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Acceptance letter

Dear (s),

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*W*arm greetings!

It's a great pleasure to inform you that, after the peer review process, your article, ***"OPERATING REGIME OF WATER RESERVOIRS FOR SAFE TRANSPORTATION OF FLOODS"*** has been accepted provisionally and considered for publication in AIP Conference Proceedings.

Thank you for submitting your work to this journal. We hope you submit your articles in future.

Sincerely,

Conference Committee

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OPERATING REGIME OF WATER RESERVOIRS FOR SAFE TRANSPORTATION OF FLOODS

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ANNOTATION

The article proposes creation method of developing and calculating the most optimal mode of operation of water reservoir, with taking into account natural and technical impacts which influence to them. Researches were conducted in the Andijan reservoir. Estimated that the hydrological regime of the Karadarya River, which flows into the reservoir, is not similar with consumption and start to change year by year. The most optimal mode of operation of the Andijan reservoir has been developed for many years with taking into account the hydrological regime of the Karadarya River and technical changes in the reservoir. The calculation of the ordinates of the boundary line of the reservoir filling during the operation of reservoirs is based on the importance of maintaining a reserve volume for the amount of water collected from them for safe passage of flood waters. The proposed operation mode of reservoir allows for the prevention of emergencies and efficient use in years of high water content.

KEYWORDS:

River, reservoir, natural, technical, hydrological regime, flow rate, flood, operating mode, filling boundary line, exploitation.

INTRODUCTION AND ANALYSIS OF THE CURRENT CONDITION OF THE PROBLEM.

The main task of exploitation service of the reservoir is safe and efficient use of water from the reservoir's, facilities and equipment in the reservoir complex. Because each reservoir is a potentially dangerous object. The volume of water in the upper part of reservoirs has a large pressure, i.e. potential energy, if those pressure will go to the lower basin at an uncontrollable level due to some reason, it can cause great losses in the lower basin and serious economic, environmental and human safety problems in general [4, 5, 12].

Emergencies in reservoirs can occur as a result of natural disasters (earthquakes, floods, hurricanes), in that condition their performance exceeds the established norms can have a significant impact on the reliability of facilities. Wind-generated waves in the reservoir, start to change because of maximum water discharge of flood, due to climate change conditions and other factors [9, 13]. Quantitative values of these factors are determined by statistical calculations, with basis of long-term meteorological, hydrological and seismic observations.

It is worth noting that sometimes it is said that "Even if the reservoir is full at the time of the flood, the waterworks will be able to withstand even the smallest possible flood." However, in such extreme conditions, water transfer is very dangerous and can lead to unpleasant or accidental incidents in constructions and especially in the lower bay. For example, the erosion of concrete or metal coatings, the failure of mechanical equipment, the washing of the downstairs of reservoir, and so on [2,3].

During intensive rains time, if the reservoir is maximally overfilled, it is important to withdraw water immediately with the goal of decreasing water level into a level that does not pose a threat to the reservoir [8].

In practice, the opposite is also the case, i.e. they are afraid of overflowing the reservoir, pumping out excess water on the eve of the flood and as a result failing to reach the maximum amount of water that can accumulate in the reservoir.

Thus, in order to prevent flooding of the reservoir, it is necessary to develop a regime of reservoirs for floods and non-flood periods, depending on the value of factors formed under the influence of natural and technical phenomena, in order to safely transfer the required amount of water to buildings and subsoil during floods. prevention and rational use of water resources.

MATERIALS AND METHODS.

The studies were conducted on the example of the Andijan reservoir and analyzed the change in the flow of water flowing into the reservoir over time (1987-2018) (Figure 1). The Karadarya River, which flows into the reservoir, consists of joining the Tor and Kararulja, Yassi and Kurshab rivers.

