Section 2. Geography

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The problem of aerotechnogenic pollution in urban settlement Nickel (Murmansk region)

Abstract: The article presents the characteristics of the vegetation in the vicinity of Nickel according to the author’s fieldwork in the summer of 2015. The influence of aerotechnogenic pollution of a copper-nickel plant ‘Pechenganickel’, located in the settlement, is also described.

Keywords: aerotechnogenic pollution, the effect of the emissions, transformation of vegetation, changes in the soil structure.

Urban settlement Nickel is located in the north-west of the Kola Peninsula in Pechenga district of Murmansk region. There is a mining and smelting copper-nickel integrated works “Pechenganickel” in the settlement producing nis matte and sulphuric acid simultaneously (nis matte is an intermediate of the copper and nickel smelting from the sulphide ore). This manufacture has a highly significant effect on the surrounding landscapes appearing especially badly as an aerotechnogenic pollution. The investigation of the occurrence and consequences of this effect as by literary sources and directly in the field was the purpose of this study.

Field work was conducted in the vicinity of Nickel in June 2015. It involves landscape descriptions of adjacent according to the special form which the researcher fills with the detailed characteristics of landscape components like plant community, soil type, topographical form etc. The descriptions were done to define the state of landscapes there.

The main pollutants of combine “Pechenganickel” emissions are the sulphur compounds, primarily sulphur dioxide, as well as the metallurgical dust containing heavy metals such as nickel and copper. Let us consider the effect of the emissions component by component. The sulphur compounds effect mainly the leaf cuticle (upper waxy protective layer), which leads to physiological dryness, violent mineral acids cause burns to the leaves and needles. Entering the plant through the air pore sulphur dioxide oxidizes to the high-toxic compound — sulphite (SO$_3$), and then slowly converts to sulphate (SO$_4$) — less toxic compound. At sulphur dioxide’s sparse distribution sulphite almost completely oxidizes to sulphate without damaging the plant. At high concentration and long-term exposure sulphite forms much faster than sulphate, so it causes a damage. Moreover, the concentration of sulphate can reach phytotoxic doses, too. An indication of chronic sulphate lesion is chlorosis (the abnormality of chlorophyll formation and the reduction of of photosynthetic activity). The sulphur compounds indirectly effect the plants through the soil acidifying that affects the availability of nutrients for the plants [1, 31–32; 2, 113–115].

Heavy metals containing in the atmosphere in the form of solids are inert by themselves but in contact with the plant they can cork up the air pores and damage the epidermis. In combination with other substances metal particles may become phytotoxic. The influence of heavy metals is also evident through the soil because of their accumulation there. The only barrier is organic soil horizon where the precipitation pollutants and emissions are accumulated. Organic soil horizon is the main nutrition horizon for plants so technogenic componentry accumulated there are absorbed by 50–60% by plants. When the content of nickel and copper in the organic soil horizons reaches 200 mg/kg, it damages the root systems of plants, further increase of concentrations arouses its mass extinction. Metals negatively affect the soil microorganisms, mainly microfungus, which also perish under the high concentrations [1, 31–32; 2, 113–115].

Now let us look at the particular features of landscapes discovered from our field descriptions. Please, draw your attention to the fact, that forests there are located on their northern boundary, at the turn of northern taiga and forest-tundra subareas. So the environmental conditions there cause vegetation oppression, not to mention the impact of the pollution.

