COMMON QUESTIONS:

WETLAND ASSESSMENT

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PREFACE

This guide is designed for local government officials, land trust staff, state and local officials, federal agency staff, developers and others interested in assessing wetlands for regulatory, restoration, land acquisition, environmental impact analysis, or other purposes. It addresses frequently asked questions concerning assessment. A selected bibliography and list of web sites provide the reader with more information concerning specific subjects.

The guide is the result of several Association of State Wetland Managers research projects over the last five years. It draws upon four technical reports by Jon Kusler concerning wetland assessment for regulatory purposes. See Kusler, J. 2004. Assessing Functions and Values. Association of State Wetland Managers, Inc., Berne, New York http://www.aswm.org/propub/functionsvalues.pdf; Kusler, J. 2004. Integrating Wetland Assessment into Regulatory Permitting. Association of State Wetland Managers, Inc., Berne, New York http://www.aswm.org/propub/integrating.pdf; and Kusler, J. 2004. Wetland Assessment in the Courts, Association of State Wetland Managers, Inc., Berne, New York http://www.aswm.org/propub/courts.pdf

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COMMON QUESTIONS
WETLAND ASSESSMENT

How important are wetland assessment criteria and procedures in the protection and restoration of wetland ecosystems?

A. Wetland assessment is the gathering and analysis of information needed for wetland decision-making. Assessment criteria and procedures are critical because the outcome of wetland protection/destruction battles is increasingly determined by the information available to decision-makers. As data gathering and analysis techniques become more sophisticated and complex, the types of information gathered and analysis procedures including simplifying assumptions become increasingly important. Assessment procedures often determine whether activities in wetlands are permitted and the impact reduction and compensation measures (restoration, creation, enhancement) required.

The wetland information needed by wetland decision-makers (e.g., regulators, planners, public land use managers) encompasses a broad range of issues and topics and is not limited to "functions" and "values" although most of the efforts to develop rapid wetland assessment techniques to date have focused on functions or functions and values. Required information also often includes the delineation of wetland boundaries, evaluation of natural hazards such as flooding and soil stability, determination of land ownership, evaluation of existing wetland uses, and other types of information. It includes information concerning public attitudes and values. All of the necessary information, not just one type, must be gathered by the wetland decision-maker with available funds and expertise and often within a limited time frame.

What is assessed and what is not assessed in a given instance and the methods used including scale and accuracy of assessment will often determine whether a wetland and related ecosystem will be protected or destroyed. Consider, for example, a proposed dam affecting many wetlands. Proponents of dams have traditionally concentrated their information gathering efforts upon economic benefits such as navigation, water supply, and flood control with limited consideration of biological and biodiversity impacts. If "assessment" efforts focus entirely upon water system benefits, decision-makers receive a one-sided picture. However, if assessment also considers economic costs, risks, impacts upon wetland and broader ecosystem biodiversity, and other impacts, decision-makers are presented with a more balanced view.

"Wetland assessment is the gathering and analysis of information needed for wetland decision-making. Assessment criteria and procedures are critical..."

The need for comprehensiveness and balance in assessment does not stop with including biological considerations in information gathering. Proponents of dams often now do carry out some measure of biological analysis but sometimes concentrate their evaluation upon warm water fish species. Warm water fish thrive in reservoirs and a dam may appear to have net environmental benefits if this is all that is considered. Nevertheless, a different picture emerges if impacts on coldwater fish, amphibians, birds, mammals, endangered species, and other species present in an unaltered stream are considered.

Therefore, the process by which wetland managers decide in a particular instance what types of information will and will not be gathered and the scales and degrees of accuracy is of great importance.

Is it possible to gather detailed information, up front, on all wetlands in a locality, region or state?

A. As a practical matter, no. In an ideal world, wetland decision-makers would gather all of the relevant types of biological and other types of information for wetlands and related ecosystems within a planning and management area. However, this is typically impossible because funds, staff, and time of decision-makers are limited. There are also scientific limitations and gaps in scientific knowledge (see discussion below).

