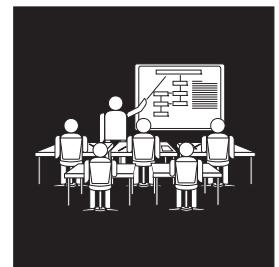
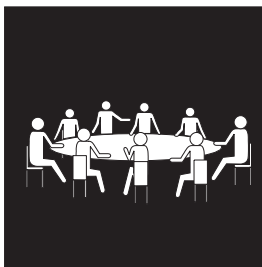


# Handling Scientific and Technical Information in Contentious Public Issues:

---

## *A Public Issues Education Approach*

Background Material, Visuals, Handouts, Case Scenarios



Kay E. Haaland  
Regional Faculty—Leadership and Community Development  
Washington State University Extension  
Mount Vernon, Washington

L. Steven Smutko  
Extension Specialist  
Department of Agricultural and Resource Economics  
North Carolina State University  
Raleigh, North Carolina



*Contents*

Introduction ..... 3  
The Workshop Curriculum: Objectives and Overview ..... 4  
Resources List ..... 6  
Visuals ..... 7  
Handouts ..... 24  
Case Scenarios ..... 37

## Introduction

*Cooperative Extension educators share a common mission that reaches across many different disciplines: to enable people to improve their lives and communities through learning partnerships and putting knowledge to work. From its beginnings, Extension has provided educational programs about public issues. The traditional method of Extension interaction in public issues involved campus-based faculty in creating teaching materials and traveling to meetings to teach people, in an objective and neutral way, about their policy options.*

Over the years, Extension public issues educators have continued to follow the ideals of neutrality and objectivity. At the same time, they have increased the scope of their work considerably. Public issues educators now teach about natural resource and environmental issues, community investment, welfare reform, the school-to-work transition, food safety, and child care. Educators are discovering that effective education on these matters requires working directly with a multitude of citizens to help them identify and resolve public issues through facilitated dialogue and information exchange.

This new mode of public issues education creates opportunities for Extension educators to work on issues that are ill-suited to traditional information dissemination methods. However, many of these issues are complex, and potentially divisive. Scientific and technical information—the currency of the Extension educator—is at the heart of these issues.

Advocates and policy makers look to science and technical experts to help improve their decisions. But, in many cases, the science itself is at the center of controversy, and Extension educators can find themselves in an uncomfortable position. They must decide how to provide and interpret scientific and technical information in contentious situations. Information provided through university research may be considered one-sided or irrelevant. Moreover, information is often disseminated by warring experts, people may mistrust the source of the data, or equal access to data may become the focus of the debate.

Some of the confusion and complexity that surround public issues can be directly attributed to the way information is organized, interpreted, communicated, and judged to be useful. Government agencies, community groups, advocates, and academics approach data gathering and interpretation in different ways with different needs in mind. Members of these groups will implicitly value or devalue scientific information according to their training and the rules of their professional cultures. If Extension educators are not mindful of how to work in situations where information is a focus of the debate, their efforts can be compromised.

## The Workshop Curriculum

---

This workshop, *Handling Scientific and Technical Information in Contentious Public Issues*, is designed to improve the skills of Extension educators who work on contentious public issues. It focuses on one very important component of public issues education: those cases where information is likely to be debated and discussed apart from the substantive issues. This workshop is based on material developed by a consortium of organizations involved in resolving environmental disputes. RESOLVE, Inc., the U.S. Institute for Environmental Conflict Resolution, and the Western Justice Center Foundation sponsored the development of a report entitled *Managing Scientific and Technical Information in Environmental Cases: Principles and Practices for Mediators and Facilitators*. A copy of this report can be obtained at the following Web site: [http://www.resolv.org/tools\\_pubs.html](http://www.resolv.org/tools_pubs.html).

This workshop is designed to follow other training courses in public issues education methods, such as educational program design, public issues assessment, group facilitation, conflict resolution, and collaborative decision-making.

## Curriculum Objectives

---

This curriculum is designed to train Extension educators in one particular aspect of public issues education: handling scientific and technical information. In this workshop you will learn to:

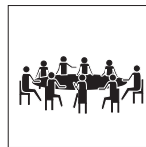
- ▶ Identify the various roles of Extension educators in resolving public issues where scientific and technical information are key features.
- ▶ Recognize the differences between data conflicts and other substantive conflicts in public issues.
- ▶ Apply appropriate methods of integrating science and technological information into collaborative processes.
- ▶ Use “best practices” tools and strategies to:

- Manage warring or contested science (including distrust in the science from your own institution).
- Manage scientific and technical uncertainty (including lack of good data).
- Deal with issues that involve power imbalances resulting from limited access to information, such as environmental justice issues.

## Curriculum Overview

---

This workshop is presented in four modules, each building on the other. Copies of the instructor’s Powerpoint slides, the required handouts for each module, and the case scenarios are provided in this packet. Page 6 of this booklet contains a guide to these materials.



### Module 1: Public Issues Education Roles for Extension Educators

An extension educator can assume a number of roles when getting involved in public issues education. Each role serves a useful purpose. Some educators take on multiple roles. For example, in some situations an educator may assume the joint roles of convenor and facilitator or mediator. It’s important for you to consider which roles are most appropriate for you given the topic, your level of experience in public issues education and group process skills, the potential risks of getting involved, and the time and financial resources available.



### Module 2: Sources of Conflict

The conflicts surrounding public issues often emanate from more than one source.

- ▶ *Interest-based conflicts* are caused by differences in the stakeholders’ substantive interests. These differences are typically viewed as the primary sources of conflict, the issues people are divided over.

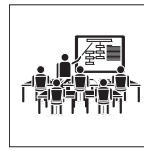
- ▶ *Value conflicts* are caused by different ways of life, ideologies, philosophies, and different criteria for evaluating ideas or behavior.
- ▶ *Structural conflicts* are caused by unequal control, ownership, or distribution of resources. Power conflicts are structural.
- ▶ *Relationship conflicts* are caused by stereotyping, misperception, poor communication, or repetitive negative behavior.
- ▶ *Data conflicts* are caused by lack of information, misinformation, distrust in the information (and its sources), different views on what is important, different interpretations of data, and different assessment procedures. Data is often a significant source of conflict.



*Module 3: Rockslides on the Road to Agreement: Key Concepts and Principles*

An educator faces a number of challenges when dealing with scientific and technical information in a public issue dispute. It is important to understand those challenges so methods and techniques can be developed for addressing them. These challenges are grouped for discussion as follows:

- The Nature of Knowledge
- Uncertainty
- Research and Information Gathering
- Modeling
- Stakeholders, Experts, and Other Third Parties
- Information and Conflict
- The Educator's Role



*Module 4: Tools and Techniques*

This module defines the recommended “best practices” to use during the stages of a collaborative process.

