

Integrating Scientific Information, Stakeholder Interests, and Political Concerns

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INTRODUCTION

Central to resource and environmental management is the question of what qualifies as fact. Regulatory agencies have responsibility for deciding what new studies are needed, who should conduct them, and what existing data are acceptable sources of information for rule making, permitting, management plans, and other decisions. However, public and private stakeholders have the right to question the credibility of the scientists and the science used, to generate studies of their own, and to challenge the decisions that use this information. These challenges may come in the form of public outcry, public relations campaigns, or even litigation. While such efforts provide an outlet for airing concerns, they tend to add to the overall level of public uncertainty. Often, there is no forum to evaluate what, whether, and how scientific and technical information should be incorporated into specific policy decisions.

No matter the scale, scope, or substance, all environmental and resource management challenges are characterized by the need to cope with scientific uncertainty and make difficult choices about how to value scarce resources. Collaborative decision-making processes seek to involve contending stakeholders in making these decisions together. Their goal is to respond to all, rather than choose among, competing interests and competing approaches to handling scientific uncertainty. Joint fact finding (JFF), as part of a larger consensus-building process, offers a mechanism to bring together decision makers, stakeholders, and scientific and technical experts to build a common base of knowledge to inform resource management decisions. JFF promotes integration across disciplines, across sectors, and across agencies, and allows for the consideration and incorporation of social, cultural, economic, and ecological principles in the formation of environmental and resource management and policy decisions. Thus, integrated resource management is an effort not merely in linking scientific and technical disciplines, but in integrating diverse stakeholder groups, the public included, as well as policy-makers and scientists, into the ongoing process of planning, decision making, monitoring, and evaluation.

GENERAL PROBLEM

Resource and environmental management involves multiple parties with multiple interests, different levels of technical expertise, varying scientific backgrounds, and competing political priorities. Because of these factors, decision makers tend to separate science from other important resource management considerations. Often, they see questions of science as distinct from questions of values. This can blind them to the non-objective decisions inherent in the generation and interpretation of scientific data.

Scientists as well as decision makers prefer to separate science and policy. In the scientific community, 'good science' is often equated with non-political science, so scientists distance their work from the decision-making process. In their efforts to remain objective, they limit their interaction with those in the policy arena before, during, and after their scientific inquiry. Further, it is taboo for scientists to attempt to interpret how their research conclusions might apply to the policy decision at hand. Thus, their involvement ends the moment they hand their report to the agency representative who commissioned it. Scientists who work too much with decision makers or stakeholders risk losing neutrality in the eyes of their colleagues. Unfortunately, by distancing themselves from policy-relevant questions, scientists may also lose credibility with stakeholders.

Rather than working with scientific or technical experts and asking questions about their research or conclusions, stakeholder groups often commission their own studies. This additional research can bring to light new and important questions that help inform policy. However, some parties use science as a means of influencing a policy outcome. By hiding their interests behind a scientific report, some stakeholders are able to push for a policy outcome most favourable to them. This is called *adversary science*. The result is an ever-growing list of 'facts' and corresponding refutations and an equally long list of values that are left out of the conversation. In this way, the separation of science and policy decisions can lead to the manipulation of both.

Consider the following situation. A federal agency is responsible for creating a management plan for a checkerboard of public and private land in the western United States. Parts of this land are being used for ranching and recreation. Other areas include forest land for which there is a permit application for commercial harvesting. The land also serves as habitat for threatened plant and bird species.

Several different private and non-profit groups, in addition to many local stakeholders, have become involved in the management plan decision-making process. There is disagreement over several facets of the plan, including proposals for a new road through the forest, stricter regulation of recreational activities, and habitat conservation measures. There is also disagreement on regional priorities. Some believe that the region should focus on boosting the economy through timber, ranching, or even oil exploration, while others think that the natural environment should be preserved and used as a resource to attract recreationalists and tourists to the region. Some are more concerned with preserving a certain way of life, such as the ranching tradition that has existed for generations in the region. Others are calling for a change

in lifestyle that would restrict extractive practices and place a higher value on the region's diminishing environmental resources.

There is no research report that seems to balance all of the scientific, economic, and political concerns expressed by the many different stakeholders. The agency asked contractors and agency scientists to research the region and the possible impacts of different management proposals. They have just received the final reports, which have interesting scientific conclusions but do not really lead to an obvious policy recommendation. Further, some of the stakeholders don't trust the agency scientists or the contractors who were hired to conduct some of the research. Thus, several stakeholder groups have brought forward additional experts to address issues such as timber harvesting methods, species habitat, ranching, and potential effects of the different proposals on the local economy. Each of the experts claims to be neutral and objective in presenting 'the scientific evidence' for the impact of the land management proposals. These experts have never met with each other or with the stakeholders for a systematic review and discussion of the evidence. Instead, they appear separately to defend their work and criticize the assumptions, methods, and findings of other experts. To further complicate matters, experts representing different disciplines, such as biology, forestry, geology, and economics, do not communicate with stakeholders or help them understand how their very different types of data can help inform the management plan.

Stakeholders who are not also technical experts quickly become frustrated and decide that there is no right answer to the question. They may also be frustrated if they have observational data to contribute to the discussion, particularly if it conflicts with technical data. For example, a long-time local resident or a timber worker may be able to comment on the presence or absence of an endangered bird species in a certain area of the forest. However, because such stakeholders are not trained scientists, both technical and non-technical experts in the group may dismiss their contextual knowledge as being neither scientific data nor couched in technical language; some may believe that the stakeholders have ulterior or biased motives (e.g., 'They are saying that to get a predetermined outcome' or 'Those loggers don't care about wildlife').

Perceptions of unequal distribution of scientific resources can undermine the collaborative spirit and lead to a breakdown of the process, or worse yet, to litigation. The likely outcome of this scenario would be a program based on a political compromise within the 'range' of arguments presented by the duelling experts. Additionally, the conversation on regional economic and social priorities would have been left behind in the midst of the focus on scientific conflict.

