin is so complex that the damage may be irreversible.

Because of the small amount of soil covering most of the watershed area, and also because of hurricane-force winds that are common in the region, it is very hard to regenerate plant growth in the surrounding forest area once trees are cut down.

Heedless of these hazards, Russian lumbermen have stripped many acres bare. The recent growth of towns and homes in the vicinity of the lake has further denuded the shoreline, and the consequences have been far-reaching. With the trees

gone, the soil is washed away by rain and wind—a process that increases the flow of silt into the lake and also reduces the ability of the land area to retain the moisture it receives in the form of rain and snow. In 1968, an observer reported that, owing to timber-cutting, a third of Lake Baikal's basin had lost a significant portion of its natural water-regulating capacity, and that more than a hundred and thirty streams and springs in the area flooded during the thaw and were dry for much of the rest of the year. This disruption of the ecological and hydrochemical balance of Lake Baikal's tributary streams has inevitably affected the chemical makeup of the lake itself. There has been a noticeable increase in the quantities of sulphates, chlorides, magnesium hydroxide, and nitrates in its waters. Very little of this is traceable to the Baikalsk plant; most of it arises from the destruction of the tree cover and from certain other forms of man-made assault on the area, so the elimination of factories could not in itself repair the damage.

The method of moving the cut timber causes still further damage. Large numbers of logs are rafted together and floated or towed down the tributary rivers and through Lake Baikal itself. Though this method is cheap-

est so far as day-to-day costs are concerned, it is expensive in many other ways. For one thing, about ten per cent of the logs sink, and sunken logs do two kinds of harm: they cover up vital fish-breeding grounds, and they absorb the lake's oxygen. In 1968, it was estimated that a million and a half cubic metres of timber had sunk over the preceding decade and that fifty streams, with a combined length of twenty-two hundred miles, were thereby eliminated as spawning grounds for fish. In some of the river bottoms, the logs were piled three or four yards high. The paper and lumber mills recently agreed to stop rafting their logs and to ship them by rail instead. But partly because such shipment requires a considerably increased cash outlay and partly because the railroads have been very slow in supplying flatcars, the logs have continued to be shipped by water, and have continued to damage the lake.

For years, it was thought that landslides would be unlikely in the region because of the predominantly cold climate. With the disappearance of the tree cover, this is no longer the case. And, most threatening of all, the cutting of the trees and the intrusion of heavy machinery into the wooded areas has unstabilized a large area of sand dunes southeast of the lake. By 1963, there were large stretches of shifting or poorly anchored sand there. Lately, observers have warned that these shifting sands are linking up with the Gobi Desert, just over the border in Mongolia, and there are fears that the Gobi will sweep into Siberia and destroy not only Lake Baikal but a large portion of the surrounding forest.

UNFORTUNATELY, no one knows how to restore virgin nature. The only hope for Lake Baikal is that Soviet industry will curb its passion for production in time to prevent complete destruction of the area. To that end, a new law regulating the use of Lake Baikal was passed by the Council of Ministers of the Soviet Union—the country's highest administrative body—in February, 1969. The law provides for the establishment of a special water-conservation zone of some twenty thousand square miles, where no timber may be cut, and again forbids any lum-

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bering on mountain slopes steeper than twenty-five degrees. The law also stipulates that submerged logs are to be removed from the rivers and from Lake Baikal, and that logs are to be brought down the mountainsides by cableways rather than dragged down by tractors. Construction of new factories is strictly regulated, and none are to be established where they might pollute the lake or its tributaries. Furthermore, the purification plant at Baikalsk was to be reconstructed before the end of the year. The Selenga factory was ordered not to start production of cartons until its purification equipment was ready, and other industries in the lake's basin were similarly restricted. The questions remain whether this new law was passed soon enough and whether it is strong enough. After all, the 1960 law addressed to many of the same issues proved to be ineffective, and there is not much reason to believe that the

1969 law will be any more so. Will the Ministry of Timber, Paper, and Woodworking wait obediently once the Selenga plant is ready to operate if proper water treatment is not yet assured? If so, they will be showing greater self-restraint than they did at Baikalsk. In fact, an August, 1970, report in *Komsomolskaja Pravda* indicated that abuse of the lake had increased, not decreased, since the passage of the 1969 law.

Nor can it be assumed that worse will not follow. Though Lake Baikal is no longer untainted, it does remain much purer than anything else around. It is only natural, therefore, that various proposals for its exploitation continue to be advanced by Russian industrial planners. For example, one proposal—fortunately not acted upon—was that the outflow of water from Lake Baikal be artificially increased in order to accelerate the ac-

cumulation of water in the Bratsk reservoir. This would have resulted in a drop in the level of Lake Baikal—a change whose consequences cannot be predicted. Lately, there have been reports that the Ministry of Timber, Paper, and Woodworking is not going to confine its projects in the basin to the Selenga and Baikalsk factories, and that at least one other such plant is apparently in the advanced blueprint stage. Similarly, the government chemical ministries have let it be known that the Soviet economy would benefit greatly if chemical plants could be established on the lake's shores and could use the lake's waters. In 1968, Galazy warned that Lake Baikal's unique ecological system might be destroyed within the next decade. The industrial manager's may fulfill his prophecy. In the case of Lake Baikal, at least, there seems little to choose between private greed and public greed.

—MARSHALL I. GOLDMAN



WORLD POLITICS  
July 1971

## THE SOCIAL COSTS OF MODERNIZATION: Ecological Problems in the USSR

By DAVID E. POWELL

Let us not be too proud of our victories over nature. For every such victory nature takes revenge on us. True, each of these victories, the first time, has the consequences we calculate, but the second and third times, the consequences are altogether different and unforeseen and very often destroy the significance of the first ones.

—Friedrich Engels<sup>1</sup>

VIRTUALLY all of the existing literature on modernization is concerned with the virtues of modernity. It focuses on the gains to be derived from modernization—industrialization, material progress, social welfare, political rationality, etc. But experience suggests that gains are usually achieved at some cost: the drive toward modernity seems invariably to produce new social and personal problems. In the USSR—perhaps the world's most developed underdeveloped country—the modernization process has been accompanied by massive social costs.

To be sure, the Soviet regime has been responsible for a number of significant achievements, and has fashioned a central authority capable of mobilizing the nation's resources toward social, political, economic, and scientific-technical change as effective as that of any country. But Soviet modernization has been achieved at a heavy cost. Traditional patterns of family life, religion, personal freedom, and community organization have been disrupted. The USSR is presently faced with a growing drinking problem, crime and juvenile delinquency, the beginnings of a drug problem, and alienation and emotional tension among substantial numbers of citizens. These difficulties have accompanied the Soviet Union's rapid social and economic change.

In an assessment of the Soviet experience, then, achievements must be weighed against failures, and gains must be balanced against perceptible costs. Perhaps this cost/benefit dualism can be seen most clearly in the realm of ecology: the ambitious Soviet effort to transform the environment, despite (or rather because of) its many successes, has at the same time resulted in much harm. Recent years have witnessed growing evidence of pollution and misuse of the land throughout the Communist world. States as different as Czechoslovakia, Poland, Rumania, and the

<sup>1</sup> *The Dialectics of Nature*, as cited in *Literaturnaya gazeta*, December 20, 1967.

