

Salt vs Sand: The Environmental Cost of Winter Road Maintenance

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Abstract

As winter approaches, communities around the world that experience snow are faced with the tall order of keeping roads as safe as possible for motorists and pedestrians. In North America, municipalities have applied salts to roads to act as de-icing agents for over eighty years. In contrast to sand, which is used for its abrasive properties to help provide traction on slippery roads, salt lowers the freezing point of water which helps clear ice and snow from the road. Research shows that using salt, sand, or a combination of the two most certainly does make roads safer during the winter months. The parties responsible for winter road maintenance often focus on the financial cost of the operation, but there is an environmental cost as well. Sodium chloride (NaCl) is the most common form of salt applied to winter roads and has been shown to have significant effects on the environment year-round, not just when it is applied during winter. Roadside vegetation, amphibians, and macroinvertebrates are all susceptible to negative effects brought on by using salt for winter road maintenance. Both ground and surface water sources which are often relied upon by nearby human communities have experienced an increase in salt concentration that in some cases exceeds guidelines and thresholds established for clean drinking water. Sand has negative impacts on the environment as well- unlike salt, it does not dissolve in water and contributes to sediment build up which negatively impacts aquatic ecosystems. It also contributes to particulate matter in the air and bears the added cost of street sweeping and cleanup towards the end of the winter season. How these effects are measured and to what extent has been the subject of numerous studies and continues to be an important question for municipalities and the scientific community. Understanding these effects is important for future decision making on winter road maintenance - whether it be salt or sand - keeping both roads and the surrounding environment safe remains an important perennial task for society moving forward.