So on the whole aerotechnogenic pollution leads to the degradation of the plant communities, as we can see it today in the vicinity of Nickel. All the negative consequences described earlier lead to the formation of a new forest type: typical subshrub-moss and lichen type is changed by more stable grass-subshrub forests. However, due to abnormality of the nutrient status of soils grass-subshrub forests may also be transformed into anthropogenic light forests and heathlands. Pinus sylvestris is highly responsive to air and soil pollution, so approaching the source of contamination, it disappears from the community. Mosses and lichens are the most susceptible plants to adverse ecological situation because of the high absorbing capacity, so they first of all disappear from plant communities, mosses keeping longer than lichens, as they can tolerate higher concentrations of sulphur compounds and heavy metals than lichens due to high sensitivity to pollution component of lichen alga. Because of the prevailing western winds there the north-eastern and south-eastern surroundings of Nickel are covered with heathlands which turn into light forests on the distance from the source of contamination.
Aerotechnogenic influence also causes morphological changes in the soil profile structure — the upper horizons are destroyed and washed away. Moreover, under the pollution impact the spaces with a reduce thickness of debris layer, that increase approaching the source of contamination. In those areas where vegetation persists, debris layer is the same to non-polluted areas, but it has a gray color, a high degree of decomposition and is filled with technogenic dust. If the vegetation is absent, debris layer is also absent, and the upper mineral soil horizons are partly destroyed, and above it a thin silty technogenic layer forms in “Pechenganickel” nearby areas [2, 198–200].

Thus, the aerotechnogenic pollution in the vicinity of Nickel affects primarily vegetation and soil. Pollution components of emissions (sulphur compounds and heavy metals) damage the pine needles, leaves and root systems of plants, affecting their growth and development that, in the long run, leads to a change in the species and age composition of plant communities. Pollution also affects the soil covering by causing breakdowns and morphological changes of the soil structure properties.

As a result, there is a vegetation degradation and the formation of heathlands.

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Geo-demographic features of national composition of Uzbekistan’s population

Abstract: This article analyzes the formation of Uzbekistan’s population's national composition. We also have reviewed demographic processes.

Keywords: nation, population, demography, demo-geographic processes, ethnic growth, geographic peculiarities, birth-rate.

Population’s national composition is a result of long historical demo-geographic processes as well as socio-economic phenomena. Usually, population’s natural and mechanic movement, ethnic growth and administrative-regional changes do play an important role in the formation and location of nationalities. Under the influence of these very developments national composition of countries’ population takes shape and grows. But these developments occur in different ways in different countries due to geographic peculiarities.

In the formation of Uzbekistan’s population's national composition a mechanic movement rather than a natural movement, in other words the migration of foreigners from abroad, plays a greater role. Traditionally, a significant part of the country’s population’s national composition was made up of local nationalities, namely, the Uzbek, the Kazakh, the Kyrgyz, the Turkmen and the Tajik. However, despite this the national composition of Uzbekistan’s population was made up of, in 1979 120, in 1989 125 and in 2013 130 different nationalities and ethnicities. The growth and the geography of the nationalities living in the republic differ from each other. In every region of Uzbekistan there are certainly more than one nationalities living side by side.

Therefore, it is impossible to claim that there is a region of Uzbekistan which is populated solely by one nationality. Majority of Russian-speaking nationalities arrival into Uzbekistan is closely linked to the growth and dislocation of productive forces that took place in the middle of last century. That is why they mainly live in big cities or administrative centers of the regions that are industrialized and have a well established social infrastructure. These regions include Tashkent city, Tashkent, Navoi regions and their Chirchik, Angren, Olmaliq, Navoi, Zarafshan and Uchqduq cities, Syrdarya region, Gulistan city as well administrative centers of Ferghana, Samarkand, Bukhara regions. To a certain extent the collapse of the Soviet Union did lead to changes in the national composition of the population in many countries, including Uzbekistan. The collapse of the USSR triggered an emigrational activity by Russian-speaking nationalities living in many of the newly-independent countries. The exodus of many different nationalities from Uzbekistan to such countries as Russia, Kazakhstan, Ukraine, Belarus and other countries of Europe, Asia and North America resulted in a considerable decline of their share and percentage in the national composition of Uzbekistan’s population.

Since the last registration of population (1989–2013) the number of Russians and Ukrainians 1,8, Belarusians 1,4, Tatars 2,8, Latvians 7,3, Estonians 1,6 times decreased in the national composition of Uzbekistan’s population. The above mentioned decrease in the number of Russian-speaking nationalities is due to both mechanic as well as natural movement of population. Because among these Russian-speaking nationalities birth-rate is very low, death-rate is relatively high and figures of natural reproduction are not very high.

In Uzbekistan, absolute and relative growth of local nationalities is taking place. During 1989–2013 the number of Kara Kalpaks...