Problems in obtaining meteorological data and groundwater in Kazakhstan

 Water is an extremely limited resource and the struggle for the possession of sources is already becoming an important participant in geopolitics, being one of the causes of tensions and conflicts on the planet.

 Due to its geographic location, the Republic of Kazakhstan has a scarcity of water resources. The specific water availability of the Republic of Kazakhstan is 37,000 m³ / km² or 6,000 m³ per person per year. The large territory of Kazakhstan belongs to the drainage basins of inland lakes that do not have access to the ocean.

Atmospheric precipitation is insignificant, except for mountain regions.

 Kazakhstan is mainly an arid country. The climatic map shows that the amount of precipitation falling on the territory of Kazakhstan is insignificant and they are unevenly distributed. This is due to the location in the central part of Eurasia and the remoteness of the republic from the oceans.

The average annual precipitation in Kazakhstan ranges from 130 to 1600 mm. Thus, in the areas located in the northeast of the Aral Sea and in the western part of Lake Balkhash, only 100 mm of precipitation falls, and in some years even less. The greatest amount of precipitation falls on the Western Altai. In the lowland part of the republic, the amount of precipitation decreases from north to south. In the north of precipitation falls just over 400 mm (in Petropavlovsk - 425 mm), in the central band - up to 275 mm, in the south - up to 130 mm. The amount of precipitation decreases from west to east. In the west, in the Uralsk region, 374 mm falls out, and in the east, in the area of ​​the Zaisan depression – 200 mm.

 The study of atmospheric precipitation, the conditions for their formation is one of the topical issues of modern meteorology, many scientific monographs and articles have been devoted to it, which deal with the main aspects of sedimentation.

The mode of precipitation in various parts of Kazakhstan is very diverse. With the exception of high-mountain areas, Kazakhstan is one of the areas with insufficient rainfall. In the desert zone, precipitation is extremely low. Therefore, the main feature of the flat climates of Kazakhstan is pronounced aridity. This is determined, first of all, by the fact that Kazakhstan is located almost in the center of Eurasia. If in the northern part of the republic, with a relatively high annual precipitation, the summer maximum is well expressed, in the central regions with smaller annual sums, the latter are distributed more evenly throughout the year, and in the southern regions there is already a minimum of precipitation. Some redistribution of precipitation within the year is also observed when moving from west to east, which is due to the influence of the slope effect and individual heights. The distribution of significant precipitation (precipitation with an amount of more than 8 mm in 12 hours is called significant) across the territory of Kazakhstan is characterized by some features associated with the geographical location, the structure of the relief and many other factors. The annual number of semidiffs with significant precipitation throughout the republic varies insignificantly - from 2-4 in the south-west and extreme south to 6-8 in the north. Almost on the entire flat territory, the number of half-days with precipitation> 8 mm is 4-6. Only in mountain areas of southeastern and eastern Kazakhstan these values ​​reach 20-28. This is due to the fact that an important role in the precipitation is played by orographic features of the terrain.

 According to expert estimates, today about 80 percent of the territory of Kazakhstan is considered to be potentially flooded due to the rise of the groundwater level to the upper layers of the ground and even to the surface. Three hundred cities, villages and auls of the republic were flooded to one degree or another. Among them there are such cities as Kapchagai, Kokshetau, Atbasar, Shchuchinsk, to the smallest extent - Astana. There are two reasons for this phenomenon. First, natural natural and geological factors, and secondly - not always considered human activity. With a shallow groundwater table, flooding usually occurs in built-up areas. Underground flow on its way encounters an obstacle in the form of foundation parts of buildings, and gradually the groundwater level rises. It is quite obvious that the process of flooding is significantly accelerated with the intensity of development. The main danger in this case is an unfavorable effect on the foundations of buildings and the surrounding soils, which in time can cause deformation of buildings up to the emergency. Among the other cities in Kazakhstan, the most unfavorable situation is in Kokshetau - there, in most of the city, the groundwater table is at a very high level (about one meter) and covers the northern, central and eastern parts of the city. In cities, the process of flooding is exacerbated by the violation of unimpeded surface runoff due to weeping of irrigation ditches and cuvettes, numerous leaks from water pipes and sewer systems as a result of accidents and worn out communications. In addition, the flooding of the territory of any city in Kazakhstan adversely affects the overall sanitary and hygienic state. Suffice it to recall the invasion of mosquitoes. Specialists complain that, despite unfavorable forecasts, there are no significant measures to combat flooding.

 Activity and a shallow groundwater table can also cause environmental disasters. Kazakhstani scientists warn that a huge amount of radioactive, toxic and industrial waste in the Mangistau region of Kazakhstan can seep through the Caspian Sea with the help of groundwater.

In the sixties the Soviet Union developed uranium production. Forty years ago in the town of Koshkar-Ata, north of Aktau, a special training ground was built. More than 50 million tons of radioactive waste were buried in the landfill during the Soviet era. Scientists say that if today they do not take measures to isolate uranium from the external environment and its elements - radium, thorium, radon - formed as a result of its decomposition, then in the near future the Caspian Sea and the inhabitants of the region are threatened by an ecological catastrophe. I would like to help solve the problem of the Sixth European Framework Convention, which was signed by Kazakhstan, Russia, Azerbaijan, England, France, Italy and Norway. The Convention requires constant monitoring of wastes entering the sea and taking preventive measures to prevent this. Groundwater can also play a negative role in Northern Kazakhstan. This is not the first year in the center of attention of environmentalists around the world and the infamous mercury lake in Pavlodar. For eighteen years of work of the Pavlodar chemical plant on far from perfect equipment in one of the shops in the ground, according to international experts, it took at least eight hundred tons of mercury and more than one hundred tons accumulated in the designs and floors of the plant. According to estimates of scientists who conducted research in the contaminated zone, it would take about $ 11 million to carry out all the works. In the meantime, with each coming of spring, the problem reminds itself of itself again. First of all, a danger to human health due to the threat of contamination with mercury from the Irtysh. Today, studies show that the advance of mercury-containing groundwater to the river is an average of fifty meters per year. Obviously, the possibility of getting mercury in the Irtysh can not but cause concern among Russians - the river flows through their territory.

However, referring to the lack of funds, both the Kazakh and Russian sides are limited only by forecasting the degree of danger and by researching air, soil, groundwater and river water. Although in the world there are and successfully applied high-tech solutions to such problems. Assumptions why groundwater rise higher and even come to the surface are different. Some believe that the blame for all is the destruction of the irrigation system. In addition, today many of the wells drilled decades ago for drinking and watering and allowing to spend the "surplus" of groundwater are abandoned. Free cavities at the same time contribute to the penetration of water into the upper layers of the soil. There is another version. The modern rise of groundwater is a natural natural cycle and eventually everything will return to normal. However, how long this cycle will last is impossible to say. It is likely that more than one century will pass. Therefore, it is necessary to take measures already living.