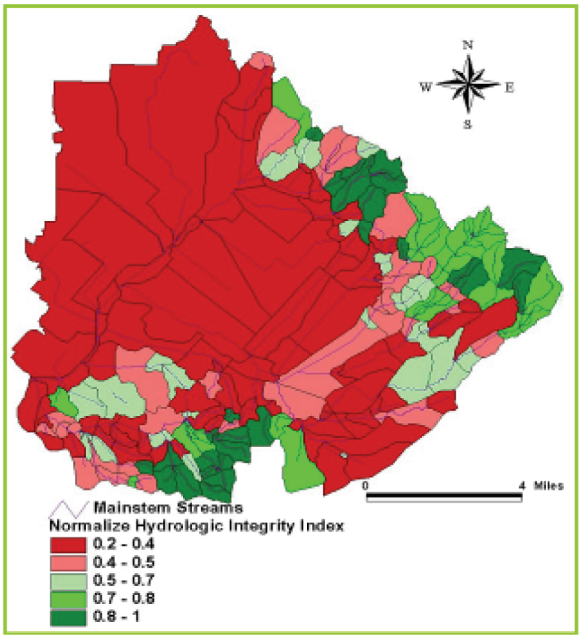
System-Wide Water SWWRP Resources Program

Multi-Scale Assessment of Watershed Integrity (MAWI)



Description: Existing methods for assessing ecosystem integrity focus largely on site-specific structural characteristics and processes, and often fail to consider how factors operating at larger watershed spatial scales influence ecosystem integrity. The Multi-Scale Assessment of Watershed Integrity (MAWI) is a planning level approach that employs a variety of field and remote indicators at multiple spatial scales to assess ecosystem integrity under existing as well as explicitly defined future development or restoration scenarios.

Application: The approach was developed and evolved through the assessment of riparian ecosystems in southern California watersheds (100-700 square miles). Results in these watersheds have been used successfully as part of Special Area Management Plans to (1) identify set aside areas, (2) compare project alternatives through a simulation of the potential impact on specific indicators and indices, and (3) develop restoration plans for riparian ecosystems in the watersheds. Current efforts are focused on adapting the approach to other ecosystems and regions, including the Russian River in northern California and the Onondaga Lake watershed in New York.

Benefits: Indices resulting from the baseline assessment provide a ranking of ecosystem integrity within a watershed that can be easily displayed and manipulated in a Geographic Information System (GIS). Indicators are scaled to a reference condition, therefore, baseline assessment results provide a measure of cumulative impacts to ecosystems within the watershed. Baseline assessment results also provide a basis for comparing alternative development and restoration scenarios.

Future Capabilities: Current work on the MAWI approach involves three major changes from earlier iterations: (1) Early applications of MAWI focused specifically on the current integrity and restoration potential of riparian ecosystems. Future iterations of MAWI will also address various aspects of upland and in-stream condition, as well as the vulnerability and conservation potential of these systems. (2) Scaling of indices will be done in a continuous rather than a discrete or categorical fashion, using a fuzzy expert system (Netweaver knowledge based development system). Fuzzy systems are a better reflection of the uncertainty inherent in natural systems and processes, and are also able to incorporate and evaluate the importance of missing data. (3) Use of the Ecosystem

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Management Decision Support (EMDS) to integrate and display the results of the fuzzy expert system models. The goal is to create modular fuzzy system templates/models in NetWeaver, which can then be easily transferred and adapted for the use and application of MAWI in any area of the country.

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