GEO-ECOLOGICAL PROBLEMS OF OASIS LANDSCAPES OF ZARAFSHAN VALLEY

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Abstract:the article discusses ecological problems in oasis landscapes of ZarafshanValley, resulting from human economic activity.It was found that contamination of surface and subterranean waters, soil greasiness in the oasis grows downstream the Zarafshan River.

Keywords: oasis, landscapes, pesticides, mineralization of water,subterranean waters, optimization of nature, environment monitoring.

Introduction. Valley of Zarafshan River is located in the heart of Central Asia and is drawn into the sub-latitudinal direction beginning from the east of the high mountains of Pamir-Alai, and to the west, on the plain it penetrates deep into the desert of Kyzylkum. The total length of Zarayshan riveris 770 km.

In geomorphological structure the Zarafshan Valley is divided into three parts: the Upper, the Middle and the Lower. To the Upper Zarafshan belong mountainous part,that extends from the source of the river to Rabothodzhin (Pervomayskiy) dam. It is called Quhistan (a country of mountains) and lies entirely in the territory of Tajikistan.From Rabothodzhin dam to Hazarinskoy gorge is called the Middle Zarafshan, where the valley rapidly expands and it surrounded from the north with off spurs of Turkestan and from the south with Zarfshan ridge. After leaving the Hazarin gorge,the river flows on the plain, surrounded by the desert Kyzylkum. This part up to the river Amu Darya is called the Lower Zarafshan.The Middle and the Lower Zarafshan administratively belongs to the Republic of Uzbekistan.

On the Upper Zarafshan Valley the river is narrow, the speed of flow of the river is big. Only slightly higher on Rabothodzhin platinum near a city Penzhikentthe valley widens to 2.0-2.5 km. In the Middle Zarafshanthe width of the valley river reaches 15-20 km. Due to the abundance of water, fertile soil

people settled in the valley in the Stone Age, as evidenced by the remains of people's settlements found in several places of the valley.Irrigated agriculture in the Middle and the Lower Zarafshanoccured 4.0-4.5 million years ago. Yet far from BC in the Zarafshan Valley were built channels,water dividing structures, accustomedlarge areas of land for irrigation.

On the Middle and the Lower Zarafshan clearly stand out five large oases, which we call landscapes. They are: Samarkand, Kattakurgan, Karmana on the Middle Zarafshan, Bukhara and Karakul on the Lower Zarafshan. All the landscapesspatially related to each other and the specialization of agriculture have much in common. In all landscapes mostly important economic crops are cotton and 35-45% of them are engaged in cotton crops.

Results and Discussions. Sowingdecades only of cotton, without complying with the rules crop rotation, as well as the excessive use of pesticides and fertilizers has led to degradation of soil, a decrease of productivity of cotton and other crops. According to T.L.Ortykov (2002), R.K.Kuziev humus content in the irrigated soil over the past 50 years decreased by 45-50%, which led to a deteriorationof the soil structure, which in turn has reduced the soil's resistance to water and wind erosion.

One of dynamic natural processes in the oases is strengthening of mineralization of water. Currently, 60% of the Zarafshan Valley irrigated land is saline to varying degrees, and they are increasing downstream. In Samarkand landscape saline land is less than 30%, inKattakurgan-about 60%, Karmana- 70.4%, in Bukhara89.5%,,in Karakul more than 90%.

Currently, all irrigated land distributed to farms and farmers to obtain high yields make fertilizers at two to three times more than the norm. For the soil condition no state organization controls. Soil scientists note that by a ruthless exploitation of the irrigated land run down, degraded.

Mineralization of Zarafshan river waterchanges dramatically downstream. In the Upper Zarafshan the mineralization make up 250-300 mg/l, in the entrance to Samarkand oasis – 400-450 mg/l, in a meridian of the city Samarkand – 500-600

mg/l, in Kattakurgan oasis – near the city Xatirchi – 900-1000 mg/l, after the city Navoi – 1300-1400 mg/l, in Bukhara oasis – near the city Bukhara - 1600-1800 mg/l, In Karakul landscape it reaches up to 2500-2600 mg/l.

Mineralization of groundwater as surface waters changes downstream of the river Zarafshan. The clearest,fresh water is available at the Samarkand oasis - 350-500 mg/l, the most mineralized water in Bukhara (1500-400 mg/l) and in Karakul oasis (2500-10000mg/l).

In order to accurately lighting the mineralization of groundwater in the oases of the Zarafshan Valley were sampled drinking water of more than 80 points, the chemical analysis was carried out in laboratory “Microelements” of Samarkand state university. In samples of water founded the number of ions, that is chlorides, sulfates, bicarbonates, carbonates, sodium, calcium, potassium and magnesium, as well as the degree of mineralization rate of hydrogen and water hardness.Changes in water salinity increases markedly from the upper reaches to the lower reaches of the Zarafshan. In the upper part of the Middle Zarafshan, the salt content in the groundwater is 100-1100 mg/l, in the middle part 1850 mg/l, In the city Aktash – 2000 mg/l, in the Lower Zarafshan changes up to – 3128 mg/l.

