

An Integrated Assessment Primer

December 2015



An Integrated Assessment Primer

December 2015

This guidance document is intended to assist teams developing integrated assessment proposals in response to the National Estuarine Research Reserve System (NERRS) Science Collaborative 2016 [Request for Proposals](#).

Contents

| | |
|----------------------------------------------|----|
| Defining Integrated Assessment | 1 |
| Integrated Assessment Participants | 2 |
| The Integrated Assessment Process | 4 |
| Tips for Contentious Projects | 8 |
| External Technical Review | 9 |
| The Final Integrated Assessment Report | 10 |
| Additional Resources | 11 |

Defining Integrated Assessment

Few coastal resource management problems are purely “environmental” in nature. They impact economies and business, infrastructure and property, human health, and well-being. Science may be essential to addressing a problem, but when it does not account for the economic, regulatory, and social aspects of a problem, it often gets ignored. Integrated assessments bring together relevant environmental, economic, and social information to better support decisions. Integrated assessment teams work collaboratively with stakeholders to examine the root causes of a problem and evaluate potential options for making positive change.

Integrated assessment (IA) offers an effective way to frame and inform decisions for sustainability problems that lack consensus on the cause or solution. This approach is most relevant for situations where considerable information exists but it has not yet been integrated and synthesized in ways that are useful to end users, e.g. decision or policy makers, in their evaluation of management or policy options.

Essential Characteristics

Integrated assessment methods vary depending on the issue, decision making needs and the scope of the project. However, the NERRS Science Collaborative considers all of the following attributes to be essential characteristics of an integrated assessment.

- Addresses a challenging policy or management question (the “focal question”)
- Explicitly incorporates end user and stakeholder feedback throughout
- Evaluates an issue holistically, integrating several disciplines
- Synthesizes existing data and information to guide decisions
- Aims to build collaboration, consensus and capacity to address the issue
- Produces an evaluation of options to address the issue

IAs summarize scientific knowledge to build consensus and guide decisions about how to address a particular resource management, environmental, or sustainability issue. These projects are *assessments* in that they involve a review and analysis of existing information. Rather than running additional experiments, experts synthesize what is known and go a step beyond the scientific facts to offer an assessment or an evaluation of those facts. IA projects are *integrated* in at least four ways:

1. IAs integrate input from intended users of the assessment to clarify the context and frame the assessment in a way that can best guide decisions;
2. IAs integrate stakeholder perspectives, to incorporate diverse views about the issue and potential solutions;
3. IAs integrate knowledge from several disciplines, typically the physical, biological, technological, and social sciences; and
4. IAs integrate an assessment of both causes and solutions for the focal problem.

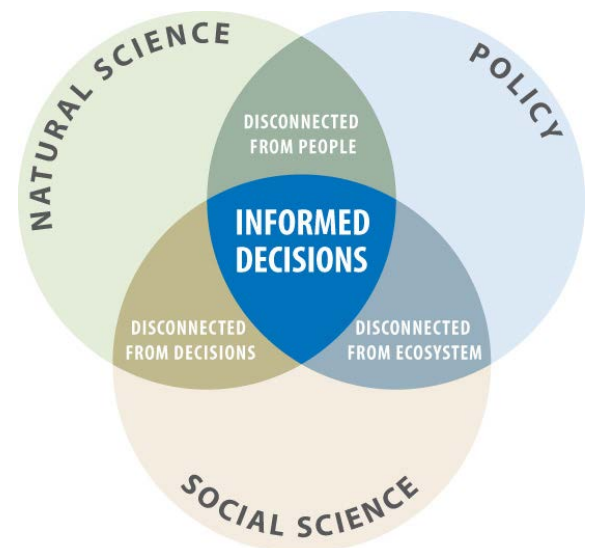


Figure 1. Integrated Assessment brings together knowledge of ecosystems, people, and policy to improve decision making.

Integrated Assessment Participants

Integrated assessments explicitly integrate different technical specialists and a diverse group of end users and stakeholders. This section outlines the roles of different participants in the IA process, recognizing that some people may play multiple roles, and encourages the development of a project advisory group.

