

Factors for Success in Developing Use Attainability Analysis

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ABSTRACT

A Use Attainability Analysis (UAA) is a process to review and potentially modify a waterbody's designated uses, when the uses are not existing or attainable. This research identifies factors for success by analyzing key challenges faced in the UAA process and reporting on the common lessons learned. UAA case studies were analyzed to develop 29 findings. The findings, or factors for success, focused on five broad categories of criteria: scientific and technical understanding; legal and regulatory requirements; financial needs and impacts; public awareness and involvement; and regulatory agency preparedness. These findings were transformed into recommendations for activities or approaches that would be supportive of UAA efforts. The research included special focus on the following nationwide, emerging areas of importance for the UAAs: wet weather impacts, urban settings, and effluent-dependent or dominated streams.

KEYWORDS: Use Attainability Analysis, UAA, Designated Uses, Water Quality Criteria, Water Quality Standards, User's Guide.

INTRODUCTION

A Use Attainability Analysis (UAA) is the regulatory process that specifically authorizes and contemplates changing designated uses that are imbedded in State and Tribal water quality standards. The process for undertaking a successful UAA can be challenging, particularly when the UAA is initiated or sponsored by regulated entities. One key reason for the difficulty in conducting successful UAAs is that there is no detailed comprehensive UAA guidance or case study illustrations that address the common challenges being faced in the UAA process, especially in urban, wet weather, and effluent dominated situations. The process is complicated by the range of technical, regulatory, and institutional considerations that must be addressed in conducting a successful UAA. These difficulties prompted the need for the research discussed in this paper.

This paper summarizes research funded by the Water Environment Research Foundation that resulted in a User's Guide of Factors for Success in Developing Use Attainability Analyses (WERF, 2007). This research and User's Guide was developed as a resource for those who are considering conducting a UAA for a waterbody within their watershed, or those who are already participating in a UAA. It is also intended to be a resource to States and Tribes that need to evaluate or prepare guidance related to UAAs. This research was based on findings and recommendations derived from a detailed review and analysis of over 50 UAA efforts from across the country, selected from an examination of over 200 UAA efforts. The User's Guide is intended to highlight lessons learned from actual UAA efforts and build on and supplement previous studies and publications by WERF. These previous studies include: *Collaborative Water Quality Solutions: Exploring Use Attainability Analyses*, published in 2005 by WERF and NACWA; and reports published by WERF in 1997 including *A Comprehensive UAA Technical Reference and User's Guide* and its companion document *A Suggested Framework for Conducting UAAs and Interpreting Results*. EPA

published the *Technical Support Manual: Waterbody Surveys and Assessments for Conducting Use Attainability Analyses* in 1983. This manual, along with many other subsequent EPA guidance manuals, provide generally useful information for UAAs, but none of them examine the technical and non-technical challenges of that have arisen when conducting UAAs to address urban, wet weather, and effluent dominated situations that are common today. For a complete list of related guidance documents, the reader is referred to *Collaborative Water Quality Solutions: Exploring Use Attainability Analyses* (WERF/NACWA, 2005).

The objective of this research was to first identify factors for “success” in the UAA process, and second to develop guidance for users to apply these factors. Specific focus was placed on providing useful information that would assist stakeholders in identifying critical factors and information requirements to enhance the likelihood of making informed decisions with regard to UAAs. The guidance is grounded in actual experiences with UAA efforts, with primary emphasis on collecting and comprehensively evaluating case studies, building on the successes already achieved, and creating an awareness of the obstacles that have been encountered in some UAAs. This research did not focus on the technical aspects on the UAA, but rather more on the process.

BACKGROUND

The passage of Federal water quality legislation (e.g., Federal Water Pollution Act Amendments of 1972, CWA in 1977 Section 101a of P192-500), established the goal to clean up waterways so that they were “fishable and swimmable” and to restore and maintain the “chemical, physical, and biological integrity of the Nation’s waters.” Often overlooked is the fact that the CWA’s water quality goals also included the words “where attainable,” which are important words for purposes of UAAs. Adopting water quality standards was one of the first steps to achieving the fishable and swimmable goal. Water quality standards consist, in part, of specific designated uses and criteria that can be measured to establish whether the designated use is being achieved. A UAA is the regulatory process that allows water quality standards to be reviewed and revised when the uses upon which the standards are based are not existing or attainable.

The CWA places the responsibility on individual States and Tribes to adopt these water quality standards, and on EPA to approve them or undertake the role if States or Tribes do not do so appropriately. The CWA and its implementing federal regulations recognized that the adoption of standards is an adaptive process with some changes expected. A UAA can provide the justification for a change to water quality standards. The adaptive UAA process is important because many states adopted standards that were general rather than site-specific. In many cases these standards might not be attainable and might warrant a UAA.