THE CASE FOR JOINT FACT FINDING

The integration of scientific and technical information into decision-making processes remains a challenge for those involved in resource and environmental management. Even less explored is the integration of the local (or contextual) knowledge, or observational/anecdotal information, possessed by residents or users of natural

resources. Consensus-building processes have the potential to resolve not only the value-based conflicts over natural resources, but also the questions of fact that often delay or even overturn environmental decisions.

Consensus building is the process of brokering or facilitating agreement among the representative group of stakeholders involved in any issue or conflict (see Susskind 2000). Consensus building usually includes information gathering (i.e., joint fact finding) and a negotiation process that follows procedures or protocols that the parties themselves help to specify. The outcome usually takes the form of a written agreement that, in an environmental dispute, needs to be entirely transparent (i.e., open to public review). Because of the complexity generated by the number of parties involved and the technical nature of many of the issues under discussion, most consensus-building efforts in the environmental field need to be managed by a highly trained 'neutral' or mediator.

A full consensus-building process includes six key steps:

1. A convenor initiates a possible consensus-building process by asking a neutral party to conduct a stakeholder assessment. Through this assessment, the neutral party identifies stakeholders and assesses their interests, capacities, and potential for reaching consensus-based agreements.
2. The convenor and the stakeholders determine whether or not to proceed with a consensus-building process. If they do decide to proceed, they come to agreement on stakeholder representatives, ground rules, an agenda, a timetable, and selection of a facilitator.
3. If needed, the parties initiate a JFF process to resolve technical and factual questions and help the group focus on the development of feasible options.
4. The parties engage in a process of deliberation in which they create value by generating options or packages for mutual gain.
5. The parties distribute the value that was created by forming recommendations or proposals for agreement. They promote consensus agreements where possible and enable near-consensus alternatives when full consensus is not possible.
6. Appropriate parties are charged with the responsibility for follow-through of the agreement reached. These include responsibilities for implementation, monitoring, and providing opportunities for stakeholders to revisit and revise their agreements as necessary during the implementation phase.

At the end of this process, the group can go back to any of the six steps above as appropriate.

Consensus building has been used in negotiated rule making, permitting processes, habitat conservation plans, forestry management, and many other resource decisions. Federal and state statutes have legitimized the use of consensus building, and agencies at all levels of government have used collaborative processes to facilitate their decision making. Still, many of these processes have ignored or taken for granted the questions of scientific and technical information. There remains a great need to acknowledge and address technical questions in a collaborative manner so that

information is gathered, analysed, and incorporated into decisions in such a way that it is credible and useful to decision makers, stakeholders, and technical experts.

Joint fact finding, as an explicit step in a broader consensus-building process, provides for involvement by stakeholders, including non-technical ones, who may be affected by final decisions in the ongoing process of generating and analysing the scientific and technical information used to make those decisions (see Figure 10.1). Joint fact finding recognizes that experts and non-experts have important roles to play in specifying the scientific questions that need to be answered, selecting appropriate methods of inquiry, interpreting findings, and deciding how to handle assumptions and uncertainties inherent in these findings. In this way, joint fact finding increases the transparency of the collection and use of scientific and technical information in decision-making processes. It also allows for a more comprehensive understanding of the policy implications of scientific and technical input.

It is critical that all participants in a JFF process understand their roles. Joint fact finding should involve

- decision makers, or representatives from agencies with decision-making responsibility;
- managers who will be responsible for implementing the decision;
- representatives of stakeholder groups who will be affected by the decision;
- a convenor who can bring these key parties to the table;
- a neutral facilitator who can create a climate conducive to the joint investigation of issues, productive dialogue, and relationship building among participants; and
- scientific and technical experts who interact with and serve as a resource to other stakeholders throughout the consensus process.

Decision makers are those responsible for writing the environmental plan or policy. While the actual decision makers could be defined as the legislators, agency officials, or others who vote or decide on the approval of new regulations, these final decision makers are generally not involved in negotiations. Representatives of agencies under whose purview the new policy will be promulgated are more likely to participate in the rule-making process and therefore in the joint fact finding. This group should be clear about goals and timelines for the policy process and about where flexibility does and does not exist.

Managers are likely from the same agency as the decision makers, but they are responsible for implementing the regulations 'on the ground' from one of the agency's many field offices. For example, a manager of a new rangeland policy would work directly with local ranchers and other landowners to implement grazing regulations or habitat restoration activities, as well as to monitor activities on public lands. Managers are needed in JFF processes to inform other participants about the practicality of potential new regulations under consideration by the group.

Stakeholders are individuals or groups who will be potentially affected by a new plan or policy. A convenor and/or neutral should conduct a conflict assessment to determine the range of stakeholders and which among them should be offered a seat at the table. In environmental management issues, stakeholders often include

