U.S. Forest Service (FS) initiated its watershed research program in 1909 with the first paired watershed catchment study at Wagon Wheel Gap, CO. FS has since developed the Experimental Forests and Ranges Network, with over 80 long term research study sites located across the contiguous US, Alaska, Hawaii, and Caribbean. This Network provides a unique, powerful continental research platform for study of complex environmental and societal problems at the local, regional and landscape scale. The study of water and ecosystems through paired catchment studies has been an integral component of many of these studies since establishment in the early and mid 1900's. FS continues to maintain and develop a robust program emphasizing long term research on watershed science. The extensive temporal and spatially explicit data acquired at these sites provide an invaluable record to (a) discern decadal and longer scale responses to drivers of environmental change such as air pollution and climate; (b) identify direct, delayed, and even ‘surprise’ responses to a suite of experimental manipulations focusing on forest management practices, wild and prescribed fire, nutrient amendments, and acidification; and (c) and retrospectively and prospectively test new hypotheses. The sites span complex geographic and environmental gradients in latitude, longitude, climate, and elevation, and represent diverse habitat, vegetation and soil types, which facilitates landscape-scale interpretations. This presentation gives an overview of FS catchment research, emphasizing paired-catchment studies, and highlighting important advances in ecosystem science and ‘lessons learned’ over the last century of FS research.