A UAA is a process to review and potentially modify a waterbody’s designated uses, and hence the standards and applicable criteria. While a UAA makes sense for many reasons, most often UAAs are considered in connection with regulatory obstacles that involve difficulty meeting water quality standards including, among other things: NPDES permit issuance or renewal; listing of a waterbody as “impaired” under Section 303(d) of the Clean Water Act, which may require a Total Maximum Daily Load (TMDL); draft TMDLs that reduce the amount of pollutants that can be discharged into a waterbody; and a Combined Sewer Overflow (CSO) Long Term Control Plan (LCTP), which triggers the need to reevaluate the designated use(s) of a waterbody.

Federal regulations allow States and Tribes flexibility to modify water quality standards through the UAA process. The regulations set forth the factors that may be used to modify designated uses, known as the 10(g) factors (40 CFR 131.10(g)), which include any of the following factors:

1. Naturally occurring pollutant concentrations prevent the attainment of the use; or
2. Natural, ephemeral, intermittent or low-flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by a sufficient volume of effluent discharge without violating State conservation requirements to enable uses to be met; or
3. Human-caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied, or would cause more environmental damage to correct than to leave in place; or

4. Dams, diversions, or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the waterbody to its original condition or to operate such modification in a way that would result in the attainment of the use; or
5. Physical conditions related to the natural features of the waterbody preclude attainment of aquatic life protection uses; or
6. Controls more stringent than those required by Sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.

Any one of these factors can justify a use change. In addition to these factors, certain constraints are also placed on UAAs. A designated use cannot be removed if it is an “existing” use, a use that was attained in the waterbody on or after November 28, 1975. A use can also not be removed if the use can be attained by implementing technology-based effluent limits.

In establishing standards, many States lacked the resources to finely tune uses and as a result, many waterbodies were broadly designated, sometime resulting in uses that did not exist or could never be attained. Likewise, general non-specific uses were often assigned to larger waterbodies and then applied to their tributaries. This approach of broad designation and uses, when combined with the new regulatory trends, increases the importance of UAAs.

One of these regulatory trends has been the shift from technology-based effluent limitations to receiving water-quality based effluent limitations. This means that if the designated uses for the receiving water are not correctly assigned, then permittees may not be protecting a legitimate use, and/or may be committing public resources to protect a nonexistent or unachievable use. Another trend has been the emergence of the TMDL program as the centerpiece for water quality restoration efforts. The TMDL program involves listing impaired waters and then establishing a load limitation program to meet water quality standards. Obviously, if the designated use is not appropriate, the TMDL may be designed to protect a use that is not existing or attainable. EPA now recommends better integration of the UAA process and TMDL program (King, 2006).

Nonpoint and wet weather sources also create unique issues in meeting water quality standards because of the difficulty of tracking these sources, and the expenses associated with controlling them. More specifically for wet weather sources, the current emphasis on developing Long Term Control Plans for CSOs to meet water quality standards is a trend that has placed more importance on the UAA process. The CSO Control Policy outlines the need for water quality standards agencies to review and revise, as appropriate, the applicable water quality standards. The price tag for LTCPs for large cities is often a billion dollars or more; therefore, having appropriate standards as the regulatory target is essential.

Use designation is also a significant consideration for effluent-dependent waterbodies. In many arid areas of the country and in small streams there are discharges of treated effluent into intermittent and low-flow streams. Under these conditions, the discharge dominates the physical conditions in the streams. As a result, many effluent-dependent waterbody dischargers are now being required to meet water quality standards at end-of-pipe. Another complex issue is defining appropriate “healthy” aquatic conditions as a goal or standard, when aquatic life exists solely or largely because of the discharge.

In all of these cases, the UAA process is needed to scientifically determine the appropriate use. However, a common misconception by the public is that a UAA will result in a degradation of the quality or current uses of the waterbody. In reality, a UAA is undertaken to refine the standards so that they more accurately characterize the site-specific conditions of the waterbody. As noted above, UAAs are often initiated in response to a regulatory process that seeks substantial improvement, both in chemical and biological quality and the related uses that the water body currently provides. By regulation, a UAA cannot remove an existing use or lead to deterioration in current water quality such that an existing use would be impaired.

Ultimately, the outcome of a UAA should result in identifying the appropriate designated use for the waterbody to protect public health and the environment. The guidance described in this paper is intended to achieve that result.

METHODOLOGY

Factors supporting the successes in UAA efforts were identified in this research through detailed examination of 54 UAA case studies. These case studies were culled from a candidate inventory of over 200 UAAs by focusing on those that provided good illustrations of success factors and/or also provided diverse geographic, topical and waterbody representation. The 54 UAA efforts were examined through application of a questionnaire that provided a comprehensive framework of information on the UAAs in the context of five categories of criteria for the factors.