THE CONSENSUS BUILDING PROCESS AND THE ROLE OF JOINT FACT FINDING

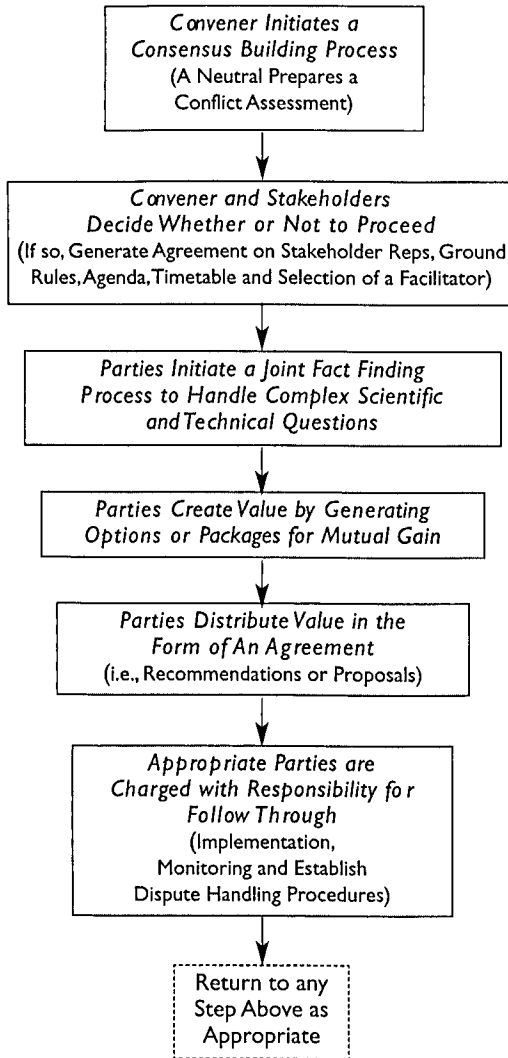


FIGURE 10.1 The consensus-building process and the role of joint fact finding

SOURCE: Consensus Building Institute, 2002

advocates hoping to represent the resource in question, such as a river, ecosystem, or a particular plant or animal species. Local community stakeholders may have social or economic concerns, such as the effect of a decision on growth, open space, or the job market. Stakeholders can also include business and industry representatives whose development or delivery of products and services may be affected by the decision. Participants from this group often communicate how regulations will impact resources of their sector, including in terms of time and money.

Joint fact finding also brings in scientists and analysts to work with decision makers, managers, and stakeholders to frame the research question(s), gather data, interpret the data, and communicate the research results. Unlike collaborative efforts where scientists and other analysts are merely consulted, JFF requires these experts to play a central and ongoing role throughout the entire decision-making process. Members of the technical team must be seen as credible to all parties and be able to work in a collaborative situation with decision makers and stakeholders. This does not mean that they should sacrifice objectivity. Rather, they must conduct their work in a transparent fashion, be willing to address stakeholders' questions, and help the group consider how scientific and technical information relates to the policy decision. Further, they must be able to communicate across disciplines with experts involved in other research related to the policy.

In order to bring together decision makers, managers, stakeholders, and experts, a convening group or individual is often needed to provide neutral ground, funding, and logistical support. An agency with policy-making responsibility may serve as the convenor if that is acceptable to the rest of the JFF participants. Generally, convenors take responsibility for identifying and contracting with facilitators. It is advisable for the convenor to confirm that the facilitator is acceptable to all participating stakeholder groups and to set up a procedure for participants to raise and address concerns about the facilitator's performance and/or impartiality.

A qualified facilitator is one of the more important resources in consensus building and joint fact finding. The most effective facilitators are able to work both on the specific tasks of the group and on group dynamics—building a sense of shared purpose, positive working relationships, and camaraderie. Facilitators can do more than just run a good meeting, however, if engaged early in the consensus-building process. If the facilitator enters the process either as the assessor or as the facilitator of initial stakeholder meetings to discuss the results of the assessment and plan the process, then he or she can provide substantial help in process design and process management. In a JFF process, the neutral can help the group identify information sources and experts and facilitate the process of reaching agreement on questions, methods, and interpretation of data. Further, facilitators can promote the legitimacy and effectiveness of the process by

- encouraging effective representation and participation of key stakeholders by helping all participants update their organizations/constituencies regularly;
- helping the group meet its agreed goals as efficiently as possible through careful management of the work plan and agendas for individual meetings;

- identifying resource needs (e.g., funding for consultants, training on technical aspects of forest management or certification) and helping the group meet those needs;
- helping individual participants and the group as a whole with essential steps in the negotiation process, including consideration of each participant's core interests, the creation of options and proposals on specific issues, the development of package agreements, and the crafting of final decisions in light of agreed goals, principles, and criteria; and
- identifying and helping to resolve conflicts among participants, acting as an impartial mediator and problem-solver.

The JFF process has six key steps (see Figure 10.2). In the first step, the convenor, in consultation with a neutral, assesses the need for a JFF process. This assessment should include an identification of what scientific, financial, and human resources will be needed for a successful collaborative inquiry. Convenors should identify some of the data gaps or scientific controversies that could be addressed by joint research. With the help of a neutral in talking to interested parties, convenors should identify a balanced group of stakeholders, decision makers, and managers to work with experts to fill in these gaps. They should also estimate the time and funding needed to convene a JFF process and consider how to cover these costs.

If all parties weigh the costs and benefits of joint fact finding and decide to proceed, convenors can invite the group to the table to begin the process. At this stage, the neutral should assist participants in developing ground rules for working together. Participants should also draft a work plan, which should include discussions on outstanding scientific questions required to inform the policy decision and which experts to involve in researching these questions. Before going further, all parties must understand the different sources of conflict, the questions to be dealt with through joint fact finding, and the other issues that must be considered in the overall consensus-building process. They should also be clear about realistic goals and limitations of their work as it relates to the policy-making process.

Once the JFF group, including the scientific experts, has been assembled, participants must scope the study. Experts can aid other participants in translating their concerns about knowledge gaps or conflicting information into researchable questions. They can also help identify appropriate methods of information gathering and analysis, as well as the costs and benefits of different research methods.

Throughout scoping and the other phases, participants must continue to tie the scientific inquiry back into the policy questions to ensure that their work will be relevant to the decision-making process that will follow joint fact finding. It is also critical for experts to promote transparency in their work by explaining inherent scientific uncertainties and other research limitations.

As the experts conduct the study as scoped by the JFF participants, they should draw on the latter's expertise and knowledge. This could include inputting a manager's observational data into their models or learning about a research site from a local stakeholder. Experts should educate participants about the complexities of their