Detailed and accurate evaluation of the functions and values has not taken place (as far as we can tell) for all wetlands within even a single local government in the U.S. despite community adoption of wetland plans and regulations for more than 30 years. Generalized assessment of the functions and values of most wetlands has taken place for a small number of communities (primarily "Advanced Identification" and Special Area Management efforts using WET and other techniques).

Because of the costs of detailed and accurate information gathering and analysis are great and the time and expertise available limited, choices must be made in the geographic scope of the information gathering, the types of information gathered, and the scales and degrees of accuracy. Data gathering must be prioritized and simplifying assumptions and compromises must be made. These choices have strong "policy" as well as scientific components and individuals and groups designing and using wetland assessment methods wield considerable power over the ultimate protection/destruction decisions.

Field assessment

When information is gathered is also important. For large water projects and land development schemes, information is needed "up front" before final decisions are made to construct dams, drainage projects and the like. It is very difficult to incorporate wetland protection/restoration in project design when biological information is not available at an early stage.

Not only the types of information gathered but also who gathers the information is also important. Government regulators often must rely upon project proponents to carry out much of the actual information gathering undertaken on project proposals due to limited funds. This means that assessment methods must be understandable and usable by project proponents. Methods must also not be so subjective that project proponents can easily bias results.

What elements of wetland assessment have "policy" as well as scientific components?

A. Many elements do because they require value judgments in deciding what needs to be assessed, the assessment methods, and the degree of accuracy. Important policy components are included in the definition of basic terms such as "function", and "value", the types of information gathered (and not gathered), the simplifying assumptions, the analytical procedures, and other aspects of assessment.

How important are the basic terms (definitions) used in assessment?

A. Of considerable importance. The scope of assessment depends, to a considerable extent, upon the definitions used for the terms, "assessment", "function", "functional value", and "value". For example, if wetland assessment is focused upon assessment of natural processes and all the available funds are spent upon this, little or no information may be gathered pertaining to wetland boundaries, land ownership, natural hazards, and a broad range of other information needed to apply the Section 404 regulation public interest review criteria or to determine the most "appropriate" and "suitable" use of wetlands for local planning and zoning. Similarly, if "function" is used to only describe certain physical characteristics of wetlands, not the flood conveyance, flood storage, erosion control, and roles of wetlands as required by many regulations, then information gathering will stop short of meeting regulatory needs. If "assessment" is defined not to include assessment of "value", then the impact of proposed projects upon people will not be evaluated.

And, it is difficult to imagine how a determination of the impact of a proposed activity on the "public interest" can be determined without considering impacts on people. In addition, if assessment of "value" is narrowly defined to only include public attitudes toward wetland functions and not broader fact-finding with regard to physical facts, then no or limited data gathering finding will take place for archeological, historical, recreational, aesthetic, and similar cultural services of wetlands.

What sorts of information are needed for wetland decision-making?

A. Many types, depending upon the wetland management technique, program goals and context. One of the reasons it has been so difficult to develop widely acceptable wetland assessment methods is that decision-making information needs differ considerably. Wetland identification and delineation is a common, essential first step in planning, acquiring, regulating, developing or otherwise protecting and managing wetland resources for water resources, land management, and other purposes. Nevertheless, decision-making needs then vary in terms of biological, hydrologic, topographic, land use and other information. Degrees of specificity and accuracy also differ.

For example, detailed fisheries information is to carry out a wetland fisheries restoration and management project; detailed waterfowl information for a waterfowl management project; and detailed flood studies flood storage or conveyance project. Biological information is of great importance. But, other features needed for Section 404 public interest review and land and water planning may include land ownership, natural hazards (flooding, erosion potential), protection status of wetlands, vulnerability to impacts, restoration potential, and the economic suitability of wetlands for various uses.

Why is it difficult to evaluate wetland functions and values?

A. Assessment of the many onsite and offsite factors which determine functions and values including overall hydrologic, ecological, social contexts is time consuming, expensive and requires multi-discipline expertise. Wetlands and related resources are complex and large amounts of information are needed to describe relevant plants, animals, soils, geology, hydrology, and other features.

For example, efforts to assess biodiversity are complicated by the broad range of hydrologic and ecological niches within a single wetland related to the depth of water, saturation, flooding, soils and plant and animal species. And, these niches shift somewhat throughout a single year and over a period of years as water levels change. This prevents simple characterization of a wetland as a whole without analysis of more specific subzones within a wetland over time.

