The American Journal of Engineering and Technology
(ISSN – 2689-0984)
Published: January 15, 2021 | **Pages:** 5-9
Doi: https://doi.org/10.37547/tajet/Volume03Issue01-02

IMPACT FACTOR
2020: 5. 32
OCLC - 1121105677

Criteria For The Use Of Elements Of Reliability In The Exploitation Of Reservoirs

Rakhmatulla Azatboyevich Ermanov
Assistant, Tashkent Institute Of Irrigation And Agricultural Mechanization Engineers, Tashkent, Uzbekistan

Daniyar Tanirbergenovich Paluanov
Associate Professor, Tashkent State Technical University, Tashkent, Uzbekistan

ABSTRACT

In this study, the assessment of the safety of reservoirs and their hydraulic structures considered reliability criteria related to the quality of design and construction work, natural and anthropogenic impacts during exploitation, exploitation, technical condition and other factors. There are measures to eliminate problems that arise during the exploitation of reservoirs.

KEYWORDS

Reservoir, hydraulic structures, reliability, safety, exploitation, flood, flow, slope washing, dam.

INTRODUCTION

The age of hydraulic structures (HS) in the country is 50-60 years and more, the technical condition of these facilities has been used for a long time, their technical capacity and reliability are reduced due to insufficient and high-quality repairs. In addition, the lack of attention to environmental factors during the operation leads to a decrease in the level of reliability of exploitation of hydraulic structures [1].

The importance of this issue is that despite the significant progress in the operation of hydraulic structures, in recent years there has been an increase in the rate of failure of hydraulic structures, even accidents, as well as in reservoirs, pumping stations, rivers and

The American Journal of Engineering and Technology
(ISSN – 2689-0984)
Published: January 15, 2021 | **Pages:** 5-9
Doi: https://doi.org/10.37547/tajet/Volume03Issue01-02

IMPACT FACTOR
2020: 5. 32
OCLC - 1121105677

streams. As a result, they have to spend extra money every year to rebuild them.

Changes in the safety of hydraulic structures, their constant monitoring, rapid processing of data from control and measuring instruments installed in reservoirs and other structures, as well as the analysis of compliance with diagnostic instructions and their impact on the strength of structures and a serious study of the experience of foreign countries in this field and a skill-based assessment of the safety of existing hydraulic structures using new innovative methods based on the acquired skills [2,3].

Determining the safety criteria of hydraulic structures and assessing the risk of accident of hydraulic structures, as well as the study of defects that cause complete or partial loss of capacity of the facility and studying the defects and exploring several options to ensure their sustainability is a difficult engineering task.

RESEARCH METHODS

The scientifically based results of this research will allow to develop effective practical measures to ensure and increase the reliability of the use of hydraulic structures, as well as to prevent possible emergencies [4].

In order to ensure that any factor in the safety of reservoir facilities does not occur or its impact is small, it is necessary to identify the causes of each of them on the basis of a separate approach and identify measures to prevent these causes. In order to assess the elements of reliability under the influence of these factors, of a number of reservoirs hydraulic structures the technical condition was studied. One of the biggest problems in the exploitation of reservoirs is the overfilling of the reservoir, the washing of the banks of the reservoir under the influence of waves, the filling of the reservoir bowl with mud [5].

RESEARCH RESULTS

Emergencies of nature In recent decades, there has been a growing trend in the territory of the republic. Floods, mudslides and other dangerous natural phenomena are becoming commonplace. The results of this study show that the frequency of occurrence of natural hazards is increasing as the effects of global climate change increase. The number of floods in the region has been growing rapidly since 2015. Such short-term currents, calculated in tens of minutes or hours, destroy reservoirs, hydraulic structures, bridges, roads, flood canals, fields and other crop fields. At the same time, the inundation flow threatens the mountains and settlements in the foothills of the republic [6].

River flow is a inundation flow over time, characterized by high levels of solids and a sharp rise in surface area. Inundation flow, as a rule, consist of water and stone destruction products and are characterized by sudden onset and rapid and short-term action.

According to long-term analysis, inundation are more prevalent in the highlands of the Fergana Valley, in the mountains and foothills of Tashkent, Kashkadarya, Surkhandarya, Samarkand, Jizzakh and Syrdarya regions. Global climate change on Earth has had a major impact on precipitation formation. In particular, liquid rainfall, which falls mainly in the spring-summer period, has been manifested in recent years with a special focus on a small area, and rainfall in the form of rainfall in this area is falling most intensively. This leads to a dangerous flood. Inundations are common in the mountainous and foothill regions of Uzbekistan and are transboundary in nature, as most of the inundations occur in neighboring Kyrgyzstan and Tajikistan. The largest inundation centers in Kashkadarya region are the Kashkadarya, Guzardarya, Tankhizdarya, Yakkabogdarya basins, as well as the mountainous areas of the region (Figure 1).

The American Journal of Engineering and Technology
(ISSN – 2689-0984)
Published: January 15, 2021 | **Pages:** 5-9
Doi: https://doi.org/10.37547/tajet/Volume03Issue01-02

IMPACT FACTOR
2020: 5. 32
OCLC - 1121105677

All rivers of Kashkadarya region are divided into two categories:

- Rivers with constant flow throughout the year;
- Temporary inundation currents, occasional, often only during rains.

As can be seen from the graph above, although the change in the average perennial volume of river water flow is not sufficiently noticeable, the change, i.e., the oscillation intensifies throughout the year, is the intensification of river water flow during succulent periods. This has a significant impact on the safety of reservoirs, hydraulic structures and adjacent areas.