Recommended practices are organized based on the following topics:

- On the Educator's Role
- Assessing the Issue
- Designing the Process
- Defining the Problem
- Structuring and Managing Discussions
- Working with Experts
- Negotiating and Problem-solving
- Making and Implementing Agreements

## Learner's Resources

---

page

### Visuals

Introduction, Slides 1 – 3 .....	7
Getting Started with the Curriculum, Slides 4 – 8 .....	8-9
Module 1. Public Issues Education Roles for Extension Educators, Slide 9 .....	9
Module 2. Sources of Conflict, Slides 10 – 12 .....	10
Module 3. Rockslides on the Road to Agreement, Slides 13 – 27 .....	11-15
Module 4. Tools and Techniques, Slides 28 – 49 .....	16-23

*You will also view three video clips during the workshop.*

### Handouts

Module 1. Public Issues Education Roles For Extension Educators (Handout 1) .....	24-25
Module 2. Sources of Conflict (Handout 2) .....	26
Module 3. Rockslides on the Road to Agreement: Key Concepts and Principles (Handout 3) .....	27-29
Module 4. Tools and Techniques for Public Issues Educators (Handout 4) .....	30-33
Module 4. Situation Mapping (Handout 5) .....	34-35
Module 4. Facilitating a Focused Discussion (Handout 6) .....	36


*Your instructor will introduce each handout during the workshop.*

### Case Scenarios

Case Scenario 1. Hog Heaven .....	37-38
Case Scenario 2. Feet and Inches .....	39
Case Scenario 3. Knowledge is Power .....	40-41

*You will use one of the three case scenarios in Module 4.*

**Handling Scientific and Technical Information in Contentious Public Issues:**  
*A Public Issues Education Approach*



*slide 1*

---

---

---

---

---

---

---

---

**Objectives**  
**You will learn to...**

- Identify the various roles of Extension educators in resolving public issues wherein scientific and technical information are key components.
- Recognize the difference between data conflicts and substantive conflicts in public issues.

*slide 2*

---

---

---

---

---

---

---

---

**Objectives**  
**You will learn to...**

- Apply appropriate methods for integrating science and technical information into collaborative processes.
- Use tools and techniques to:
  - Manage warring information sources or contested science, including distrust in the science from your own institution.
  - Manage scientific and technical uncertainty, including lack of good data.
  - Deal with issues that involve power imbalances, such as environmental justice issues.

*slide 3*

---

---

---

---

---


---

---

---

**Traditional Roles in Public Issues Education**

- Creating materials
- Presenting the policy options
- Providing alternatives and consequences
- Remaining objective and neutral



*slide 4*

---

---

---

---

---

---

---

---

**The scope of your work has increased.**

- You have more opportunities to work directly with citizens and agencies to identify and resolve issues.
- Many issues are complex, contentious, and potentially divisive.
- Many issues are “data intensive.”
- Science itself can be at the center of the controversy.

*slide 5*

---

---

---

---

---


---

---

---

**Information Controversies**

- Information is often disseminated by warring experts.
- People can mistrust the source of the data.
- Equal access to data can become a focus of the debate.



*slide 6*

---

---

---

---

---

---

---

---

**Are you clear about how to work in situations where information is the focus of the debate?  
If you are not, your efforts can be compromised.**

---

---

---

---

---

---

---

---

*slide 7*

**Source of Materials**  
*Managing Scientific and Technical Information in Environmental Cases: Principles and Practices for Mediators and Facilitators.*  
 RESOLVE, Inc.  
 U.S. Institute for Environmental Conflict Resolution  
 Western Justice Center  
 www.ecr.gov

---

---

---

---

---

---

---

---

*slide 8*

*Module 1: Public Issues Education Roles for Extension Educators*




---

---

---

---

---

---

---

---

*slide 9*



**Sources of Conflict**

Working with Scientific and Technical Information in Contentious Public Issues

slide 10

---

---

---

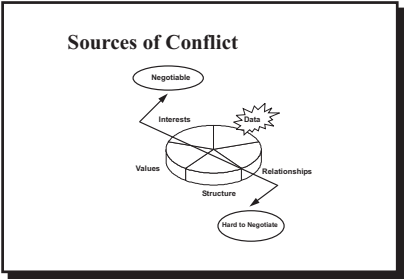
---

---

---

---

---



slide 11

---

---

---

---

---

---

---

---

**Data Conflicts**

- Lack of information
- Misinformation
- Distrust of the information, the sources, or both
- Different views on what is important
- Different interpretations of data
- Different assessment procedures

slide 12

---

---

---

---

---

---

---

---



**“Rockslides”**  
**Key Concepts and Principles**

Working with Scientific and Technical  
Information in Contentious Public Issues

*slide 13*

---

---

---

---

---

---

---

---

**On the Nature of Knowledge**

- Scientific research rarely provides definitive, unequivocal answers. All information is subject to questions of validity, accuracy, authenticity, and reliability.
- We can examine and debate information, but not always test. Subjective awareness, including intuition and hunches, often plays a role.
- Complex public issues often deal with systems. The whole is different than the sum of its parts.

*slide 14*

---

---

---

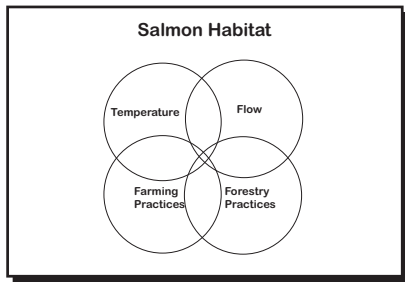
---

---

---

---

---



*slide 15*

---

---

---

---

---

---

---

---

**On Uncertainty**

- Biological and social uncertainties are facts of life. We will never know everything we need to make perfect decisions and predict all their impacts.
- Uncertainties arise from:
  - Insufficient measurements or observations.
  - Conflicting measurements.
  - Competing or fragmentary theoretical frameworks.
- Most decisions have unintended consequences, not merely calculated risks, side-effects, or trade-offs.

*slide 16*

---

---

---

---


---

---

---

---

**Should We Breach Dams for Salmon?**



*slide 17*

---

---

---

---

---

---

---

---

**On Research and Information Gathering**

- Stakeholders often face a need or desire for more information than is available. However, too much data can be overwhelming.
- Credible information commissioned or produced by some parties may be distrusted by others.
- The presumption that people implicitly trust scientists is not necessarily true.
- Information and research cost money, usually a lot of money.

*slide 18*

---

---

---

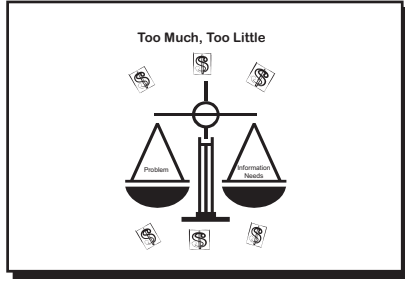
---

---

---

---

---



slide 19

---

---

---

---

---

---

---

---

**On Modeling**

- The promise of modeling may seduce stakeholders into believing models are infallible.
- Models may appear to be in opposition, when in fact they are designed with different assumptions. They are not comparable.

slide 20

---

---

---

---

---

---

---

---

**Watch What You Compare**

Sunlight + Photosynthesis + Water + DNA =  
Rera Delicious

Sunlight + Photosynthesis + Water + DNA =  
Macintosh



They are both apples, but they differ in taste, color, and shape.

slide 21

---

---

---

---

---

---

---

---

**On Stakeholders, Experts, and Other Third Parties**

- ON SCIENTISTS
  - Uncertainty and division exist even among scientists, but disagreements may be less intense than you think.
  - Scientists with a stake in the issue may not be sufficiently impartial.
- ON STAKEHOLDERS
  - Some are unable or unwilling to do their homework.
  - People's tolerance for complexity and ambiguity varies.
- ON ALL OF US
  - Life experiences influence our view of the issues.