A candidate list of UAA efforts was compiled by conducting a thorough search of UAA efforts across the country. The research team obtained case study candidates from previous research in this area by WERF and NACWA (WERF/NACWA 2005), from recommendations from the WERF Project Subcommittee of experts and a Resource Panel of nation-wide professionals involved in UAAs, from examination of files at EPA Headquarters, and from contacts with Water Quality Standards Coordinators in the EPA Regional offices and selected States.

All compiled case studies were classified based on information such as waterbody type, designated use, parameter of concern, EPA regions, State, and status of the effort. The over 200 candidate case studies were too many for detailed examination within the resources of this project and more importantly, many of these studies were either poor examples or similar to other UAAs in characteristics and process. Therefore, the total list was reduced to 54 of the best case studies, which were selected for detailed examination by the research team, several of which represented groups of similar UAAs within one State.

The final list of UAA case studies was selected based on those that would be most useful in identifying factors for success. Studies that were duplicative, incomplete, poor illustrations or had poor documentation were excluded. Emphasis was placed on finding studies involving urban, wet weather, and effluent-dependent settings. However, all UAAs were initially considered because they had potential to illustrate factors for success even if in the context of a problem such as mining that was not within the emphasis of this research. The studies were also selected to ensure broad and balanced representation based on geography, EPA region, designated use, pollutant of concern, waterbody type, and factors used for UAA justification. Overall, the 54 UAA efforts represented all ten EPA regions, 30 States, the District of Columbia, and one U.S. Territory, eight general designated uses, eighteen pollutant types or pollutant type groups, and seven waterbody types. A summary of all of the 54 case studies is provided in Table 1, with key characteristics of the UAA efforts described.

Evaluation criteria were developed and used as tools to analyze each of the various UAA case studies. These criteria allowed the research team to analyze each UAA effort in the context of its various component processes and attributes. The evaluation criteria were used to identify lessons learned and ways to improve the development and acceptance of UAAs in the future. The categorical criteria proposed for this research fall into five groups:

1. Scientific and Technical Understanding
2. Financial Needs and Impacts
3. Legal and Regulatory Requirements
4. Public Awareness and Involvement
5. Regulatory Agency Preparedness

For each criterion, a list of research questions was developed to help the research team investigate the process for each UAA case study. The evaluation of each UAA began with general questions that provide a basic understanding of the status, background, and setting of the UAA, such as: “Who is taking the lead in developing the UAA?” and “What is the status of the UAA process?” as well as questions about the nature of the waterbody, pollutant sources and water quality issues. This was followed by detailed research questions that inquired about the nature and outcome of the UAA process in each of the five criteria areas.

For example, in the area of Scientific and Technical Understanding there were questions about the type and quantity of data collected; the nature of modeling used, if any, and what kind of technical analysis; and the

nature of analysis used to evaluate the various 10(g) factors required for a UAA approval. In the area of Financial Needs and Impacts, questions were asked to determine the relative importance economic socio impacts and other financial considerations had in the UAA process. If economics or socio impacts did play a significant role in the UAA additional questions were asked to assess how was it done, what analyses were conducted, what financial factors were considered, and what guidance was used. In the area of Legal and Regulatory Requirements, questions were asked related to what kinds of regulatory considerations and agencies were involved in the UAA and what factors were significant obstacles. In the area of Public Awareness and Involvement, questions were asked related to the types of stakeholder involvement, their issues and how they were engaged and educated. Last, in the area of Regulatory Agency Preparedness, questions were asked related to how well engaged were the various agencies throughout the process, who was supportive and who were obstacles and why, as well as what types of guidance were available and used.

The information from detailed questions were compiled in a database and analyzed to identify findings that support success in the UAA process. The information in the database was sorted to evaluate various hypotheses about the UAA process. Since UAAs involve a wide range of approaches and issues, the team felt it appropriate to examine hypotheses in the context of different subsets of the data, sorted by issue such as use type, pollutant, wet weather, or effluent dominated. Hypotheses about the UAA process were then tested by looking at the full collection of results to either validate or refute the finding. Findings were validated by common observation of the hypothesis but not rigorous statistical verification.

The findings hypotheses were drafted based on close examination of the UAA process, based on interviews conducted by team members, consultation with the PSC and experience of the research team. Thus, the findings are a combination of qualitative observational patterns, conventional wisdom and professional experience, but not statistically validated correlations. Unfortunately, the sample set was too limited to provide a rigorous validation of findings, as each UAA is a unique situation and replication of procedures rarely occurred. The findings are illustrated by case study examples.

Table 1. Characteristics of the Fifty-Four UAA Efforts That Were Examined In Detail.

Note: Total numbers or percentages for each key characteristic do not total 54 or 100% because multiple descriptions may apply for a UAA effort.