USSR have shown signs of profound ecological damage.<sup>3</sup> The Soviet Union seems to have "progressed" furthest in this direction: Soviet sources admit to the full range of symptoms, from littering, an excess of pesticides, and despoliation of the land to noise, air, and water pollution of sometimes immense magnitudes.<sup>4</sup>

Soviet industrialization, no less than American industrialization, has given rise to vast damage to the environment. I will spell out below how the Soviets perceive this problem and what they are doing and intend to do about it. As we shall see, the USSR confronts many of the same problems as the United States does, and for many of the same reasons. A strong urge toward industrial production, a weak and divided anti-pollution lobby, and official ignorance of, or indifference toward, damage to the environment—all these facts are clearly visible both in the USSR and the United States. Industrial development has, by and large, taken priority over the care of nature; environmentalists are not heard until the damage has been done. Only now is the Soviet government beginning to heed the warnings uttered as long ago as the 1950's. And, though it is too late to save certain communities and ~~bodies of water, it may not be too late to protect and preserve the rest.~~

The official response to the growing menace of pollution has been piecemeal and unsystematic. Local government agencies have experimented with a number of approaches, but, until recently, the central authorities have simply avoided the problem. In the past two years, however, the Party has begun to mobilize its resources for a broad-scale attack on pollution and polluters. The official policy of focusing attention on one area, which for many years had allowed the Party to remain indifferent to ecological damage, may now be working to the benefit of the environment. New principles of land legislation (1968), public health (1969), and water legislation (1970) suggest a concern and resolve that had long been absent.<sup>4</sup> Whether these measures are enforced, whether these general principles are transformed into public policy, remains to be seen.

<sup>2</sup> See *Lidova Democracie*, July 26, 1970; *Zycie Warszawy*, October 8, 1970; *Scientia*, March 19 and July 16, 1970.

<sup>3</sup> *Pravda*, July 27, August 17 and November 21, 1967, February 11, 1970; *Literaturnaya gazeta*, March 15, 1966 and August 9, 1967; *Sovetskaya Rossiya*, April 12, 1970, in *Current Digest of the Soviet Press* [hereafter cited as *CDSP*], xxii, No. 48 (December 1970), 8; *Nauchno-tekhnicheskyye obshchestva SSSR* [hereafter cited as *NTO*], No. 2 (1968), in Joint Publications Research Service [hereafter cited as *JPRS*], No. 45,666, 14; *Oktyabr*, No. 10 (1966), in *CDSP*, xviii, No. 48 (December 1966), 16.

<sup>4</sup> *Pravda* and *Izvestia*, December 14, 1968; *Pravda* and *Izvestia*, December 20, 1969; *Izvestia*, April 28, 1970.

Air and water pollution in the USSR represent formidable problems. Soviet industry, geared for rapid economic growth, has, over the course of half a century, dumped untold millions of tons of sewage into the nation's waters and millions of tons of particles of dirt into the air. Until very recently, the authorities have paid little heed to the environmental costs incurred. Pollution of Soviet waters has now assumed crisis proportions, and air pollution, too, represents a considerable threat to the well-being of citizens. Although the problem of clean air is not nearly so manifest as the problem of clean water, it is much more than a minor nuisance, and there is every reason to expect the situation to deteriorate further. At present, concerned citizens and officials are devoting their primary attention to the nation's rivers, lakes, and streams. Nonetheless, aware that the problem of dirty air has assumed the proportions of a national disaster in other countries, and aware that the USSR is entering the automobile era, central and local authorities are devoting increasing attention to air pollution. They are determined to deal with the situation before it gets out of hand.

Pollution in some regions of the USSR has reached formidable levels. Millions of tons of acid, petroleum products, metal, fiber, and salts are discharged each year into Soviet rivers. Only a small part of the more than seventy million cubic meters of waste water that flow into them annually has been decontaminated.<sup>5</sup> As a result, hundreds of major rivers are polluted, and thousands of lesser rivers and streams have suffered the same fate.<sup>6</sup> Industrial enterprises, power plants, mines, agricultural fields all contribute to the problem. In addition, many forests have been "timbered out"; the resulting soil erosion damages the land and adds to the dirt flowing into bodies of water.

Pollution is noticeable even to the casual tourist. Visitors to Moscow and other large urban centers can see smog and haze in the air, as well as filth in local rivers. Only a decade ago these were not present. In some parts of the country, pollutants in the atmosphere have reached appalling concentrations. Scientific studies indicate that in many major industrial cities the concentration of harmful substances in the air

<sup>5</sup> Perhaps one-tenth of this effluent undergoes biochemical purification (thus removing 80-95 per cent of the impurities). Another third of the waste water is subjected to less thorough purification, removing perhaps 40 per cent of the impurities, and the remaining waste water empties into other bodies of water without undergoing any decontamination whatsoever. *NTO* (fn. 3).

<sup>6</sup> *Literaturnaya gazeta*, May 14, 1969; *Pravda*, June 21, 1965 and December 15, 1969; *Izvestia*, July 9, 1968; *Sovetskaya Rossia*, November 14, 1968, in JPRS No. 47,065, 39-40, 48.

greatly exceeds the norm set for people's health. The city of Mayevka, for example, the site of a steel mill, has been described as "literally covered with soot." In Siberia, "a dense cloud of smoke and dust constantly hangs over" the city of Irkutsk.<sup>7</sup> And, as the Soviet automobile and truck population increases, the problem is getting worse. In 1966, a *Pravda* editorial observed that "the poisonous haze of exhaust gases over cities is becoming thicker and thicker," and a year later the same newspaper charged that exhaust gases from automobiles "thoroughly pollute the atmosphere of our cities."<sup>8</sup> As the date approaches when Togliatti's Fiat plant begins adding dramatically to the number of cars in the Soviet Union, the problem can only get worse. And, as Soviet industry continues its rapid rate of economic growth, industrial enterprises add more and more dirt to the air. Air pollution thus threatens to become as significant a problem as water pollution.

Pollution in the USSR, like pollution elsewhere, involves two major costs: (1) to the health of citizens, and (2) to the national economy. Human physiology knows no ideological boundaries; excessive concentrations of certain gases and solids suspended in the air or dissolved in water can do serious damage to people's well-being anywhere. Soviet ~~scientists know this as well as their counterparts in the West do.~~ But although the Soviet authorities are familiar with the implications of pollution for public health, they seem far more concerned with its economic consequences. Following Soviet practice, we will focus our attention on these.

Pollution caused by an individual enterprise is likely to raise the costs of production of other factories located downwind or downstream from the guilty enterprise. As the air becomes filled with soot, for example, the use of electric power for artificial lighting increases. Thus, in the city of Leningrad, a sharp rise in power consumption has been attributed chiefly to dirty air. Moreover, ash carried through the air accelerates wear and tear on the friction parts of machinery with which it comes into contact. Sulphuric and sulphurous anhydrides, coming into contact with moisture in the air, help to corrode metal.<sup>9</sup>

Though pollution inflicts harm on virtually all sectors of the economy, its economic costs are seen most vividly in the fishing industry. Spokesmen for the fishing industry, scientists, and environmentalists have published numerous articles describing the damage done to spawning grounds or to adult fish by effluents from chemical enterprises, oil

<sup>7</sup> *Izvestia*, September 17, 1968; *Pravda*, April 8, 1966.