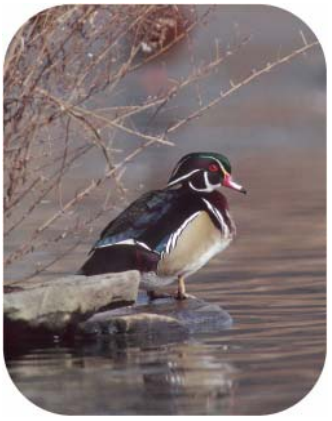
Water level fluctuations also mean that it is difficult to use a single observation of wetland hydrology, plants, and animals to describe or characterize a wetland. Time-series information is needed.

Evaluation is also difficult because most wetlands are altered (e.g., partial drainage) and further changes are occurring in water regimes due to manipulation of those regimes (e.g., dams) or watershed development.

Finally, evaluation of "value" is difficult because different segments of society feel differently about various functions and attitudes change over time.

Are there major gaps in scientific knowledge with regard to evaluation of wetland functions/values?

A. Yes, much has been learned scientifically about wetlands over the last several decades. However, there are also many gaps in scientific knowledge that seriously limit assessment. For example, the hydrologic and ecological requirements (depth of water, water temperature, salinity, sediment tolerances, vegetative needs, other food needs, etc.) of many wetland mammals, hundreds of wetland birds, hundreds of wetland amphibians and reptiles, thousands of plants, and millions of wetland insects are poorly understood. Many biological, chemical, and physical processes are also only partly understood.



Waterfowl often use wetlands for short periods

Are wetland assessment needs for regulatory purposes different from those for other purposes?

A. Yes, somewhat. Wetland assessment needs for regulatory purposes are different than assessment for acquisition, public land management, and other purposes for a number of reasons. Wetland regulations have typically been adopted to serve multiple goals and multi-factor information gathering is needed to apply such multiobjective regulatory criteria. In addition, wetland assessment for regulatory purposes usually takes place in the context of proposed changes in wetlands such as fills or drainage. This means that before and after change scenarios must be evaluated in terms of protection and restoration criteria (e.g., alternatives analysis, impact reduction, compensation).

Regulations also involve the control of private land uses (in contrast with public land management, acquisition planning, etc.) and Constitutional protections for private property come into play. Because of this, regulatory agencies must carefully follow statutory criteria and procedures in regulating private property. They must gather sufficient information to be able to defend regulations in court (if need be). Ironically, many rapid wetland assessment approaches developed ostensibly for use in regulatory contexts fail to develop much of the information needed by regulators.

Are some types of information more important in regulatory contexts than other contexts?

A. Yes. Courts have also traditionally given great weight to certain factual considerations in determining whether regulations "take" private property and lesser weight to others. For example, courts have given great weight to data related to the protection of public health and prevention of nuisances. This means that multifactor wetland assessment approaches and the evaluation of the impact of proposed activities upon flood flows, erosion control, and water quality are particularly importance in meeting taking challenges.

Land alteration affects regional hydrology

Is it sufficient to only assess wetland physical functions to evaluate wetlands for regulatory purposes?

A. No. Assessment of basic physical processes is important in understanding the functions of a particular wetland and the possible impacts of a proposed activity. However Federal Section 404 regulations and state and local wetland regulations set forth regulatory goals and criteria which require linking those processes to "services" provided by wetlands such as flood storage, fisheries production, and water quality protection. It is also important to assess (albeit subjectively) "values" including archeological, historical, aesthetic, recreational and other values. The impact of proposed activities must be evaluated in terms of those goals and criteria.

What approaches or methods have been used to assess wetlands to date?

A. Three overall approaches have been used by local governments, states, federal agencies, not for profits and others to assess wetlands for land planning, water planning, public land management, acquisition, restoration, regulation, and other purposes.