Key Characteristic	Description	Total (#)	Total (%)
Setting	Effluent Dominated	27	50%
	Wet-weather impacted	16	30%
	Urban	18	33%
	Other	23	43%
Pollutant Source Category	Agricultural runoff	19	35%
	CSOs	9	17%
	Industry	14	26%
	Natural background	14	26%
	POTWs	22	41%
	Urban stormwater	16	30%
	Mining	6	11%
Other	9	17%	
UAA Factor - 131.10(g)	1	14	26%
	2	22	41%
	3	27	50%
	4	15	28%
	5	16	30%
	6	11	20%
	Undetermined	3	6%
Designated Use Assessed	Aquatic life	36	67%
	Recreation	23	43%
	Drinking water	11	20%
	Other	3	6%
Parameters of Concern	Bacteria	14	26%
	Metals	6	11%
	Nutrients	14	26%
	Organic hydrocarbons	0	0%
	Pesticides/Herbicides	0	0%
	Solids	5	10%
	Temperature	10	19%
	Ammonia	4	7%
	BOD	5	9%
	Chloride	3	6%
	Dissolved oxygen	12	22%
Other	19	35%	
Status	Completed and adopted	29	54%
	Completed and rejected	8	15%
	Considered but never developed	4	7%
	Started but then abandoned	1	2%
	On-going	13	24%
	Not started but under consideration	6	11%
	Completed and under U.S. EPA review	2	4%
Outcome	Use upgrade	6	11%
	Use removal/revision	28	52%
	No change in use	15	28%
	Other	25	51%

RESULTS

Research findings were drawn from an in-depth analysis of the case studies, proceeding first with a set of hypotheses and then examining the case studies to validate those observations. The research findings are organized according to the five criteria categories as previously described. Each finding was then translated into a recommendation. In all there were 29 findings and recommendations. The full scope and depth of these is more than can be explored in this paper, and the reader is referred to the full research report (WERF, 2007). The discussion herein is intentionally succinct and illustrates only some of the findings in each of the five categories:

Scientific and Technical Findings: In the category of scientific and technical findings, several observations were evident, but all were encompassed in one single concept: “getting agreement on technical scope and approach up front” and maintaining that agreement. The case studies clearly illustrate that success was facilitated by early involvement among the stakeholders and agencies to agree on the needed data and analyses, the appropriate decision pathways and definition of terms, the necessary modeling approach for complex sites, the context and scope for economic analyses, and the need to integrate with other regulatory programs, especially TMDLs.

Early and continuing agency involvement throughout the UAA process was common in recent, successful UAAs and viewed as very important to success. This includes development of or agreement on UAA guidance, early project and work plan involvement, and ongoing project review. Agencies are much more likely to accept the outcome of the UAA if they have been involved in scoping the project and thinking about data needs and ultimate interpretation.

Successful UAAs generally also had an agreed decision pathway early in the process. This pathway was most effective when it consisted of the definition of critical regulatory terms (for example, natural, background, feasible, non-remedial, irreversible); careful analysis of which of the six 10(g) regulatory factors were appropriate for the justification; definition of data needs and how the data would be used; and the regulatory implications of the process. Data needs were variable but defined by the nature of the UAA and typically included characterizing the physical, chemical, and biological aspects of the waterbody. When historical information was available, successful UAAs strived to combine this with current information.

Financial Needs and Impacts: In the category of findings related to financial needs and impacts, the findings can be grouped into two issues: the economic justifications for UAAs and the cost management of conducting the UAA studies. On the first issue, the review of case studies showed that economic considerations were rarely the primary justification addressing wide spread economic and social impacts or economic affordability/feasibility nor were designated use valuations used. In part, this was because guidance on these approaches was very limited and when available was overly narrow and controversial. On the second issue of cost management to conduct UAAs, the case studies indicated a wide range of costs and that costs at times inhibited State involvement, but that costs could be better contained when State protocols for UAAs are developed and followed.

The review of case studies found that most UAAs that have resulted in designated use refinements have not relied on 10(g) Factor 6 (widespread socioeconomic impact). In part, the reason for this is that the same six factors that are defined in EPA regulations for justifying a designated use change also are the factors for granting variances from water quality standards. As a result, Factor 6 considerations have been used by agencies to grant a variance rather than remove or revise a designated use, even though assessment of the attainability of a designated use and its potential refinement may have been the initial intention of the UAA effort. This is often a matter of convenience or policy for the agency because a variance is explicitly intended to be temporary. Another reason for sparse use of Factor 6 is the recognition by UAA proponents that the Federal guidance on this factor has substantial limitations and applicability, particularly for municipal entities.

