



Valuating Service Loss of Snow Cover in Irtysh River Basin

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Abstract

Snow provides essential resources and services for human well-being and socioeconomic development in arid areas. With the change in snow cover resulting from climate change that causes concerns about its consequences, there is a pressing need to analyze and understand its impact on the benefit that people has been enjoying from snow. These can be derived from the variation in economic value of snow services, that are demanded to meet socioeconomic activities. Based on the average of snow cover from 1979 to 2016 in Irtysh River Basin, we use the approach by applying economic evaluation to estimate the annual value loss of snow services. Considering the decreasing trend of snow mass at rates of $-10.2 \times 10^6 \text{ t year}^{-1}$ ($p < 0.05$) or 0.3% per year, the annual service loss in Irtysh River Basin is currently worth up to 196 million Chinese Yuan. Within it, the service loss of climate regulation contributes the most, or about 84.7 million Yuan. The loss of freshwater service contributes only about 19%, implying that there would be a significant underestimation of service loss if only water supply would be considered. This may cause biased decision-making when we are facing the challenges of declining services as a result of climate change, impacting on the balancing of socioeconomic development and environment conservation for the sustainability over a long term.

Keywords: cryosphere science, climate change, snow cover; cryosphere service; service value; Irtysh River Basin.