JOURNAL OF MULTIDISCIPLINARY SCIENCES AND INNOVATIONS
VOLUME 5, ISSUE 05
MONTHLY JOURNALS
ISSN NUMBER: 2751-4390
IMPACT FACTOR: 9,08

EROSION PROCESSES ON THE BANKS OF THE PACHKAMAR RESERVOIR

Nabiyev Elyor Safarovich Dotsent, t.f.f.d. (PhD)

Qarshi davlat texnika universiteti
E-mail addreses: elyor.nabiyev.84@mail.ru
https://orcid.org/0009-0000-2783-3043
Doniyorov Toshmamat Omonovich Dotsent, q.x.f.f.d. (PhD)

Qarshi davlat texnika universiteti

E-mail addreses: dtoshmamat@mail.ru.

https://orcid.org/0009-0009-1164-813X

Annotatsiya. Suv omborining gidrologik rejimi ham qirg‘oq abraziyasi jarayonlariga katta ta’sir ko‘rsatadi. Suv sathining tez-tez o‘zgarishi natijasida qirg‘oq jinslari namlanadi va mexanik barqarorligi kamayadi. Bu esa yer o‘pirilishlari va ko‘chkilar xavfini oshiradi shu sababli qirg‘oq emirilishini kuzatib nazorat qilish muhim kasb etadi.

Abstract. The hydrological regime of the reservoir also has a significant impact on the processes of coastal erosion. As a result of frequent changes in the water level, coastal rocks become wet and their mechanical stability decreases. This increases the risk of landslides and landslides, therefore, monitoring and controlling coastal erosion is important

Kalitli so‘zlar: Pachkamar suv ombori, qirg‘oq chizig‘ining tez-tez o‘zgarishi, lyossimon jinslar, suv ombori sathining keskin, zondlash ma’lumotlari

Ключевые слова: Пачкамарское водохранилище, частые изменения береговой линии, лёссоподобные породы, резкие изменения уровня водохранилища, данные гидроразрыва пласта

Key words: Pachkamar Reservoir, frequent changes in the shoreline, loess-like rocks, sharp changes in the reservoir level, hydraulic fracturing data

Login. The Pachkamar reservoir is one of the largest irrigation reservoirs in the Kashkadarya region. The reservoir was built mainly to irrigate agricultural lands, regulate water resources, and improve water supply. The Pachkamar reservoir is bordered by foothill and low-mountainous areas, and the surrounding relief has a complex geomorphological structure. The geological layers in the area are mainly composed of loess-like rocks, sandstones, and conglomerates. Since these rocks are relatively unstable to the effects of water, coastal erosion processes develop rapidly.

The climate is continental, with high temperatures and evaporation in the summer, and relatively cold weather and low precipitation in the winter. This causes seasonal changes in water levels and affects coastal erosion processes.

The hydrological regime of the reservoir also has a significant impact on the processes of coastal abrasion. As a result of frequent changes in the water level, coastal rocks become wet and their mechanical stability decreases. This increases the risk of landslides and landslides

The displacement of the banks as a result of a sharp rise in the level of the reservoir is mainly caused by a sharp rise in the level of the reservoir during floods and sometimes by attempts to retain large amounts of water coming from above in the reservoir in order to save water in the reservoir. As a result, the reservoir causes erosion of the coastal soils, washing out the surface parts of the banks as a result of the effect of water pressure, erosion and subsidence of soft soils as a result of water pressure. In all cases, soil and other soil bodies in this case settle in the reservoir basin. The repetition of this situation has its effect on the reduction of the useful

volume of the reservoir, leading to a decrease in the useful volume of the reservoir. A sudden drop in reservoir levels is the opposite of the sudden rise in reservoir levels described above, and occurs as a result of a sudden reduction in the water in the reservoir.