Economic valuations of the designated uses were not observed as a method in any of the case studies reviewed to inform the decision-making process in a UAA effort. Although economic valuation methods

exist and are fairly well accepted for certain types of water uses (e.g., travel cost methods for recreation uses), they do not appear to have been used in any of the UAAs examined as part of this review. Economic valuations of the designated use could provide some future UAAs. For example, if attaining a certain aquatic life use (such as salmonid spawning) for a waterbody would require removal of a dam to provide suitable spawning habitat, then the relative economic value of fly fishing in a free-flowing riverine reach could be compared to the value of reservoir fishing. This type of economic cost comparison would not serve as the determining factor in a UAA, but could inform stakeholders and decision-makers as to the economic impacts.

A wide range of costs, complexities, and schedules associated with conducting a UAA was observed, with the cost dependent on site-specific conditions. Large, complex UAAs could cost hundreds of thousands of dollars or more, while in some States streamlined, simple UAAs conforming to standardized protocols could cost ten thousand dollars or less. However, following State guidance when it was available minimized costs and streamlined the UAA process. In addition, the development of State guidance or use of other State guidance was a factor in helping States with limited resources and background in UAAs undertake and support studies.

Legal and Regulatory Requirements

In the context of legal and regulatory issues, the findings can be generally summarized in two categories: following the regulations, and considering all stakeholder issues. The case studies indicated that carefully complying with all applicable regulations and thoroughly documenting that compliance through a complete administrative record was important to success and avoiding litigation. The case study review also indicated that it was important to consider all stakeholder issues and potential regulatory constraints by involving a coordinated stakeholder effort, considering downstream users, and anticipating the relationship to other regulatory programs such as TMDL, CSO and NPDES.

The legal requirement in all UAAs was to comply with State, Tribe and Federal statutory and regulatory water quality requirements and to follow applicable administrative procedures. However, it was important not only to follow these requirements, but also to build an administrative record of work plan development, agency meetings, and agency communications from the beginning of the process. The administrative record is the ultimate backstop when disputes arise late in the UAA process. The review indicated that having solid documentation of agreements, analyses, compliance with procedures and rules, etc., was an important attribute in successful UAAs.

Unexpected legal obstacles still can often occur because UAAs play a role in other regulatory programs (TMDL, NPDES, CSO, LTCPs, etc.). Potential litigation should be a real consideration, and UAA studies need to carefully follow regulations and thoughtfully integrate with other regulatory programs. Also, downstream uses (intrastate, interstate, or tribal) were not always fully explored and can represent unanticipated obstacles. When downstream uses were not considered, obstacles were sometimes encountered.

Regulatory Agency Preparedness

The preparedness of regulatory agencies to openly consider UAA processes and their abilities to understand the requirements was important to the success of UAAs. Findings in this research showed that agencies were most prepared if they had already developed guidance or protocols, and were least prepared when faced with complex situations or sites which unexpectedly involved other agencies like USFWS or EPA Regional input. In addition, agencies were often not initially open to consider alternative solutions, but when the agencies were effectively engaged these alternatives provided satisfactory outcomes for all parties.

When statewide UAA protocols and/or guidance exist, State agencies tended to be well prepared and the UAA process proceeded more smoothly. Examples included Kansas, Oklahoma, Missouri, Ohio, Minnesota and Colorado. Few other states have UAA guidance and protocols, but a number are in the process of developing guidance. In more complex UAAs or in states with limited experience, State agencies are less prepared unless proponents initiate close cooperation.

The input of Federal and State fish and wildlife agencies is also important to the success of aquatic life UAAs and EPA regional staff on all UAAs. On the State level, fish and wildlife agencies often are in different departments or at least different divisions of government than the water quality agencies. Their objections to UAAs can be unexpected obstacles. Also, EPA regional staff are the ultimate decision-makers for UAA approval, but support by EPA for pursuing UAAs was found to widely vary by EPA region.

Public Awareness and Involvement

Public awareness and involvement are elements of high importance in UAAs, not only because of regulatory requirements, but also because a change in use represents a change in a public resource, and regulatory agencies place high value on public reaction. Based on the review of case studies, the research team found that public involvement varied widely in successful UAAs, but when successful, it generally involved more than the minimum required effort and included face-to-face communication. Successful UAAs had a comprehensive well-thought-out public education and involvement process.

Also, two important points were found to be critical to the public education message: 1) the UAA process was inherently an objective process to assess the actual attainable uses, not an effort to degrade water quality and/or downgrade uses; and 2) the choice of uses can have significant additional economic costs. Finally, it was observed that politicians generally do not get involved in UAAs, except when large expenditures are involved, and then typically they were supportive of the process.

