Inundations in the Kura River

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Abstract

For the present, in countries where inundations take place, measures implemented in order to reduce the damages and destructions, and prevent inundation-related human death do not always give desirable results. The problem is faced in the territory of the Republic of Azerbaijan as well. This paper deals with the study of inundations occurring in the lower parts of the Kura river, damages caused by inundations, effectiveness of protection methods taken against this natural disaster in Azerbaijan. The concrete constructive proposals on increasing efficiency of ways of protection are given.

Key words: inundations, water reservoir, prevention, meanders, subsoil waters

There are 8400 rivers in Azerbaijan Republic, out of which 5141 fall to the share of the basin of the Kura River. The studied river flows through territories of Turkey, Georgia, Azerbaijan, and falls into the Caspian Sea. The rivers of the basin of Kura has extremely irregular flow regime throughout a year. In 2010, inundations occurring in spring became catastrophic, destroying river banks in many places. Simultaneously, water flows covered the urbanized areas.

Inundations were responsible for economic losses and destructions, particularly in flat areas making 40 percent of the territory of the republic, including low flows of the rivers of Kura and Araz. Inundations are observed mainly in distance of 300 km from Mingachevir city, the areas near the mouth of Kura River, the basin of the Araz River, especially140 km far off Shahsevan point where Kura and Araz are joining as well as the plain of Kura-Araz which is the largest one not only in Azerbaijan but also Transcaucasia.

The inclination of the studied territory starting from Mingachevir and ending at the Caspian Sea affects inundations' influence. The absolute height of these territories is low and even 27 meter below than the sea level.

There are 2 cities, 15 administrative regions, 300 settlements and 1.2 million people living in the areas with risk of inundation. The area where the studied natural disaster happens is known as the main industrial and agricultural region of Azerbaijan. Heavy inundations damages 100 ha of plots of land, thousands of kilometres of irrigation canals, collectors, and drainages.

The rise of subsoil waters near the ground surface was responsible for arising high mineralization and saltiness of arable lands. Catastrophic inundations affected Azerbaijan's economy, resulting in damage at about one billion dollars (Babakhaniv N.A., 2006). Along with these damages, inundations causes to arising and spread of infectious diseases such as malaria, gastroenterostomy and others.

The water reservoirs have been constructed on regularly overflowed rivers in order to prevent the destroying power of inundations. Despite that thousands of water storages were constructed for prevention of inundations and floods in a number of countries, functioning of many reservoirs are not still principally efficient.

In 1953, the first large water reservoir of Mingachevir with 625 square km of area and 16070 million cubic meter of capacity was built with the purpose of preventing the floods and inundations in the Kura River. In 1970, Araz water joint with 145 sq.km of area and 1350 million cubic meter of volume was commissioned as well. In 1980, the another water reservoir Shamkir (Constructive geography..., 1996) with 116 sq.km of area and 2677 cubic meter of capacity as well as a few others were constructed and given to exploitation. During the beginning phase of the functioning of these water reservoirs any inundations in the low parts of the Kura and the Araz were not observed. But after the completion of fullness of these reservoirs, inundations began to take place and became more intensive.

As a result, in 1967, 1969, 1979, 1982, 1987, 1993, 1997, 2002, 2003 and 2010, the inundations in the rivers of Kura and Araz caused to great economical damages and destructions. The last devastating inundation happened in 2010.

The water reservoirs existing in Azerbaijan as well as in the world operate not only in order to prevent floods and inundations but also for regulating the amount of water brought by the rivers. They also play significant role in production of electricity at water power stations, irrigation works, provision of population with drinking water, fishery, development of tourism and etc. Some governmental bodies suggest that new constructed water reservoirs in the country will be able to completely prevent the inundations in Azerbaijan. But this idea is absolutely wrong as it's impossible to prevent the mentioned natural disaster by this way.

Generally, depending on their area and capacity, water reservoirs are intended to be used for 100-300 years. During these periods, reservoirs become full as a result of accumulation of slimes at their bottom. Further these slimes should be cleaned. Another way is the stopping of functioning of reservoirs. In the global practice, it is still theoretically possible to clean such water storages as Mingachevir from slits, but practically it is a process of high cost, and it is more expedient to stop the exploitation of them and construct the new ones. In Azerbaijan, exploitation period of small water storages such as Pirsaat, Bolgarchay and others is over as they are completely filled. It is more rational to construct new reservoirs nearby the old ones.

The Kura and especially the Araz bring large amount of slimes and sinking materials (Museyibov, 1998), gathering them in the constructed water reservoirs. The depth and water capacity of these storages have incisively reduced earlier than it was intended, and this condition do not allow to prevent inundations effectively.

Sometimes in order to get cheap electric power, not taking into consideration the prognosis about the expected rainfalls, water was collected in more than the norm in reservoirs during less watery periods. In the last decades, population seriously suffered from the challenges related to Mingachevir water storage three times. Most critical situation here was observed in May and June of 2010 when level of water become higher.

Formulating the above mentioned facts we can conclude that it is not possible to prevent the inundations in the rivers of plain areas at the expense of water storages.

Humans are fighting against overflow of rivers since ancient times as well as from the fourth century in Egypt when its population constructed ground dams for the purpose of preventing inundations (Ginko, 1977). In the present, this method is successfully used as the main protection method in the countries with high risk of floods and inundations. However, in extreme periods such ground dams were not able to prevent natural disasters in rivers. It is considered that the construction period of ground dams in Azerbaijan took place since XVI-XVII centuries. However, we think this way of solution has been concerned to more ancient periods in this territory. In the lower part of the river flow and areas near the mouth of the Kura, flowing into the Caspian Sea was impossible because these lower parts were below the sea level. So, the Kura could reach the Caspian Sea only through the ground dams.