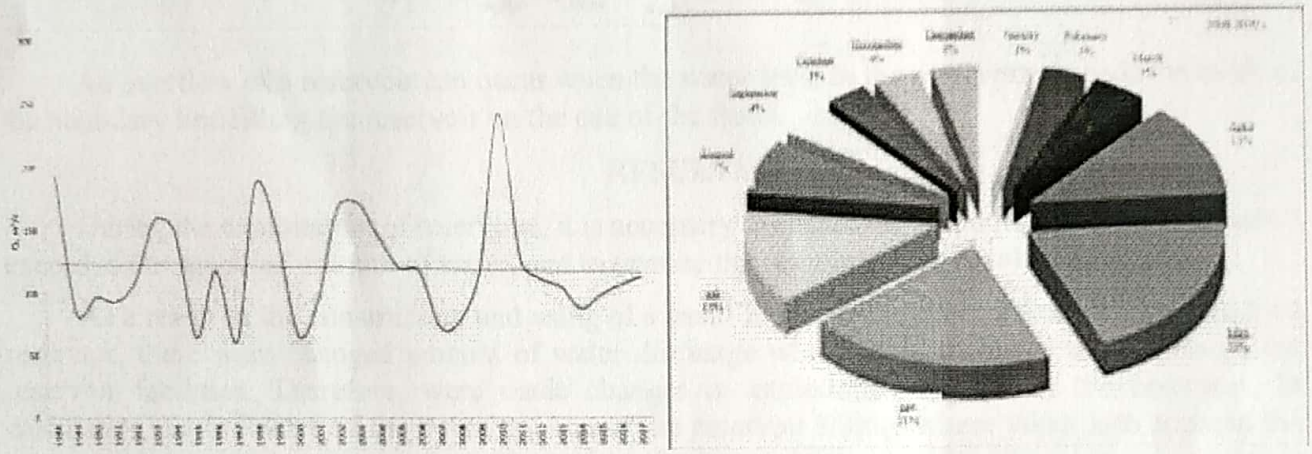

Figure 1. The average annual change of water discharge of Karadarya River and it's distribution over the months

Analysis of the flow of the Karadarya River by years shows that in some dry years the water supply is good and in some years much lower than the demand level, and in wet years the positive difference between the flow rate is greater than the negative difference between water discharge and poverty [1].

In some years, the character of the distribution of the Karadarya River changes significantly. The maximum water discharge is 1110.0 m3/s in May and the minimum water discharge is 25.0 m3 / s in January [11, 12]. Taking into account the above factors affecting the hydrological regime of the Kara-Darya, the following values of water discharge in the calculated supply were determined (Figure 2):

- 0,01 % suply - 2194,0 m^3/s;
- 0,1 % suply - 1664,0 m^3/s;
- 1 % suply - 1307,0 m^3/s.

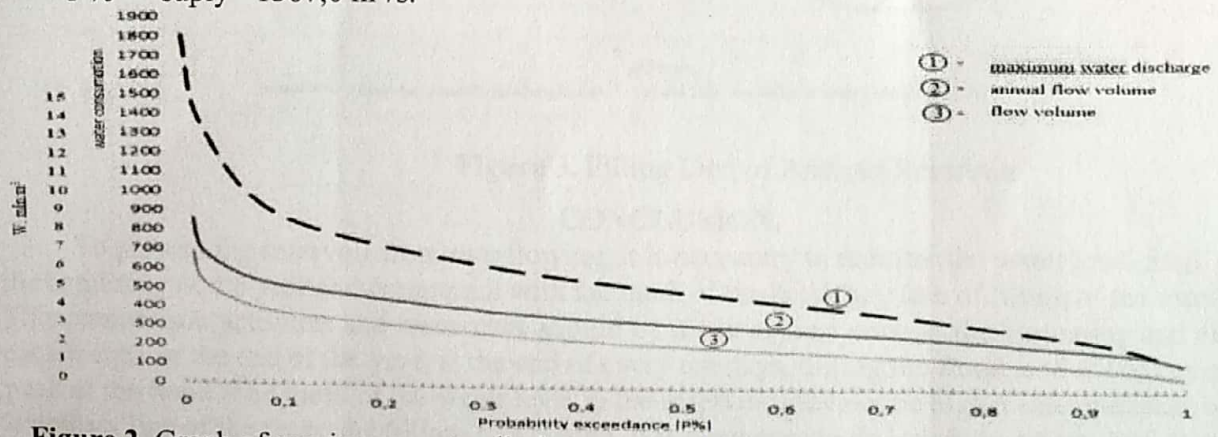

Figure 2. Graph of maximum water discharge, annual flow and flood volume distribution in the Karadarya River.

