Abstract: “Regularization” is a mathematical term that, in its broadest sense, refers to any measure that is taken to ensure that a stable solution is obtained to an otherwise ill-posed inverse problem. In traditional calibration practice, this is achieved through adherence to the so-called “principle of parsimony” in which parameters requiring adjustment through the calibration process are reduced to a number for which a unique estimate can be obtained for each. Use of regularization eliminates the need for a modeler to formulate a parsimonious inverse problem in which a handful of parameters are designated for estimation prior to initiating the calibration process. Instead, the level of parameter parsimony required to achieve a stable solution to the inverse problem is determined by the inversion algorithm itself. Where parameters, or combinations of parameters, cannot be uniquely estimated, they are provided with values, or assigned relationships with other parameters, that are decreed to be realistic by the modeler. Conversely, where the information content of a calibration dataset is sufficient to allow estimates to be made of the values of many parameters, the making of such estimates is not precluded by “preemptive parsimonizing” ahead of the calibration process. Use of automated methods of model calibration must not reduce the capacity of the modeler to exercise his/her judgment; in fact it should enhance it. Fortunately, regularized inversion allows a modeler’s judgment to become an integral part of the calibration process. The result is a stable process that allows maximum receptivity of parameters to both “hard information” provided by the measurement dataset and “soft information” embodied in a modeler’s understanding of the area, encapsulated in the set of regularization constraints. HSPF and GSSHA hydrologic models that have been developed for watershed systems in the Sinclair-Dyes Inlet Watershed in Kitsap County, Washington, USA will be used for the purpose of demonstration.