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Akzhigit Risbaev,
Lecturer at the Department of Physical Geography, National University of Uzbekistan named after Mirzo Ulugbek,
Mukhriddin Avezov,
Doctor of Philosophy in Geographical Sciences (PhD), senior lecturer at the Department of Physical Geography, National University of Uzbekistan named after Mirzo Ulugbek
Tashkent, Uzbekistan

IMPACT OF CLIMATE CHANGE ON THE AREA GLACIERS IN THE PSKEM RIVER BASIN

Abstract: *the article provides a brief physical and geographical overview of the Pskem River basin. Information is provided on the decrease in the area of glaciers (in%) in the river basin. Pskem depending on their morphological type. An analysis of glacier degradation in the river basin was carried out. Pskem (in sq. km) depending on the exposure of the slopes.*

Key words*: cirque glacier, exposure, morphological type, river basin, Pskem valley.*

Introduction. Currently, special and increased attention is paid to the problem of climate change and its forecast for the coming decades. A significant increase in the rate of glacier reduction is observed in almost all mountainous regions of Central Asia, in particular, in the Pskem River basin.

Method and research. River pool Pskem (area 2830 km^2) is located between the Talas Alatau and its southwestern spurs of the Ugam, Maidantal and Pskem ranges. The favorable orientation of the basin in relation to the movement of moisture-bearing air masses approaching the mountainous region of Central Asia from the west and southwest facilitates their easy penetration into the upper reaches of the river, and the location of the ridges forming a

closed “bag” in the upper reaches creates conditions for complete moisture capture, brought by these air masses [4].

Results of research. The annual amount of precipitation in the upper reaches of the basin can reach 1500-2000 mm and most of the precipitation falls in solid form (snow). Orographic features of the river basin Pskem and the relatively low air temperatures of the warm half of the year create favorable conditions for the accumulation of solid precipitation and the formation of glaciers.

When compiling the catalog, aerial photographs (AKFS) from 1968 were used. As a result of deciphering the AKFS of the Pskem river basin, 250 glaciers with a total area of 89.4 km^2 were identified, among which 214 have dimensions greater than 0.1 km^2 [2]. Of these: complex valley – 7, simple valley – 12, asymmetric valley – 2, cow-valley – 20, cirque – 111, slope cairn – 8, cairn – hanging – 34, hanging-cir – b, hanging – 4, slope – 10. The distribution of morphological types of mountain glaciers in the Pskem River basin is shown in Figure 1.