It is seen from the graph, the maximum inflow to the reservoir occurred in April-July, accounting for 60-70% of the total flow. Under the influence of climate change in the region, it is observed that the amount of river water flowing into the reservoir and the timing of its formation are changing. In particular, the annual distribution of hydrographic indicators of flow by months shows that the hydrograph is shifting to the left. Such changes in the river regime, i.e. the further change of the river regime to the incompatibility with the consumption regime [8], indicate the need to define the exploitation condition of the reservoirs.

In order to prevent flooding of reservoirs, safe transfer of the required amount of water to structures and the lower basin during floods, to collect as much incoming water as possible, an anti-break line and its infill line will be formed [6, 10] and its ordinates is determined by:

$$W_j = W_{тула} - S_{макс} + \sum_{i=j}^{j} (A\sum K - \sum Ч) \qquad (1)$$

An overflow of a reservoir can occur when the water level in the reservoir exceeds the mark of the boundary line filling the reservoir on the eve of the flood.

RESULTS.

During the exploitation of reservoirs, it is necessary to ensure the amount of water which hasn't exceeded the specified amount of water, and to operate the reservoir with absolute accuracy.

As a result of the construction and using of a small HES (Hydro Electro Station)-2 in Andijan reservoir, there were changed amount of water discharge which takes to lower basin through the reservoir facilities. Therefore, were made changes in exploitation regime of the reservoir. In calculating the ordinates of the boundary line of the reservoir filling, where taken into account the reserve volume which ensures water volume for safe passage of flood waters. This reserve volume is taken into account in the flood periods (IV-VI) in accordance with the gyrological regime of the Karadarya, and the ordinates of the boundary filling line of the reservoir were calculated according to formula (1).The change in the boundary line of the reservoir filling by months is shown in Figure 3.

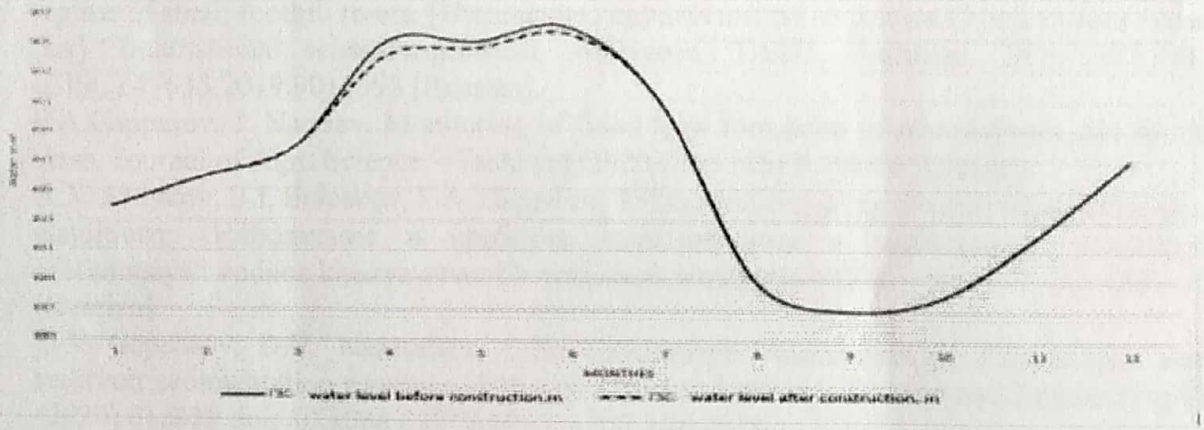

Figure 3. Filling Line of Andijan Reservoir

CONCLUSION.

To prevent the reservoir from overflowing, it is necessary to monitor the water level mark from the beginning of the year and compare it with the mark of the boundary line of filling of the reservoir. This comparison activities and researches should be made at least once at the beginning and end of each month, at the end of the year, at the end of every ten days, during the flood, and every day at the peak of the flood. The mark of the water level in the reservoir may not be higher than the mark of the boundary line of the reservoir filling. If it is high, it is necessary to do lower the water level from the limit line of filling the reservoir.