---

---

---

---

---

---

---


---

---

---

*slide 22*

**Life Experiences Influence Our Perceptions**




---

---

---

---

---

---

---

---

---

---

*slide 23*

**On Information and Conflict**

- Politics and underlying values often affect political decisions, even when a profusion of scientific information is available.
- Information that is usable by all stakeholders requires trust in the information and the methods by which it is produced.
- Scientific and technical complexity can escalate conflict, alarming and overwhelming people with too many counter-ideas or unclear options.

---

---

---

---

---

---

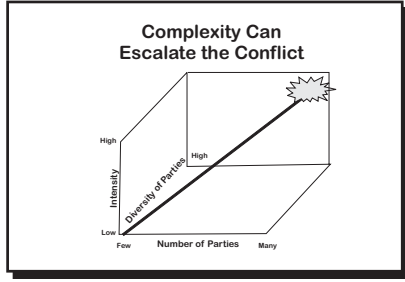
---

---

---

---

*slide 24*



*slide 25*

---

---

---

---

---

---

---

---

**On the Educator's Role**

- We tend to think in terms of agreements, solutions, and decisions. In many complex problems, it may not be possible for stakeholders to find a solution.
- The educator's biases can infiltrate the process – for example, when framing the issue.

*slide 26*

---

---

---

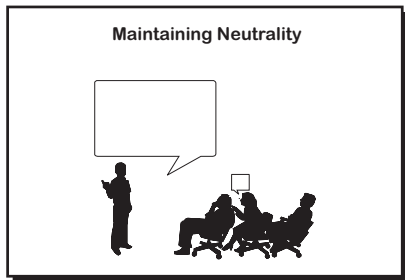
---

---

---

---

---



*slide 27*

---

---

---

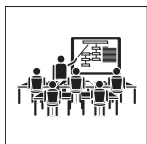
---

---

---

---

---



**Tools and Techniques**

Working with Scientific and Technical Information in Contentious Public Issues

*slide 28*

---

---

---

---

---

---

---

---

**Introduction**

- The setting we work in can be chaotic. Our focus should be to help people proceed thoughtfully through a decision-making process.
- Group process strategies should be considered more as “rules of thumb” rather than hard and fast techniques.
- Guidelines are not applicable to every case.
- Multiple discussions of the legal, social, economic, and technical issues are often required.

*slide 29*

---

---

---

---

---

---

---

---

**Tools and Techniques: When**

- Assessing an issue
- Designing a process
- Defining the problem
- Working with experts
- Negotiating and problem-solving
- Making and implementing agreements

*slide 30*

---

---

---

---

---

---

---

---

**Substantive Knowledge and the Educator**

- Get immersed in the issues and language of the topic.
- Use self-restraint if you have expertise in the area.
- Prepare to manage different kinds of expertise.

*slide 31*

---

---

---

---

---

---

---

---

---

---

**Assessing the Issue**

- Identify key players; consider their level of scientific and technical sophistication.
- Identify and assess the issues:
  - Potential information needs and data conflicts
  - Kinds of data the parties are relying on
  - Sources of information
  - Potential impacts, risks, precautions, and benefits that are likely to emerge

*slide 32*

---

---

---

---

---

---

---

---

---

---

**Assessing the Issue**

Question assumptions that science-related issues are actually at the core of the controversy. A narrow scientific focus may miss or distort the issues or process.

*slide 33*

---

---

---

---

---

---

---

---

---

---

**Designing the Process**

- Design a process strategy that anticipates and intentionally incorporates the scientific and technical issues.
- Timing is critical. Pace the data gathering and flow so information is available when needed.
- Ensure the proper level of confidentiality through documents, contracts, or ground rules.

*slide 34*

---

---

---

---

---

---

---

---

**Designing the Process**

- Develop a process that allows the stakeholders as a group to:
  - Define the information they need.
  - Decide where they will get it.
  - Decide what they will do with it.
  - Determine how it will be incorporated in their decision-making process.

*slide 35*

---

---

---

---

---

---

---

---

**Designing the Process**

- Examples of information and learning strategies:
  - Technical study team appointed by parties
  - Science summit
  - Moderated panel discussion
  - Poster sessions
  - Jointly created background papers
  - Facilitated “fish bowl” science discussion
  - Session where experts are invited to draft proposed language for a negotiating document

*slide 36*

---

---

---

---

---

---

---

---

### Defining the Problem

- Generate multiple descriptions of the scientific and technical problems as opposed to an inflexible, single-problem definition.
- Jointly agree on studies to be undertaken and methods to produce and analyze them.

*slide 37*

---

---

---

---

---

---

---

---

### Defining the Problem: Situation Mapping

- A situation map is a visualization tool.
- It “maps” the elements and relationships of a situation.
- It helps participants understand the situation and begin to identify information needs.

*slide 38*

---

---

---

---

---

---

---

---

### Situation Mapping

- Begin with a *map chassis* – a core fragment to get people thinking and involved.
- *Elements* are parties, issues, and activities – nouns.
- *Relationships* are verbs on lines that connect elements.



*slide 39*

---

---

---

---

---

---

---

---

### Situation Mapping: Prompting Questions

- Involve participants in revising the map by asking prompting questions
  - What are the central issues in the situation?
  - Who are the key stakeholders in this situation? How do they interact?
  - What actions, behaviors, or practices should be included?
  - What connects with what? In which way or direction?

*slide 40*

---

---

---

---

---

---

---

---

---

---

### Situation Mapping

- Situation mapping is creative, not evaluative.
  - Ideas should be generated, not critiqued
- Situation maps can be either a single worldview, or a shared worldview.
- Strive for dynamic complexity, not detail complexity.
  - It is more important to understand the dynamics that give rise to the situation than to depict the details that constitute it.

*slide 41*

---

---

---

---

---

---

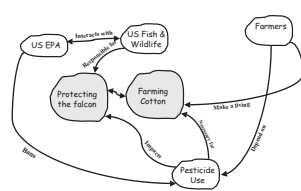
---

---

---

---

Situation Map:  
The Cotton-Pesticide-Falcon Issue



*slide 42*

---

---

---

---

---

---

---

---

---

---



**Working with Experts and Information**

- Keep the scientists on target with what is relative to the group.
- Have scientists explicitly discuss the assumptions behind their data.
- Encourage scientists to use plain language and good visuals.
- Ask experts to state their understanding of the pertinent risks, benefits, and cautions.

*slide 46*

---

---

---

---

---

---

---

---

---

---

**Working with Experts:  
Focused Discussion Method**

- Level 1 – Clarification
  - “Are there any questions about points of fact or clarification?”
- Level 2 – Reflection
  - “How do you feel about what you just heard?”
- Level 3 – Interpretation
  - “How does the information just presented affect the issues at hand?”
- Level 4 – Action
  - “Based on what you just heard, what needs to happen?”

*slide 47*

---

---

---

---

---

---

---

---

---

---

**Negotiating and Problem-solving**

- Frame the discussion on how the stakeholders as a group can find a livable solution.
- The greater the uncertainty, the more adaptive the resulting solution should be.
- Explore the best and worst alternatives to a negotiated agreement to understand how each party proposes to handle scientific uncertainties if there is no agreement.