<p>PREPARE for JFF</p> <p>STEP 1</p> <p>Understand how JFF fits into consensus building process</p>	<p>SCOPE the JFF process</p> <p>STEP 2</p> <p>Work with stakeholders to draft roles and responsibilities</p> <p>Generate technical questions</p> <p>Identify existing information and knowledge gaps</p> <p>Advise on methods for dealing with conflicting data and interpretations of facts and forecasts</p>	<p>DEFINE the most appropriate methods of analysis</p> <p>STEP 3</p> <p>Translate general questions into researchable question</p> <p>Identify relevant methods of information gathering/analysis and highlight the benefits and disadvantages of each</p> <p>Determine costs and benefits of additional information gathering</p> <p>Determine whether proposed studies will enable stakeholders to meet their interests</p>	<p>CONDUCT THE STUDY</p> <p>STEP 4</p> <p>Undertake the work checking back with constituents</p> <p>Draw on expertise and knowledge of stakeholders</p> <p>Review drafts of the final JFF reports</p>	<p>EVALUATE the results of JFF</p> <p>STEP 5</p> <p>Use sensitivity analysis to examine the overall significance of scientific assumptions and findings</p> <p>Compare findings to the published literature</p> <p>Translate findings into possible policy responses</p> <p>Clarify remaining uncertainties and appropriate contingent responses</p> <p>Determine whether and how JFF results have (or have not) answered key questions</p>	<p>COMMUNICATE the results of JFF process</p> <p>STEP 6</p> <p>Jointly present findings to stakeholders</p> <p>Scientists communicate JFF results to various constituencies and policy-makers</p> <p>Determine if further JFF is necessary</p>
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FIGURE 10.2 Joint fact finding: Key steps in the process SOURCE: 2003 Consensus Building Institute, <http://www.cbuilding.org>

research and check back with them regularly with progress reports, data, and draft findings.

In examining the significance of assumptions and findings and evaluating the study outcomes, participants should use sensitivity analysis. Does changing the parameters of certain assumptions lead to widely different results or to similar results? How much do inputs have to vary to affect outputs? In developing draft and final conclusions, participants should maintain transparency by noting the assumptions, uncertainties, and limitations of the scientific inquiry. They should also compare the results of their studies with the published literature and, if necessary, submit their results for peer review. JFF participants must determine whether all key questions have been answered and how their findings can inform the policy decision.

Communicating the results of joint fact finding is an important final step, as the eventual policy outcome will affect a much larger population than the stakeholders who have participated directly in the process. Participants should prepare key messages from their research findings to share with other stakeholder constituencies and policy-makers. It is important that their communication convey the sense that the research was scoped, conducted, and evaluated in a collaborative manner, and that all members of the JFF team are behind the results. In the communication stage, participants should listen to feedback from other stakeholders and determine whether additional research is needed. If participants conclude that their JFF efforts have yielded the necessary scientific and technical information, they can feed this information into the larger policy-making process.

If stakeholders are able to accomplish these steps jointly, they can dramatically reduce the time and effort spent on debating scientific issues, they can build a shared understanding of the range of uncertainty where there are not definitive factual answers, and they can create a firm scientific/technical foundation for the standard that they recommend. The process can improve collaboration among all stakeholders, facilitating trust among them and reducing the likelihood of 'duelling experts'. Distinct from 'blue ribbon panels' or adversary science, joint fact finding is an inclusive stakeholder process that seeks to generate better and broader understanding of technical issues as well as increased legitimacy for the decision-making process (McCreary, et al. 2001). JFF efforts may also result in a coalition, which could be a major asset in building consensus around non-scientific controversies throughout the policy-making process.

Joint fact finding is particularly suited to integrated resource management and has been used in many environmental decision-making processes, including coastal zone management, watershed management, and facility siting (e.g., McCreary et al. 2001; Ozawa and Susskind 1985; and Jacobs et al. 2003). It is especially useful in settling environmental conflicts when there is incomplete data, when parties make public claims that data are inaccurate, and when stakeholders initially lack the technical capacity needed to participate in decision making (Ehrmann and Stinson 1999).

As much as experts strive for objectivity in their work, practitioners should recognize that the experts' advice and judgments are not always based solely on their technical training and that all technical judgments have a range of value judgments

embedded in them (Susskind and Dunlap 1981). Joint fact finding also has mechanisms to deal with non-objective decisions inherent in scientific inquiry. According to Susskind and Dunlap (1981), the following decision points have the potential to be influenced by non-objective criteria:

- choice of professional team members;
- organization of the work plan;
- approaches to coping with uncertainty;
- attitudes towards mitigation;
- approaches to public participation; and
- use of data for and the style of forecasting.

The public should have a role in making these non-objective decisions to help ensure that the research process is consistent with the needs and expectations of the larger decision-making process. Environmental decisions must incorporate the best available scientific information while recognizing the values inherent in such decisions. Consensus-based approaches to decision making provide an opportunity to clarify the scientific and political values that often influence decisions but remain hidden from public view (Ozawa 1991). Joint fact finding can assist in managing the balance between science and values, helping to ensure that scientific information is used in value-laden resource management decisions while leading to effective and stable public policy (Karl and Susskind forthcoming).

Rather than hiding values behind scientific reports, joint fact finding promotes transparency in all phases of research. In this way, the relationship between science and policy can be clarified, and other concerns, such as socio-economic considerations, can be addressed.

Joint fact finding can also complement and strengthen adaptive and integrative management efforts (Ashcraft 2003). *Adaptive management* is the process of making management decisions in light of scientific uncertainty and the dynamic nature of environmental processes. It involves making decisions with the best available information and creating contingencies to be triggered if certain thresholds or unanticipated consequences occur. This allows resource managers to revise and improve plans as they are implemented. Based on feedback from resource managers and data collected from environmental monitoring, adaptive management allows stakeholders to address unintended consequences and grants them the flexibility to improve plans based on information collected during implementation.

As part of a consensus-building process, joint fact finding would make adaptive management a key component of resource decisions by giving stakeholders the opportunity to discuss the uncertainty of scientific and technical information. In dealing with the many unknowns inherent to environmental management in a transparent fashion, stakeholders are able to negotiate how this uncertainty should be dealt with and reflected in the implementation of a resource management plan. While building consensus on the resource plan, stakeholders can also craft monitoring agreements and the criteria for triggering a review of implementation measures. For example, while stakeholders involved in a JFF process to create a rangeland management plan

might agree on a certain number of livestock per acre, this number could be increased or decreased based on performance criteria such as surface water contamination and riverbank erosion in grazing areas. The group would agree on a monitoring plan, which could include who would conduct the monitoring of these criteria and how often. They would also negotiate acceptable levels for each criterion, above or below which the group could reconvene to revise their plan.

