

## Mining in the Middle Don River Basin: Threats and Counteraction

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The Don is one of the major rivers of Russia. It rises in the town of Novomoskovsk (60 kilometers southeast from Tula, southeast of Moscow) and flows for a distance of about 1,950 kilometers to the Sea of Azov. The area of its basin is 426,600 square kilometers; Average discharge – 935 m<sup>3</sup>/s. From its source, the river first flows southeast to Voronezh, the southwest to its mouth. Voronezh area is located in the Middle Don River Basin. Voronezh area is the third largest area in the Central Federal district of Russia with the territory of 52,200 square kilometers. The area is centered in Voronezh (840,700 citizens by January 1, 2007). Voronezh area finds itself at the south of the Central Russia and after the Soviet Union disintegration has become a border zone – in the south it borders Ukraine, Voronezh area neighbors: Rostov area at the south, Belgorod area at the west, Kursk area at the north - west, Lipetsk and Tambov areas at the north, Volgograd area at the north – east. Voronezh area is the third largely populated area in the Central Federal district of Russia, after Moscow and Moscow area. By January 1, 2007 the total area population amounted to 2,294,600 people. Population density is 44 persons per 1 square kilometer.

The Middle Don River Basin is one of the most important territories for Russian economy. Due to significant deposits of iron ore, phosphates, granite large – scaled mining plants (Lebedjan Mining plant, Pavlovsk granite Mining Company) and mining – related enterprises (Novolipetsk Metallurgical Works, Rossosh Fertilizers Plant) are situated in the Middle Don River Basin. Also mineral resource base in Voronezh area is represented non-metallic deposits, mostly construction materials (sands, clays, chalk, crude cement, ochre, limestone, sandstone), especially in the southern and western parts of the area. Voronezh area prospected mineral deposits are developed by a number of middle – scaled mining enterprises, such as OAO Voronezhskoe Rudoupravlenie, Semiluk construction materials combine, OAO Podgorensky Gementnik, ZAO Kopanishensk construction materials combine, Zuravsk ochre plant etc. This leads to environmental degradation and industrial pollution of the Middle Don River System. Mining activities cause appreciable damage to agriculture and food quality reduction. Safe disposal of mine waste, including tailings, is generally recognized as the single largest environmental challenge facing the mining industry worldwide and a major expense for mining companies. Modern open – pit mining has a very high waste – to – product ratio, making waste the major product of mining. The mineral industry of Central Russia generate about 85 million tones of waste per year. The storage of this waste poses significant engineering challenges. The tailings dams are leaking, or breaking, and seeping toxins on a daily basis. Serious environmental and social disasters (not only in Central Russia, but in Romania, Philippines, Spain and other countries), caused by tailing – dams that burst, have served to focus public attention on this problem.

In the Middle Don River Basin mine waste poses an environmental threat not only through its volume but because of its toxicity. Mine tailing commonly contain sulfides as well as metals (arsenic, iron, copper, lead,

manganese, cadmium, chromium, zinc, nickel, mercury) that occur naturally in the ore body. When sulfides in the tailing are exposed to air they oxidize. If oxidized tailing come into contact with water, environmentally toxic sulfuric acid is produced. This process is known as acid mine drainage. The sulfuric acid also accelerates metal leaching in tailings. Acid mine drainage can have a toxic impact on ground and Surface water around mines. According to the United States Environmental Protection Agency, water pollution from mining poses one of the top three ecological security threats in the world. Although water is the main path – way for these pollutants, a major property is their low water solubility and high lipid solubility. Thus they tend to accumulate in lipid structures in plants and animals. Therefore, as all these pollutants are bioaccumulable, their concentration in fish and other aquatic organisms are not only a biological monitor of environmental pollution, but also as a sentinel human health indicator and monitor of potential human health hazard.

Within the Middle Don River Basin 521 thousand people live in conditions of polluted water. Human diseases are no longer only secondary to microbial or parasitic pollution, but first and foremost, to chemical pollution induced human (particularly, industrial) activities. Many chemical compounds of production process are mutagenic, carcinogenic and allergenic. From such pollution originate many diseases with a growing incidence. They include malignant tumors, congenital malformations, infertility, blood system diseases, food-related allergies, degenerative diseases of the central nervous system. Local non-government organizations (Clean Water Foundation, Green World, Youth for Environment) and volunteers are promoting the broad spectrum of activities for maintaining ecologic balance in the Middle Don River Basin such as conferences on negative agricultural effects of mining and population health protection, empowering local democratic institutions in environmental field, study the most significant sources of wastewater at the South of Central Russia.