In watery years, the line of limiting the filling of the reservoir gives possibilities to prevent accidents, except for excessive useless water supply.

If the reservoirs are planned and operated based on above measures, they will be prevented from malfunctions and accidents, exploitation of the reservoir will be further improved, and the efficient use of water from the reservoir will be achieved.

REFERENCES

1. A.A. Arifjanov, L.Samiev, T. Apakhodjaeva, and SH. Akmalov, 2019, December. Distribution of river sediment in channels. In IOP Conference Series: Earth and Environmental Science (Vol. 403, No. 1, p. 012153). IOP Publishing.
2. A.A. Arifjanov, Sh. Akmalov, I. Akhmedov, and D. Atakulov. "Evaluation of deformation procedure in waterbed of rivers." In IOP Conference Series: Earth and Environmental Science, vol. 403, no. 1, p. 012155. IOP Publishing, 2019.
3. A.A. Arifjanov, T. Apakhodjaeva, and Sh. Akmalov. "Calculation of losses for transpiration in water reservoirs with using new computer technologies." In 2019 International Conference on Information Science and Communications Technologies (ICISCT), pp. 1-4. IEEE, 2019.
4. M.R. Bakiev Analysis of the problem of environmental safety in the exploitation of groundwater reservoirs in hydro systems. [Анализ проблем надёжной безопасности эксплуатации грунтовых плотин водохранилишных гидроузлов]. // Journal of Irrigation and Melioration. № 3 (13). –T.2018. - B. 10-14 [Russian].
5. F.A. Gapparov, D.V. Nazaraliev, J.J. Narziev Organization of safe and efficient use of reservoirs // International scientific-practical conference // TIMI, Tashkent. 2017.- B. 66-69 [Uzbek].
6. F.A. Gapparov, S.M. Qodirov, M.F. G'affarova Dispatch schedule for rational filling and depletion of reservoirs. [Диспетчерский график по рациональному наполнению и сработке водохранилищ] // Jurnal Gidrotexnika. St. Petersburg, 4 (52) 2018- P.98-100 [Russian].
7. F.A.Gapparov, A.X.Sodiqov Standard instruction on technical operation of reservoirs. Tashkent, 2007 - 75 b [Uzbek].
8. F.A.Gapparov, S.R.Mansurov, S.M.Qodirov, M.G'affarova. Changes in the hydrological regime of small foothill rivers. [Изменение гидрологического режима предгорных малых рек]. International scientific-practical conference. TATU, Tashkent. DOI: 10.1109 / ICISCT47635.2019.9011993 [Russian].
9. F.A.Gapparov, J. Narziev. Monitoring of flood flow formation in mountainous and foothill areas. Journal of Agro Science. –Tashkent, 2020.- №3 (65) Б. 54-55 [Uzbek].
10. A.X. Sadykov, B.I. Beleskov, F.A. Gapparov. Filling and emptying of reservoirs in low-water conditions. [Наполнение и сработка водохранилищ в маловодных условиях]// Melioratsiya i vodnoe khozyaystvo: Sb. nauchnyx trudov SANIIRI. – T. 1997. - C. 130 – 133 [Russian].
11. F.A. Gapparov, D.V. Nazaraliev, Q.Sh Eshkuvatov. Assessment of Chimkurgan water reservoir sedimentation processes IOP Conf. Series: Materials Science and Engineering 883 (2020) 012039 doi: 10.1088 / 1757-899X / 883/1/012039.
12. F.H. Hikmatov The genetics analysis of silt in the rivers of Central Asia. The issues of computation and prediction / Proceedings of the 10th International Symposium on River Sedimentation. Volume II.– Moscow, 2007.- P.256-26.
13. A.A.Yangiev, F.A.Gapparov, D.S.Adjimuratov Monitoring the formation of mudflows in the mountainous and foothill regions of Uzbekistan. [Мониторинг формирования селевых потоков на горных и предгорных районах Узбекистана]. Materials of the international scientific-practical conference "IV Urkumbaevskie chteniya" Kazakhstan 23-24 November 2019. P.190-192 [Russian].