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A Framework for Knowledge Accumulation in Hydrology.

Knowledge accumulation is a necessary element of progress in any scientific field. However, hydrology has been rather poor in developing such a general and transferable knowledge base. The result of this problem is a tremendous amount of poorly connected empirical studies, which by themselves constitute research advancements, but whose general contribution remains unclear. High quality research, performed in individual studies, falls short of creating a holistic knowledge base for a science if individual studies cannot be connected to form a holistic picture. Hydrology, with its highly place based nature is, as are probably most geosciences, particularly problematic in this regard.

While one cannot prescribe scientific progress, I believe one can put a framework in place that fosters knowledge accumulation by enabling synthesis of individual studies. Such synthesis is necessary to identify generalizable principles and first order relationships. Main elements of such a framework include access to common datasets, the definition of essential hydrological descriptors, and the pursuit of comparative hydrology.

Implementing this framework to foster the advancement of a new theory has important consequences for our research, our publications and our teaching. In research we have to give equal weight to the synthesis of studies as we do to individual studies themselves. In publishing we have to provide essential hydrological descriptors that enable synthesis and the placement of each study into the larger hydrological context. And in education, we can use the ideas presented to move away from textbooks that are theoretically strong, but disconnected from real world situations. Throughout my talk I will use PUB-related examples to support my thesis that a framework with the above-mentioned elements is needed to improve knowledge accumulation in hydrology.