Rakhmonov K.R., PhD., Assoc. prof.

Lecturer at Terrestrial Hydrology Department

National University of Uzbekistan named after Mirzo Ulugbek

Tahkent, Uzbekistan

Sultashova O.G., PhD., Assoc. prof.

Lecturer at Natural geography and Hydrometeorolgy Department

Auezov A.S.

Mgr student

Karakalpak State University named after Berdakh

Nukus, Uzbekistan

Abatova N.

Mgr student

Karakalpak State University named after Berdakh

Nukus, Uzbekistan

Xalmuratov B.

Mgr student

Karakalpak State University named after Berdakh

Nukus, Uzbekistan

THE CONNECTION BETWEEN THE SUSPENSION RUNOFF OF THE SURKHANDARYA BASIN RIVERS AND THE WATER FLOW

Annotation. The study of water erosion from rivers basin and their formation in the formation of suspended riverbeds is of great scientific and practical importance. Research in this area will allow, firstly, to determine the laws of water erosion and the formation of suspended riverbeds, and secondly, will be important in the practice of irrigation and hydraulic engineering. With this in mind, the issue of in-depth study of the erosion processes in the river basin, to draw appropriate conclusions from it and to develop the necessary recommendations in this regard is very important today.

Keywords: water flow, hydrological data, correlation coefficient, water consumption, hydrological post

The extreme values of turbidity and flow in the Surkhandarya basin rivers were first studied by V.L. Shuls, but later the problem was covered in the scientific works of Yu.N. Ivanov, O.P. Sheglova, A.R. Rasulov, Z.S. Sirliboeva, F.H. Hikmatov, S.R. Saidova and others. However, given that these calculations were made almost 35 years ago, it is one of today's requirements to determine such work on the basis of the latest hydrological data [6].

In order to achieve this goal, the following tasks were considered and solved:

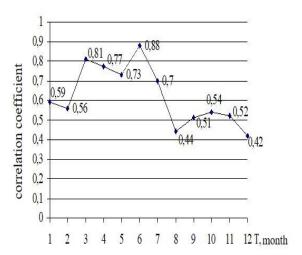
- collection of hydrological data on suspended runoff (R, kg/s) and water consumption (Q, m^3/s) observed in selected rivers;
- to study the relationship between suspended solids and average annual values of water consumption;
- Assess the relationship between suspended discharges and average monthly water consumption and their annual variation.

The Surkhandarya basin was selected as the object of research to cover the issue. Accordingly, the study of the relationship between the suspended runoff of the rivers belonging to this basin and the water consumption and the drawing of appropriate conclusions from them determine the subject of the study.

Standard hydrological data on average monthly and annual suspended runoff and water consumption were collected and analyzed in order to perform the tasks set out in the study. These materials are standard hydrometeorological data recorded for many years at the hydrometeorological posts under the auspices of Uzhydromet.

Graphs of the relationship between the suspended runoff of the studied rivers and the water flow were initially drawn based on the average annual values of these magnitudes. These types of relationships were statistically evaluated, that is, regression equations representing the relationships between

hydrological variables were constructed, and double correlation coefficients were calculated. This category of work was initially carried out on the example of the average monthly suspended runoff (1935-1987) and water consumption (1930-1987) observed at the Zhdanov hydrological post in Surkhandarya. The change in the month-to-month correlation coefficients, determined on the basis of the monthly amounts of water consumption, was analyzed with the help of suspended flows (Fig. 1).



r(x,y) = 0.90R, kg/sec 700 y = 2,5595x - 101,35600 $R^2 = 0.8098$ 500 400 300 200 100 0 100 150 200 250 300 Q, m³/sec

Fig. 1. Changes in the correlation coefficients representing the relationship between the Surkhandarya (Zhdanov) suspension runoff (R) and water (Q) flows

Fig. 2. Correlation between

Surkhandarya (Zhdanov) annual
suspension runoff (R) and water (Q)
consumption

The highest values of the correlation coefficients, representing the relationship between monthly suspended runoff and water consumption, occur in March-July. The maximum correlation coefficient was 0.88, which was observed in June. Its minimum value (r = 0.42) is in December (Figure 1).

In the next part of the study, the relationship between the average annual values of suspended flows and water consumption observed at the hydrological post in the village of Surkhandarya Zhdanov was studied (Fig. 2).

The density of the relationship between the average annual suspended runoff (R) and water (Q) consumption r q is equal to a correlation coefficient of 0.90.

