



Monitoring Riparian Ecosystems

Importance

Riparian vegetation is the most important functional component of riparian ecosystems. Near-stream vegetation contributes to stream-bank stabilization and provides habitat, organic matter, and nutrients essential to terrestrial and aquatic organisms. Riparian plant communities are sensitive to hydrologic change and vary depending on local geomorphology (see photo). Human activities and periodic natural disturbances, including flooding and fire, can affect riparian ecosystems. Also, climate change may affect precipitation regimes, leading to changes in the shape of stream channels and in water-limited ecological processes, such as nutrient cycling and plant reproduction. Integrated monitoring of vegetation, hydrology, and geomorphology can detect impacts and disturbances to these systems. Long-term monitoring of integrated riparian ecosystems will complement aquatic macroinvertebrate monitoring, thus providing a more complete evaluation of overall stream health.

Long-term monitoring

Riparian monitoring occurs along one to three reaches of selected streams in 8 Southern Colorado Plateau Network (SCPN) parks. Vegetation monitoring includes frequency and abundance of shrub and herbaceous species, and forest-structure attributes. In addition, surface and groundwater dynamics, and stream channel morphology are monitored. Pilot studies were completed in 2006 and initial integrated riparian monitoring was implemented at SCPN parks in 2007.

However, because of the large size, remoteness, and dynamic nature of some riparian ecosystems, this method of monitoring is too limited to detect all the variability within the system. SCPN is looking at the use of remotely-sensed imagery, including LiDaR (Light detection and ranging) and multispectral imagery to determine geomorphology and vegetation composition of riparian areas.

Management applications

Reduction or depletion of stream flow may result from diversion or retention of surface water, groundwater extraction, climatic drought, or a combination of an-



The vegetation near the Mancos River in Mesa Verde National Park varies depending on its proximity to the water and the shape of the floodplain. Photo courtesy of SCPN.

thropogenic activities and natural processes. Significant depletions of surface and groundwater can lead to dewatering of channels and floodplains, resulting in a variety of structural and functional changes, including the mortality of riparian vegetation and aquatic biota, destabilization of channel banks, and the encroachment of upland vegetation and nonnative weeds into the riparian zone.

The first few years of monitoring data will be used to document current conditions of selected riparian ecosystems in SCPN streams. Over the long term, integrated riparian data will be used to (1) examine the response of riparian vegetation to changing water availability or physical conditions, (2) follow the recovery of integrated riparian ecosystems after major disturbance events, such as floods or catastrophic fires, and (3) document riparian ecosystem response to climate change.

Contact

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Park units where riparian ecosystems are monitored

Bandelier NM	Mesa Verde NP
Canyon de Chelly NM	Petroglyph NM
Chaco Culture NHP	Salinas Pueblo Missions NM
Hubbell Trading Post NHS	Walnut Canyon NM