As a result of a sharp decrease in the level of the reservoir, a residual pressure of water vapor is formed between the coastal soil layers, and as a result of its influence, erosion of the coastal soil, its displacement, landslides and erosion on the banks occur. As a result of the resulting events, the reservoir basin is filled with silt and sediments and the volume of the reservoir decreases. (Figure 1)

Figure 1. View of the banks of the Pachkamar reservoir.

The reservoir is a large hydraulic structure built on the Guzor River. Construction work began in 1964, it was put into operation in 1967, and it was fully completed in 1968. The length of the reservoir's water surface is 3.9 km, width is 1.8 km. The water surface area is 12.8 km², the maximum (maximum) depth is 51 m, and the average depth is 30 m. The reservoir regulates the seasonal and partly perennial water regime of the river. The upper length of the dam is 593 m, the height is 68 m. A lifting dam with a length of 198 m and a maximum height of 12 m was built on the right bank of the reservoir. A water outlet with a water flow of 30 m³/s was built on the right bank of the reservoir. 2 conical dampers are installed in the lower part of the water outlet. On the left side of the dam, a spillway with a water flow of 260 m³/s (water flow during extreme floods of 480 m³/s) was built with the Left Bank Canal open.

Results. The erosion processes on the banks of the Pachkamar reservoir are mainly due to the large surface area of the reservoir (12.8 km²), which is why waves generated by strong winds wash away coastal rocks. Frequent changes in the coastline during seasonal water intake and discharge cause soil loosening and erosion. The area around the 198-meter dam on the right bank is more exposed to wave action, which requires special engineering protection. If erosion processes continue for a long time, they may reduce the capacity of the reservoir and negatively affect the safety of hydraulic structures, therefore, the process is monitored. The depth of the reservoir, which is up to 51 meters, and the geological structure of the coast are among the main factors affecting the rate of erosion.

The method of calculating the rate of shoreline displacement compares maps or satellite images from different years to determine the displacement of the shoreline

$$E=\frac{L_1-L_2}{T}$$

where: E - coastal erosion rate (m/year) L_1 - coastline coordinate in the first year L_2 -coastal line in the next year **T** -time interval (years) For example: coastline in 2010 = 120 m, coastline in 2020 = 95m, time = 10 years $E=\frac{120-95}{10}$ The result: we can see that the coast is eroding by an average of 2.5 meters every year.

$$V= L \times h \times S$$

Here: V- volume of eroded soil L - bank length h - bank height S - bank displacement. So, using these formulas, we can determine that up to thousands of m^3 of soil can be eroded in a reservoir every year. Therefore, constant monitoring around reservoirs is important.

Conclusion. The abrasion processes observed on the banks of the Pachkamar reservoir are affecting the morphometry of the reservoir every year. Calculations show that as a result of bank erosion, hundreds of thousands of cubic meters of soil enter the reservoir every year. Therefore, regular monitoring of these processes based on GIS (Geographic Information Systems GIS) technologies and remote sensing data is important.

References

1. E. Safarov, I. Musaev. Geoaxborot tizimi va texnologiyalari. O_quv qo_llanma. Toshkent. 2012. Tafakkur.-184. Gambling.

2. “Pachkamar suv ombori”, O‘zbekiston milliy ensiklopediyasi:7-jild Toshkent: „O‘zbekiston milliy ensiklopediyasi“ Davlat ilmiy nashriyoti, 2004 704-bet.

3.Nabiev E. Reliability study of irrigation canals and pipe culvers //E3S Web of Conferences. – EDP Sciences, 2023. – T. 410. – C. 05025.

4. Xujakulov, R., Rahmatov, M., Nabiev, E., & Zaripov, M. (2021). Determination of calculating stresses on the depth of loess grounds of hydraulic structures. In *IOP Conference Series: Materials Science and Engineering* (Vol. 1030, No. 1, p. 012133). IOP Publishing.

5. Nabiev E. **Reliability indicators of pipeline water supply systems for irrigation canals** //Intent Research Scientific Journal-(IRSJ) ISSN (E): 2980-4612 Volume 4, Issue 3, March - 2025