At the next stage, on the basis of hydrological data observed at the Shurchi hydrological post in Surkhandarya in 1955-2018, the relationships between suspended runoff (R) and water (Q) consumption were studied, correlation coefficients were calculated, and their annual changes over months were assessed (Fig. 3).

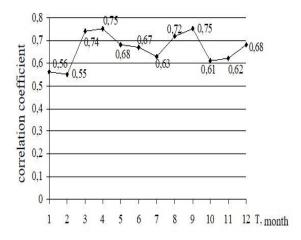


Fig. 3. Changes in the correlation coefficients representing the relationship between the Surkhandarya (Shurchi) suspension runoff (R) and water (Q) consumption

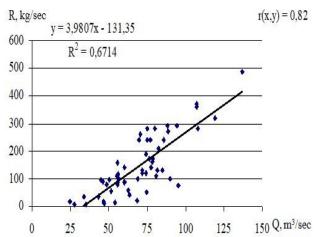


Fig. 4. Graph of connection between
Surkhandarya (Shurchi village)
suspension runoff (R) and water (Q)
consumption

In this case, the minimum value of the correlation coefficients is in February (r=0.55). The densest correlations are typical for April and September, when the calculated correlation coefficients for these months are r=0.75.

The connection between the average annual suspended runoff and water consumption at the Shurchi hydrological post in Surkhandarya is also much more intense. The correlation coefficient of the regression equation representing this relationship is r = 0.82 (Fig. 4).

In the final phase of the study, the relationship between the average annual and monthly suspended runoff (R) and water (Q) consumption observed at the Manguzar hydrological post in Surkhandarya was studied. Based on the

values of the calculated correlation coefficients, their monthly variation during the year was considered (Fig. 5).

The maximum value of the calculated correlation coefficients for suspended runoff and water consumption (r = 0.92) is in March. The lowest value of the correlation coefficient is 0.56, which is for December.

Table 1. Regression equations and correlation coefficients representing the relationship between annual suspended runoff and water consumption

№	River observation point	Regression equation	Correlation
			coefficient (r)
1	Surkhandarya - Zhdanov	$R_{o'rt} = 2,5595 \cdot Q_{o'rt} - 101,35$	0,90
2	Surkhandarya - Shurchi	$R_{o'pr} = 3,9807 \cdot Q_{o'rt} - 131,35$	0,82
3	Surkhandarya - Manguzar	$R_{o'rt} = 3,9571 \cdot Q_{o'rt} - 61,895$	0,88

The results of the calculations show that the correlation coefficient related to the flow of water and suspended streams observed at the hydrological post in the village of Zhdanov, Surkhandarya, is higher than at the Shurchi hydrological post. Furthermore, the correlation coefficient determined based on the average annual values of suspended runoff and water consumption measured at the Manguzar hydrological post was 0.88 (Table 1).

The regression equations obtained in the study can be used directly in the practice of hydrological calculations. For example, in some years or months, it is possible to recover unobserved values of suspended streams using regression equations. As a result, it will be possible to lengthen the short line of the suspension runoff.

Reference:

- Иванов Ю.Н. СВН рек бассейна Сырдарьи. Тр. САНИГМИ. 1967.
 -Вып.36(51). -309 с.
- 2. Расулов А.Р., Хикматов Ф., Сирлибаева З.С. Формирование и режим СВН горных рек // Динамика и термика рек,... Тезисы докладов III Всесоюзной конференции. М., 1989. С. 203-205.

- 3. Хикматов Ф. Анализ стока взвешенных наносов рек Центральной Азии // Проблемы освоения пустынь. Ашхабад, 2001.- 1. С. 39-46.
- 4. Шульц В.Л. Реки Средней Азии. Ч. 1,2. -Л.: Гидрометеоиздат, 1965. -691 с.
- 5. Щеглова О.П. Формирование стока взвешенных наносов и смыв с горной части Средней Азии // Тр. САНИГМИ. 1972. Вып. 60 (75). 228 с.
- 6. Джаксымуратов К., Отеулиев М., Айтмуратов А., Бекмуратов А. Исследование режима, ресурсов и использование подземных вод южного Приаралья (Республика Каракалпакстан). "Экономика и социум" No12(79) 2020, 497-501 с. DOI 10.46566/2225-1545_2020_1_79_497 (https://a78cf8ac-3ef5-4670-8fcd-a900ec94fdfb.filesusr.com/ugd/b06fdc_661c534fcbf1415e8be8dd5c1850f 5e2.pdf?index=true)