STATISTICAL ESTIMATION OF THE FEED SOURCE AND HYDROLOGICAL REGIMES OF THE PISKOM RIVER

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Abstract: *In this article reviews statistical estimation of sources and hydrological regimes of the Piskom River Basin. Discussed average yearly water expenditure trends of the river basins situated in this area.*

Key Words: *river basins, water discharge, flow volumes, regression equation, variation coefficient, trend coefficient, chronological graphs, synchronism, water content, extreme values.*

1. Introduction:

The flow of rivers is not constant from year to year, and sometimes it changes. All of Central Asia's rivers are mostly feeds with snow water, so the annual flow of this rivers depends primarily on how much snow is accumulated in the mountains for a period of watery time. In rivers feeds with ice and glacial snowfalls, the flow change is smaller year by year. Because the amount of flow generated by the melting of ice and glaciers will not depend on the amount of precipitations which falls in the same year. The amount of flow created by ice and glaciers is almost marks with energy balance of sun on the ice and glaciers. It is determined by a heat balance during melting periods (July - September).The energy balance during the melting period of ice and glaciers changes not big from year to year and stays stable over the years. In addition, the flow of groundwater comparing with snow water also changes few year by year, whereas groundwater reserves are substantially flooded by melting of the seasonal snow. The fluctuation of the flow over the years depends on the source of the flow of rivers[1].

In the Central Asian rivers there is a tendency of duplication and seasonal recurrence of grazing years during flow of annual flows.

In watery years returning period of which water volium not les then many years water volum is equal to 81%, and in less water period it equal to 84%.

There are no years with synchronic in change of water level in rivers. Even in extreme watery and less water years rarely seen the same water volumes of river [3].

2. Goal of the research:

To study the formation of the hydrological regime of the Piskom River based on new data. For realizing this goal, the following tasks have been identified and solved:

- Determine the discharge source and quantity evaluation of the Piskom basin.
- Statistical evaluation of the hydrological regime of the Piskom River

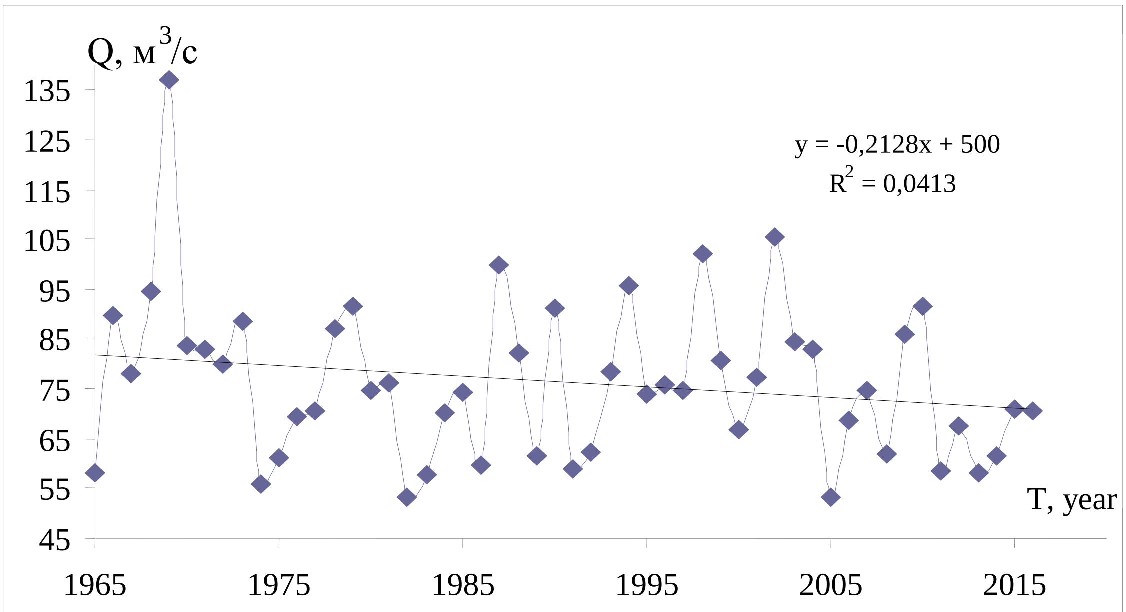
3. Analysis and Discussion:

According to V.L. Shults, average annual water consumption of the Piskom River is 82.2 m^3 / s, Maydontol rivers is - 15.0 m^3 / s, and Oygain rivers is - 27.9 m^2 / s. Thus, the water flows to Piskom basin from Maydontol River 17% and Oygai River 37%. The average flow module of the Maydontol River is 31.8 l / sec * km^2, and 27.4 l / s km^2. In downstream of the Piskom River is 29.0 l / s * km2. The average annual water discharge of the Piskom River varies between 56 - 118 m^3 / s [3].

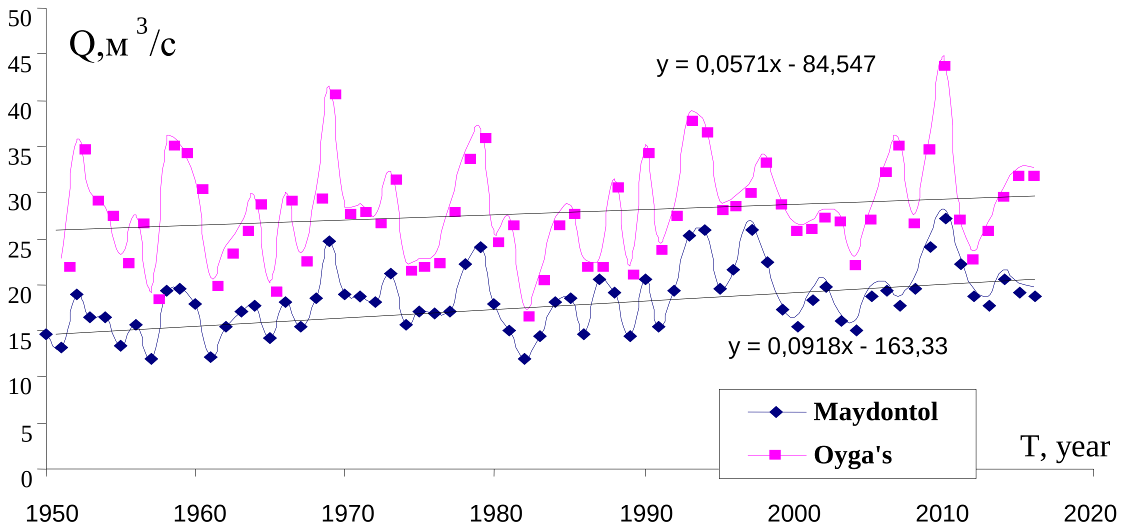
Statistical indices of water discharge of Piskom River and rivers contactes to this basin have been evaluated and the results are given in Table 1 below. The Piskom River water discharge variability coefficient is only equal to CV = 0, 208, whereas both Maydontol and Oyga's rivers variability coefficients are equal toCV = 0.215 and CV = 0.191. Such small values of variation coefficients typical for rivers which feeds with ice-cold water. Annual water discharge change can be expressedregeneration equations. It is clear from the equation,protected water discharge at Piskom – Mullala Hydrostation and this discharge equal to 0.2128, which means Piskom-Mullala river discharge decrease with that average. The water discharge of the Oygai and Maydontol rivers have increased every year by 0.0571 and 0.0918 m^3 / s (Table 1) .

Table 1. Statistical indices of the Piskom river basin

River basins	**Average annual water discharge, Q m3 / c**	**Quadrature is y**	**Variation coefficient Cv**	**Regression equation**	**Trend coef ficient**
Piskom-Mullala	76,37	15,87	0,208	У=-0,213Х+500	-0,2128
Oygai's - rivers	28,77	5,483	0,191	У=0,0571Х-84,55	0,0571
Maydontol –rivers	17,6	3,777	0,215	У=0,0918Х-163,3	0,0918



1–Figure. Chronological chart of the Piskom River Water discharge



2 -Figure. Chronological chart of water charges for the rivers Oygais and Maydontol