<sup>8</sup> *Pravda*, December 11, 1966 and November 16, 1967.

<sup>9</sup> *Izvestia*, August 11, 1966.

CPYRGHT

refineries, pulp and paper mills, sugar refineries, and other polluters. Sulfates, chlorides, and suspended particles oxidize, thus using up oxygen from river water without which fish cannot live. Hundreds of rivers and other bodies of water that used to contain large fish have completely lost their importance for the fishing industry. In the USSR as a whole, the fishing industry is said to lose between 120 and 300 million rubles a year because of river pollution.<sup>10</sup>

Although industrial wastes exact their toll on fish gradually, there have also been instances of mass destruction of fish due to the sudden emission of large quantities of effluent. In July, 1965, one such incident occurred near Volgograd; millions of fish were poisoned by the discharge of unpurified waste water by the Kirov Chemical Plant in Volgograd. Losses were estimated at ten to twenty million rubles. The year before, the Iset River caught fire near Sverdlovsk. Many of the city's enterprises had been dumping their sewage, filled with fats and oil by-products, into the river. The concentration of combustible materials in the river grew so dense that a lighted cigarette thrown into the water one day was enough to ignite it. Countless numbers of fish perished.

~~"Once a transparent stream abounding in fish,"~~ a Soviet citizen lamented, "the Iset lies dead for hundreds of kilometers below Sverdlovsk, turning into a collection of sewage."<sup>11</sup>

Pollution of fishing waters has reached such vast proportions that a procedure was adopted in 1969 whereby the Chief Administration for Fish Breeding and Protection of Fish must agree to sites where enterprises are to be constructed near commercial fishing waters. Proof that there will be adequate devices for decontamination must be submitted to the fish-protection agencies for their approval before the site-selection process can be completed.<sup>12</sup>

#### CAUSES OF POLLUTION

Numerous factors are involved in any explanation of why pollution has reached such an alarming level. The explanation involves political, economic, and scientific components. As we shall see, the most important factor contributing to pollution is the ignorance, indifference, or outright hostility that Soviet officials traditionally have manifested toward efforts to curb pollution.

Some pollution is an inevitable correlative of industrial civilization.

<sup>10</sup> *Literaturnaya gazeta*, May 14, 1969; *NTO* (fn. 3). See also *Pravda*, in *JPRS* No. 36,384, 69.

<sup>11</sup> *Izvestia*, December 17, 1965; *Pravda*, April 2, 1966; *Oktyabr* (fn. 3), 15.

<sup>12</sup> *Pravda*, July 28, 1969.

Production involves the creation of by-products and waste; even the best-intentioned technological society has yet to devise means capable of preventing waste entirely. As industry develops, it produces a greater volume and variety of substances, and methods for extracting these new substances from waste water or the atmosphere are either unknown or difficult to carry out. Though some substances can be extracted from waste, others invariably remain. For the foreseeable future, then, some part of industrial or agricultural waste will inevitably be carried into the sea or the atmosphere.

Although some pollution is inescapable, certain aspects of the problem in the USSR are attributable to the operation of the Soviet system. We can identify four causal factors.

(1) *Technological backwardness.* Anti-pollution technology is rather backward in the USSR. Methods for utilizing waste products and purifying effluents have not been studied very carefully, in part because few people have been encouraged to study these processes. Higher educational institutions have not expressed interest in stimulating such study, and those who are already in the field are treated badly and have little

incentive to combat pollution. The specialized institutes that train students for work in the petroleum industry, for example, do not prepare specialists for the water-supply and water-disposal shops of oil refineries or chemical enterprises. There simply is no opportunity available for those who would specialize in water purification. Indeed, even basic courses in conservation or ecology are rarely offered, and when they are, they are available only to certain students. As long ago as 1947, Moscow University introduced a course in conservation, and similar courses were soon set up at other institutions of higher learning. However, none of the courses is open to all students—not even to all students in technical fields. The course at Moscow University is offered only to zoologists and biogeographers; Rostov University's course is open only to botanists; and only geographers may register for the course at Perm University.<sup>18</sup>

The level of scientific work done in universities, specialized institutes, and technical schools is also rather low. Little time is spent devising instruments and techniques for purifying wastes. According to a 1965 decree of the RSFSR Supreme Soviet, "The designs of installations for purifying industrial wastes are often based on methods that have not been tested even in laboratory conditions, let alone in production conditions; this lowers the effectiveness of the funds expended. Research and higher educational institutions are doing an extremely poor job of

<sup>18</sup> *Komsomolskaya pravda*, May 25, 1967 and January 6, 1968.

CPYRGHT

working out and introducing progressive methods of purifying sewage water and the wastes released into the atmosphere and of rationally using and reproducing natural resources."<sup>14</sup> Most of the installations that are designed and put to use are inefficient; moreover, they are not given proper care and often break down. Inferior designs, poor workmanship, delays in building, and excessively low capacities all contribute to the problem. Pollution equipment is not large enough to handle the job in most enterprises, and much of the equipment is poorly managed. Repairs are carried out infrequently, and by ill-trained technicians.<sup>15</sup>

The same problem inhibits efforts to curb air pollution. Existing gas-purification machinery often fails to function, and the process of replacing equipment with new, improved designs is slow. Many devices are too small for the task assigned to them; others suffer from inadequate maintenance and repair. Unproved systems of gas removal and pollution control are employed, and as a result they frequently break down or operate inefficiently. Little attention is paid to the design and construction of new installations, and existing ones deteriorate rapidly.<sup>16</sup>

(2) *The low status of anti-pollution work.* If few students are provided with an intellectual appreciation of conservation when they are in school, fewer still develop an incentive to deal with such matters once they are at work. Water-disposal shops and personnel are considered auxiliary. Salary levels are lower than in other sections of plants, the opportunities to earn bonuses are fewer, and, even in the matter of retirement pensions, employees of water-disposal or -purification shops are subjected to discrimination. As a result, few choose a career in anti-pollution work, and the rate of turnover in this sphere of industry is very high. For example, large numbers of anti-pollution specialists at the Baikalsk Pulp Plant near Lake Baikal give up their jobs every year and move to Bratsk, where they receive higher wages at the lumber industry complex.<sup>17</sup> In view of the inadequate training available and the low level of financial incentives, it is understandable that anti-pollution technology has stagnated and that not many have chosen this line of work. The system provides few incentives to potential environmentalists.

<sup>14</sup> *Vedomosti verkhovnogo soveta RSFSR*, No. 44 (370), November 4, 1965, in *CDSP*, xvii, No. 46 (December 1965), 3.

<sup>15</sup> *Pravda*, June 21 and November 12, 1965; *Izvestia*, September 3, 1968.

<sup>16</sup> *Pravda*, March 24, 1969; *Ekonomicheskaya gazeta*, No. 28 (1966), in *JPRS* No. 37,534, 16.