Water hardness changes in the spring waters from2,6 and 4,5 and mg-ekv/l, in groundwater increases from the upper reaches of the river to the lower pool. In the upper part of the Middle Zarafshan it changes from 10,55 to 17,49 mg-ekv/l, downstream reaches up to 34,00 mg-ekv/l, in the Lower Zarafshanin Romitan district of Bukhara region it made up - 41,6 mg-ekv/l. In general, hardness in groundwater exceeds the MCL from 1,5 up to 6,0 times.

Distribution of anions and cations in the water given based on 20 water samples. Depending on mineralization of water in groundwater chlorine ion content increases from the upper part of the valley Zaravshan in its lower part. For example, it ranges from 161 mg/l -252 mg/l, up to 546 mg/l, and in the Lower Zarafshan – 609 mg/l. Sulphate ions high degree of migration, but low compared to chloride ions [7]. The main sources of sulphate ions are sedimentary rocks containing gypsum andanhydrides. These rocks are widely distributed in the

foothill plain of Zirabulok, Ziyavutdin, Karatag Mountains and massifs Malikchul and Urtachul. A large number of sulfate ions in the artesian wells and groundwater of Narpay area are connected with these deposits. In all four wells from which samples were taken in water Narpay area a content of sulfate ions exceeds to 3.5 times of the MPC. The amount of sulfate ions in groundwater in the Middle Zarafshan in rare cases exceeds MPC level, but in the Lower Zarafshan it's content is quite large. For example, in the Zhandarov district of Bukhara region it's number is 789 mg/l, in Karakul district – 464 mg/l, in Romitan – 1076 mg/l. The number of ions of hydrocarbons in spring waters changes from 171 mg/l up to 432 mg/l.

With change of mineralization of water, also changes the number of cations of calcium, magnesium, sodium and potassium. Of these cations, content of calcium fairly mineralized in many waters. By extent of the sodium ions have high solubility and migration. Magnesium ions can be found less than calcium. Usually, in weakly mineralized water found a large amount of sodium. The amount of sodium and potassium ions in an ordinary well water is increased from 1.5 to 6 times the SEM.

In the last years ground waters of Bukhara and Karakul oasis become not suitable for drinking. To provide the population with quality drinking water from the Samarkand oasis it was built pipeline Damhodzha - Navoi - Bukhara. It provides part of the population of Navoi and Bukhara region with drinking water. In perspectives Samarkand oasis will provide with clean drinking water not only the population living in the lower reaches of the Zarafshan River, but also the population of the Khorezm region and the Republic of Karakalpakstan. Therefore Samarkand Oasis as a reservoir of clean groundwater must be protected from possible contamination and preserve as a precious national wealth.

In the Upper Zarfshan in the territory of Tadjikistan there are two large mining and industrial enterprises, wastes of which permanently pollutes the river Zarafshan. These are - AnzobMining and Processing Plant and Magian gold mining complex. They do not have water treatment plants and septic tanks are

available for the temporary storage of contaminated water. After their filling excess water continually falls into the river Zarafshan. According to G.G.Deushev, S.Sh.Arutyunyan, M.M.Sultonov (2003) of these enterprises in Samarkand oasisannually receives 90-1200 tons of antimony. Together with antimony come mercury,arsenic, lead, zinc, copper and other heavy metals. All settlements in the Upper Zarafshan located on the banks of rivers in a narrow valley. Household and industrial waste and wastes of cattle farms dropped into the river. Therefore, on the border between Uzbekistan and Tajikistan at the entrance of the river Zarafshan Samarkand oasis phenol content of oil products, nitrates, certain types of heavy metals, as well as bacteriological contamination is often higher than the MPC.Due to the lack of control and no intergovernmental agreement nobody is responsible for the pollution and its consequences. The Zarafshan River Basin home to more than 4 million people, their health, fortune, wealth directly associated with the river Zarafshan. Therefore, between neighboring countries should be set intergovernmental agreements that meet international standards and regulations.

Groundwater pollution from sources in addition depends on filtration sediment properties. In unconsolidated coarse clastic sediments of pollutants along with the water quickly percolates down and they can reach tens of meters of power from the land surface. According to N.I. Sabitova (2001) in the Samarkand oasis on the banks of Akdarya water mineralization at a depth of 100 meters is higher than the MPC. She noted that this is not due to natural factors, but is due to human activities.

At the current rate of the population growth in the mid-21 th centuryit will double to 50 million mark. This leads to the fact that in the oases density of population will double and every inhabitant of the Republic will have to 7.0-7.5 hundredth of irrigated land, against the current, which is 14-15 hundredth. Currently, land occupied by settlements, various state andprivate buildings, irrigation and road networks and other make up an average of 10-12% of the total area of irrigated land. This figure is also in the middle of the 21st century will reach 20-25% of fertile land. Due to a decrease of area of irrigated lands will be intensified

anthropogenic load per unit area and of course, naturallywill worsen ecological condition. In order to improve environmental situation and support the environmentally sustainable development of oasis landscape it is necessary:

1) Separately for large oases of Uzbekistan to develop a special program for optimization and sustainable environmental development;

2) Greater involvement of innovation and advanced technology to clean up water pollution havens;

3) Improve and strengthen the service monitoring of the condition of the natural environment, constantly monitor the quality of agricultural products grown in the oases of;

4)To study the spatial movement of chemical elements and determining the functioning of the landscape it should be systematically maintained landscape-geochemical survey, making the landscape map oases.

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