The primary objective of this research is to improve the methodology for water availability assessment at ungauged sites. The Ping river basin is selected as a study catchment because it is an upstream catchment contributing to the Chao Phraya river basin where the capital city of Thailand, Bangkok, is located. Having a shortage or abundance of water in the Ping basin will destroy the economics of the country. The Ping basin is data-sparse, especially along the border of the basin. Therefore, an estimation of water availability must be performed through regionalisation. The quality of each measuring gauge is assessed using scoring system developed for this study. Customisation of conceptual rainfall-runoff models is performed with an aim to capture hydrological responses. A number of parameter regionalisation approaches are tested and the most appropriated method is adopted. The performance of the model and associated uncertainties are evaluated. NAM and IHACRES considered the most appropriate models for regionalisation due to a small number of parameters. Simple techniques of regionalisation, i.e. linear regression, yield poor results compared to other techniques. Uncertainties are likely to arise from soil parameters.