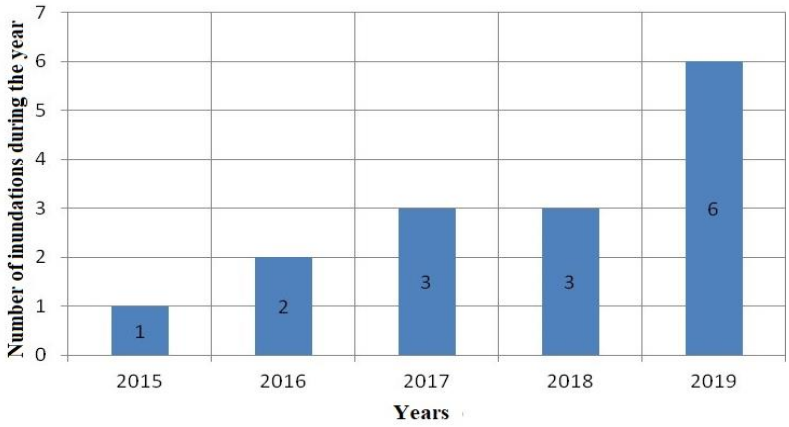

Figure 1. Number of inundations in 2015-2019

Safety assessment of reservoir hydraulic structures is determined by a number of factors, the quality of design and construction work, natural and anthropogenic impacts during exploitation, operational, technical condition and other factors. The following criteria must be met in order for each element of reliability to enable reliable exploitation of the reservoir:

- At the beginning of the year, the use of a dispatching schedule, quickly developed, taking into account all the changing conditions of the year, allows you to reliably supply water to all consumers;
- Reducing the rate of mudflow in the basin will help to prevent landslides, control of turbidity of water entering the reservoir and the application of measures against them, the reduction of the useful volume of the reservoir over the years;
- To prevent violations of the protective elements of the high slope of the dam [atmospheric influences (changes in air temperature and humidity, wind), plate breakage, cracking, slipping, landslides] to increase the reliability of the reservoir operation;
- Useless loss of a large amount of water in the reservoir during the dam and its filtration processes (along with groundwater, the leakage of soil particles from the dam body increases over time, there are accumulated leakage paths or cavities, increased water consumption in the infiltration, relocation and washing of soil layers to prevent the emergence and collapse of the dam body, such as landslides, landslides, dam collapse);
- Reliability of the reservoir dam, its normal sinking and sliding;

The American Journal of Engineering and Technology
(ISSN – 2689-0984)
Published: January 15, 2021 | **Pages:** 5-9
Doi: https://doi.org/10.37547/tajet/Volume03Issue01-02

IMPACT FACTOR
2020: 5. 32
OCLC - 1121105677

- Prevention of failures in water intake facilities and water permeability is always in the normal state;
- Prevention of breakdown of mechanical equipment in the reservoir (accumulation of debris in the gate grooves, failure to move, failure of the mechanisms that move the gates, driveways or their elements);
- Risk of flooding structures and dams due to washing of the bottom of the reservoir and destruction of the lower connecting structures (large water consumption through the dams, falling stones or other objects, poor performance of concrete works, changes in the riverbed during floods and below the dam structure, use of sand and gravel quarries);
- Constant monitoring of measures to prevent power outages in the reservoir or failure of the reserve power supply;
- In the water protection zone of the reservoir it is allowed to carry out only activities that serve the reliable operation of the reservoir and do not adversely affect it;
- Water quality in the reservoir is within the established limits for drinking and permissible pollution.

Coastal erosion under the influence of water waves plays an important role in reducing the rate of turbidity of the reservoir basin. In large reservoir dams, this problem is overcome by installing parapets. In small reservoir dams, shore protection works are being carried out by reducing the kinetic energy of water waves generated by wind by laying tetrahedrons on the shores, which have entered our practice in recent years. Currently, such works are used in water basins in the Aral Sea region (Figure 2).

Figure 2. Laying tetrahedral on the banks of the reservoir

CONCLUSION

Analysis of the results of the study shows that the assessment of safety of reservoirs and their hydraulic structures requires strict adherence to reliability criteria depending on the quality of design and construction work, natural and anthropogenic impacts during exploitation, operation, technical condition and other factors. Reservoirs require the use of innovative methods used in world practice in solving problems that arise during the exploitation.

The American Journal of Engineering and Technology
(ISSN – 2689-0984)
Published: January 15, 2021 | **Pages:** 5-9
Doi: https://doi.org/10.37547/tajet/Volume03Issue01-02

IMPACT FACTOR
2020: 5. 32
OCLC - 1121105677

REFERENCES

1. Paluanov D.T., Maxmudov A.A. Some aspects of providing the safety of hydrotechnical structures // Materials of on-line conference "Prospects for the development of scientific progress in the twenty-first century and the role of innovation in this progress". – Tashkent, 2019. – Part 2. – P. 191-193.
2. Gapparov F.A., Mamatov S.A. Factors influencing the reliability of the operation of ware reservoirs // "Ecological and geographical aspects of the use and protection of natural resources in a single natural historical area". – Fergana, 2010. – P. 108-109.
3. Paluanov D.T., Ermanov R.A. Problems in exploiting hydrotechnical engineering structures: solutions and suggestions // International Journal of Advanced Research in Science, Engineering and Technology. – India, 2019. – Vol 6, Issue 9. – P. 10862-10864.
4. Dams and Development: A New Methodological Framework for Decision Making. Report of the World Commission on Dams. Overview. – London, 2000. – 35 p.
5. Mahmudov E.J., Paluanov D.T. The organization of monitoring of the quality of the search and maintenance of the water supply facilities // The journal of "Putting on the efficiency of irrigating croplands". Issue No. 3 (67). - Novocherkassk, 2017. - p. 134–139.
6. Gapparov F.A., Nazaraliev D.V., Narziev JJ Organization of safe and efficient use of water reservoirs // International scientific-practical conference. - Tashkent: EITI, 2017.