Metrics for Environmental Benefits Analysis

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Under expanding Congressional authorization and appropriation, the U.S. Army Corps of Engineers (USACE) established Ecosystem Restoration (ER) as a primary Civil Works mission with the primary purpose "…to restore significant ecosystem function, structure, and dynamic processes that have been degraded". The return on that investment has not been meaningfully quantified, due in part to difficulties in characterizing environmental outcomes. The USACE requires an approach for measuring project success that is applicable at both the project and programmatic levels as well as across ecosystem types. Past techniques for measuring success were largely subjective and rested in the hands of "professional judgment", and while these techniques may be somewhat effective, they are often unrepeatable, may express agendas, and are difficult to integrate into programmatic guidelines. More recently, scientists and practitioners have advanced and improved methods to quantify environmental benefits, including: peer review committees, reference system analyses, monetization of ecosystem services, emergy analysis, and net environmental benefits analysis. Each of these techniques serves a unique role in quantifying environmental benefits and contributes to the blossoming field of Environmental Benefits Analysis (EBA). As a major land holder, environmental manager, and funding source of many restoration projects, the USACE has a significant interest in advancing the field of EBA. As such, a multi-year, multi-million dollar program has been initiated to holistically incorporate EBA into a consistent framework for scientific valuation of projects and programmatic decision making. This program will emphasize seven research focus areas: conceptual modeling, metrics, evaluation and forecasting, decision analysis, environmental benefits quantification, ecosystem services, and programmatic assessment.

This presentation will discuss of one of these focus areas, metrics for environmental benefits analysis. Results of a meeting among a multidisciplinary, interagency committee of subject matter experts will be summarized and proposed approaches for establishing metrics will be offered. Choice of appropriate metrics will be integrated into a decision analytic framework and the importance of setting clear objectives highlighted. A unifying goal for effective ecosystem restoration and management, enhancing ecosystem integrity, will be presented, and major components of ecosystem integrity identified and discussed. Finally, an iterative three-step metric development process will be presented, consisting of: 1) selecting metrics based on a logical hierarchy of natural, constructed, and proxy metrics, 2) evaluating results based on desirable properties of metrics, and 3) documenting and archiving data and observations.