Historically constructed 650 km-long ground dams on the Kura and Araz sometimes were not able to keep Azerbaijani territories from inundations till the construction of the Mingachevir reservoir. The main reasons for arising inundations were the construction of ground dams in limited areas, insufficient maintenance and reconstruction of the water storages, and unwise attitude to dams. State laws and programs about ground dams were not implemented, and this also accelerated the problem (Musayeva, 2010). Despite the high length of ground dams on the rivers, they are not sufficiently reliable for solution of problem of inundation in Azerbaijan as well as many other countries.

The rivers in the ideal world plains flow by meanders. The meanders incisively reduce the flow speed, and consequently, risks of arising of inundations. The management of shipping navigation becomes impossible in such rivers. During the post soviet period the meanders of Kura River were systematically corrected. As a result, the river becomes useful for shipping navigation and ships beginning from the Caspian Sea up to Yevlakh city. The correction of meanders allowed to partly prevent the non-devastating inundations, resulting in reduction of the flow speed. There are still more than 50 uncorrected meanders in the river (Ibadzadeh, 1960).

Based on the international experience, it should be noted that area of rivers flowing through plains become regularly deepened. Unfortunately, such works are conducted mainly during inundation periods in Azerbaijan. The deepening works were carried out in 2010 by the Kura River.

However, implementation of such works were stopped and forgotten when inundations stopped. In our opinion, the mentioned works must be implemented all year round in the Kura and Araz, particularly in the mouth of Kura.

As the delta of the Kura is 27 meter lower than the ocean level, and the river cannot reach the Caspian Sea, it enlarges its mouth year by year towards the sea. In 2010, the works on deepening the delta and construction of the new extra branch of the Kura River were started. As a result, the water of Kura started to freely flow into the Caspian Sea. However, the prevention of inundations was done temporarily. Neglecting attitude to implementation of these works resulted in the incisively shallowness of the delta of the Kura. Happening of new inundations is possible at any time. Taking into consideration the above-mentioned fact it is also notable that the dry north-western winds blow during about 100 days a year in the area of Kura's delta, and as a result, the 5-8 meter high waves of the Caspian Sea bring sands with seawaters to the delta. This results in the considerable reduction of depth of the river as well as increasing flood risk in the administrative units of Neftchala and Salyan. Special works on preventing these processes also should be done.

Commissioned in 1970, the Araz water joint becomes filled during extreme periods, and causes to inundations. The last such situation happened in May and June of 2010, and resulted in destruction of some settlements. Dwellers of these settlements were evicted to safer places. The functioning of the Khudafarin water joint constructed by the Iran Islamic Republic on the Araz River plays considerable role in regulation of level of water of the mentioned river. Thus, according to the agreement between Iran and Azerbaijan, in May and June of 2010, i.e. during the period of inundations, flow of collected waters to the Araz River was temporarily stopped as a result of which the full destruction of settlements in administrative regions of Imishly, Saatly, Sabirabad and some settlements near Shirvan city was prevented.

In order to prevent the inundations, reconstruction of the river bed from the Araz River (which existed in 1896) can play a positive role in prevention of inundations in the Kura. Exploitation of this new river bed with 140 km length can create possibility for transmitting waters of this river directly into the Caspian Sea. Taking into consideration the great political, economic and even military interests, the construction of new river bed of the Araz must be implemented before the new natural disasters. High cost of this project should not be regarded as a big impediment. Any construction works in the area of 500-1000 km near this new river branch must be controlled strictly by the government.

Many small lakes and ponds like Sarisu (67 km²), and Aggol (56 km²) on the Kura and Araz historically played an important role in regulation of inundation. However, some of these lakes and ponds were drained and used for developing cotton plantations. As a result of this process, the Kura River was deprived of such sources which turned into "dead" zones. Despite that the related administrative entities restored the functioning of such regulators of natural water on the Kura River, the carried works did not give the effectiveness as it was earlier.

The natural disaster that happened in 2010 on the Kura River proved again the significance of the fact that during inundations the water of the Kura may be naturally flown into the lakes and ponds for prevention of hard consequences. When the inundation is over, the water from these lakes and ponds can be directed into the Kura again. In the present, the large lakes on the banks of the Kura River are privatised and being used for fishery. In other words, the connection of these lakes with the Kura River is segregated, and this condition does not allow to regulate the inundations by the mentioned method. We think that the regulative roles of the lakes and ponds on the banks of Kura River must be restored during the inundations. Taking into consideration the economic and strategic importance of these small water basins, privatisation of them should not be allowed.

Despite of the economic advancement, any country in the world is not able to completely prevent inundations. As fully preventing of inundations in the world's countries are not achieved, the positive solution of this global problem completely in a few coming years is also seen unreal in Azerbaijan. However, when talking about this problem, it would be very useful to implement the globally used methods in Azerbaijan. These methods will not allow to fully preventing inundations but they will bring effective results in reducing damages, destructions, and human deceases caused by this natural disaster.

So, in the Kura-Araz plain where historically inundations happened very often, measures on preventing the studied kind of natural disaster must be done continuously, taking into account international practice in this area as well. In the meantime, the development of industrial spheres, location and settlement of the population and other works must be implemented in safer territories.

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