The first approach involves multiobjective, landscape level analysis of lands and waters throughout a geographical area including wetlands. Thousands of communities have "overlaid" wetland, floodplain, public water, natural hazard, existing use information, land ownership information, public infrastructure information and other types of information to produce land and water use plans and zoning maps which allocate lands throughout a community to their most "suitable" or "appropriate uses". These maps and plans are then enacted with "conservancy" or other "sensitive" land zones for wetlands and other sensitive areas. Overlay analysis has been done manually in many instances or, more recently, through the use of GIS systems. Regulatory agencies have also carried out multiobjective analysis at particular sites by using a combination of existing maps and data and field surveys.

Multiobjective, landscape level analysis is useful in planning and regulation because it provides a composite, multiobjective information base with information relevant to many aspects of wetland protection, restoration, and use. However, it does not provide detailed, site-specific information pertaining to wetland functions and values for particular wetlands and particular sites.

The second approach involves the use of various wetland "rapid" assessment approaches to assess a broad range of wetland "functions" or wetland "functions and values". Over 40 methods have been developed since 1990 alone. These approaches generally involve both assessment of functions and values although some such as Habitat Evaluation Procedure (HEP) and Hydrogeomorphic (HGM) address only functions. Many compare wetlands with other wetlands. Following the WET (Wetland Evaluation Technique) model, many attempt to assessment "capacity", "opportunity", and "social significance". Many develop "nominal" (nonratio) numbers in assessing wetlands. These approaches have some strength and uses but have not been widely used in decision-making for a variety of reasons described below.

People count

The third approach involves the application of more specific assessment techniques and methods to assess particular functions, values, issues, and problems at specific sites. These techniques are issue-specific and generally applied only where a specific function, value, or problem has already been identified as of "possible" importance at a site through a more generalized analysis. These techniques often involve field surveys and observations to help determine the presence or absence of an endangered species, or other species or suites of species. They may involve the application of specific ecosystem or engineering models (e.g., WETHINGS, HEP, IBI, HGM, HEC).

Why have formal rapid wetland assessment techniques been little used in regulatory and other wetland decision-making contexts?

A. Existing formal rapid assessment techniques have not been used for many reasons. The most common reason is that the techniques fail to develop much of the critical information needed by decision-makers and are, simultaneously, too costly and time-consuming to apply. Simplifying assumptions and large margins of error are other problems. Often regulatory and land management agencies have found that field surveys (without the use of any "named" assessment technique) combined with professional judgment and common sense provides more useful information for the funds expended than more formal assessment approaches.

Is it valid to compare wetlands with other wetlands in wetland assessment?

A. For certain purposes, such as determining land acquisition priorities and establishing protection or management priorities, comparison of wetlands with one another in terms of functions, values, and condition is useful. Many of the early wetland assessment approaches were, in fact, developed to guide wetland acquisition efforts.

However, comparison of wetlands with other wetlands for land and water use planning and regulatory purposes fails to provide much of the information needed to determine whether development should occur at a wetland versus an upland site—the typical planning and regulatory situation. Developers do not typically propose to place development in one wetland versus another wetland. The relative suitability of wetland versus upland sites for development depends upon ecosystem context, natural hazards, land ownership, public trust values, the costs of public services and many other factors.

Comparison of wetlands only with other wetlands may suggest that certain "low value" wetlands should be developed. However, when compared with uplands, wetlands with even limited natural functions and values are often less desirable for development than upland sites due to a combination of natural hazards, unstable soils, high costs for public services and other factors.

Can wetland "functions" and "values" be accurately assessed without considering hydrologic and ecosystem context?

A. Certain wetland features can be assessed by examining the areas within wetland boundaries. For example, the structural stability of wetland soils can be evaluated if a fill and building are proposed. Wetland plant and animal species within a wetland can be inventoried. Nevertheless, significant problems have emerged with assessment methods that do not consider offsite factors in evaluating many functions and values, particularly if the goal of the assessment is to evaluate the ecosystem importance of wetlands or to restore wetlands. Use of wetlands by many animal species such as fish and amphibians depends upon adjacent ecosystems and connections between wetlands and other upland and aquatic areas. Failure to consider broader hydrologic regime including likely changes to such regimes due to urbanization and other factors is a primary reason for failure of many restoration projects. It makes no sense to carry out detailed, quantitative assessment of the features of wetlands within wetland boundaries when the margins of error due to this narrow focus are extremely large.