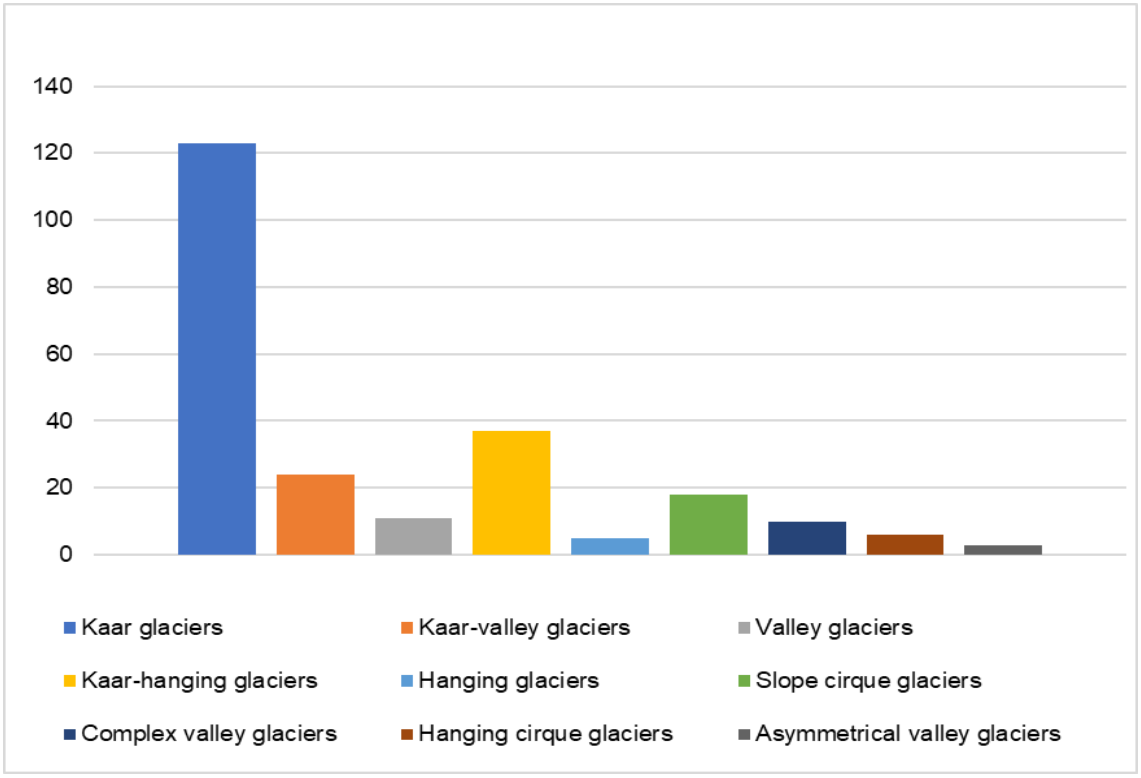

Fig. 1. Distribution of glaciers by morphological types [2].

Of these, the cirque morphological type of glaciers predominates. Tar glacier is a small mountain glacier that lies in a bowl-shaped depression in the slope created by the activity of snow and ice. The glacier can occupy the entire crater or part of it and, as a rule, ends in a short tongue; at the mouth of the cara it is usually bordered by the bank of the terminal moraine.

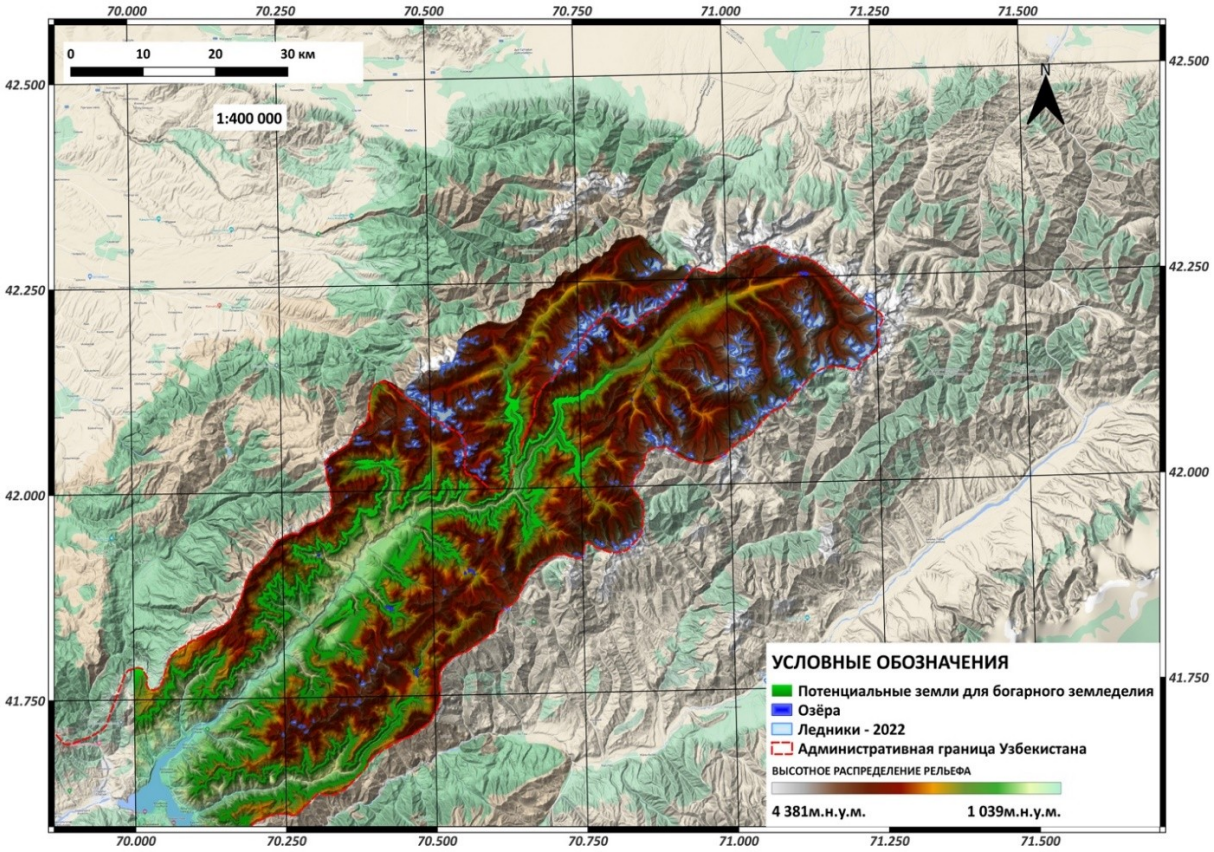

Fig. 2. Map of glaciers in the Pskem river basin

The area of glaciation varies depending on the morphological type of glaciers. The greatest reduction in the area of glaciers is characteristic of hanging cirques (-43.7%), on slope cirques (-34.l%), cirques (-30.2%) and hanging cirques (-33.8%) glaciers. On valley (+1.7%) and complex-valley (+3.9) glaciers, a slight increase in the area of icing was observed. However, in general, in almost all morphological types (not including valley and complex-valley) there is a process of reduction in the area of glaciers. T.Sabitov [3]

shows in his works that the area of the Barkrak Left glacier in 1968 was 1 km^2, and in 2020 0.76 km^2, i.e. decreased by 24% over 50 years.