HOW JOINT FACT FINDING ACTUALLY WORKS, INCLUDING KEY CHALLENGES AND LESSONS

The JFF process varies a little from case to case, depending on the types of issues and the stakeholders involved. But there are a number of typical challenges that stakeholders face when trying to implement this process. We will illustrate below some of these challenges (as well as key lessons) by reviewing the JFF process of the Cancer Incidence Study, which was conducted by the Northern Oxford County Coalition (NOCC), a multi-stakeholder group from Rumford, Maine (the case was originally described in McKernan and Field 2000).

The Cancer Incidence Study

In February 1991 a popular New England television news show ran a segment called 'Cancer Valley'. The story depicted a rural American community's worst nightmare. It suggested that the people living in Northern Oxford County, Maine, were experiencing extraordinarily high rates of cancer, and it implied that air emissions from a local paper mill might be responsible. Images of local residents walking through cemeteries, with the mill's billowing smokestacks looming in the distance, struck an alarmist note.

The television show clarified (some say exacerbated) a dispute that had been brewing for some time in four rural towns surrounding, and economically dependent on, the mill: Rumford, Mexico, Peru, and Dixfield (hereafter referred to as the four-town area). For many residents of the towns, the television show lent credence to suspicions that a high percentage of residents had contracted cancer. Others opposed the claim that there was a health problem in their community. These residents warned that the label 'Cancer Valley' could tarnish the community's reputation and hinder economic development. Still others were equally concerned that the controversy over cancer rates would force the mill to close, breaking the valley's economic backbone.

Though many residents had very real fears about high cancer rates, little data was available to substantiate or alleviate those fears. Likewise, data on the quality of the air in the four towns were limited to parameters monitored by the mill, hardly a credible source given the controversy. In the absence of trusted information, the controversy seemed sure to produce an extended series of attacks and counterattacks. The regulatory agencies pointed out that the mill was meeting all permitting requirements, including all state and federal regulations for emissions of criteria pollutants. The mill management stated that it had recently invested over \$50 million in

technologies designed to reduce both the odour and the toxicity of the wastes emitted through the mill's stacks.

The community felt it was stuck, not knowing how to deal with these multiple, emotional, and complex issues. A JFF process transformed the dialogue and allowed the community to begin to resolve the long-standing conflict.

Challenge #1: Scoping the Work

With the help of the US Environmental Protection Agency (EPA) and the state Department of Environmental Protection (DEP), the community convened a stakeholder group to address the controversy. They called themselves the Northern Oxford County Coalition. The 25-member group included concerned residents of the towns (including some employed by the mill), health-care providers, small businesses, the mill management, local and state elected officials (including members of the Maine legislature), and state and federal agencies responsible for protecting human health and the environment.

Once the NOCC was convened, following a stakeholder assessment process, one of the things the members had to decide on in their first meeting was how to proceed. To get a work plan going, the NOCC's facilitators (who knew no more than any NOCC member about how epidemiologists might assess whether there is a cancer problem in a community or how air-quality experts would judge the quality of the air people breathe) took two steps:

1. They went back to the results of the stakeholder interviews completed during the assessment process to clarify what kinds of questions the NOCC might want to ask as part of a JFF process.
2. They got on the phone with expert epidemiologists, toxicologists, and air-monitoring experts to ask how one would go about answering the question of whether cancer rates were unusually high in their community. Specifically, NOCC members wanted to know where to find the necessary data and how long it would take to analyse the information.

Based on this effort, the facilitators presented the NOCC with a set of options on how to proceed:

- they could undertake a study of cancer incidence or respiratory illness;
- they could analyse air quality on the basis of existing data; or
- they could design new monitoring/modelling or lifestyle choices, involving issues such as smoking and diet.

One of the hard choices was what to do first. During the interviews conducted by the facilitators, many stakeholders, even those who disagreed adamantly with one another on other issues, had listed their worry about cancer as their highest concern. However, representatives of EPA and the Maine DEP argued that studying cancer was too difficult because of its multiple forms and the vast uncertainty about its causes. They also pointed out that because cancer has such a long latency period, current cancer rates

would not be a good indicator of the valley's present environmental conditions. They suggested that an investigation into respiratory illness might better indicate the current status of the valley's public health and environmental quality. Still other NOCC members, the health-care providers among them, thought that the NOCC should focus first on helping residents see the need for healthier lifestyles. In the end, the NOCC decided to launch its work with perhaps the most controversial and difficult issue at hand—cancer in the valley.

The members agreed to embark on a joint study of cancer incidence. The Maine Bureau of Health had a large, multi-year database of cancer cases in the state, so completion of the study seemed feasible. It would be affordable and doable, but more importantly, it would speak to the strong concerns of the citizen representatives. It seemed that pursuing any other issue would be seen as a diversion if not an outright denial of the problem. Even though there were compelling reasons why a cancer incidence study might not be the most pragmatic choice, the stakeholders would only commit to the process if they felt it addressed their fundamental concerns. Once the coalition had grappled with the mystery of local cancer rates, it might then take on other issues, such as air-quality monitoring, mill emissions, emissions from transportation sources, and/or smoking habits.

Key Lesson: Joint fact finding must be based on the interests of the stakeholders, not merely on what the experts think is the most technically feasible and prudent subject.

Challenge #2: Selecting an Expert

It was clear from the beginning that the cancer study was going to be a complicated and time-consuming task. The first step was to assign the bulk of the work to a subset of NOCC members who cared about cancer incidence, whose background would prepare them for the work, and who were committed to putting in the time needed. A technical subcommittee (TSC) was formed to initiate and oversee the study. As a group, the TSC members represented the key stakeholder groups in the NOCC, including citizens, the union, the mill, and the state and federal public agencies. While there were individuals with scientific and medical backgrounds on the TSC, its members also included local citizens without such background.

