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Climate change is disrupting seasonal flow of rivers

Climate change is disrupting the seasonal flow of rivers in the far northern latitudes of America, Russia and Europe and is posing a threat to water security and ecosystems. A team of scientists led by the University of Leeds analysed historical data from river gauging stations across the globe and found that 21% of them showed significant alterations in the seasonal rise and fall in water levels. In this study, the team used monthly average river flow measurements from 10,120 gauging stations from 1965 to 2014.

Human activities are altering river flow patterns worldwide, both directly through flow regulations such as reservoirs, and indirectly through land use change and the impacts of climate change on air temperature, precipitation, soil moisture, and snowmelt. Over two-thirds of the world's rivers have already been altered by humans even without considering the indirect impacts of increases in greenhouse gases and aerosols. River flow seasonality plays a critical role in the predicted cycle of floods and droughts. A weakening of these peaks and troughs can threaten water security and freshwater biodiversity.

In northern North America, the researchers found that 40% of the 119 stations observed showed a significant decrease in river flow seasonality. Similar results were also observed in southern Siberia with 32% of stations showing a significant decrease. There was a comparable pattern in Europe, with 19% of the river gauging stations experiencing a significant decrease—mainly in northern Europe, western Russia and the European Alps. In addition, regions in the contiguous United States (the lower 48 states in North America, including the District of Columbia) showed predominantly decreasing trends of river flow seasonality overall, except for rivers in the Rocky Mountains and Florida. In central North America, the research showed significant decreasing river flow seasonality trends in 18% of the stations. By contrast, the researchers found a significant increase in river flow seasonality in 25% of the gauging stations in southeast Brazil, showing that changes to the water cycle are having a different impact in some parts of the world.

The research concludes that there is a need to accelerate climate adaptation efforts to safeguard freshwater ecosystems by managing flows to try to recreate some of the natural systems and processes that are being lost. (Source: Hong Wang et al, Science (2024).