End User¹

Effective IAs are developed in collaboration with one or several managers or policy makers who have authority to influence decision making related to the focal question, and who plan to use the results of the assessment (Figure 2). End users should help define the focal issue, clarify the decision making context, identify key stakeholders, and highlight current information needs.

Stakeholders

In addition to the targeted end users, IAs should engage a diverse group of stakeholders that are interested in or affected by the issue, even if they do not have any decision making authority (Figure 3). These are people who can contribute positively if they are involved, or impede the implementation of proposed solutions if their perspectives and interests are not considered. All end users are stakeholders but not all stakeholders are end users.

Opportunities for meaningful collaboration within an IA allow stakeholders and technical specialists to learn from each other, develop a more comprehensive understanding of the issue, and establish relationships that extend beyond the project period. Some IAs formally assess stakeholder opinions to help characterize the issue or inform the selection and evaluation of options. IAs need not engage a large number of stakeholders if they seek out respected individuals as representatives of multiple sides of an issue and create a meaningful role for them as advisors to the assessment team.

Technical assessment team

Natural, physical, and social scientists and other relevant experts comprise an inter-disciplinary team, which gathers and analyzes relevant data and information for the assessment.

Collaboration lead / Outreach coordinator

Identifying, engaging, and maintaining contact with end users

End users are people or groups planning to use and apply project results.

End users may include:

- 1) Reserve staff, natural resource managers, land owners or land use planners
- 2) Decision makers from local, state, federal or tribal governing bodies or government agencies
- 3) Leaders from non-governmental or private groups actively involved in addressing the focal question

Figure 2. Definition of End user

Stakeholders are anyone who is affected by or who has an interest or stake in a particular issue.

Stakeholders may include:

- 1) Members of local, state, federal, or tribal governing bodies or government agencies
- 2) Business leaders and industry representatives
- 3) Representatives from non-profit groups or other citizen organizations
- 4) Individuals from loosely defined user groups, such as local residents, recreational boaters, or farm owners
- 5) Any other individual with an interest in the issue

Figure 3. Definition of Stakeholders

¹ The NERRS Science Collaborative defines “end user” as a person or group in a position to apply the information or tools being produced, evaluated, or transferred through a project in a way that is of direct consequence to the ecological, social, or economic integrity of a reserve(s) and/or surrounding watershed(s).

and stakeholders requires time, expertise, and connections. One or several people on the team should be responsible for communicating with these people and creating meaningful opportunities for input and learning.

Forming a Project Advisory Group

Integrated assessment teams are encouraged to develop a formal project advisory group that includes end users, other relevant decision makers, and representative stakeholders. Regular discussions with a select number of individuals can be a more meaningful, effective, and efficient way of soliciting input than a broad outreach effort. In some cases, an appropriate advisory group may already exist and the team can formalize a relationship with the IA. Meetings with the advisory group offer a chance to regularly share results, solicit input, discuss changes in the policy/management landscape, and build relationships among a carefully selected group.

IA focal issues can be contentious, and a carefully designed advisory process can help manage potential controversy. The advisory group should include representatives from different aspects of the issue, including those likely to be vocal opponents or proponents of any potential solutions. IA teams should carefully balance participation and be transparent about who is involved and in what capacity. It is also important to select the right name for the group. For example, an advisory group is clearly that—a group selected to advise but not implement the project. However, a steering committee implies much more—a defined role to determine project plans and outcomes. Additional ideas are provided on page 8, *Tips for Contentious Projects*.

Proposal Tips:

- The NERRS Science Collaborative emphasis on collaboration and end user engagement applies equally to IA and research proposals. However, IA teams should plan to integrate feedback from both intended users of assessment results as well as stakeholders that may have unique and competing views on the focal question.
- At the pre-proposal stage, IA applicants should focus on the needs of one or two key end users that have some decision making authority relevant to the focal issue. Pre-proposals should demonstrate knowledge of these end users and their needs, and outline an approach for identifying, engaging, and incorporating input from a broader group of end users and stakeholders if funded.
- Full proposals should be developed in collaboration with one or two key end users. Proposals should demonstrate knowledge of the larger group of stakeholders and describe a more detailed plan for engaging the right players.
- If funded, IA teams should identify additional end user and stakeholder participants and take time to solicit their needs, seek feedback on the proposed approach, and adjust project plans if needed.
- Applicants must demonstrate that the assessment team has the expertise and experience necessary for the proposed technical methods and end user engagement.

