

An Alternative Approach to Measuring Hydrologic Change – a Comparison Study Between Raster-Based Analysis and “Indicators of Hydrologic Alteration”

Richard Koehler¹, Ph.D.

National Weather Service/COMET program, UCAR Office of Programs, Boulder, CO

Abstract. A comparison was made between Raster-Based Analysis (RBA) and the Nature Conservancy’s software application Indicators of Hydrologic Alteration (IHA). Data for this study came from the Colorado River at Lees Ferry, Arizona, U.S. Geological Survey gaging station.

Unaltered pre-Glen Canyon Dam streamflow data were evaluated by RBA and IHA. Data were then randomly shuffled and re-ordered on a yearly basis to create multiple flow scenarios for evaluation by both techniques. An additional dataset based on ranked annual streamflow volume was also used in this study.

Results show that while IHA captures within year flow patterns, “hydrologic alteration” statistics were virtually identical for all scenarios. Alternately, by using landscape ecology metrics RBA identified and quantified specific configuration changes not readily identified by IHA. Comparisons of streamflow configuration patterns measured by RBA show that IHA may either overlook interannual flow patterns or may incorrectly identify changes caused by climate as “hydrologic alterations”.

IHA is a successful technique used by multiple research groups and has capabilities that are not part of RBA. However, IHA has limitations when quantifying interannual streamflow patterns. RBA is an innovative approach that excels in quantification of streamflow configuration and provides additional data visualization techniques not available in IHA.

The most important conclusion from this study is that when the two approaches are combined, a robust method exists to compute composition and configuration statistics within the streamflow record. This united method also points the way for possible multi-year management options that address climatic variability and allow for a range of streamflow strategies.

¹ National Hydrologic Science Training Coordinator
National Weather Service/COMET program
UCAR Office of Programs
P.O. Box 3000
Boulder, CO 80301
303-497-8369