The comparison of LIDAR and traditional elevation data for watershed modelling

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Digital Elevation Models (DEM) are becoming a standard dataset used in many geological applications in recent times. The use of DEMs in environmental geology in the areas of watershed modelling and geomorphology are the focus of the research discussed here. Watersheds are important physical regions that define the catchment of all water flowing into a stream outlet. The watershed or catchment area can be used to assess variations of sediment concentrations, water quality, and water quantity of a stream. Watershed modelling, among other things, involves the use of a DEM to automatically define watershed boundaries, flow direction, and flow accumulation. High resolution DEMs are able to replace stereo airphoto interpretation in some geomorphological investigations. Traditional elevation data derived from photogrammetry are available for the Province of Nova Scotia at a horizontal spacing of 70 m with a vertical accuracy of ± 2.5 m. These data have been used to construct DEMs with a 20 m grid spacing and have been used to automatically build watershed boundaries. A new technology, Light Detection and Ranging (LIDAR), has been acquired in the central Annapolis Valley region with a horizontal spacing of 2–3 m and a vertical accuracy of 15 cm. The LIDAR data has been gridded to a DEM with a 2 m grid spacing using a variety of techniques. Image data ranging from airborne spectral, to satellite optical and radar data are also available for the study area and will be used to derive other modelling parameters related to surface run-off such as land cover, land use, and leaf area index. Other parameters such as geology and soil properties will be incorporated into the GIS database. An example application to compare this new technology to traditional data is planned that will include a variety of topographical index measurements as well as watershed modelling of rainfall run-off events and water quality prediction.