<sup>17</sup> During the summer of 1967, for example, more than 100 persons (out of a total of 230-240) left their jobs at the Baikalsk purification installation. *Literaturnaya gazeta*, October 11, 1967.

(3) *Appropriations and incentives.* A third major factor influencing pollution hinges on the question of money. Two components are involved here: (a) the authorization for and actual levels of expenditure, and (b) the incentive system, which stimulates a drive toward production rather than toward conservation of the environment. We will deal with each of these in turn.

State agencies invariably allocate insufficient funds to industrial enterprises for anti-pollution purposes. In addition, plant managers often choose not to spend all the funds allocated to them, diverting resources to production shops instead. Economic units strive to achieve high production indices per ruble of capital invested; they often succeed by delaying construction work on purification installations. Thus, during the period 1960-1964, more than 25 per cent of the funds allocated for the construction of purification installations in all industries was not put to use. The directors of individual plants have their own priorities, and they prefer not to invest "their" funds in ways they regard as non-productive.<sup>18</sup>

Production and profit, not social purposes or care of the environment, motivate both the central authorities and the managers of industrial plants. ~~They are rewarded for economic output, not for maintaining,~~ purifying, or enhancing the beauty of the environment. "Produce the plant product—that is the main thing," managers are said to reason. "The purification installations can wait."<sup>19</sup> Plants are permitted to begin operation before work is completed on their purification facilities—sometimes even before it is begun. The sluggishness with which commissions of experts (who must pass on purification installations) work is striking in comparison with the drive to begin production operations. According to B. Voltovskii, Chairman of the Ukrainian Council of Ministers' State Committee on Conservation, "It has become a common bad practice to plan the construction of decontamination installations as a second or even a third stage, after the main shops have already worked full blast for years." Moreover, he goes on, "In the construction of new industrial units, serious attention has been directed to only one aspect, the purely production aspect. Almost no calculation was made, for example, of the losses we would suffer if the industry discharged every year so much poisonous wastes into the air, or dumped so much water polluted with harmful substances, the effect it will have on the

<sup>18</sup> *Pravda*, February 28, 1965, December 23, 1966, June 26, 1967, and December 9, 1968; *Vedomosti verkhovnogo soveta RSFSR* (fn. 14), 3; *Izvestia*, April 15, 1969.

<sup>19</sup> *Ekonomicheskaya gazeta* (fn. 16), 16.



CPYRGHT

health and longevity of the people, how much it will decrease the available amounts of drinking water, irrigation water, etc."<sup>20</sup>

There appears to be widespread indifference—even outright hostility—to the arguments of conservationists. An article in *Izvestia* several years ago told of the director of an enterprise who began “to fuss about to have himself relieved of all these unnecessary headaches, the installation of all kinds of filters and sediment traps.”<sup>21</sup> Officials, mindful of their production assignments, devote little attention to anti-pollution measures because of their involvement in production; they consider the protection of nature minor in comparison with their “more urgent” production tasks. One critic of this order of priorities has complained: “If . . . an enterprise does not fulfill its production plan, its executives have to make a strict accounting to the party organization, the trust and the ministry. But when this same enterprise pollutes the air and releases dirty water into a river, poisoning all the life in it, it is hardly likely that anyone will demand an accounting from the guilty parties.”<sup>22</sup> Other commentators are equally indignant. One has recalled the example of an official who, in a discussion of Russia’s polluted rivers, declared that “first we have to build communism and only afterward raise fish.” But protests against such attitudes have been to little avail.

Official public policy is that increased output of goods compensates for damage to the environment. “Victors are not judged,” as the saying goes. When the time comes to receive a bonus, no one reminds the managers of a plant about the pollution they have caused.<sup>23</sup>

(4) *Organizational weakness of anti-pollution forces.* No single individual or organization has been assigned overall responsibility for dealing with pollution and polluters. The two agencies with the greatest influence here, the USSR Ministry of Public Health’s Sanitary Protection Service and the USSR Council of Ministers’ Chief Administration for the Hydrometeorological Service, have neither the power nor the will to combat pollution effectively. Their responsibility is “the protection of the natural environment against pollution by sewage, harmful discharges into the atmosphere, and toxic chemicals,”<sup>24</sup> but they

<sup>20</sup> *Pravda Ukrainy*, August 29, 1967.

<sup>21</sup> *Izvestia*, April 25, 1965.

<sup>22</sup> *Pravda Ukrainy*, September 10, 1967.

<sup>23</sup> *Literaturnaya gazeta*, February 23, 1965; *Izvestia*, November 14, 1968; *Pravda*, June 26, 1967. A 1965 conference of conservationists and fishing industry representatives adopted a resolution requesting the Ministry of the Fishing Industry “to prohibit the awarding of bonuses to officials of enterprises that have failed to take steps to eliminate and prevent the pollution of fishing waters.” *Literaturnaya gazeta*, March 1, 1966.

<sup>24</sup> *Ekonomika selskogo khozyaistva*, No. 2 (1970), in *CDSR*, xxii, No. 19 (June 1970),

CPYRGHT

share this responsibility with a dozen other state, Party, and public bodies. The problem is not simply one of variety; there are overlapping jurisdictions and rivalries, with no single agency competent to coordinate the efforts of all. "With such a large number of 'masters,'" two scientists have noted, "it is rather difficult to speak of the integrated utilization of water resources. Various kinds of lack of coordination are frequently encountered. . . ."<sup>25</sup>

A third agency, the All-Union Gas Purification and Dust Removal Association, attached to the Ministry of the Petroleum-Refining and Petrochemical Industry, is the major source of research and design work in the field of air pollution. But its powers are limited. The Association has always been attached to a single ministry, and thus it lacks a broad perspective. Many industries cause air pollution, but the Association is concerned only with "its own" problems; it refuses to assist in solving pollution problems in other branches of the economy. The Association has been described as "a second-class appendage of a branch ministry," which cannot and will not adopt a national perspective. Its resources are modest, and its point of view is restricted. Indeed, the Association has only one plant, which cannot possibly fulfill industry's needs for gas-purification equipment.<sup>26</sup>

The fact that there is no single center to coordinate research and development efforts in the area of air pollution involves considerable costs. Construction and testing of experimental installations proceed at a lethargic pace, and previously approved methods for trapping harmful fumes and dust are introduced even more slowly. As a result, "primitivism, amateurishness, and the crudest design errors" occur, and the pace of scientific progress is extremely slow.<sup>27</sup> Moreover, because of the confusing and uncoordinated bureaucratic picture, managers of individual plants tend to see matters from a limited point of view, and individual plants and ministries continue to pour pollutants into Soviet rivers and lakes.

#### WHAT IS TO BE DONE?

Given the nature and magnitude of the problem, what remedies are available to those who wish to combat pollution? Some see the problem as purely technical; their response is to call for more and better purification installations, the design of electric vehicles, etc. Others see it as an expression of the wrong attitudes; they suggest a propaganda campaign

<sup>25</sup> *Izvestia*, January 20, 1968.

<sup>26</sup> *Pravda*, March 24, 1969. See also *Izvestia*, December 29, 1968.