*slide 48*

---

---

---

---

---

---

---

---

---

---

**Making and Implementing Agreements**

- Help parties understand when they have enough agreement on technical issues to go ahead and negotiate solutions.
- When agreements are based on key scientific assumptions, make those assumptions as explicit as possible.
- Try to help craft an agreement that allows for change, so if the stakeholders are wrong about the science, they can revisit and renegotiate the issues.

*slide 49*

---

---

---

---

---

---

---

---

---

---

## Handout 1: Public Issues Education Roles For Extension Educators



An extension educator can play a number of roles when getting involved in public issues education. Each role serves a useful purpose. Some educators

take on multiple roles, for example the joint role of convenor and facilitator or mediator. It's important to consider which roles are most appropriate for you, given the topic you are dealing with, your level of experience in public issues education, the potential risks of getting involved, your group process skills, and the time and financial resources available. How do you think your roles change when information becomes the focus of the debate?

### **Catalyst**

One who generates interest and enthusiasm among stakeholders to get a public issues education program or resolution process under way.

### **Coach/Advisor**

One who uses facilitation, collaborative process techniques, and conflict resolution methods to work one-on-one with citizens and other educators to develop and carry out a public issues education program.

### **Collaborator**

One who is a full-fledged participant in a problem-solving process – from needs identification to decision-making to implementation and evaluation. The involvement could also be short-term for a particular component of the process. In this role, the educator educates by example and assists his or her fellow participants through the problem-solving process.

### **Connector/Bridger**

One who links people and resources to help resolve a public issue, provide educational information, or both.

### **Convenor**

One who takes the initiative to bring people together to work on a public issue. A convenor recognizes a public issue, identifies key

stakeholders and decision-makers, gains their support and cooperation in the educational process, and works with them to design and carry out an education program.

### **Coordinator**

One who coordinates aspects of an educational program or process to work on a public issue.

### **Data Collector**

One who collects data, technical information, research information, or all of these for a public issues educational program or resolution process.

### **Diplomat**

One who moves tactfully among stakeholders to encourage and work with them through an educational effort or resolution process.

### **Evaluator**

One who assesses the process steps as well as the products, agreements, and other outcomes of a public issues education effort.

### **Facilitator**

One who guides a group through a process in a neutral, objective manner, thereby helping the group achieve its goals and come to agreement and closure.

### **Information Provider/Resource Provider/ Translator of Research**

One who offers unbiased facts or concepts that help stakeholders make decisions. The facts or concepts may be based on scientific research, the educator's experience, or both.

### **Listener**

One who listens well to the concerns and interests of stakeholders regarding a public issue and uses that information when designing an educational program or intervention.

### **Mediator**

One who serves in a third-party, neutral position while guiding a dispute resolution process. Mediators facilitate a structured

process, intervene as necessary, and work with the collaborators to reach consensus and agreement.

**Mentor**

One who supports, coaches, and guides a colleague, thereby building the colleague's capacity to implement public issues education.

**Networker**

One who is able to move throughout a community and work with others to identify the resources and people needed to work on a public issue.

**Organizer**

One who organizes people and resources to conduct a public issues education effort.

**Process Designer**

One who designs a public issues education effort after thoroughly analyzing the situation and the needs of the stakeholders.

**Process Observer**

One who objectively observes and critiques a process to help the facilitator, the participants, or both understand which of their behaviors support the process and which hinder it.

**Process Supporter**

One who performs tasks for a group process that support the group's work. Tasks can include distributing materials; recording; arranging the site; arranging the room; and working with the convener, facilitator, mediator, or any of these individuals.

**Program Developer**

One who identifies a public issue and key stakeholders, develops a long-range educational program, and develops a set of short-range actions to implement the program.

**Public Relations/Media Relations**

One who works with the news media and public officials to accomplish public issues education within the community during and after resolution of a public issue. This individual's intent is to keep the community informed on any of the following: the process,

the issues, the potential impacts of proposed decisions, the decisions agreed on, and the implementation and monitoring plan.

**Scientist**

One who explores, experiments, creates, and examines physical, biological, and social phenomena.

**Sponsor/Host**

One who sponsors or hosts a public issues education event or process. This individual usually plays a neutral role.

**Technical Expert**

One who shares research-based information, technical data, or both with collaborators to assist them in analyzing an issue and making decisions.

**Trainer/Educator**

One who uses information, instruction, exercises, and other learning experiences to help people understand a public issue and work effectively with others to resolve it. This individual provides educational information and resources, such as fact sheets and public forums, to help others understand various aspects of a public issue.

**Transitioner**

One who helps stakeholders progress from planning to action as they confront a public issue. The transitioner can provide information, identify resources, or actively coach stakeholders to put plans into action.

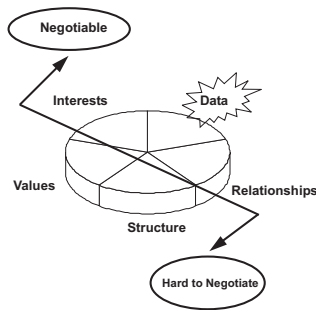
Roles in public issues education that are **not** generally appropriate for an Extension educator include arbitrator, negotiator, and advocate, unless the role involves advocating an appropriate process or education program.

## Handout 2: Sources of Conflict



Listed below are five types of conflict and their sources (Moore, 1986). When involved in a conflict, use the list as a reference to think through the sources of conflict you may be experiencing. Keep in mind that stakeholders, including the public issues educator, often experience more than one source of conflict at a time. Moore views these sources of conflict, taken together, as a *sphere of conflict*. The portions of the conflict sphere pertaining to data, interests, and relationships will likely be more amenable to resolution than those pertaining to values and structure.

### Sources of Conflict



#### Data conflicts involve:

- ▶ Lack of information
- ▶ Misinformation
- ▶ Different views on what is important
- ▶ Different interpretations of data

#### Interest-based conflicts involve:

- ▶ Substantive interests
- ▶ Perceived or actual competition
- ▶ Procedural interests
- ▶ Psychological interests

#### Relationship conflicts involve:

- ▶ Strong emotions
- ▶ Misperceptions or stereotypes
- ▶ Poor communication or miscommunication
- ▶ Repetitive negative behavior

#### Value conflicts involve:

- ▶ Different criteria for evaluating ideas or behavior
- ▶ Different goals based on different values
- ▶ Different ways of life, ideologies, and religions

#### Structural conflicts involve:

- ▶ Destructive patterns of behavior when interacting with others
- ▶ Unequal control, ownership, or distribution of resources
- ▶ Geographic, physical, or environmental factors that hinder operation
- ▶ Time constraints
- ▶ Unequal power and authority



### On the Nature of Knowledge

- ▶ Different kinds of knowledge and information come from different sources.
- ▶ Information can be examined and debated but not always tested. For example, intuition cannot be tested.
- ▶ Scientific and technical research rarely provides definitive, unequivocal answers.
- ▶ Environmental disputes often deal with systems – the whole is different from the sum of the parts.

### On Uncertainty

- ▶ People never know enough to make perfect decisions, particularly when the decisions concern **predictions** of impacts. It is not possible to know everything that will affect a situation or event.
- ▶ Risks and uncertainties cannot be ignored when:
  - There are not enough observations or measurements for interpretation,
  - Measurements conflict.
  - Uncertainty exists about competing or fragmented theoretical frameworks.
- ▶ Most decisions have unintended consequences – not merely calculated risks, side effects, or trade-offs.
- ▶ Biological and social uncertainties are facts of life.