The Integrated Assessment Process

The methods employed in integrated assessment vary depending on the geographic scope, budget, type of issue, and range of end users. Here, we describe core elements of the process that has been used by IA projects supported by the Graham Sustainability Institute and Michigan Sea Grant (Figure 4). These elements help ensure that the IA is perceived as relevant, balanced, and scientifically credible. Different components might be emphasized more or less within an assessment, depending on the context, scientific and public understanding of the issue, and technical and non-technical barriers to action. However, applicants to the NERRS Science Collaborative should include all four elements within their proposed project approach.

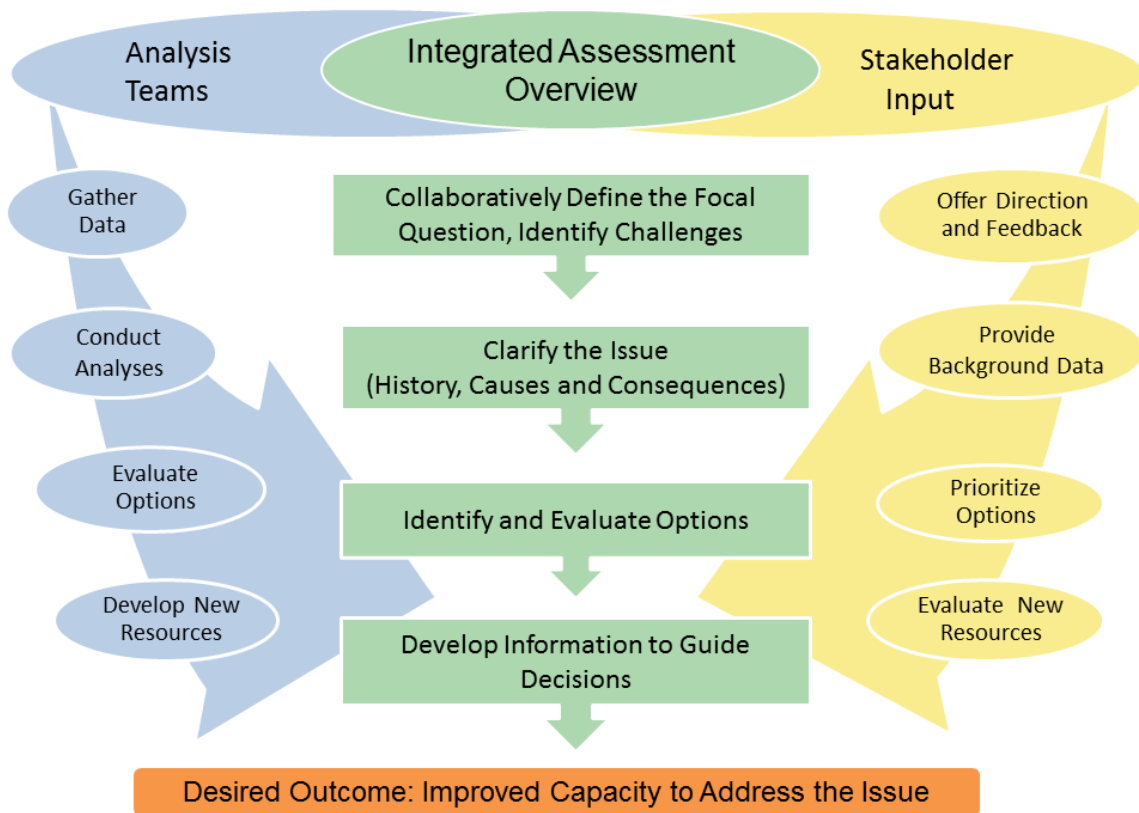


Figure 4. Diagram illustrating how analysis teams and stakeholders contribute throughout the IA process.