<sup>27</sup> *Literaturnaya gazeta*, August 9, 1967. See also *Pravda*, February 12, 1969.

CPYRGHT

to persuade citizens of the merits of conservation and the evils of pollution. One of the traditional approaches has involved the establishment of "health-protection belts" between factories and residential areas, which protect urban residents from the harmful effects of industrial wastes.<sup>28</sup> The major thrust of the official response to pollution, however, involves two elements: (a) the use of legal sanctions, and (b) the use of financial incentives. Both approaches seek to persuade polluters and potential polluters that marring the environment is bad business.

The most widespread response has been to reprimand and/or to fine polluters. In addition to serving to punish the guilty, this approach is designed to deter others from further pollution. Until very recently, however, the maximum fine was set so low that the system failed to exert any influence whatsoever on the industrial community. Errant managers usually escaped with a reprimand and/or a nominal fine.<sup>29</sup> With such lax controls, industrial executives simply ignore the instructions of sanitation inspectors. Instead, they follow the lead of local Party and Soviet officials, who are more concerned about industrial output than they are about the purity of the air and water. In the words of an *Izvestia* editorial, "The harm wrought by all this [polluting of rivers] is enormous, but the local Soviets and the various inspection teams vested with considerable powers in the struggle against the destroyers of nature display timidity and excessive delicacy 'in the show-downs.' Indulgence and protection from consequences cover up the affliction."<sup>30</sup> The system of fines has not acted as a brake on pollution. Many enterprises pay millions of rubles in pollution fines but continue to pour filth into the nation's waters and air. In fact, the system of fines is said to have been turned into an insidious device. The funds are turned over to the local Soviets, which use the money to pave streets, build clubhouses, and lay water mains. "This becomes a peculiar kind of redistribution of state funds," it turns out. "The local Soviets begin to regard pollution indulgently, if not favorably."<sup>31</sup> To provide local government authorities with a vested interest in pollution is a very inadequate way of protecting the environment.

In the past few years—interestingly enough, since the fall of Nikita Khrushchev—the Soviets have resorted to a much stronger weapon,

<sup>28</sup> *Pravda*, June 21, 1965; *Pravda Ukrainy*, August 29, 1967; *Vedomosti verkhovnogo soveta RSFSR* (fn. 14), 4; *Okt'yabr* (fn. 3), 16.

<sup>29</sup> See, e.g., *Literaturnaya gazeta*, July 12, 1962 and December 20, 1967; *Pravda*, June 26, 1967.

<sup>30</sup> *Izvestia*, November 14, 1968.

<sup>31</sup> *Komsomolskaya pravda*, April 27, 1960.

CPYRGHT

i.e., criminal law. After the mass destruction of fish near Volgograd in July, 1965, was traced to poisoning by unpurified waste water discharged by the Kirov Chemical Plant in Volgograd, the legal authorities moved against the plant's director, chief engineer, assistant chief engineer, shop chiefs, and chief of the plant's purification installations. All were charged with "an attitude of criminal negligence toward the performance of their duties, leading to the pollution of the river with waste water." Similar episodes elsewhere have brought criminal punishment, and it appears that resort to criminal sanctions will be one of the principal weapons in the Brezhnev-Kosygin struggle against pollution.<sup>32</sup>

The new Principles of Public Health and Draft Principles of Water Legislation prohibit the putting into operation of industrial facilities unless they are provided with anti-pollution devices.<sup>33</sup> Moreover, most of the union republics have adopted conservation laws. Typically, they prohibit "any action leading to the pollution of water resources or the air," or industrial activity that "adversely affects the health and sanitary conditions of the population's everyday life." Penalties include the closing down of enterprises whose pollution endangers people's health, and deprivation of freedom for up to three years for the guilty officials.

The government's position was further strengthened in the spring of 1970, when the new Article 223 was added to the RSFSR Criminal Code. According to this law, pollution of bodies of water or the air that is harmful to human beings is punishable by corrective labor for up to one year or by a fine of up to 300 rubles. Pollution that causes "substantial harm" to the health of human beings or agricultural production, or that results in the mass destruction of fish, is punishable by deprivation of freedom for a period of up to five years.<sup>34</sup> Though it is too early to say what effect these new laws will have, experience with conservation legislation in general suggests cause for considerable skepticism. Managers may continue to ignore the law's clear mandate unless prosecution officials take the offensive. Experience indicates that fines are likely to be fairly light, and the possibility of criminal punishment or the closing down of an enterprise is remote.

Because of this, some Soviet commentators have begun to argue that only by appealing to the economic self-interest of plant managers can

<sup>32</sup> *Izvestia*, December 17, 1965 and January 22, 1967; *Pravda*, June 20, 1968; *Sovetskaya Rossiya*, February 15, 1970, in *CDSP*, xxii, No. 17 (May 1970), 20.

<sup>33</sup> See fn. 4.

<sup>34</sup> *Izvestia*, April 1, 1959; *Meditinskaya gazeta*, November 11, 1969, in *CDSP*, xxi, No. 48 (December 1969), 14; *Vedomosti verkhovnogo soveta RSFSR*, No. 22 (608), May 28, 1970, in *JPRS* No. 50,956, 76.

CPYRGHT

the battle be won. This approach has been pursued along two lines: (a) demanding a charge for the use of water, and (b) persuading managers to extract valuable by-products from wastes emitted by their plants.

In Soviet industry, water is a free good: enterprises use it free of charge. No one has a material interest in economizing on its use, and, as a consequence, industrial plants make no effort to reduce the volume of water they pollute. If, however, they were charged for polluting it, they would have an incentive to purify and re-use it. At present, there is no reason—except the moral one, which is not enough—to be concerned about purification. Although the technical means for saving water exist, the incentive system does not stimulate water conservation. It has been suggested, therefore, that economic responsibility for dirtying water be borne by the guilty enterprise. In Czechoslovakia, a plant must deduct assets from its own budget for each cubic meter of water it contaminates. Managers quickly learn that when the overall sum of these deductions is large enough, it will be more profitable to construct purification installations than to pay these sums.<sup>85</sup> The system involves a kind of tax or fine—but one that, at least in Czechoslovakia, promotes environmentalism. Although the suggestion promises much, it has yet to win the endorsement of top Soviet officials.