GUIDANCE FOR SUCCESSFUL UAAs

The previous discussion summarized some of the factors for success structured in the five broad categories of criteria. These observations or findings in themselves provided significant insights to the factors contributing to success. However, to be more clear and explicit, specific recommendations were incorporated into integrated guidance. This integrated approach is a critical part of a successful UAA because each of these criteria work together and support the UAA process, as shown in Figure 1.

Figure 1. Integrated Framework for a Successful UAA (WERF, 2007)



The tendency to think about and focus on each recommendation independently is enticing because a UAA is a complex undertaking. However, to be successful, integrated recommendations need to be considered in

each phase of the UAA process. For purposes of discussing recommendations in an integrated plan, the UAA process has been divided into four components:

- Getting Started
- Conducting the UAA
- Involving the Public
- Resolution

A summary of the integration of the recommendations into the UAA process involving these four components is described in Table 1.

Getting Started

The majority of recommendations are best implemented at the beginning of the UAA process, primarily because starting the UAA process “right” tends to lead to more successful UAAs. Investing in the upfront effort ultimately leads to a more efficient and effective UAA. “Right” in this context means investing resources and time in three main areas:

- Determining who should lead and be involved in the UAA;
- Developing a mutually-agreed-upon strategy to satisfactorily address potential issues for all relevant agencies and stakeholders; and
- Defining a decision pathway and the required data needs.

Successful UAAs invariably require close cooperation between regulators and those who are regulated, independent of who initiates the UAA. This would involve regulators, permittees, water users, relevant NGOs, and the general public. UAAs that are undertaken in cooperation with a variety of interests and coalitions tend to be more broadly supported, leading to more successful outcomes. Regardless of who leads, conducts, or facilitates the UAA process, it is essential to have all relevant stakeholders informed if not involved in the process. A UAA involves many diverse stakeholders including regulators, permittees, water users and the general public. Understanding all of their interests and engaging all these stakeholders in the process is a significant factor leading to success.

Regulatory staff also should coordinate closely with their legal departments and affected stakeholders so that potential implications of any outcomes of the UAA are well understood. This could range from changes in NPDES conditions to changes in anticipated uses. In addition, State and Tribe regulators should coordinate closely with Federal regulators to avoid inconsistent interpretations and applications of the Clean Water Act. This coordination of agencies is important to streamlining the regulatory process.

Finally, regardless of who leads the UAA process, it can often be useful to form coalitions and partnerships based on common issues. This can help reduce overall costs and leverage scarce resources. In addition, partnerships may be helpful when negotiating compromises or building political support.

Beyond defining the important stakeholders in the UAA process, developing an effective UAA strategy from the start involves several elements, including: understanding the issues from all agencies involved; agreeing on an approach; integrating the UAA process with other regulatory programs; and engaging EPA regional staff early on in the process.

In addition to understanding the regulatory structure of the State and Tribe standards and how they are implemented, stakeholders need to understand which regulatory agency and/or departments are impacted by the standards development and implementation and what issues are key. All of these parties should be integrated into the process early so that key (and potentially divergent) issues and perspectives are understood at the outset of the UAA. By identifying relevant agencies, stakeholders, and issues at the start, the primary goal of team integration from the beginning is to develop a mutually agreed upon work plan and strategy with an understanding of how the results would fit into the decision process.

Standards changes require a great deal of planning and implementation time (typically approximately 2 to 3 years), and the process is often complicated and delayed by unexpected issues related to other regulatory programs. It is necessary to understand and plan for issues related to TMDL schedules, NPDES permitting compliance timelines, and other regulatory timing drivers. Ideally, the UAA should be completed prior to the initiation of a TMDL, so that the right designated uses form the basis of the TMDL and subsequent NPDES permit limits; the National Academy of Sciences (2001) recommendations stated this clearly: “to ensure that designated uses are appropriate, use attainability analysis should be considered for all waterbodies before a TMDL is developed.”

However, key to a successful strategy is not just identifying the stakeholders and issues but also developing a decision pathway up front that involves the complex integration of technical, regulatory, and political considerations. The strategic plan should include an appropriate “decision pathway” that incorporates a well-thought-out technical scope and an upfront agreement on the following issues, at a minimum:

- What is the decision pathway and relevant data needs?
- How are critical terms defined?
- Which 131.10(g) factors are applicable and appropriate?
- What existing data can and should be used?
- What new data (and/or modeling) are required?
- How will the dataset and modeling output be interpreted and used?
- How are downstream issues considered?
- What is the process and timing for revising uses, if warranted?
- What are the regulatory implications of revised uses, if warranted?

These issues might appear to be deceptively simple; however, in practice, these are often the issues that prevent a UAA from being successful.