1. Collaboratively Define the Focal Question

Integrated assessment offers an effective way to frame and inform decisions for problems that lack consensus on the cause or solution – so called “wicked problems”. These issues may have defied typical and routine action to date, perhaps because no single agency has authority to address the issue, or because there are contradictory views on what could or should be done. Although the IA focal question is likely to become more refined during the early stages of a project, a project team might begin with a basic question such as: “What are the causes of and potential options for addressing X problem in X location?”

Integrated assessment begins with a structured dialogue among scientists, decision makers, and other stakeholders to establish the key question around which the assessment will be developed. This is an essential step, one that distinguishes IA from more standard scientific syntheses or reviews. The assessment is designed to gather natural and social science information with the specific purpose of supporting decision making on a specific management or policy question. The assessment team needs to understand end user and stakeholder concerns, the decision making context, and how the assessment will support decisions. Ideally, an IA proposal should be developed in collaboration with one or more end users, and then if funded, the team should allow stakeholders and end users to offer feedback on the focal question and project approach.

By deliberately involving intended users and stakeholders, these early conversations serve to secure buy-in, build trust, and expose different perspectives. Perhaps most importantly, this dialogue ensures that the scientific assessment is framed in a way that is most useful to the decision making process. The project team needs to understand what information is needed for decisions, what components of a potential assessment are most important, and how and when the assessment might influence management or policy decisions.

Proposal Tips:

- Clearly state the IA's focal question.
- Describe the issue(s) the assessment will address, demonstrating an understanding of the context and underlying social and environmental factors. Identify previous and ongoing attempts to address the focal question and the technical and non-technical barriers that hinder an effective response.
- Explain how end users have been engaged in developing the proposal and defining the question.
- At the full proposal stage, explain which end users and stakeholders will be engaged in the assessment and why; how and when they will be engaged; and the purpose of their engagement. For example, will more effort be devoted to collaboratively refining the focal question if the project is funded?
- Demonstrate how the proposed approach is appropriate to address the focal question.

2. Clarify the Issue

Integrated assessments examine and clarify aspects of the focal question that are uncertain and are impeding action. This often includes an analysis of the current status, historical trends, root causes, and implications of the focal question. To address the issue effectively, people need to better understand the probable causes and the environmental, social, and economic consequences of the issue. During this stage, technical analyses and end user and stakeholder engagement activities help demonstrate the extent of the problem and build support for tackling the problem.

A description of current conditions and historical trends can enhance understanding and provide a foundation for further analyses. This information may be necessary for quantitative modeling and forecasting to evaluate potential options. Even in the absence of a formal modeling effort, baseline data can help project future conditions if the environmental issue is not addressed – the no-change option.

It may be tempting to push through technical components of an assessment and simply present results (e.g., model outputs, finished maps) to end users and stakeholders at the end of the process, but an IA will be most effective if they are provided a clear role in all stages of the process. Discussing interim results with end users and stakeholders helps improve understanding and allows the assessment team to benefit from the local and/or specialized knowledge of the engaged group(s). End users and stakeholders will have feedback and the project team should allow time to solicit, respond to, and adapt to suggestions. This iterative process will foster collaboration and improve the acceptance and usability of results.

Proposal Tips:

- Make sure that methods are sufficiently detailed and technically sound. This includes details on technical analyses and end user and stakeholder engagement activities, e.g., the type of activities that will occur during workshops.
- Identify known and potential data sources that will be used in the assessment and indicate how the project team will access them.
- Include a clear and thoughtful process for engaging end users and stakeholders, incorporating their input, and fostering opportunities for end users, stakeholders, and technical specialists to learn from each other.