The second approach has been tested, though not on a very broad scale. The logic is simple. Industrial sewage contains valuable substances whose discharge into water sources represents a considerable economic loss. Petroleum refineries typically lose up to 3 per cent of their total output in this way; artificial fiber plants lose up to 4 per cent of certain products, and cellulose-paper combines lose up to 8 per cent of wood fiber. Great quantities of acids, alkalis, dyes, and oils are lost, even though these substances can be easily separated from the waste waters. Phenols, too, which even in miniscule concentrations give water a medicinal taste, can easily be extracted from sewage. Furfuraldehyde and methyl alcohol (which serve as the raw material for the production of plastic) can also be obtained from sewage water, and waste liquid from soda plants can be converted into fertilizer. Efforts to save some of these valuable substances have proven successful. In Irkutsk, for example, organic substances are extracted from the sewage of a number of plants and are used to obtain fodder yeast. A cable plant in Perm, which for a long time dumped etching solutions into the Kama River, built a simple recovery installation and now produces copper foil from the former wastes. Oil, too, can be saved. Special oil traps for multi-

<sup>85</sup> *Literaturnaya gazeta*, July 12, 1967; *Izvestia*, September 24, 1966, January 20, May 13, and November 14, 1968.

staged sewage purification have decreased the oil content in sewage waters at certain plants by up to 80 per cent and organic pollution by up to 95 per cent.<sup>86</sup>

But although there are successes, there still is much room for improvement. Despite the fact that the USSR organized a broad campaign during the mid-sixties to save ferrous metals, tremendous amounts of these substances were simply washed away with waste water. Cadmium, for example, was simply dumped into the water, although by adding a small amount of alkali to the sewage waters, the cadmium could be made to settle and could then be recovered. Soviet enterprises sustain an annual loss of dozens of tons of lead, copper, nickel, chromium, cobalt, zinc, and other metals in sewage waters, although modern technology is capable of extracting these metals from waste water with the help of ion-exchange resins. This loss of metals has led at least one water-conservation authority to call for the elimination of the so-called "discard norms," maximum possible amounts of matter in waste water, for substances that can be completely extracted from sewage.<sup>87</sup> The idea is still new, and the outlook for adopting such a measure is far from bright.

Central and local authorities have recently adopted a more vigorous stance with respect to two of the most significant sources of pollution, the lumber industry and the automobile. Activity here would seem to indicate that Brezhnev and Kosygin are serious about preserving or restoring the natural environment.

The lumber industry's practice of sending "log floats" downstream to pulp mills for processing results in considerable river pollution. Whole logs, bark, sawdust, shavings, and other wood scrap sink to the bottoms of rivers. An *Izvestia* correspondent, investigating the result of log-floating on the Volga, described the picture as "an ugly one." "Sunken trunks stuck out of the water like artillery for many kilometers along the shore. You see shapeless giant heaps of logs. Waves wash off logs, and chips . . . float with the current. . . ."<sup>88</sup> The bottoms of many rivers "are lined with a thick layer of logs." Perhaps five to ten per cent of floated timber goes to the bottom. These "drowned logs," as they are called, consume the oxygen dissolved in the water and form an anaerobic, or dead, zone. Deposits of wood and rotten bark remain on the river bottoms, and food sources for fish are damaged or ruined. As the wood scraps dissolve in the water, they absorb the oxygen the

<sup>86</sup> *NTO* (fn. 3), 13; *Izvestia*, September 24, 1966; *Komsomolskaya pravda*, April 27, 1960; *Pravda*, November 12, 1965.

<sup>87</sup> *Izvestia*, September 24, 1966.

<sup>88</sup> *Izvestia*, July 27, 1968.

fish need, and give off acids, phenol, and other poisonous substances. As a result, some rivers have lost their value as spawning grounds and are no longer useful to the fishing industry.<sup>39</sup>

The authorities have begun to remedy this situation. In some areas, government agencies have prohibited the loose floating of logs down rivers used for fishing. The lumber industry in these areas now must ask permission every time it wishes to float logs. The Draft Principles of Water Legislation have added further controls, banning the loose floating of timber on navigable waterways and certain other bodies of water.<sup>40</sup>

To minimize the harm done by motor vehicles, the Soviets have adopted a number of tactics, the most important of which is to limit the number of privately owned vehicles. Other steps have been taken as well. Moscow claims to be the only capital in the world in which the use of ethylated gasoline is banned. (Ethylated gasoline pollutes the air with lead compounds, which are among the most highly dangerous products of exhaust.) Moreover, Soviet scientists have begun to develop and produce neutralizers that render exhaust virtually harmless. An automobile engine that emits virtually no pollutive exhaust gases (special chambers at the head of each cylinder insure the complete combustion of the gasoline) has passed state tests and is currently being tested on vehicles in Central Asia.<sup>41</sup>

More imaginative steps have been taken in several cities in the Ukraine and elsewhere. Municipal authorities in Kharkov, for example, have switched to electrically powered vehicles for public transportation. The city's central districts are served by trolley-buses, and the outlying districts are served by streetcars. Kiev, Riga, and a number of smaller cities are planting greenery, which absorbs carbon dioxide while giving out oxygen. By replacing noxious fumes with oxygen, they help to combat air pollution.<sup>42</sup> This is a promising approach to the problem that probably will be emulated by other Soviet cities.

#### CONCLUSION

Where man lives and works, it would seem, filth appears. Man everywhere threatens to upset natural ecological balances. No state, regardless of its social, political, or economic system, has been able to escape

<sup>39</sup> *Literaturnaya gazeta*, November 15, 1967; *Sovetskaya Rossia*, February 15, 1970.

<sup>40</sup> *Pravda*, August 31, 1969; *Literaturnaya gazeta*, March 1, 1966; *Izvestia*, April 28, 1970.

<sup>41</sup> *Nedelya*, No. 9 (February 23-March 1, 1970); *Izvestia*, February 15, 1967 and May 1, 1970.

<sup>42</sup> *Literaturnaya gazeta*, August 9, 1967.

the consequences of man's callous treatment of the environment. We might have expected the Soviet Union to be preeminently suited to preserve and enhance nature's gifts. It is less advanced than the West and thus can profit from our mistakes. The Soviet political elite claims to be guided by the lofty ideals of socialist humanism. The Communist Party, the "leading core" of all organizations, is capable of enforcing its will on any problem facing the country. The State owns the land and the means of production. The regime is committed to a rational course of modernization. In view of these facts, we might have expected the USSR to be safe from the depredations of "robber-baron" industrialists and other despoilers of nature. We might also have expected the Party to create an environment of genuine beauty, which would serve man's aesthetic, social, and economic needs.

However, as the Soviet experience shows, centralized decision-making and the capacity to mobilize the energies of the entire nation have not always led to socially desirable ends. Socialist industrialists, no less than their capitalist counterparts, have shown themselves capable of despoliation on a massive scale. Indeed, centrally determined priorities, allocations, rewards, and punishments have long meant an excessive fixation on production, at the expense of all else. Recent efforts to introduce reforms in the economic system illustrate only one dimension of the problem of overcentralization. Production for production's sake has led not only to economic distortions, but to social and ecological blunders as well.

In the political realm, the absence of autonomous groups in the community—the very essence of pluralist systems—has meant that over the years no one "represented" the environmentalists. The political elite, virtually unanimous in its desire to industrialize rapidly, and insulated from the masses, effectively denied a hearing to those more concerned with the beauty of nature. This monopoly of public opinion prevented others—with a different conception of the public good—from presenting their views. The lack of access to decision-makers experienced by conservationists, when added to the politicians' focus on rapid industrialization, meant that there was no one to lobby for nature. Only when the social and economic costs of pollution and misuse of land had assumed menacing proportions did the Party respond.

At present, the Soviet leadership, like its counterparts in the West, is faced with a pollution problem of considerable proportions. Decades of indifference to the environment have exacted their toll, and the authorities must now deal with matters that their predecessors simply ignored. They have given little indication of a desire to meet the problem head on; until recently, they resorted to makeshift measures that were uncoordinated, superficial, and quite inadequate. Recent legislation in the fields of land use, water use, and public health suggest more concern and better organization and may indicate the beginning of a broadly based, comprehensive policy of pollution control.