The first area that should be addressed is the definition of critical terms that may not be fully defined in applicable State, Tribe or Federal regulations. These terms typically include: natural, background, feasible, non-remedial, and irreversible. Decisions on a UAA justification often hinge on the interpretation of definitions for these terms. Without clear, mutually agreed-upon definitions, these terms can affect the interpretation of available data and cause disagreement between regulators and the regulated community. Properly defining these terms will also help mitigate disagreement on how the data and modeling output will be interpreted and used, which is probably the most common difference of opinion in the UAA process.

Table 1. UAA Integrated Recommendations (adapted from WERF, 2007)

Getting Started	
1.	Involve all affected stakeholders
a.	Consider third parties to facilitate the UAA
b.	Identify partners and develop coalitions on common issues to reduce costs and leverage scarce resources
c.	Use coalitions to promote the use and/or development of State guidance even if from other states
d.	By involving all relevant regulators, learn the rules, rulemaking schedules and guidance, and be sure to comply
2.	Develop a work plan and strategy for the UAA
a.	Work with all relevant agencies and stakeholders to understand all the issues and regulatory obstacles
b.	Develop a mutually agreed upon strategy that addresses all issues
c.	Integrate the UAA with other regulatory programs and agencies
d.	Engage EPA Regional staff early on
3.	Develop a decision pathway
a.	Define the decision pathway and relevant data needs
b.	Identify and define applicable factors and critical regulatory terms
c.	Work with agencies to define the scope, by making use of any available guidance
d.	Scope the data and modeling needs upfront to know what the UAA will cost
e.	Plan on the use of models to answer attainability question in complex systems
f.	Identify and involve downstream users
Conducting the UAA	
1.	Work to gain approval
a.	Use sound science and a thoughtful process
b.	Keep good documentation
2.	Develop thorough and appropriate economic analyses (as needed)
a.	Consider including economic analysis (e.g., cost-benefit or cost-effectiveness) to help stakeholders understand what may be “feasible” for technical factor UAAs (Factors 1-5)
b.	Conduct an “affordability” evaluation if Factor 6 is a legal basis for the UAA, consider other indicators of affordability beyond EPA economic guidance
c.	Additional economic guidance for UAAs is needed
d.	Consider whether putting an economic value on the use is needed
Involving Stakeholders	
1.	Fully engage the public
a.	Do more public involvement than the minimum
b.	Use face-to-face communication
c.	Educate on the purpose and potential outcome of UAA
d.	Identify the economic investments at stake and educate the public of the consequences
2.	Educate decision makers where needed
a.	Communicate the issues to real decision makers
b.	Define economic impacts for elected officials
Resolution	
1.	Be open to alternative regulatory outcomes

Consensus on the issues does not, however, mean that the UAA outcome should be pre-determined prior to compiling or developing all of the data. Rather, this recommendation focuses on the need for a clear pathway for what data are needed and how the data will be interpreted and used in making decision or judgments. Understandably, regulatory staff may want to wait until after they see the information to determine how it should be interpreted. However, these issues tend to be easier to resolve objectively before the data are available because the discussions can be theoretical.

Another strategy to help mitigate disagreement is to rely on available guidance. Federal guidance on UAAs is somewhat limited, and State guidance varies greatly. Because many states are in the process of developing their own guidance, it is more typical that no guidance exists. In these circumstances, the UAA team (including both regulators and the regulated community) should work together to select guidance used in other states and/or to answer the questions relevant to a clearly defined decision pathway.

Investing resources into either answering the difficult questions upfront, or determining what information is needed to be able to answer those questions as part of the UAA, is a good investment. A well-defined decision pathway also has the added benefit of being a tool for developing a tighter technical scope and budget. While it might seem like a difficult upfront challenge, the majority of successful UAAs have the hallmark of close early cooperation on these issues so that all parties' objectives and needs can be met in the process. If agreement cannot be reached upfront on many of these issues, it is better to understand these disagreements and re-assess the probability of a successful UAA before resources are unwisely invested in the process.

Last, when considering the issues and stakeholders, many UAAs focus on stakeholders that “come to the table” and the issues they bring. However, it is critically important to seek out issues and stakeholders and in particular to consider downstream uses that might not initially be engaged but later could become a major obstacle.

Conducting the UAA

Once a decision pathway has been defined and the UAA proponents want to proceed, two elements contribute to the successful completion of a UAA:

- Rely on sound science and good documentation to gain approval; and
- Rely on thorough and appropriate economic analyses.

A successful UAA relies on many factors for success, but without a sound technical basis that relies on good science, the other UAA elements do not matter. Each UAA situation is unique, and there is no cookbook for how to use available biological, chemical, and physical data to determine existing and attainable uses. Given that fact, a well-defined decision pathway that lays out how much data/modeling is needed, and how that data/modeling can and should be interpreted, can help minimize disagreement. In short, any time that a UAA can be based on objective interpretation of the data/modeling versus subjective interpretation of the data, the stronger the UAA scientific and technical basis will be.