The TSC members began by asking two questions: what kind of expert assistance do we need to carry out this study and where can we find it? They quickly realized that one or several people trained in epidemiology would be the best equipped to help. The mill and the union both had their own experts to recommend. The Department of Public Health (DPH) offered to help, and while at first the TSC thought that this was a good idea, it then realized that because of the agency's missteps years ago, its legitimacy had been left wanting in the eyes of the citizens. Thus, the TSC decided that the best route would be to identify a single outside expert chosen by the whole group.

The TSC suggested a few people to contact in the state of Maine. The facilitators volunteered to contact these individuals and to make some additional inquiries. Telephone calls to universities in New England and New York turned up a number of scientists willing to advise the NOCC. Then the TSC convened to review the resumé's.

By the end of this meeting, the members decided to recommend that the NOCC retain Dr Bill Barnes (not his real name), a highly qualified epidemiologist from a respected New England university. They reached the decision quickly and efficiently. They also agreed to invite Dr Barnes to the next TSC meeting to present methods for analysing Rumford's cancer rates, as well as to a meeting of the full coalition just one week later. But the plan began to unravel.

As it turned out, and unbeknownst to the mill's NOCC representative, Barnes had given a video deposition as an expert witness in a suit brought against the mill on behalf of sick workers. Just one night before the next TSC meeting, several representatives of the mill called the facilitators and insisted that Dr Barnes be dismissed. They appealed to the facilitators, asking how they could trust this expert. They apologized for not realizing this sooner, but said they had no doubt that Dr Barnes was an advocate for the union and would therefore not provide the kind of non-partisan advice that would make the cancer study credible.

Since this appeal was made at a very early stage of the coalition's work, members were quick to be suspicious of one another's intentions. When the mill's representative brought his request to the TSC meeting, some TSC members were furious, demanding to know why the mill was reneging on an earlier agreement. With Dr Barnes waiting outside, the NOCC members argued about what to do. Some insisted that Dr Barnes was perfectly capable of being neutral and that the mill was stonewalling the initiation of a study to uncover facts about cancer. Others supported the mill's request, noting that it was understandable why the mill was concerned about Dr Barnes's neutrality.

In the end, the subcommittee decided to follow through on the decision to have Dr Barnes give a general presentation on epidemiology at the next NOCC meeting, but they agreed that a new technical adviser should be found immediately afterwards. The facilitators encouraged the committee to talk about criteria that could be used to ensure that members' preferences would be accounted for in the selection process. The TSC agreed with the mill's proposal that the NOCC's technical advisers should not have had any past involvement in litigation involving any of the constituencies represented in the group. The TSC then requested that each potential adviser be asked to fill out a detailed disclosure form identifying any prior connection he or she might have had with the NOCC's members and affiliated organizations.

Over the next week, the facilitators scrambled to locate advisers who would have the same depth of experience as Dr Barnes but who would be seen as credible by all of the NOCC's constituencies. While discussing the new resumés, NOCC members again raised sharp objections to the mill's eleventh-hour protest. But the group was able to reach consensus on the selection of Dr Daniel Wartenberg, an epidemiologist from Rutgers University. Dr Wartenberg had no prior involvement with any of the parties and was viewed by everyone as having the ability to offer non-partisan advice. He was also generous in his offer to assist the NOCC, expressing interest in participating in a community-based process and only asking for a small stipend and travel expenses.

Key Lesson: The legitimacy of the process is strongly enhanced by a stakeholder group jointly identifying, reviewing, and selecting an independent expert(s) to aid them in their work.

Challenge #3: Refining the Study Design

Even though a cancer incidence study is relatively straightforward, the TSC had to wrestle with numerous assumptions and choices in study design. It began by seeking to refine the purpose for the investigation. Some members wanted to explore the linkages between cancer cases among workers and exposures to toxic chemicals emitted from the mill. Others thought they should first examine the rates of cancer to determine if there were elevated rates worth worrying about.

Given these possible researchable questions, Dr Wartenberg reviewed with the TSC an inventory of potential research methodologies, from a community health survey, to an analysis of local prescription use, to a case-control study. For each, he explained the advantages and disadvantages, including the availability of data, the degree of uncertainty in interpretation, the cost and time involved, and the methodology's ability to answer questions important to the TSC members.

Ultimately, the TSC members agreed that an investigation of cancer incidence using Maine Cancer Registry data would be the best option. This was not an easy decision, as some stakeholders found it difficult to accept that, at least at this stage, the investigation would not pinpoint causes of cancer, but only the rates of cancer as compared to other places.

Further discussion about the merits and limitations of the TSC's approach brought to the surface some of the members' serious concerns about the quality of the data in the Maine Cancer Registry. Some members were worried that cancer cases might have been under-reported in the registry in its early years. With Dr Wartenberg's help, the TSC built into the study design a quick test to help assess the possibility of significant under-reporting. NOCC members also worried that other cases remained undocumented because residents of the four towns had been treated in other states. The TSC's representative from the Bureau of Health played a key role at this juncture, helping the group understand the strengths and limitations of the registry's cancer database.

The TSC also had to determine what the rates in the four-town area would be compared to. After all, rates would only be 'high' or 'low' if they were compared to rates from somewhere else. The group reviewed various options, including comparing local cancer rates to rates in other similar Maine towns (perhaps a mill town), in the remainder of Oxford County, in the state as a whole, and/or in the entire United States.

While some members liked the idea of comparing Rumford cancer rates to those of a similar mill town, the group raised two concerns.

1. If the rates ended up quite similar, did this mean that there was no problem, or did it mean that both towns had elevated cancer rates, perhaps associated with the mills?

2. How would another town feel if NOCC members dredged up that town's data on cancer incidence without their explicit permission?

Dr Wartenberg emphasized the advantages of comparing Rumford rates to a database with a significant number of cases. Such a comparison would increase the likelihood that the results would be statistically significant.

The TSC spent three or four meetings making decisions such as these and eventually developed a methodology for the study, which it brought before the full NOCC membership. The proposed study design entailed an investigation of average cancer rates for 22 different kinds of cancer in men and women for the period 1983 to 1992, and a comparison of those rates to rates in the state of Maine and to a national database, called the US SEER white population database (the Surveillance, Epidemiology, and End Results Program of the National Cancer Institute). The NOCC approved the study design with a few minor changes.