The characteristics of wastewater are an important measure of Society's progress to modernity. If the water has biological contaminants it can be presumed that society is still water-traditional and poor, as it does not have the ability to treat its human sewage and other organic wastes. If the water is full of chemical toxins then society is progressing towards the next phase of water-industrial use but is still poor as it cannot clean the water before discharge. If the water has cocktails of trace toxic pollutants - from arsenic and mercury to hormones and pesticides to even more deadly dioxins and furans - then the society is truly industrialized and rich. It uses huge amounts of products, which contain these chemicals, it also spends huge amounts to treat its effluents, but it is finding that traces - deadly and toxic traces - escape its best efforts. It needs to continuously upgrade its treatment plants and effluent standards to track and treat the new characteristics of its wastewater.

What then would one say of waters, where all three characteristics of waste are found - biological, crude chemical and modern chemical? This wastewater is clearly reflective of a society in various stages of economic growth. But it is also a society, which as it grows is finding itself incapable and unable to treat its waste. It is accumulating all waste and all costs of treatment as it progresses towards higher levels of industrialization. In simple terms, it is society in deep trouble. It has a double-burden of pollution to treat - traditional and modern.

It therefore, also has a double-burden of diseases to treat – the traditional water-borne diseases, which still result in unacceptable human morbidity and mortality - and the modern chemicals, which result in expensive diseases like cancers and other genetic disorders. It is this double – burden of pollution and

disease that large parts of the industrializing Don River Basin is confronted with today.

In course of environment conservation and human health protection the main step was establishing the Centre for Ecologic Adversity Counteraction (CEAC). CEAC is non – government organization, rendering information, medical and juridical assistance. CEAC is promoting TV and newspaper campaign devoted to mining in pacts on environment in the Middle Don River Basin. The exceptional role of the mass media is most visible in the new areas of social concern, such as environmental risks.

General and specific functions of the press dealing with environmental issues were considered within the project. The most general functions included:

- supplying environmental information;
- providing social communications on environmental risks;
- providing continuing social and individual learning on environmental risks.

The complexities, uncertainties and high stakes characteristic of these risks demand that a wide-range of viewpoints and concerns be presented to both for decision-makers and the public. This is especially the case for new democracies emerging in Europe where traditional approaches by the press to explaining and communicating appropriate information do not satisfy new demands on information and communication.

Radical changes in Russian society had many effects on environmental press coverage. Firstly, ecology issues in the national press ceased to be a specialty of scientists and professional bureaucrats, but became a field of national interest leading to heavy involvement in press discussions of many and various journalists, as well as of many other social groups. Secondly, in dealing with environmental issues the press turned directly to basic human needs, to the need for a healthy environment, and to the responsibility of each individual in keeping the environment safe. Thirdly, the social actions to improve the environment became an integral part of societal efforts to build civil society.

Also CEAC founded water quality research laboratory and worked out new system of human health monitoring in the zones of mining activities. In course of human health monitoring carrying out, it is suggested that the groups are defined, which require immediate, scheduled, or preventive diagnostic procedures. In this case the use of expert assessment has allowed identifying the basic factors involved and provided quantitative estimation of their indicators for each of groups mentioned above. These factors include years of residing in the zones of mining activities, frequency or contacts with polluted water, age, complaints of pains or unpleasant sensations in various parts of the body and others. This allowed making special questionnaires for population in territories of mining activities. When the computer data base was created the number of points characterizing the patient's state of health was automatically calculated.

Those who took a certain number of points form the groups requiring immediate, scheduled or preventive diagnostic procedures. Screening medical examination included objective inspection, laboratory research, instrumental testing of the internal organs. The analysis of the data obtained showed that there were much more patients with various diseases among people from the highest risk group than in other groups. Early identification of different diseases enabled to conduct successful treatment in time.

All these prove the practical significance of proper structuring of medical examination, the necessity of competent management of diagnostic screening in territories of mining activities.

The considerable efforts have been made to predict the consequences of putting into commission new mining enterprises and expanding already working ones, initiate public discussion on carrying out certification of wastewaters and production wastes, revising the current sanitary norms and regulations. Due to public movement for the Don River protection two waste processing plants were built in its basin during last three years, However, substantial quantities of pollutants still remain after decontamination therefore it is necessary to continue the community work to reduce the negative influence of mining enterprises on environment.

Environmental degradation and human health hazard are the painful matters for interaction between local authorities and community activists. Only coordination of their activities will allow to get the positive changes of ecologic situation in the Middle Don River Basin. According to present challenges the regional state establishments have to pay more attention to mining-related issues.

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