Coupled with sound science and thoughtful analysis is the need to maintain good documentation of references, analyses, data sources, modeling calibration/results, conversations, meetings, etc. This provides an administrative record of not only the sound technical basis that is the underpinning of a defensible UAA, but that the appropriate regulatory steps were followed in a timely fashion. Avoiding litigation requires two things, sound technical arguments and absolute compliance with regulatory rules and schedules. The administrative record is the measure for meeting these two needs.

UAA Factors 1 through 5 are usually thought of as “technical” factors, and in fact EPA has indicated that economic analyses are most appropriate for Factor 6 rather than technical Factor 4 regarding the operation of dams (EPA 1998). Thus, it is evident that technical analyses alone can suffice for a legal determination for Factors 1 through 5. Nonetheless, some successful UAAs have also included economic analyses to inform the decision to modify designated uses even though Factor 6 may not have been cited as a legal basis for the decision. Useful and informative economic analyses could include cost-benefit and cost-

effectiveness analyses, which assist in stakeholder understanding and acceptance of what may be realistic or feasible regarding water quality improvement and attainability of standards.

As noted earlier, economic Factor 6 (substantial and widespread economic and social impact) has not been relied upon for many UAAs to date. If Factor 6 is to provide legal justification for a designated use change, however, it may also be advisable that the analysis consider other indicators of affordability rather than restrict the analysis to what is contained in current EPA economic guidance. One such indicator is the economic and social impact on lower income households in the affected area, rather than relying solely or primarily on impacts to median income households.

The other area where UAAs can better incorporate financial considerations is to consider whether developing an economic value of a current or attainable use is needed. The economic value of the use refers to the idea that a waterbody has a value related to its use (fishable and swimmable). If the use were refined, how would that value change? For example, what economic effect would be associated with moving from a fully supporting recreational use that includes swimming to a more limited recreational use that includes only boating? Again, EPA guidance is silent on this issue, and the research team did not identify any case studies in which this has been done. From a non-technical standpoint, this analysis might have an influence on the political and public perception of the UAA process, although such an analysis is not of the regulatory decision criteria.

Involving Stakeholders

As mentioned previously, involving the full breadth of stakeholders early on and throughout the process is essential for success. This is needed not only to gain their approval, but also to identify key issues and ensure that the UAA study adequately addresses all issues.

Independent of who leads the UAA, public involvement is important to a successful outcome, not just the engagement of regulatory and permittee stakeholders. Successful public involvement almost always requires more than the minimum public notification requirements spelled out by rule-making processes. An important goal of the public involvement component of a UAA is to build trust, increase understanding of the UAA process, solicit feedback, and learn more about the waterbody and available data resources. Merely relying on public notice and/or one hearing to obtain feedback is a disaster waiting to happen. Invariably your response will be in mistrust and strong objections, many of which are not easily countered.

As with any public awareness campaign, face-to-face communication is the most effective method because questions can be asked and (hopefully) answered real-time. In addition, this forum can help build trust between UAA proponents and the public, many of whom may not fully understand what a UAA is or what the outcomes of a UAA process may be. Furthermore, this is the best opportunity to inform the public of the large economic investments at stake and to engage them in the discussion of the various consequences and how much they are willing to pay for various outcomes.

Resolution

An underlying theme to this guidance is that a successful UAA outcome can be defined broadly, where alternative regulatory solutions result from consideration of a UAA, or where a UAA leads to widespread public and political recognition that current uses are appropriate.

Getting there requires a great deal of upfront planning and discussion, as well as a commitment throughout the process to base the UAA on sound science, appropriate economic considerations, and public input. Even if all of the recommendations contained herein were followed, a UAA outcome might still be different from what was originally anticipated. Going back and reviewing the parties' objectives and needs is a good idea because it represents being open to an alternative regulatory solution. It is important to not be wed to one solution (i.e. a specific change in the use), but to fully consider what practical issues are at stake, and determine if alternative regulatory solutions solve those practical challenges and meet the concerns of the full range of stakeholders.

Examples of alternative solutions are many but could include a temporary variance, site specific criteria, a long-term compliance schedule with milestones for reconsideration, or a use refinement versus a removal. These and other alternatives are also worthy of consideration.

CONCLUSIONS

There is no one cookbook recipe on how to get to a successful UAA process, but the findings from the research support the idea that there are many good lessons learned. If those who undertake UAAs, review UAAs, or are involved as interested stakeholders follow the recommendations outlined in this research, the odds of successful resolution can be greatly enhanced. Appreciate, though, that successful resolution is not necessarily a use change, but rather agreement on appropriate uses and consensus resolution of regulatory challenges. Following the steps outlined in this paper will ensure that UAAs are conducted with full consideration of all stakeholder issues and are undertaken with appropriate technical analyses and regulatory process.

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