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ASSESSMENT OF THE CURRENT STATE OF THE ICE REGIME OF RIVERS
FROM DIFFERENT NATURAL ZONES OF THE LAKE SEVAN BASIN

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Climate change is profoundly altering the ice regimes of mountain rivers, making long-term monitoring essential for understanding hydrological responses to warming. This study assesses long-term changes in river ice regimes, including the duration of ice cover and other ice phenomena, over the period 1938–2024 based on observations from 34 hydrological stations operated by the Hydrometeorology and Monitoring Center of the Ministry of Environment of the Republic of Armenia and distributed across different natural zones of the Lake Sevan basin. The rivers exhibit a wide range of ice phenomena, including bank ice, ice cover, slush, ice drift, ice jams, and ice dams. The timing and duration of these phenomena are strongly controlled by altitude, with higher-elevation rivers experiencing earlier freezing and later ice breakup. Based on these characteristics, the rivers were classified into four ice-regime categories: stable ice cover, unstable ice cover, absence of observable ice phenomena, and rivers where ice formations have disappeared, primarily because of anthropogenic alterations. The results reveal a consistent reduction in the duration of ice phenomena across the basin throughout the study period. Moreover, since the early 1940s, the rate of change in river ice-regime characteristics has accelerated markedly, indicating increasingly rapid climate-related changes. Analysis of long-term variations in freezing and ice-breakup dates, together with air-temperature variability, demonstrates a clear trend toward later freezing and earlier ice breakup, providing robust observational evidence of the impacts of ongoing climate change on river ice dynamics in the Lake Sevan basin. These findings establish an important scientific baseline for future hydrological assessments and climate change impact studies in high-mountain river systems.

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Keywords: Armenia, Lake Sevan basin, ice regime, different natural zones, temporal changes.

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