Key Lesson: Give multiple stakeholders the opportunity to wrestle with the hard choices and assumptions one must make in conducting a study that is scientifically credible and salient to the questions and concerns of stakeholders.

Challenge #4: Interpreting the Data and Writing the Report

When the data arrived, Dr Wartenberg prepared statistical tables for the TSC (and eventually the NOCC) to review. The tables showed that the rates for all cancers combined for both males and females in the four-town area were elevated when compared to those for Maine as a whole. It showed that males had a statistically significant elevated rate for cancers of the respiratory system, male genital system (primarily the prostate gland), and lymphatic system (lymphomas). Females were shown to have a statistically significant elevated rate for cancers of the endocrine system (primarily thyroid) and the colon. A number of other types of cancer were elevated in females but not to a statistically significant degree.

While the facts seemed straightforward enough, the next step was to interpret the data and to summarize the results in a report for the full NOCC and finally for all residents of the four towns. This was perhaps the most challenging part of the Cancer Incidence Study. In order to develop the content of a cancer incidence report, the TSC had to agree on how to present the data. But it soon became clear that interpreting the data was not an objective exercise. For example, some NOCC members thought that the report should say that some of the higher-rate ratios (a number that compares the local cancer rate to the state or national rate) warranted concern and further investigation. Other TSC members were equally insistent that epidemiologists would not typically be concerned about ratios unless they indicated cancer rates two to three times the state average. They pointed out that those elevations less than two times higher were just as likely to be 'noise' as they were to be indicators of real problems, especially with such a small data set (thousands of people rather than millions). This led to a long discussion about whether the TSC should include in its report a benchmark that signalled when the community ought to be concerned about a cancer. Some

thought that any rate ratio that was elevated should be of concern. Others felt that the subcommittee should not raise concern unless the rate ratio was two to three times greater than expected. And still others argued that the TSC should just present the numbers and let the readers decide.

Reaching an impasse on this issue, the TSC decided to have its draft report peer reviewed. If the subcommittee couldn't resolve these questions, perhaps advice from three professional epidemiologists would help. Interestingly, these experts each had different answers to the TSC's question about when a community should be concerned about a specific rate ratio. In fact, the peer reviewers' responses reflected the range of opinions held by TSC members.

Turning to peer reviewers did not produce agreement. But TSC members discovered that what seemed a local, highly partisan dispute was also a disagreement among scientists across the country. This helped the subcommittee gain an appreciation for the difficulty of drawing precise, universally shared conclusions about technical issues. From this new vantage point, they could agree to the facilitators' recommendation that they abandon the quest for a singular consensus on how to interpret the rate ratios for the community and instead agree to describe the range of views among them in the body of their report.

Key Lesson: In joint fact finding, the meaning of data, analysis, findings, and conclusions is discussed, deliberated upon, argued over, and ultimately determined by the stakeholders themselves. Conclusions and implications are drawn jointly.

Challenge #5: Communicating the Results

During the time the TSC was collecting data, analysing it, and writing the cancer incidence report, the NOCC met to hear reports from the subcommittee about its progress and to provide input. Still, when the final report was presented to the full coalition, it was apparent that additional negotiations were needed.

Some NOCC members were frustrated that the report was only an incidence study and did not include any analysis of what might be causing the elevated rates. Others were frustrated that the report didn't make a clear statement about whether or not there was a cancer problem in the valley. For those who had long been convinced that cancer rates were sky high in the four towns, it was hard to fathom why the TSC couldn't say that there was a confirmed health problem wherever there was a local cancer rate that was statistically significantly higher than the same cancer's rate statewide. At this point, the TSC needed to assist Dr Wartenberg in educating the larger group. TSC members explained that statistical significance is just one of the many factors that scientists weigh when evaluating cancer incidence, and pointed out that scientists often disagree in their conclusions about what to be concerned about. The TSC banded together at that point, seeking to persuade the NOCC that what was important was reaching agreement on what all of the stakeholders could do to follow up on this incidence data, both with further research and with concrete actions to improve public health.

Despite frustrations on the part of a few members, the NOCC ultimately did reach agreement on the report, 'A Report on Cancer Incidence in the Rumford Maine Area.'

The NOCC also decided to leave the letter outlining the concerns of one TSC member attached to the final document. The main motivation for working hard to bridge remaining differences was a shared desire on the part of the NOCC members to get the cancer incidence data out to residents of the four towns. Copies of the final report were distributed informally by NOCC members and placed in the town libraries. The final report was sent to health-care providers, community organizations, and the local hospital, where the NOCC sponsored a 'Grand Rounds' on the results. All attending physicians attended a briefing by Dr Wartenberg and the committee on the results. A summary of the study was also printed as an insert in 7,000 copies of the local newspaper.

Key Lesson: In joint fact finding, the direct participants in the process become the best advocates for the study's methods, data, and conclusions.

Conclusion

The NOCC Cancer Incidence Study did not find a smoking gun that identified the cause of the increased rates in the valley (or failed to identify it, for that matter). However, the incidence study did bring to the community credible, legitimate information on a highly controversial and painful issue. Furthermore, by working through the details and limitations of the study, the members of the community (or at least of the NOCC) discovered that they could work together, that trusted information could be produced, and that information was not the end all and be all. In the end, the NOCC decided to spend its remaining dollars, not on further study (which was quite possible and might have been useful), but on creating a new non-profit organization broadly dedicated to public health. The River Valley Health Communities Coalition was formed when the NOCC disbanded, and it has been in operation since 1997.

Key Lesson: In joint fact finding, participants learn first-hand the power and limitations of data and study.

CHALLENGES OF IMPLEMENTING JOINT FACT FINDING

Besides the challenges illustrated above through the Cancer Incidence Study, there are several other typical challenges that parties may face in a JFF process. Below, we describe these other challenges and some possible responses to them.