### On Research and Information Gathering

- ▶ Overly simplified or excessively summarized information often dilutes the potential impacts of policy choices.
- ▶ Stakeholders often face a need or desire for more information than is available.
- ▶ Information and research cost money, usually a lot of money. The stakeholders may have concerns and differences of opinion about how to match the perceived seriousness and risks of the problem with cost of the research and data needed.

- ▶ Some disputes involve urgent situations that require action before research is available.
- ▶ Several parties may have critical information that could help resolve the matter, but it is confidential or proprietary.
- ▶ Scientific and technical information may exist, but the framework for interpreting and understanding it may be shifting. For example, data about global warming is being interpreted differently now than in the past.
- ▶ Too much information may be available, and it may be so disorganized or extensive that stakeholders feel overwhelmed as they attempt to sort through what is relevant, synthesize it, and apply it to the problem at hand.
- ▶ The available information may be spotty, may not show strong cause-and-effect relationships, and may not indicate an obvious decision. Conclusions can be suggested or inferred about cumulative effects, but there may be no completely logical basis for policy.
- ▶ The significance of the information may be unknown or have marginal value, or there may be no way to evaluate or compare the information.
- ▶ Even when credible, research-based, scientific and technical information is available that could enhance decision-making, it might not be used effectively:
  - Some or all of the stakeholders may have trouble using it. They may not be able to articulate what they need to know, how to identify it, or whom to contact.
  - Stakeholders may perceive the information as skewed, and they may feel overwhelmed by political spin and media hype.
  - Some stakeholders may distrust the information if it has been commissioned or produced by other stakeholders.

- Stakeholders may choose not to examine available information. They may believe the information is irrelevant to reaching an agreement or there is no practical solution to the problems of conflicting interpretations.

### On Modeling

- ▶ Many environmental conflicts benefit from modeling to define problems, review impacts, or illustrate choices. The *promise* of models may seduce policymakers and disputants into believing models are infallible. However, models are rarely fully predictive; they are illustrative at best.
- ▶ Scientists working for opposing parties may bring different models to the table based on different assumptions – ( inputs, interactions, and outputs). They may appear to be models of the same system, but in fact they are not. The models are presented as being in opposition when they simply are not comparable; they are not using the same information.

### On Stakeholders, Experts, and Other Third Parties

- ▶ Some stakeholders are not willing or able to study and understand the available scientific and technical information.
- ▶ People’s tolerance for complexity varies. Some stakeholders are able to tolerate a great deal of technical complexity and scientific ambiguity. Others are impatient with the process. Their differences can lead to irritation, quarreling, and persistent fights over the production of useful and usable information.
- ▶ The scientist and the science may not be trusted by some of the stakeholders.
- ▶ Public agencies, community groups, and private businesses often approach scientific aspects of the same issue differently. For example, private businesses may be defensive and provide only enough information to satisfy the law. Community interest groups, who often have fewer resources, may use their resources offensively. Public agencies, in contrast, are

usually required by law to meet standard burdens of scientific proof. The issue may be poorly framed. The definition of the problem may be incorrect, incomplete, or in contention and thus exclude critical values that are important to some of the stakeholders.

- ▶ Various specialized sciences are involved in providing critical scientific and technical information, but the conclusions may not converge into a logical policy choice.
- ▶ Uncertainty and division may exist among the scientists. Despite research and applied studies, significant scientific and technical uncertainty may remain. Peer-reviewed studies can be challenged, and the opinions of credible experts are often deeply divided.
- ▶ Predictive scientific theories may be postulated before empirical research is completed. In these situations, the differing sides can argue positions without “proof,” while government agencies have a compelling need to make policy and regulate. A recent example of this would be the government’s need to control potential outbreaks of “mad cow” disease and scientists’ differing views of its future impact on public health.
- ▶ Scientific inquiry and obfuscation are sometimes used to muddle or delay needed decisions.
- ▶ Public agencies are usually the targets for legal tests of decisions, so they generally rely heavily on “the best” scientific and technical information. “The best” may be debatable.

### On Information and Conflict

- ▶ Conflicts over information, data, and knowledge are an inevitable and integral part of most issues. Those disputes, however, are rarely caused by scientific and technical information *per se*. The causes are more likely to include one or more of the following: competition over interests; different criteria for evaluating a situation; differing goals and values; misinformation, lack of information, or differing ways of

interpreting data; unequal control, power, or authority to distribute or enjoy the resources.

- ▶ Politics and values affect the process. The underlying values often influence the political decision-making even when a wealth of scientific information is available.
- ▶ The stakeholders typically bring information to the table that bolsters their position. Scientific and technical issues and data are often used as strategic or tactical “weapons.”
- ▶ Reductionist thinking – as in “Here is the problem; these are the options” – does not deal with the potential for unintended consequences as well as some stakeholders would like to think.
- ▶ Scientific and technical complexity can escalate the conflict by alarming and overwhelming people when there are too many counter-ideas or unclear options.



### On the Educator's Role

Educators tend to think in terms of agreements, decisions, and solutions. When there is no tangible result to a process, it can

imply failure to them. In many public issues, however, the right action is no action. Because educators play a critical role in framing or reframing the scientific and technical issues, their personal biases can infiltrate the process.

Before beginning any educational effort, assess your own knowledge of the issue to be addressed.

### Self-assessment

1. If you lack experience or knowledge, don't hesitate to partner with someone who has it.
2. Do not pretend to be an expert if you are not. Immerse yourself in the issues and language of the topic to sharpen your insights and to help you ask better questions.
3. Let the stakeholders educate you on the scientific and technical issues. It's all right to ask them for an honest assessment of your lack of knowledge. Ask them to let you know when it helps and when it hinders the group.
4. Do not become the science advisor; your impartiality could be jeopardized. Help the stakeholders understand their need for independent assistance.
5. If you have expertise in an area, use self-restraint. If you feel compelled to share your knowledge, ask the group for permission first.
6. Be prepared to manage the different kinds of substantive expertise the stakeholders bring to the table.
7. Ensure that the appropriate types of scientists are involved.
2. Complete a preliminary stakeholder analysis to identify key players, and include information on their level of technical sophistication.
3. Start discussions early with the coordinating committee to identify potential scientific and technical issues.
4. Don't assume all the key stakeholders have accepted you.
5. Identify the information needs of the stakeholders up front, the kinds of data they may be relying on, and the potential data conflicts that may emerge.
6. Identify sources of information, methods, and which scientists are most trusted by each party. Find out why.
7. Question any of your own assumptions that scientific and technical issues are at the center of the controversy. Lack of data, misinformation, and inconsistencies are often part of a dispute without being at the center of it.
8. Make preliminary estimates of funding and other finite resources, and consider how to balance resources among technical assessment and public involvement.
9. Complete a formal issue assessment that includes scientific and technical issues. Raise questions that identify what is known, potential information needs, and potential data conflicts.
10. Have scientists explain how they define risks and accuracy for the particular problem or analysis.
11. Given what you know about each scientist's position, frame or re-frame technical questions. Pose questions as problems to be solved and questions to be answered; ask "how" rather than "should."
12. Question any assumptions that science-related issues are actually at the core of the controversy. It's important not to reduce or trivialize institutional racism, power relationships, risk preferences, economics, and other social factors. Keeping a narrow

### Assessing the Issue

1. Form a "coordinating committee" early with key stakeholders represented.

scientific focus may miss or distort the issues and process.