Table 1. Reduction in the area of glaciers (%) in the river basin Pskem depending on their morphological type from 1968 to 2022

Morphological type	Glacier area, km^2		ΔS, %
	1968	2022	
Valley glaciers	11,7	11,9	+1,7
Kaar-valley glaciers	24,4	21,4	-12,3
Kaar glaciers	34,1	23,8	-30,2
Kaar-hanging glaciers	11,4	7,5	-33,8
Hanging glaciers	1,4	1,1	-22,9
Slope cirque glaciers	8,5	5,6	-34,1
Complex valley glaciers	11,3	11,7	+3,9
Hanging cirque glaciers	3,5	1,9	-43,7
Asymmetrical valley glaciers	0,7	0,6	-14,3
Total	107,0	85,6	-20

Source: the table was compiled by the author based on data from tables [2, 3].

It has been established that the exposure of mountain slopes affects the position of the snow line. On the southern slopes the snow line rises higher than on the northern ones (for northern latitudes). The author analyzed the location of glaciers by exposure. As a result, the degree of change in the area of glaciers (Table 1, Fig. 2 and 3) in the Pskem River basin was established.

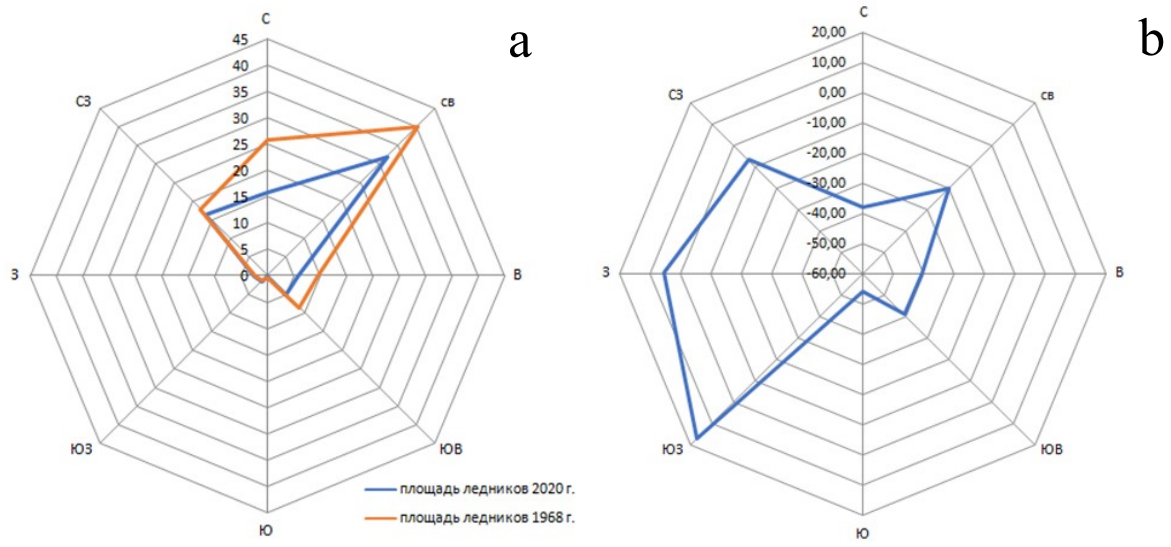

Fig. 3. Reduction in the area of glaciers in the Pskem river basin (km2) depending on their exposure from 1968 to 2022: a – distribution of glacier area by exposure in 1968 (1) and 2022 (2); b – reduction in the area of glaciers of different exposures, in %.

Conclusion. In conclusion, it is noted how the areas of glaciers in the Pskem River basin have changed from 1968 to 2022 (by 20%). Analysis of the distribution of glaciers by morphological types suggests a decrease in the areas of glaciers such as cirques, slope-cirques, hanging cirques, hanging glaciers. carts. The area of glaciers has decreased quite significantly. Based on the slope exposures, we can conclude that there are mainly more glaciers in the northern northwestern and northeastern parts. A significant decrease in their areas was revealed in the southern and southeastern exposures of the mountains of this basin.

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