3. Identify and Evaluate Options

All integrated assessments should help end users and stakeholders evaluate potential options for addressing the focal question – this is the central purpose of an IA. When planning an assessment, teams should identify the type of options that will be considered during the assessment and then refine these potential options as the project progresses. Depending on the issue, options might include natural resource management actions, legislative or regulatory policies, targets (e.g., 20% reduction in nitrogen), education or outreach strategies, or potential private and public sector actions that fall within a future scenario (e.g., a community development scenario).

If not already established, initial IA results and project activities can help end users establish goals, strategies, and potential options for addressing the focal issues. End users may need to prioritize potential actions, allowing subsequent analyses to focus on options that are most politically, socially, and economically feasible. However, it is important that integrated assessments help end users compare a suite of options, rather than recommend a single approach.

There are many ways to evaluate potential options quantitatively and qualitatively. Some evaluation tools include ecological or economic models, cost-effectiveness or cost-benefit analyses, trend analysis, scenario development exercises, case studies, or other structured discussions with stakeholders. The IA team should select the approach that is most appropriate for the project.

There are many assumptions that go into the development and interpretation of scenarios and forecasts which should be discussed candidly with end users. Assessment teams should provide an assessment of certainty levels associated with projections and other technical analyses. This information not only helps decision makers understand the strengths and weaknesses of the analyses, but also provides guidance for future research needs to reduce

uncertainties. Public comment and peer review processes can help ensure acceptance by the decision making community.

Assessment results are more likely to be seen as relevant and balanced if a collaborative process is used to identify and evaluate potential options. On-going communication with end users is essential in this stage because perspectives and the overall decision making context may evolve during the project. A variety of methods are available to solicit input. Workshops, focus groups, or field trips can allow participants to brainstorm and consider the feasibility of different strategies. Informal surveys can be used to characterize concerns, set goals, and prioritize strategies. Real time polling during workshops can allow participants to “vote” and collectively rate goals and potential actions.

Proposal Tips:

- In the problem statement, clearly identify the type of potential options that will be evaluated, e.g., management actions, regulations, legislation, education/outreach programs, or other initiatives.
- One of the outputs for IA must be an evaluation of options for addressing the focal question. The format for this evaluation will vary depending on the question and project.
- Proposals must demonstrate that the project has the requisite technical capacity for proposed work, including expertise, time, data, and analytical methods.

4. Develop Information to Guide Decisions

Integrated assessment results should be summarized so they are accessible and usable by end users and stakeholders. The IA should not recommend a specific policy or management action, but rather provide enough scientific information so that end users can make informed choices among two or more well-documented options. Final products must include an IA report, which is described in more detail below. In addition, IA projects might aggregate or develop other resources to guide decisions such as maps, models, graphics, funding guidance, model ordinances, case studies, or education materials. These products should be scoped and refined through a collaborative process to ensure there is general consensus on their application and that they meet specific end user needs.

Some IA projects successfully use or modify existing analytical tools (e.g., watershed models) to examine the focal issue and evaluate options. However, the development of new decision support tools to be used by end users after a project ends (e.g., an online mapping application) often requires significant time and resources, which can detract from other parts of an assessment. For some issues, it might be premature to create a new tool to implement a specific strategy if there is still significant uncertainty about the issue. In these cases, an IA could evaluate the use of a new tool as a potential option for addressing the issue, and provide data or guidance to support its development.

Proposal Tip:

- Dedicate enough time to develop and revise the final IA report and other project outputs.

Tips for Contentious Projects

Some of the characteristics of an issue that make it appropriate for an integrated assessment—contradictory views regarding the cause or solution; resistance to resolution; economic, social, or political barriers—may also generate significant controversy around a project. For contentious projects, transparency and conflict management are particularly important and some additional process steps are suggested to ensure effective engagement and positive outcomes.

- **Develop a clear and public plan for the project.**² This document should state:
 - **What is being done.** Avoiding jargon, develop a brief description of the project outlining the need, process being used, and possible outcomes.
 - **Who is involved,** how and why those participants were identified. Explain their role in terms of decision making, defining project outcomes, and resolving disagreements. Clearly define and distinguish between different groups, such as the project team and an advisory group.
 - **The funding source.** Be clear and transparent about the source of funding for the project and how that, if at all, influences the project.
 - **The project timeline.** What is the overall plan for the project? What will be accomplished by set dates? What information will be made available about the project during the work period (preliminary reports, draft reports, etc.).
 - **Opportunities for public input.** Depending on plans, be clear about how and when broader public input will be solicited, how that input may be used, and how the team will report back on how the input was used.

