

# **Karst Vulnerability Assessment Procedures and their Linkage to Forest Management Guidelines, British Columbia, Canada**

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## **Abstract**

British Columbia, on the west coast of Canada, contains significant tracts of forested and mountainous terrain, with forestry being an integral part of the British Columbia economy. Some of the best known karst and cave areas in British Columbia occur on Vancouver Island, where considerable activity in forestry occurs. In 1997, an initiative was put forward by the British Columbia Ministry of Forests to manage karst as a functional ecosystem. Since that time a set of karst inventory standards have been developed, along with a handbook for karst management guidelines. (The latter has yet to be released.) A karst vulnerability rating procedure is used to directly link the karst inventory data/attributes to the karst management guidelines at the site level (1:5,000 or 1:10,000 scales). Karst Field Assessments are required for any proposed forest development (for example, a cutblock or road) on or adjacent to karst areas. The attributes evaluated during the Karst Field Assessment include: (1) the karst unit boundaries and geological characteristics; (2) the surface epikarst; (3) the overlying soil thickness and texture; (4) the location, density, and significance of surface karst features; (5) the roughness of the overall karst surface; (6) karst streams and hydrology; (7) the potential for caves and other subsurface openings; and (8) the occurrence of unique or unusual karst biota and/or habitat. A four-step karst vulnerability procedure is used to stratify the forested karst landscape, resulting in polygons with low, moderate, high, or very high vulnerability ratings. This procedure evaluates a combination of epikarst sensitivity, surface karst feature density, and subsurface karst potential. The procedure also allows for the integration of three modifying factors: fine textured and erodible soils, karst topographic roughness, and unique or unusual karst biota and/or habitats. In karst landscapes with a low vulnerability (for example, poorly developed epikarst, no surface karst features, and thick soil cover) management using existing British Columbia Forest Practice Code guidelines would be acceptable. In karst terrain with a moderate vulnerability (for example, a small number of surface karst features, thin soil cover and moderately developed epikarst) certain modified practices would be required along with the Forest Practice Code guidelines. In karst areas designated as high vulnerability (for example, well developed epikarst, high density of surface karst features and high likelihood for subsurface openings) management would likely involve measures not currently covered by the Forest Practice Code. These measure could include specialized road construction techniques and harvesting practices (for example, partial cutting or heli-logging). In very high vulnerability karst where there is a high level of openness between the surface and subsurface, no harvesting or road construction would normally be carried out. The vulnerability rating procedure as outlined could have applications for other development activities in karst terrain, such as mining, urban construction, and park lands. The vulnerability rating procedure used in these situations would systematically stratify the karst landscape, allowing for management constraints or prescriptions to be applied in an unbiased manner.