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Artificial snowmaking and potential water conflicts in mountain resorts. The case of Avoriaz (Haute-Savoie, France)

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The practice of artificial snowmaking is recent (1990s), and may use large volumes of water. In the French Alps, the total consumption is on average 20 Mm3 per year (Miquel, 2003), which corresponds to the annual consumption of drinking water for a city of more than 300,000 inhabitants such as Nice (France). Moreover, snowmaking does not represent the only use of water in winter sport resorts. The available water resource is used for drinking water, artificial snowmaking and leisure activities (swimming pools, golf spas). One can speak in this context of a multifunctionality of the resource. Of particular concern is the winter season when streams reach their lowest level (from December to April). These activities require that water is drawn from resources created at other times of the year.

Water for snowmaking production is pumped from drinking water reservoirs, rivers, groundwater tables, artificial hydropower reservoirs, as well as from hill water reservoirs, specifically built for storing water for snow production, themselves supplied from surface water capture. In Avoriaz (Haute-Savoie, France) the risk of shortages is important. The reason is that the resort is supplied by a unique lake or hillside reservoir (Lake 1730), which satisfies two particularly high-consuming water uses (the water supply for production of snow and drinking water). On a finer scale, namely that of a single day in January 2011, considerable volumes are drawn off in the space of a few hours (10,114 m3 on 24 January), while pumping for drinking water spreads out over several months. Intensity of use for the production of snow can trigger water scarcity and water conflicts with other uses such as drinking water.

Good management of the resource is, therefore, especially important. However, no legislation specific to artificial snowmaking has been established. Even if, at present, there is no situation involving shortages and conflicting uses at Avoriaz, the situation needs to be monitored. During winter 2010-2011, insufficient snowfall resulted in large-scale production of artificial snow, thereby considerably weakening the water resource. The poor contribution made by precipitation at the end of the winter and during summer did not enable these reserves to be refilled. In November 2011, reserves were insufficient to start snowmaking production. The lake level was very low and was disturbing the drinking water supply. Without precipitation at the beginning of winter the situation would have been catastrophic for the winter season. In conclusion, this study shows that resource sharing is a risky situation and can cause water deficits punctually.

Reference

Miquel, G. 2003. Rapport sur la qualité de l'eau et de l'assainissement en France. Office parlementaire d'évaluation des choix scientifiques et technologiques, Paris, 195 p.