13. Raise questions about the kinds of information stakeholders anticipate needing and the potential impacts, risks, precautions, and benefits that are likely to emerge.
  14. Determine what is available to help focus the issues, what is proprietary, and what can be freely shared.
  15. Discuss the stakeholders' various perceptions of "risk" and "precaution." Find out how their ideas apply to the issues. Risk preferences can vary widely among stakeholders, so it is useful to know.
  16. Coach the stakeholders on different approaches that might be used to resolve information-intensive issues. As much as possible, get them to think about how information will be jointly gathered and examined.
- a. Compose a list of questions that will be composed of outside experts, process participants, or both.
  - b. Organize a "science summit" wherein the experts isolate disagreements, clarify what does not need to be contested, and search for areas of agreement.
  - c. Organize a moderated panel discussion wherein the participants can ask questions of the experts.
  - d. Develop poster sessions that provide opportunities for stakeholders and experts to exchange views.
  - e. Ask experts and stakeholders to create background papers together and make presentations to the group.
  - f. Facilitate a "fish bowl" science discussion wherein a panel of scientists discusses the issues while being observed by an audience of stakeholders.
  - g. Organize a session wherein experts are invited to draft proposed language for a negotiating document.

### Designing the Process

1. Design a process strategy that anticipates and intentionally incorporates the scientific issues known. Anticipate and help organize the roles of partisan and outside experts
  2. Timing is critical. Actively coordinate the gathering and analysis of technical information. Pace the data flow so the needed information is available when needed.
  3. As early as possible, get the stakeholders to decide jointly what is "adequate" information – what kind, how much – and when to include the information in the process.
  4. In advance, have them define what they will do with new information, how they will incorporate it into their process, or not. Identify what kind of information would change their minds.
  5. Support the flow of information by using design strategies:
    - a. Advise stakeholders to appoint a technical study team. The team can be
6. Ensure that the startup processes include anticipated exchanges regarding technical issues (such as ground rules and identifying interests).
  7. Ensure the proper level of confidentiality for technical discussions through documents or contractual agreements (for example, ground rules or a protocols list).
  8. Determine how much of the process needs to be behind closed doors versus how much needs to be in the public eye – know the legal requirements.
  9. Pre-negotiate the financial and time resources that will be needed to deal with technical information.

### Defining the Problem

1. Develop multiple descriptions of the technical problems as opposed to creating an inflexible, single-problem definition.
2. Don't focus on data and data analysis too early. It's usually more important to understand the legal, political, social, economic, and scientific contexts. This will help determine how the scientific and

technical data and questions fit into the big picture.

3. Use data as a discussion point rather than assuming it will inherently lead to an answer.

### **Working with Experts**

1. Clarify with the stakeholders how experts will be brought in, what they will provide, and what roles they might play that would be pertinent to a resolution.
2. Build bridges between scientists and nonscientists by helping each to understand the other's perspectives, values, and ways of knowing.
3. Ask scientists to discuss explicitly the assumptions behind the data they present.
4. Allow the participants to confront a scientist's assumptions and any bias they perceive the scientist has. No scientist is perfectly neutral.
5. Be prepared to discuss the basic assumptions behind any scientific assertion, especially if there is conflict over it. Help the participants understand that differences in assumptions are rarely due to malice or ignorance, but legitimate differences in professional approaches, interests, and previous experiences.
6. Ask each expert to state his or her understanding of the pertinent risks, benefits, and cautions. Ask each to describe the situation both qualitatively and quantitatively.
7. Keep the scientists on target with what is relative to the group.
8. Encourage scientists to use plain language and good visuals.
9. Urge scientists to use peer-reviewed studies.
10. When scientists are working away from the main group (for example, on a technical committee), help the stakeholders focus their questions to the scientists and reach explicit consensus on the questions before giving them to the scientists. Avoid

"Should we?" questions. Use "Under what circumstances might we?" questions.

11. Assist dueling experts by bringing in an acceptable third-party scientist. Experts are generally amenable to discussing their differences with a respected colleague in their field.
12. When access to technical expertise is unequal, discourage the use of overly sophisticated presentations by just one side. Instead, use jointly constructed visuals that all the participants can understand.
13. Encourage lay stakeholders to rely on evidence generated by good scientific methodology, not on quantity alone or the personality of the scientist.
14. Include social scientists to bring rigor to the analysis of cultural and social impacts and to some of the more qualitative and subjective aspects of decision-making.
15. Public issues educators need to guide participants through a reality check. Ask questions that lead the participants to question whether their positions are tenable and can be sustained.

### **Negotiating and Problem-solving**

1. Frame the discussion on how the group can find a livable solution. Discourage negotiation styles that imply "right" and "wrong."
2. Sometimes participants defend their own position not on its merits, but by the lack of others' data: "Show me the data!" goes the cry. In these instances, remind participants that this is a joint search for common understanding and that the onus of proof should not be placed on any single participant or group.
3. Jointly produce and analyze the technical information. It will lead to development of criteria for judging options and eventually to development of the options.
4. Regarding modeling, have the participants negotiate critical assumptions that will be used in the model(s). Discuss the

limitations and uncertainties of modeling as well as the benefits.

5. Privately explore the best and worst alternatives to a negotiated agreement to understand how each party proposes to handle scientific uncertainties if there is no agreement.
6. It can be useful to get a commitment from the participants to do a representative test or data collection. Decide in advance what decision they will collectively make under different outcomes of the test. Agree on the method to test or gather data. The data or experiment should provide enough information to make a decision or justify their joint decision to others.
7. Move any "Precautionary Principle" vs. "Reasonable Risk" debate into explicit pieces that allow participants to make trade-offs according to their risk tolerance.
8. Scientists, engineers, and technical experts often have psychological barriers to making trade-offs. When that's the case, don't ask them to do it. Help them understand that there are alternatives to approaching complex policy problems and that it's often possible to balance several competing ideas. Explore "bundles" of gives and takes; suggest the scientists think in terms of agreeing on probable ranges rather than trying to find a perfect number.
9. Help the scientists, technical people, and participants understand that compromise solutions are not inherently bad.
10. Discourage traditional offer/counter-offer negotiation styles that imply "right" and "wrong." Frame the discussion on how the group can find a livable solution.
11. Many stakeholders in public issues are experienced negotiators. Let the "natural dispute resolvers" get more involved in the process. Stay out of their way.

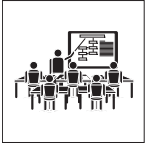
### **Making and Implementing Agreements**

1. The public issues educator may have to confront the participants to get them to make their best-case and worst-case

arguments to each other. For example, a statement such as this would be appropriate: "We are not going to settle this unless you can convince the other side to agree. Let's map out everyone's best facts and arguments."

2. Help participants understand when they have enough agreement on technical issues to go ahead and negotiate solutions.
3. When agreements are based on key scientific assumptions, make those assumptions as explicit as possible. Explore what mechanisms can be used to monitor the assumptions. Determine what to do if those assumptions turn out to be different or untrue.
4. Promote dynamic, flexible, and adaptive agreements that balance ...
  - the need for business stability (reasonable stability) and
  - the need for higher levels of environmental assurance flexibility and performance-based adaptability.
5. Help participants understand that all scientific decisions are provisional despite the finality of legal, administrative, and political decision-making. The solution is "temporary" until such time when future scientific evidence can better inform a decision.
6. Try to help craft an agreement that allows for change so that if they are wrong about the science, they can revisit and renegotiate the issues. (This is difficult, especially in public health issues.)
7. Help the scientists maintain face at the conclusion of an agreement that still poses great uncertainty.
8. Include the scientists when you celebrate closure.

