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RAMP

RIVER

PEOPLE

RESOURCES

ENVIRONMENTAL MANAGEMENT

## Potential Effects of Forestry on Aquatic Ecosystems

Without effective management and precautions, logging operations can have significant negative impacts on aquatic ecosystems, as described below.

**Changes to stream hydrology.** Forest harvesting can lead to changes in the amount of water entering streams as well as the timing of these flows. In forested areas, trees take up water from the soil and release it to the atmosphere through transpiration. Trees also provide shade that leads to slower melting of the snowpack. When trees are harvested, less precipitation is taken up by trees and water can move quickly over the land, especially if soil has been compacted by heavy equipment. Snowpacks in harvested areas melt more quickly without the shade provided by forests; during spring freshet, this can lead to a higher peak flow occurring during a shorter period of time. The changes in stream hydrology that occur as a result of forest harvesting depend on a complex interaction of harvesting practices, topography, vegetation, soil structure, and climate.

Impacts to stream hydrology can be minimized by appropriate planning. Information on soil texture, moisture content, equipment, and timing of operations (e.g., restricting logging to the winter, when soils are frozen) can be used to minimize soil compaction. Leaving some live trees or vegetation in the harvested area and prompt reforestation can also help to minimize hydrologic impacts.

**Changes to water quality.** Forest harvesting can lead to higher levels of sediment in nearby waterbodies. Removal of vegetation can leave the land exposed to erosion by wind or water; for example, without the interception of raindrops by vegetation, the impact of the water on exposed soils can dislodge soil particles that can then be carried into streams by surface runoff. Stream sediment concentrations can also increase if equipment is operated in or driven through a stream, or if the stability of streambanks is reduced by harvesting trees in the riparian zone. Whether carried into the water from the land or disturbed in-stream, higher sediment levels have negative effects on aquatic habitat (AARD 2006).

**Changes to in-stream habitat.** Logging in riparian zones can reduce shading and lead to higher water temperatures and exposure to ultraviolet radiation. Temperatures that are too warm can affect biological processes in fish and other aquatic organisms, while greater exposure to sunlight can lead to increased growth of algae in the streams. Logging in the riparian zone can also reduce the supply of nutrients (e.g., fallen leaves) and woody debris (e.g., fallen logs that provide cover for fish) to the stream.

The negative impacts described above have decreased in recent years due to both government regulation and cooperation by forestry companies. Today, sound management plans seek to minimize damage to aquatic ecosystems by considering the design and layout of cutblocks and roads in relation to the natural environment. For example, limits on harvesting in the riparian zone can help maintain streambank stability, allow riparian vegetation to trap sediment carried by surface flow, and help to maintain aquatic habitats.

Pollution from pulp mills is another potential negative impact on aquatic ecosystems. The by-products of chlorine bleaching (e.g., dioxins and furans) used in pulp mills can be highly toxic to aquatic organisms and historically have been a major issue of concern. Today, however, most mills use different processes and chemicals and have reduced the discharge of these highly toxic chemicals into the environment. However, other components of pulp mill effluent can have negative impacts on the aquatic environment as well. The breakdown of organic matter in effluent can consume large amounts of oxygen, leaving the water oxygen-depleted. This condition is stressful for many aquatic organisms. Under current laws, pulp mill discharge into aquatic environments is strictly regulated, with effluent quality and its impact on the environment regularly monitored.

The [Aquatic Ecology](#) module discusses these issues further.



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