Are generalized aerial or satellite surveys sufficient for wetland assessment?

A. Arial surveys and satellite imagery have proven useful for wetland mapping and delineation and for "overview" evaluation of overall ecological and hydrologic characteristics. They have also proven useful for monitoring and enforcement activities.

"…comparison of wetlands with other wetlands for land and water use planning and regulatory purposed fails to provide much of the information needed…"

But, using remote sensing exclusively to decide whether wetlands are to be destroyed or modified without supplemental onsite examination of plant and animal species is misleading because there are limits upon what can be assessed from an air photo or satellite image. Remote sensing approaches also typically provide only a "one shot" view of resources unless time series images are used. In addition, the status of scientific knowledge is not often sufficient to project the capability of wetlands to serve as habitat for particular species based upon general vegetative and hydrologic characteristics alone. Real, on the ground observation of vegetation, wildlife, hydrology, soils and are features is needed to supplement and validate more general analyses.

Are bioassessments needed?

A. Collecting plant and animal species information at wetland sites is essential in determining the impacts of proposed activities and in allocating wetlands to their most appropriate uses. It is also not possible to gain a clear picture of the overall condition of a wetland without considering the condition of specific plant and animal species. It is not possible to determine whether there are rare, endangered, or threatened plants and animals at a site without on the ground observations. Assessment methods which only evaluate general wetland features but fail to evaluate actual species and assemblages of species therefore provide only a partial picture of ecosystem functioning and project impacts.

Volunteers from Minnesota towns being trained to assess the biological integrity of wetlands

However, bioassessments can also be time consuming and expensive. And, they must be carried out with care. A single visit to a wetland site will often provide only limited information concerning the plant or animal species which may be found at a site over time because of seasonal and long term variations in water levels and temperature and resulting variations in plant and animal species.

Many states are now developing wetland bioassessment methods similar to those used for rivers and streams. These hold considerable promise for providing improved evaluation of biological condition, the impacts of projects on that condition, and the success of mitigation and compensation measures.

Do simplifying assumptions need to be made in assessment methods?

A. Scientists developing wetland assessment techniques have invariably found it necessary because of economic and time restraints to make simplifying assumptions in the evaluation of wetland functions and values and to use various "surrogates" and indicators in assessment. Typical assumptions include: a wetland is in a natural condition; hydrology is not changing and will not change over time; wetland functions depend upon onsite features; and natural processes are the most important features (ignoring opportunity and social significance). These assumptions, however, are often not appropriate in a specific setting and application of a general model in this setting with some modification or supplementation may result in inadequate and inaccurate assessment. It is therefore important that scientists make clear their assumptions and simplifications so that users can tailor assessment models for use in specific factual situations.

Is quantified (numerical) assessment of functions and values practical or possible?

A. Quantified assessment of some functions such as flood conveyance and storage using HEC (Hydrologic Engineering Center) or other models is possible but expensive and time consuming. Quantified assessment of many other functions and values including biological, archaeological, historical, recreational, and aesthetic values is even more difficult and the numbers developed are more often based more on conjecture than ecological or cultural significance.
Because it is difficult to develop "real" (ratio) numbers in assessing wetlands, many rapid wetland assessment procedures utilize nonratio numbers to help assess wetland

functions or condition (e.g., rating a wetland on a 1-10 nominal scale for a particular function or condition). Nonratio numbers can help suggest the overall importance of a particular function or feature.

However, such numbers cannot ordinarily be validly added or subtracted (as is often attempted). They are also subject to manipulation and may be misleading in calculating compensation needs. They must be used with care.

Is it possible to conduct an accurate assessment without considering anthropomorphic changes in hydrology?

A. In urbanizing areas and other areas with rapidly changing hydrology due to human activities, future conditions must be reasonably anticipated in evaluating restoration potential. This is not easy, but failure to anticipate future hydrology is a major reason for failure of restoration projects.

Does any single wetland assessment method meet the broad range of information needs?