## Handout 5: Situation Mapping



Use **situation mapping** to identify data needs. Situation mapping is a visualization process that helps people graphically represent a situation to create a shared and systemic understanding of it. It is particularly useful in the early stages of defining the problem, and can be used to help participants pinpoint data and information needs.

### Situation Mapping

- Begin with a **map chassis** – a core fragment to get people thinking and involved.
- **Elements** are parties, issues, and activities – nouns.
- **Relationships** are verbs on lines that connect elements.



The process begins with a “map chassis” – a core fragment that gets people thinking and involved in editing and adding to the map.

- ▶ Elements are parties, issues, and activities. They are labeled as nouns and represented by polygons.
- ▶ Relationships are labeled as verbs and are represented as lines that connect elements.

The following questions may help you develop your situation map:

- ▶ What are the central issues?
- ▶ Who are the key stakeholders? How do they interact?
- ▶ What actions, behaviors, or practices should be included?
- ▶ What connects with what? In what way or direction?

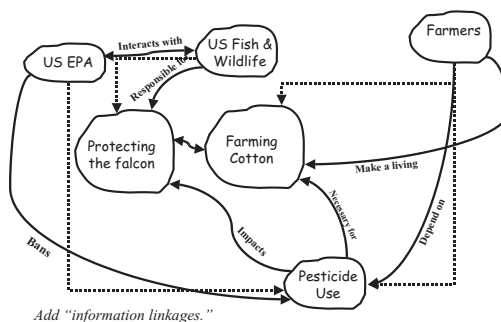
**Situation mapping is creative, not evaluative.** The purpose of situation mapping is to understand the situation, not to generate new solutions or to debate potential changes. It is a brainstorming exercise in which the rule of thumb is to separate the process of

generating ideas from the process of evaluating them.

**Situation mapping can be used to reflect individual perspectives.** It can also be used to map the shared viewpoints that make up a group’s perception of a situation. For example, representatives of one stakeholder group can develop their own situation map and compare it with the maps of other stakeholder groups to learn how others see the situation differently. Alternatively, a diverse group can work together to develop a single, composite view of the situation. In the latter case, no participants should be expected to necessarily hold the complete view, but they should be able to see their particular viewpoint represented in it.

**The objective of situation mapping is not to accurately depict a particular situation in all its detail and minutiae.** Rather, situation mapping should be used to capture the dynamics that give rise to the particular situation. According to Daniels and Walker, situation maps should “seek to portray the fundamental forces that drive, reinforce, and constrain the choices that the stakeholders might be interested in pursuing.”

Situation Map:  
The Cotton-Pesticide-Falcon Issue



**Slide 43** depicts a situation map of the falcon and cotton-farming issue in Cameron County. When you are satisfied with the completed map showing elements and relationships, the next step is to map **information linkages** among the elements. The dashed lines in Slide 43 indicate information linkages between the

“human” elements (people, organizations, and interest groups) and the “nonhuman” elements (places, actions, and resources,). Identify the following data and information parameters:

**For each element that describes a person, organization, or interest group:**

- ▶ What data and information does this entity provide?
- ▶ Are the data viewed as credible by all stakeholders?

**For each “nonhuman” element (a thing or an action):**

- ▶ Is information complete?
- ▶ What additional information is needed?

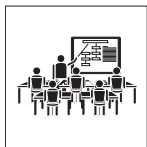
**For each relationship:**

- ▶ Is more or better information needed to understand the interaction among elements?

Establish priorities for collecting information and data.

The completed situation map provides the group with an understanding of the key elements and relationships that give rise to the issues the stakeholders are attempting to resolve. By including detail about information linkages and parameters, stakeholders can begin to develop a process for gathering and evaluating data and information.

## Handout 6: Facilitating a Focused Discussion



The purpose of a **focused discussion** (Stanfield) is to bring the participants together mentally: to get them “all on the same page.” The discussion may

be short or long, depending on the situation. Focused discussions are particularly appropriate after a presentation or a video or when the participants were asked to read something to prepare for the discussion.

The value of a focused discussion is that it helps the participants identify and focus on the real significance of the issue being discussed. It helps them put events into perspective. And, it gives participants common understandings of the issues. Each focused discussion is tailor-made for best results – questions have to be relevant to the subject and the group.

In a focused discussion, the facilitator leads a group from surface observations of a situation to in-depth understanding and a response to the situation. It works well with unsophisticated and anxious participants as well as with confident and strong-willed ones. The facilitator uses focused questions to engage participants in the discussion. The questions are designed to fit the situation and they are prepared in advance. It doesn't hurt to write more than you'll probably need.

The focused discussion moves the participants through four sequential levels of thought. Questions at Level 1 should be easy to answer as this introductory phase helps break the ice. Here are descriptions and examples of each level.

**Level 1 questions** focus the participants' attention, identify realities (what is directly observable), and clarify information. These first questions elicit facts. They ask what participants have heard, seen, read, or otherwise learned about the situation. These questions help to ensure that everyone deals with the same information:

*What caught your attention when you read the article?*

*What stuck in your mind?*

*What were the main points?*

*What points didn't you understand, or which ones need clarification?*

**Level 2 questions** bring out people's emotional responses. They are concerned with feelings, moods, memories, and associations. Questions at Level 2 help participants describe how they feel about something, whether they like it, whether it angers or excites them. The questions help reveal the participants' initial responses to the situation.

*What does it remind you of?*

*How do you feel about what you just heard; are you skeptical, intrigued?*

*What was your gut reaction?*

**Level 3 questions** build on the objective data and feelings from Level 1 and Level 2. They draw out the significance of the information and help build a story of what is happening. The “story” may answer some of the “why” questions within the situation and reveal the values held by members of the group. Level 3 questions may consider alternatives and options.

*How does the information presented fit with the topic at hand?*

*What do you see as strengths and weaknesses of what you just heard?*

*What is an insight here?*

*How will this affect our work?*

*What does all this mean?*

**Level 4 questions** make the discussion relevant for the future. The questions use the information discussed in Levels 1, 2, and 3 and lead the participants to make short- or long-term decisions or choices based on that discussion. Level 4 questions help bring the discussion to a close.

*What are some of the first steps we need to take to implement those changes?*

*What are some changes that can be made to resolve the problem?*

*What is our response?*

*What decision is called for?*

*What are the next steps?*

## Case Scenario 1: Hog Heaven

### Managing Warring or Contested Science in a Public Issues Education Context

Swine production has doubled in Bloom County since 1995. Many farmers have adopted new technologies, many designed and tested at your university, that make large-scale swine production possible. Rural incomes have climbed as more and more farmers have added swine production to their farming practices.

Nevertheless, this growth has not occurred without controversy. As the industry has expanded, concerns about odor and water pollution have been voiced by rural neighbors, environmental organizations, and public health advocates. The issue gained wide attention when a group of investors announced plans to construct a large sow operation on land in the northwest part of the county. Concerns have intensified to a fevered pitch as Bloom County citizens grapple with trying to balance the economic benefits of increased livestock production with quality of life and environmental protection.