To cope with the problem, however, will require the expenditure of massive sums of money. More important, it will require a fundamental



re-ordering of priorities, from the almost pathological fixation on production to a more balanced attitude, showing as much concern for ecology as for production indices. Communism in the USSR and elsewhere has been basically oriented toward *transforming*, not preserving, nature. Now this transformation must proceed in a more balanced manner. As a Soviet conservation official has argued: "Man transforms nature. This relationship to nature should always be one of mutual benefit. That is the main thing. In other words, in using nature, protect it; in protecting nature, use it—sensibly."<sup>48</sup> It may well be that the policy-makers have now turned their full attention to ecology, interpreting their modernizing mission somewhat more broadly. If this is so, their monopoly of power should enable them to mobilize the nation's resources effectively and deal with the problem. If Soviet socialism is to manifest the profound humanism its leaders claim for it, steps will have to be taken very soon, for the social costs of modernization thus far have been substantial. Whether or not the regime takes the necessary steps remains to be seen.

<sup>48</sup> *Pravda*, December 15, 1969

WASHINGTON POST  
21 February 1971

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AN ENGELS VISION BLURRED BY EAST EUROPE'S POLLUTION

By Dan Morgan

Washington Post Foreign Service

**B**ELGRADE — "The factory town transforms all water into stinking manure," wrote philosopher Friedrich Engels of the squalid capitalist industrial centers of his time. He went on to predict that socialism would put a stop to the "present poisoning of air, water and land."

A century later the Communist countries of Eastern Europe are a long way from fulfilling Engels' environmental vision. In many places east of the Elbe, streams are indeed being turned into "stinking manure"—by untreated sewage and industrial waste from state-owned plants. Tons of sulphur-laden ashes from coal-burning power plants and factories desecrate acres of forest and cloud city skylines. And the overall visual impact of Eastern Europe—in contrast with the manicured highways of West Germany or the decorative villages of provincial France—is often one of shabbiness and neglect.

Last July in Budapest, the top Communist leaders of Eastern Europe formally recognized pollution as a problem when they called for the environment to be placed on the agenda of an East-West security conference.

A conference on the environmental situation has been called by the East European leaders in Prague for the spring, and some of the shackles have been taken off the controlled Communist press to enable it to expose the reasons for air and water pollution. In Poland—by far the most advanced in pollution control measures and public awareness of the problem—the resulting attacks on industrial violators have been described by one factory manager singled out as an offender as "sadistic."

**A Classic Conflict**

**T**HE reason for this new mandate to the press is clear—an environmental crisis that has begun to equal the one already afflicting the West in some respects. Moreover, pollution now poses for the Communist leaders

some fundamental choices between productivity and cost-saving on one hand, and steadily worsening conditions for work and recreation on the other.

As the Polish Baltic riots showed in December, Communist populations want better conditions for daily life. But pressure to cut production costs places a powerful check on extensive controls, and one which is aggravated by increasing competition for world markets and acute shortages of money for new technological advances.

The Vistula River, for instance, is the picturesque central artery of Poland from which a beautiful mermaid was said to have emerged centuries ago and chosen the site of Warsaw. Today Warsaw—otherwise one of the best designed cities in Eastern Europe—pumps most of its sewage untreated into the Vistula, and complete sewage treatment facilities may not be ready for as much as 10 years because of the tremendous engineering costs of driving a new pipe system through the underground rubble that lies beneath the newly built capital.

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Belgrade sunsets take on a bluish hue from the haze of smoke that rises from the factories along the Sava River, but Czechoslovakia's northern Bohemian mining and industrial region may be the East bloc's dirtiest district. In northern Bohemia, darkness comes at noon. It is brought on by the mingling fumes from chemical and electric power plants that often become so dense that they force motorists to switch on their headlights in broad daylight on a sunny morning, as they drive past the moonscapes and slag heaps of Most and Usti on the Elbe.

The region reflects a classic conflict between state needs and human requirements. Since 1945, Czechoslovakia's use of coal for electrical power has tripled, and the next five years of industrial growth calls for even greater power production. Like most of Eastern Europe, Czechoslovakia relies heavily for electrical power on the burning of soft brown coal, one of the dirtiest fuels known to man. Northern Bohemia is rich in it. Because the crumbly dusty substance cannot be transported easily and must be burned where it is mined, the area has borne the brunt of new electrical power installations.

### Grim Statistics

**R**ESULTS ARE PLAIN to see. The party newspaper, Rude Pravo, estimates that 50,000 acres have been damaged by chemical wastes in northern Bohemia, and that 17,400 tons of ash fall on the area every year. Evergreen forests have died out altogether in some places.

Workers at local factories have threatened to move to cleaner parts of the country, and the central government has responded with some concessions to local interests, such as a program of supplemental cheese and milk for children to combat health threats posed by pollution, and one-month fresh air vacations for the school children.

In 1969, a new electricity works for the area was approved by the Prague government. Since then, the district committee has been demanding such pollution mitigators as a 600-foot chimney to disperse ash more widely, and limits on the amount of coal that can be burned at the new site.

"It would be possible to eliminate the pollution, but it would double the cost of electricity," said Dr. Mirko Matyas of the local governing committee,

and a specialist on the problem. The main threat to health are the toxic sulphur dioxide fumes, although the ash is extremely unpleasant. Gases are still below danger levels, Matyas says.

The problem of sulphur dioxide fumes is serious in Eastern Europe because of the continuing use of soft coal, whose sulphur content is roughly twice as high as that of hard coal. Eliminating it cheaply is a problem that has defied scientists in some 3,000 institutes around the world. Czechoslovak and Polish officials speak of installing a Japanese process for turning the sulphuric wastes into ammonium sulphur compounds—in effect by building a second plant next to the coal-burning installations. But the cost is prohibitive.

"It may be that this is a scientific problem that will not be solved until we no longer are burning coal," said a Prague chemist pessimistically.

Pollution in Czechoslovakia today seems curiously fitted to the present mood of political discouragement 30 months after the Soviet invasion. Perhaps the saddest of all reminders of an environmental crisis in the making is the city of Prague itself, once among the loveliest capitals in the world. Today, garbage piles up in back alleys and on humid or misty evenings, smog completely obscures the magnificent view of Prague Castle across the Vltava River.

### Rivers of Black

**B**UT THE CZECHS have no monopoly on pollution in the Communist bloc. Nature-loving East Germans, outdoor enthusiasts by tradition, have also begun to take fright at the industrial landscapes they see around them.

"There are no fish in the Saale river near Halle," wrote a reporter for the weekly Wochenpost recently. "The water in the river is black, and smells like a chemical experiment. On summer days, when there is little wind, a pall of smog hangs over Bitterfeld, Halle, Schkopau and Leuna, increasing the heat and making it difficult to breathe."

East German district water boards are now cracking down with fines for industrial polluters and with fees for use of river water, a measure aimed at forcing plants to economize on water use. A number of plant managers have been practicing self-criticism in the press. Dr. Eberhard Anton of the Buna chemical works recently described fines against his plant as "absolutely

justified," and added that pollution could not be checked by "platonic [sic] declarations."