Charts show that the flow of water in the rivers has synchronous oscillations over the years, and water discharge similarly changes in different watery years. The average yearly water discharge of Piskom, Maydontol, and Oygai Rivers is shown in Figure 1 below. During the 1933-2016 year, the most watery years were found in the Maydontol River: in 1952, 1958, 1959, 1969, 1973, 1978, 1979, 1965, 1987, 1988, 1990, 1992-1998, 2001, 2002, 2007-2012. On Oygaing river meet: in 1934, 1942, 1946, 1948, 1949, 1952, 1953, 1958-1960, 1968-1969, 1973, 1978-1979, 1987-

1990, 1997-1999, 2006-2007, 2009-2010. The water discharge of Maydontol River which was less than the norm seen between 1934-1940, 1943-47, 1955-57, 1961-62, 1965, 1967, 1974, 1981-83, 1986, 1989. The water discharge of Oygaing River which was less than the normis observed in the following years: 1936-40; 1950-51; 1957; 1961-62; 1965; 1967; 1974-76; 1982-83; 1986; 1989; 1991; 2004; 2011-2016.

From the aforementioned years it is known that watery and low water years can form groups in sequential order. But, it has been analysed that in the rivers of Maydontol and Oyana, much and less watery years are always not similar. For example, in 2012-2013, water discharge was higher than the norm in Maydontol river, whereas water discharge in the Oygai River was much lower than norm. Compared to the annual changes in the Piskom, Oygaing and Maydontol rivers, the average flow of water in the Piskom River is decreasing, while the Oygaing and Maydontol river discharge have a smaller increase.

According to the Shults V.L. classification, these rivers are classified into rivers which feeds with snow-ice, delta d coefficient for watery year (2016)for Piskom, Oygaing and Maydontol rivers is d = 0,618; 0.821; 0.565; for low-watery year (1982) is d = 0,735; 0,744; 0.775; for average watery year is d=0.743; 1,015; 0,921.

Table 2.Coefficient of V.L. Shults for Piskom river basin ($d=W_{VII-IX}/W_{III-VI}$)

River-point	High watery year (2016)	Low watery year (2003)	Average watery year (1982)	Average long-term
Piskom-Mullala	0,618	0,735	0,743	0,766
Downstream of Oygaing	0,821	0,744	1,015	1,031
Downstream of Maydontol	0,565	0,775	0,921	0,939

Melting of the snow and ice with different score in Central Asian river basins causes to change of share of flow with different value in different year and prologs to many month. As a result, watery period of river prolongs to long time and curve of water value graph of this river takes shape of long and not high figure. The Central Asian Rivers differ with these properties from flat rivers. In plain area river basin melting of the snow goes in all territory and prologs for short time. For this reason curve of flat rivers short and high. 20-80% of the water value in the Central Asian river flows in watery years Spring (from March to June). In this period can be observed maximum flow of the river in low places.

4. Summary:

Piskom River is one of the main creator rivers of the Chirchik River and its basin is bordered by the Talas Olatovs in the north, the Ugam ridge in the northwest, and the Piskom mountain in the south and southeast. Almost half of the glaciers which feeds, or 140 of the 222 glaciers are located in the Piskom basin, mainly in the watershed area of Maydontol and Oygai.

According to the researches of V.L. Shults, average annual water discharge of the Piskom River is 82.2 m^3/s, Maydontol's - 15.0 m^3/s, and Oygais - 27.9 m^3/s. Thus, the Maydontol gives about 17% of water to the Piskom River, and Oygaigeves37% of the water of Piskom. The average value of the flow module is 31.8 l / sec * km^2, and Oygais is 27.7l /sec* km^2. In the low part of Piskom River average flow module equal to 29.0 l / s * km^2 Water discharge of Piskom River varies between 56-118 m^3/h.

The Piskom River's water discharge variability coefficient is CV= 0.208, whereas both Maydontol and Oygai's rivers are CV = 0.215 and CV = 0.191. These small values of variation typical for river which feeds with snow-ice. Change of water discharge year by year can be explained with regression equations. It is clear from the equation that the water discharge continuous decreasing at the Piskom-Molala hydrostation, and this decrease equal to -0.2128, which means that the average annual water discharge of the Piskom-Mullala River decreaseswith this score. The water discharge of the Oygai and Maydontol rivers is increasing every year average 0.0571 and 0.0918 m3/s.

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