

Glaciers in the Bow Basin

How might climate change affect the Bow River? Human influences on the atmosphere through increased releases of greenhouse gasses are predicted to result in climate change. A rise in the average global temperature could be triggering a series of changes to our climate; one scenario suggests that these changes could include shorter, warmer winters, and changes in precipitation (proportionately more rain and less snow).

Potential Climate Change Impacts

The Intergovernmental Panel on Climate Change, an international co-operative of the United Nations Environmental Program and the World Meteorological Organization, has recorded nearly one degree Celsius ($^{\circ}\text{C}$) of global warming in the last century. Climate stations in Alberta reflect this trend. Average annual temperatures across the prairies have increased in the last 50 years, with Banff and Calgary warming almost 1°C in the last 65 years. Higher minimum temperatures, rather than higher maximum temperatures, are the basis for this warming trend. By the middle of this century, the prairie region is forecast to warm by 2 to 5°C in one scenario. In cold temperate climates like the Bow River Basin, one scenario predicts that this may result in changes to the timing of streamflows. A smaller proportion of precipitation would fall as snow, resulting in a smaller snowpack accumulated over the winter. With less snow available for melting, runoff and streamflows are predicted to decrease during the spring. The natural snowmelt regime of the Bow River may therefore decline to a modest runoff peak earlier in the spring. Streamflows would increase during the winter, as proportionately more of the winter's precipitation would fall as rain.



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Influences on Flow

Predicted changes to glaciers may also influence flows of the Bow River. Glacial meltwater contributes only about 2.5% of the total annual flow in the Bow River upstream of Banff, but in low flow years, it can contribute up to 16%. During the summer months, these contributions are about 7% during average flow years, but in the lowest flow year (1970), 47% of the August flows upstream of Banff came from glacial meltwater¹. Over the last few decades, glaciers in the Bow River Basin have been receding.

If this increased melting rate continues, increased flows would be expected during the summer. However, as the glaciers continue to retreat, less meltwater will be available over time to supplement streamflows during the summer. This source of water, increasingly important during years of drought, may therefore be in decline in the Bow River Basin. These cumulative changes in source waters may result in small changes in flow in typical years, but substantial declines in drought years.

Bow Glacier Recession Since 1898



Conclusion

These potential impacts on streamflows of the Bow River have implications for economic, societal and industrial sectors, as well as the environment. Several ongoing multi-disciplinary studies hope to forecast the impacts of climate change on the water resources and future water supply within the South Saskatchewan River Basin. Finding ways to better manage water resources and reduce conflicts between users are some of the goals of the studies and the Bow River Basin Council.

1. Reference: Young, G.J. 1996. Contribution of Glacier Meltwater to the Flow of the Bow River.

For More Information

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