Developing this document can be a very productive step for the project team—moving from proposal to action and identifying areas which need additional clarification or focus. It can also be a very helpful resource to share with project team members so they are using consistent language when talking about the project with individuals outside the project team.

- **Be prepared for Freedom of Information Act (FOIA) requests.** FOIA requests are a possibility for any publicly funded institution or project. It is helpful to know, in advance, how a project's host institution handles these requests.
- **Consider using Conflict of Interest (COI) forms.** COI forms can help identify, manage, and document if someone has a real, or perceived, conflict with a particular topic or project team. The COI form can help determine if a connection may create a bias or inappropriately influence project outcomes. The National Academy of Sciences provides a useful COI form example³ which can be adapted for an IA, or a project's host institution may have a form. It may be appropriate for researchers, other project team members, and external reviewers to complete COI forms. However, advisory group members may be valuable contributors to the project precisely because of the perspective their conflicts afford, and thus a COI for advisors would be inappropriate.

² Examples of project plans can be found at:

- <http://graham.umich.edu/media/files/water-levels-ia-plan.pdf>, and
- <http://graham.umich.edu/media/files/HF-IA-Final-Report.pdf>, see chapter 1.

³ http://www.nationalacademies.org/coi/bi-coi_form-3.pdf

External Technical Review

Integrated assessments must be perceived as scientifically credible, balanced, and relevant to the decision making context in order to be accepted and influential. On-going consultation with end users helps ensure relevance and an inclusive stakeholder process helps ensure the results are perceived as balanced and fair. A key part of ensuring scientific credibility is developing a transparent process for soliciting input from technical experts external to the assessment process. External reviewers can offer valuable feedback on technical analyses and verify that project results are scientifically sound.

IA full proposals submitted the NERRS Science Collaborative must include a concise plan for eliciting external technical review. Applicants are encouraged to develop a plan that best suits the issue, the types of products planned, and the needs of end users. The following are key considerations proposing teams should consider when developing a useful review process:

Why: A thoughtful, transparent review process is particularly important for assessments that seek to address highly controversial topics, projects conducting analyses unfamiliar to end users, or situations where the intended users may have concerns or may need to formally demonstrate the credibility of project results. IAs typically develop outputs that synthesize existing science and are designed to meet end user needs. IA teams may not plan to publish any or all of their results in scientific journals, so this review process adds a level of peer review for the technical project outputs. If needed, Science Collaborative staff are available to coordinate formal, independent review of project outputs to improve perceptions of credibility and fairness.

Who: External reviewers should include people with relevant technical expertise that can offer feedback on specific analyses, modeling, and technical results. To ensure that they offer a new, unbiased perspective, reviewers should not be participating in the assessment process in any other way. Reviewers could be from within the state or region and therefore have some familiarity with the specific policy or management situation, or be from outside the state to ensure they are not perceived as biased or connected to a particular stakeholder group. A diverse group of 2 -5 reviewers should be selected such that all technical components of the project can be adequately reviewed, e.g., cost-benefit analyses or hydrologic modeling.

When: This external review process could occur at one or several interim points during your assessment, or occur only as the project nears completion. An interim technical review can serve to check analytical methods and assumptions, providing enough time for the team to revise their approach as needed. Alternatively, a final review can add an additional level of credibility for project outputs, which could be important for certain end users, particularly if the issue is controversial. Teams should select and build into their timelines the approach that will add the most value for their project.

How: Project teams may choose to recruit external reviewers and manage the review process themselves, or ask the Science Collaborative for support. If an IA project is selected for funding, Science Collaborative staff are available to help identify external reviewers, provide advice on implementing a review process, or coordinate a formal, independent review process of the final IA report and other project outputs. Regardless

of the specific approach used, the review process should be incorporated into the timeline and project approach at the full proposal stage. The process should also be documented in the final IA report, including the type of feedback received and the team's response to this input.