A. None of the existing wetland assessment methods meets the full range of information needs. Different wetland assessment techniques do different things. Costs, levels of expertise, understandability, and accuracy also differ. For example, WETHINGS evaluates capability for particular animal species. HEC can be used to project hydrology and hydraulic and define floodways and flood storage. WET (despite its limitations) provided some evaluation of capacity, opportunity, and social significance. HGM provides a more satisfactory evaluation of overall ecological capacity than many other techniques but is also subject to limitations.

A combination of methods is often needed to evaluate problems and issues in specific contexts.

Does the Hydrogeomorphic Method remedy the problems of earlier techniques?

A. HGM was broadly proposed for use by federal agencies in 1996. It has a number of innovative and attractive features for evaluating and comparing wetland processes and condition. These attractive features include the classification of wetlands, the identification of functions, the use of reference sites (sampling), and the separation of wetland functions and values for evaluation purposes.

However, the HGM technique as presently proposed has not been implemented in regulatory contexts in the last eight years despite the development of many HGM models. It is subject to important limitations. It develops only a small portion of the information needed to apply the Section 404 public interest review permitting criteria and similar criteria at state and local levels and is quite costly and time-consuming (at least through development stages). It evaluates ecological condition and overall characteristics but does not provide species-specific information (fish, birds, wildlife) needed by wetland planners and regulators for a variety of purposes (e.g., compliance with the Endangered Species Act). It does not directly evaluate “functions” as the term has been broadly used in regulations and the literature such as flood storage and conveyance but only the underlying processes. And assessment of underlying processes does not necessarily produce accurate assessment of “goods and services” and values. It does not evaluate “opportunity” or “social significance” including who benefits and who pays from changes in conditions and there is little opportunity for public input. It does not consider or assess “values” such as archaeological, cultural,

heritage, health and safety, or other values. It makes a variety of assumptions that may or may not be valid in a given context.

To make HGM more useful, the U.S. Army Corps of Engineers and other federal agencies need to provide guidance concerning its use. HGM needs to be used in combination with other assessment methods to provide the information needed for regulatory and other purposes.

Compensation ratios need to reflect more than ecological condition

Is it sufficient to assess relative "ecological condition" in calculating "compensation" ratios for regulatory purposes?

A. It is not enough to only assess relative ecological "condition" or "capacity" in calculating compensation ratios. Many other factors are relevant to calculation of compensation ratios including the length of time it takes to bring a project to a functioning condition, the hydrology, sedimentation rates, the expertise of the project sponsor, whether mid-course correction capability is provided, whether monitoring and management will be provided over time, threats to a site, and a host of other factors.

"Who" benefits and who will suffer costs from wetland losses is also relevant. For example, restoration or creation of a wetland in a rural area with few potential "users" in the area will not adequately compensate (from a public interest perspective) for destruction of a wetland with similar acreage ecological capacity in an urban area serving thousands of individuals including minorities for recreation, education, and other purposes. The "public interest" involves social justice and social equity issues as well as scientific considerations.

Is a hierarchical approach to wetland assessment needed?

A. Because of budgetary and staff limitations, hierarchical approaches to wetland assessment are needed which begin with generalized analysis of areas or sites (e.g., identification of "red flags" and "yellow flags" and overall hydrologic and ecosystem context) and proceed to more specific analysis of particular functions, values, issues, problems, etc.

What are promising future directions for wetland assessment methods and techniques?

A. Some promising directions for assessment include:

- Development and testing is needed of multiobjective landscape or area-wide assessment methods which can be simultaneously applied not only to wetlands but floodplains, riparian areas, and other related ecosystems. These methods need to be suitable for application through GIS, manual "overlay", and other approaches.
- Various combinations of landscape level and site-specific wetland assessment approaches involving overlay approaches (and GIS analysis in some instances) with more detailed assessment methods on a site-specific or issue-specific basis are needed.

- The development of additional multivariate bioassessment (IBI) models for use with water quality standards and for a broad range of other purposes is needed.
- Further development of HGM models and guidebooks and the calibration and testing of HGM will increase the capability of wetland managers to assess ecological capacity and condition.
- The establishment of local, state, and regional wetland reference site systems could aid the development and calibration of more specific wetland assessment approaches and models. Reference site systems can be used for long term monitoring, research, interpretation, and education.

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