Esthetic blemishes such as these pale by comparison with the sheer economic and health impact of pollution in certain parts of Eastern Europe.

- Lead and carbon monoxide from automobile exhausts in Prague is often "above the norm," according to the Communist Party newspaper Rude Pravo. (Governments in Eastern Europe have shown little or no concern for auto safety requirements or exhaust emission standards, though Hungary this year initiated controls on diesel bus exhausts, which are infamous polluters in Budapest.)

- One-third of the rivers in Poland are so polluted that they cannot be used either for drinking or agriculture. Fish kills have occurred near paper manufacturing plants. Out of 14,000 industrial plants in the country, 8,400 send wastes directly into rivers. And the Warsaw daily Zycie Warszawy describes 600 plants as "oppressive" polluters and 300 as "downright dangerous."

- The Czechoslovak town of Melnik, north of Prague, grows the succulent grapes for a pleasant white wine drunk all over the country. But experimental mice which were fed ashes emitted by the local power plant died in two days. (Americans consume almost three times as much energy per person as Czechs and Slovaks, according to Prague figures, but both countries produce about the same amount of pollutants per head—6,000 pounds a year.)

- Bathers in the select Yugoslav resort town of Dubrovnik were covered with tar and oil last spring. Increased oil tanker traffic in the Adriatic and offshore drilling pose an ever-present threat that a disaster could someday ruin beaches and hurt the Yugoslav tourist trade which Belgrade depends on to offset an unfavorable trade balance with the West.

The East European governments are not blind to these phenomena. But the problems that have become obvious now have been long accumulating in the years of industrialization, and obstacles to solving them are to a large extent built into the economic and political infrastructure of the Communist countries.

There seems to be little immediate hope for a radical shift away from brown coal as a major fuel, for example. Atomic power is only on the distant horizon. Except for Yugoslavia

Approved For Release 1999/09/02 : CIA-RDP79-01194A000200180001-5

and Romania, hydroelectric power is unavailable. The introduction of natural gas from the Soviet Union is making it possible to reduce coal burning in housing projects and private homes, but the big Soviet supplies will not start flowing West for several years and then a large portion will be earmarked for West European markets.

Under the auspices of the "Budapest Clean Air Committee," the government in the Hungarian capital has begun to convert the 90 per cent of city housing heated with coal. But the project is costly and slow. So far 1,000 buildings in the downtown core have been switched over to gas or central hot-water city heating. At the same time, the Hungarian government is trying to decentralize industry, half of which was until recently concentrated in the capital.

Nevertheless, much of Eastern Europe appears to be wedded to brown coal for the better part of a decade.

Regional cooperation on eliminating the causes of pollution has been surprisingly limited, considering the tightly-knit character of the Communist bloc. Polish officials, for instance, complain that for years Czechoslovakia has been polluting the Oder River with salty wastes from coal mining operations, a short distance before it flows into Poland. The northern Oder is a river of great historic importance to Poland, since it forms the country's post-World War II western boundary. But more important, the river is a main source of water to industrial Silesia in Poland which is desperately short of water resources.

Under an international agreement, chemical pollutants in it are measured at the Polish-Czechoslovak frontier, but Polish officials say drily that the monitoring does not help much to eliminate the poisons. A leading Warsaw official conceded that "it's true that centrally planned societies have a better chance to solve these problems than others." But he added that the solution "demands huge capital investments which are often beyond our reach."

### No Smoke, No Bread

FOR MONTHS NOW, Poland's Pulawy nitrogen fertilizer plant has been under attack by the *Krajobrazy Club*, an organization of journalists that specializes in defending the Polish environment in print. One commentator said that a contaminated cloud of am-

monium nitrate aerosol fog reaches 10 miles or more from the plant and threatens 22,000 acres of land.

The practical answer given by plant director Mieczyslaw Kolodziej, a "devoted camping man," struck at the core of the problem.

"Myself, with all my love for nature, I cannot agree to treat artificial fertilizers as a nightmare of contemporary man," he said. "In the past years we were able to raise grain production from 17 to 22 hundredweight per half acre—partly due to use of fertilizers. For the dollars we had to pay to import grain we could build five or six plants the size of Pulawy every year. To me the issue is simple. If we did not have Pulawy we would not have bread."

However, the director admitted that at the time the first nitrogen plant was built "we had no experience whatsoever on nitrogen compound fallouts... even today we do not know well all the poisonous compounds."

This conflict between an industry and the community it serves could be typical for East or West. But there seems to be some question whether the

state ownership of factories may not actually put Communist governments at an embarrassing disadvantage in taking forceful action against industrial violators of pollution laws.

"In the United States," claimed an ecologically minded regional planner in Katowice, Poland, "you can close down a plant. Here the plant belongs to the state and closing it would therefore damage the whole society."

This fall, the country got a blue-ribbon commission on the environment, under the prime minister's direct control. Some \$200 million are allocated for pollution control in the next five years, including nearly \$30 million for air pollution research. The country manufactures its own electro-filters for factory chimneys—though press critics complain that too many are marked for export rather than installation in Polish plants. Under the air control law, all new or rebuilt factories must have the filters and there are limits on emission of chemical ash by older ones.

### Hopeful Signs

THROUGHOUT EASTERN EUROPE, the centrally-approved five-year development plans are the decisive guides to area development, and re-

gional planning has been surprisingly weak. But there are signs that the Communist governments are moving toward more local enforcement and are putting more teeth in regional master plans. A new taxation system in Hungary will make industries pay local taxes, with a view to making them more responsive to their communities, for instance.

Another case in point is Silesia, the former fiefdom of the new Polish party leader, Edward Gierk. The industrial and mining area is Poland's Ruhr, dirty and smogbound. But environmentalists and regional planners have nonetheless made considerable headway in the last few years.

The Institute of Town Planning and Architecture has won some of its battles with the Ministry of Coal Mining, particularly in keeping the bulk of new workers' housing well-separated from mining zones. The Institute's regional plan is an "advisory, scientific plan," which takes into consideration water supply, industrial needs and the overall ecology of the region. Though it has no force of law, its concepts are supposedly worked into the five-year plan for the area, which does.

The Institute reported recently that land reclamation projects had doubled the forested area of the Katowice region in the last 20 years. But it said that more research was needed in the search for plantings that could take hold on bituminous coal dumps. Coal mines are now required to pay indemnifications for new land taken for mining, and to fill used-up shafts with sand to prevent cave-ins. Since state ministries collect the indemnities, however, one Polish journalist wrote that the transaction was a "transfer of money from one pocket to another."

There is a long way to go, however. The evening train from Katowice to Warsaw still joggles past Orwellian landscapes on its way out of Silesia—great catch basin lakes pumped up from underground coal mining operations, grimy row houses that could as well be set in Liverpool or the Bronx, and giant mounds of coal and slag.

East and West seem little different in that moment of departure from Silesia. Whether the socialist lands of the East can provide a purer environment for man, as Engels predicted, is yet to be proven. In the long run it could provide a telling test for the relative worth of industrial society in East and West.