The Final Integrated Assessment Report

NERRS Science Collaborative research and IA projects are required to submit regular progress reports and share project outputs (e.g., graphics, fact sheets, journal articles). In addition, IA projects must produce a final IA report. The information below is intended to help applicants develop a project timeline that includes the completion of this report.

The IA report provides a concise summary of findings that can serve as a reference for end users, stakeholders, and other technical experts. IA projects are intended to support environmental problem solving, and therefore the final report should describe all the options the project team considered for addressing the focal question, the process for vetting the options, and an evaluation of those options. The final IA report should also describe the assessment process and any analyses conducted to clarify the issue (e.g., history, causes and consequences). The final report is intended to complement and synthesize any other project outputs or existing resources (e.g., previous reports, new maps or fact sheets). Depending on the situation, other outputs may be referenced in the final report, included as appendices, or incorporated in their entirety.

Unlike a traditional research report, an IA report will likely include some judgment about the facts and how they relate to the decision making context. These judgments should also be explained and justified (e.g., Are they based on model outputs, a panel of experts, or the results of a focus group?). IA teams are encouraged to go beyond the facts to include objective analyses, but they should clearly state the certainty of their statements and distinguish between data, inferences or recommendations. Analysis based upon model outcomes should include the confidence level associated with any predictions or inferences. Less quantitative options will need to include other ways of documenting the level of confidence associated with anticipated outcomes.

As discussed above, the project team must have a process in place for soliciting input from end users and key stakeholder representatives. This group must have an opportunity to review and influence the content and format of project outputs, including the final IA report.

Public Comment

Once all end user input is incorporated, project results must be presented to the broader public and feedback gathered and documented in the report. The public consultation process should be designed to suit the project and could range from a town hall meeting, webinar, an online comment form, or public comment on draft reports. Public comment, as distinct from end user or stakeholder input, should not change the content of the report but be gathered as an appendix. These comments provide further input to decision makers who will be selecting and implementing options for addressing the focal question.

Timeline

Project teams should reserve 4 to 6 months to develop and revise project outputs, including the final report and any other products. If the Science Collaborative is managing an external technical review of the IA report, teams should reserve 3 months for the review and revision process. The revised final report should be submitted along with a final progress report.

Additional Resources

Links to these additional IA resources can be found on the NERRS Science Collaborative website: <http://graham.umich.edu/water/nerrs/resources/ia>

- ***The Integrated Assessment Center at the Graham Sustainability Institute***
The Graham Sustainability Institute has been facilitating IA projects for five years. The projects vary widely in their scope and style, but most involve researchers from the University of Michigan with guidance from IA specialists. Project fact sheets and reports are available on line and could be a useful model for teams developing new IAs.
- ***Tackling Wicked Problems through Integrated Assessment: A Guide for Decision Makers, Project Leaders and Scientists*** (PDF Report, 23 pages)
This guide provides more background on integrated assessment and a long reference list of related reports and journal articles. Please note that this guide was published in 2009 and describes eight stages of IA. The NERRS Science Collaborative encourages the use of the more flexible IA framework that is outlined in this IA Primer and the 2015 RFP documents.
- ***Benefits of Integrated Assessment: Information for Decision Makers, Project leaders and Scientists*** (PDF Report, 54 pages)
This report describes an evaluation of four case study projects and the types of benefits that emerged, including new partnerships, modified perspectives, changes in processes, and new opportunities. The case study descriptions might be useful to teams developing new IA projects. This study was also published in the Journal of Environmental Studies and Sciences.
- **Michigan Sea Grant**
Michigan Sea Grant has been supporting integrated assessments as part of their research program since 2007. The research area of their website includes project factsheets, IA reports, and other resources that could aid teams developing new IAs.
- **The Integrated Assessment Society**
This professional society supports the community of scientists and practitioners who use integrated assessment. Their website includes additional resources, including a dedicated journal and conferences about IA.