Aquifer vulnerability and direct recharge from precipitation were modelled in Okanagan Basin, British Columbia. The vulnerability study evaluated mapping approaches for regional and local scales using the DRASTIC method. Original rating tables provide sufficient detail for mapping at the regional scale, where broad ranges of geologic material are present. However, modified rating tables improved spatial representation of input parameters at local scales, which is useful for local planning. Spatially-distributed recharge throughout the valley bottom was modelled using the HELP code. Average annual recharge is 65 mm/yr, with 109 mm/yr near Vernon, and 37 mm/yr near Oliver. The regional recharge map adequately captured the magnitude and distribution compared to a local map constructed using HELP (42 mm/yr); However, regional recharge results were higher compared to a local map constructed using the MIKE-SHE code (6 mm/yr). Compared to measured evapotranspiration data, HELP appears to under-estimate evapotranspiration, therefore over-estimating recharge within semi-arid regions.