1. *There may be resistance from potential convenors (agencies) who fear that their authority will be undermined in a JFF process.*

Many resource managers agree in principle with the importance of public involvement and collaboration. However, it is unclear that there is widespread agreement on what constitutes the right amount of public involvement, particularly when it comes to questions of scientific and technical information. Resource managers (and their technical staff) feel that the wrong questions will be asked, the scoping of the studies will be gamed to ensure a preordained outcome, the public won't understand, the clarity and purity of science will be undermined by the meddling of stakeholders, or

the outcome will never be reached owing to conflict and stalemate among diverse interests.

Response: Because of this resistance, a contract should clearly define the appropriate roles and responsibilities of each of the stakeholders, including the resource managers. Clear timelines, available resources, and work plans should be developed jointly to ensure not only transparency but also good project management. Furthermore, showing concrete examples of the results of successful joint fact finding might be helpful. It should also be made clear to all stakeholders that if, after an initial stakeholder assessment, they do not agree with the recommendations for moving forward, they have no obligation to stay involved. And, importantly, all stakeholders, including the convening agency, have the right to withdraw from a JFF process at any point if their interests are not met.

2. *Some stakeholders might be reluctant to join a JFF process because they think that agreeing to participate in joint fact finding will lead to co-optation.*

Some stakeholders may think they are better off staying on the sidelines and trying to block or undermine the official process. They may think that negotiating with groups with whom they have traditionally disagreed will lead to unacceptable compromises. Some stakeholders may also be worried that they do not have the negotiating skills or institutional capacity to participate effectively or to achieve their goals.

Response: Joint fact finding is part of a voluntary process. Stakeholders should understand that a JFF group as a whole will determine the decision rule—consensus involves seeking unanimity but settling instead for overwhelming agreement when every effort has been made to hear and respond to the concerns of all participants. Thus, stakeholders cannot simply be cut out of the process (especially regulatory agencies). Further, participation does not preclude legal or political options. Joint fact finding is intended to expand, not limit, stakeholders' opportunities to have their needs met. Importantly, joint fact finding can help diverse parties pool their technical and financial resources so that more, rather than less, technical work is accomplished.

The institutional capacity to participate is an important issue. Joint fact finding requires that stakeholders commit time to the process, but it recognizes that different parties have different skills. Participation brings many benefits. For example, stakeholders gain inside access to a great deal of information that might otherwise be unavailable to them. Additionally, participants are given the chance to build their technical knowledge and capabilities. Stakeholders can request training in negotiating and consensus building before they begin joint fact finding, skills that can be applied to future resource management issues they may encounter. They can also request to be briefed on any number of technical issues, from hydrology to risk assessment to population ecology. And, if resources permit, stakeholders can request that the convening agency pay for a technical adviser to support their participation.

3. *There may be resistance from key powerful parties, particularly private sector or non-convening agencies, that expect to use back channels to influence outcomes and worry that the transparency of joint fact finding puts them at a political disadvantage.*

Response: For those who find that backroom deals and connections to the powers-that-be are their chief means of doing business, yes, joint fact finding is a problem. Technical studies undertaken by diverse groups are less open to manipulation, suppression, and controversy. But a group that wants others to negotiate in good faith needs to be willing to negotiate in good faith itself. Stakeholders should keep in mind that transparency applies to all parties and that being upfront about needs and goals can save them valuable time, time that is often spent guessing what other parties really want. And, as always, if a group is unsatisfied with the outcome of joint fact finding, it is not required to sign any agreement or give up efforts to have its needs met through other political or legal channels.

4. *Lack of money—what’s the point of starting a JFF process if you lack the funds to do the necessary work? Perhaps it is better not to pretend that joint fact finding is possible if some of the necessary resources are not available.*

Response: Collaborative processes such as joint fact finding are sometimes a magnet for additional funds. The gathering together of a diverse group of stakeholders is a powerful signal to convenors and potential funders that there is a willingness to solve the problem at hand. Funders understand that money spent on consensus building will not make matters worse, and they tend to like the idea of a single pooled effort, rather than competing efforts, to conduct research, create models, analyse data, and undertake other technical activities. Whatever money is or is not available, it is still better to have the product generated jointly so that the results will be credible to all parties and used in a manner that actually improves the resource management decision.

5. *Scientists don’t know how to participate in JFF. Because they do not want to be viewed as biased, they keep thinking that they should mail in their findings and stay as far away from policy discussions as possible.*

Response: Scientists are beginning to learn about new ways of being involved and making their research relevant to current policy questions. Capable scientists understand that they can help frame questions and issues, and can design methodologies that address questions of pertinent public concern. Many scientists are learning how to work with, and not just for, clients that include not only agencies, but agencies and their stakeholders. Joint fact finding does not require scientists to advocate policy. Rather, it helps them learn how to assist groups working collaboratively to connect the results of JFF with policy choices in reasonable ways. In fact, joint fact finding can give scientists the opportunity to advocate for and undertake work that has a much higher chance of actually being used in policy-making, because the research conducted through joint fact finding builds ownership and gains so many more supporters. And for scientists who complain that policy-makers and the public ‘just don’t get it,’ joint

fact finding can be an important means of building knowledge and confidence in technical and scientific work.

CONCLUSION

Joint fact finding, as part of a larger consensus-building process, offers a mechanism to bring together decision makers, stakeholders, and scientific and technical experts to build a common base of knowledge to inform more integrative resource management decisions. Joint fact finding promotes integration across disciplines, across sectors, and across agencies, and allows for the consideration and incorporation of social, cultural, economic, and ecological principles in the formation of environmental, resource management, and policy decisions.

Regardless of the political party in power, everyone calls out for good policy decisions based on sound science. However, in the words of one US Geological Survey scientist, the problem has been that sound science is something ‘invoked by all and listened to by none.’ In order for science to be sound, it must be credible, legitimate, and salient. Joint fact finding offers stakeholders a real opportunity to meet this three-pronged policy test of sound science. Whether it be in ecosystem management, integrated resource management, epidemiology, or endangered species habitat protection, joint fact finding can be an effective means to harness science for good policy-making.

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