Recognizing the need for a public discussion on the issues surrounding the growth of the livestock industry in Bloom County, the county board of commissioners weighed in on the issue. The commissioners passed an ordinance declaring a moratorium on building new intensive livestock operations and expanding existing operations until they could devise a plan for how to proceed. The ordinance called for the formation of an Intensive Livestock Operations Moratorium Study Committee to conduct research, describe the problems associated with intensive livestock operations, and recommend solutions to those problems. Committee members were appointed by the commissioners and represent the various interests with a stake in the outcome of the policy decisions.

The Study Committee members represent the following stakeholder groups (the number of members representing each group is shown in parentheses):

- livestock producers (2)
- Soil and Water Conservation District (1)
- local and regional environmental organizations (2)
- county public health department (1)
- county planning department (1)
- rural nonfarm resident (1)
- public at large (1)

Recognizing the level of contention within the community over the location and management of swine operations and the diversity of opinions held by members of the Study Committee, the county manager enlisted the resources of Cooperative Extension to engage the group in a process whereby they could amicably discuss the issues and arrive at policy recommendations that meet the needs of county citizens.

You have no ties or allegiances to Bloom County or its residents, so you have been asked to work on this issue. **Your task is twofold: to assist the members of the Study Committee with their investigation of the issues associated with intensive livestock operations and to help them develop recommendations for the county board of commissioners.**

You know going into this project that members of the committee are in strong disagreement over the social, environmental, and economic impacts of swine farming. Although the committee has not yet been officially convened, several issues regarding data have already come to your attention:

1. Various members have been amassing data, much of it from the Internet to support their positions for or against intensive livestock operations.
2. Committee members have contacted you to suggest specific speakers for the committee. For example, the environmental organizations want the committee to hear a water quality engineer

from a neighboring state whose research has documented the transport of nutrients from animal waste settling ponds to nearby surface waters. The agricultural interests want to hear from researchers from the state university (your place of employment) who researched and designed the waste treatment systems now in use on most farms.

3. Several committee members have stated that they mistrust the data that comes from the state university. They maintain that it was the university's research that made intensive hog production possible.
4. The state epidemiologist (not a university employee), citing increases in nitrate-contamination of drinking water wells, has testified in public hearings that large-scale hog operations should be banned from the state.
5. Groundwater studies undertaken by the state environmental agency and state university faculty have shown that most waste treatment ponds do not leak and are not a source of nutrients entering surface waters. Only those that were poorly designed or improperly maintained pose a threat to water quality (estimated to be approximately 10 percent of all waste systems).
6. You suspect there are other information concerns that haven't yet been identified.

### **Your Task Today**

For this exercise, you are to identify and describe activities, techniques, and practices that you would use to help the Study Committee deal with the issues of contested science. In particular, consider the following questions:

1. *How would you decide what information and technical data should be presented to the committee?*
2. *How would you structure and manage technical presentations and group discussion?*
3. *How would you handle the data trust issue – particularly mistrust in data from your university?*

Review the "Tools and Techniques" provided in Handout 4.

Discuss this case and prepare a short oral presentation to the rest of the class.

## Case Scenario 2: Feet and Inches

### Managing Scientific Uncertainty in a Public Issues Education Context

The Grand River is the state's third-longest river and is contained entirely within the state. The river drains a large watershed that includes several municipalities, expanses of hardwood forests, and much of the state's most productive agricultural land. Two summers ago, 10 million fish died in a major hypoxia incident at the mouth of the Grand River. The culprit: nutrient enrichment caused by a host of sources, most notably municipal and agricultural runoff upriver. The fish kill coincided with the governor's re-election campaign for his second term. The governor promised that if re-elected, he would do everything in his power to restore water quality in the Grand River.

It is two years later, the governor was re-elected, and the state legislature passed the Grand River Water Quality Improvement Act, calling for a 30 percent reduction in nitrogen discharges into the river from all sources within the next five years. In carrying out the wishes of the General Assembly, the Environmental Management Commission (EMC), the state's environmental rule-making body, has decided, among other measures, to require the maintenance and protection of riparian buffers in the Grand River watershed. Existing natural vegetation on the river and its tributaries must stay. Although the EMC mandated that buffers must be maintained, it did not specify how wide the buffers should be nor the uses that would be allowed within the buffers. Several scientists have been studying the efficacy and functions of riparian buffers; the relationships among soil types, topography, vegetative cover, and rainfall are extremely complex. As such, prescriptions for buffer width are impossible to make with any precision for such a large watershed. Scientific opinions on optimal buffer width for nitrogen reduction vary from 20 to 100 feet. Recognizing this uncertainty, the EMC decreed that a series of stakeholder meetings and workshops would be

conducted to develop consensus recommendations for buffer width and uses and that representatives from these interest groups would comprise the stakeholder committee: agriculture, environment, urban development, forestry, and local government.

Recognizing that Cooperative Extension has the objectivity and experience to carry out such a task and that it is trusted by most parties, the EMC has asked you to lead this effort. **Your task is to assist the stakeholder committee in its investigation of the issues associated with establishing riparian buffers on the river and its tributaries, and help them develop recommendations for the EMC.** You know that members of the committee disagree strongly over the desired buffer widths that should be applied. The environmental organizations are pushing for maximum widths. Although all of the commercial interests want to see water quality restored, they believe that 20-foot buffers are sufficient. All groups have studies that back their respective positions.

#### Your Task Today

For this exercise, you are to identify and describe activities, techniques, and practices that you would use to help the stakeholder committee deal with the issue of uncertainty. In particular, consider the following questions:

1. *How might you design a process where committee members can gather and share information?*
2. *How would you structure and manage technical presentations and group discussion to effectively deal with scientific uncertainty?*
3. *What advice would you give the group regarding fashioning a solution that recognizes the uncertainties inherent in the issue?*

Review the "Tools and Techniques" provided in Handout 4.

Discuss this case and prepare a short oral presentation to the rest of the class.

## Case Scenario 3: Knowledge Is Power

### Dealing with Power Imbalances in a Public Issues Education Context

Five years ago, Julene Smith, a resident of Beulah Fork, a low-income, semi-rural community within eyesight of a large petroleum bulk storage facility (tank farm), began to notice the smell of gasoline in her drinking water. After an investigation, the State Health Department reported that approximately 700,000 gallons of fuel from the tank farm had seeped into the water table, tainting Smith's drinking well and possibly threatening dozens of others. Although the oil companies that own the terminal and state and local officials had known about spills and leaks since the late 1980s, many residents say they were not notified until Mrs. Smith found the benzene (the source of the gasoline odor) in her well.

Fearing the tank farm was a significant health threat, some Beulah Fork citizens did their own investigating. They got together, compared notes, talked with area families, and tabulated cancer illness in their community. They found that within 2 miles of the tank farm, more than 150 people were diagnosed with cancer in 900 households. After local citizens reported these findings, the State Health Department decided to do their own assessment. Six months later, state health authorities released the results of a preliminary health survey for several neighborhoods in the area. It showed a slightly higher—but not statistically significant—rate of leukemia in the area. State health authorities said the finding could be a statistical fluke. But because leukemia can be caused by high doses of benzene, a constituent of gasoline, they conducted a follow-up study in Beulah Fork.

The Health Department released the results of this more refined study last summer. The study did not show a significantly higher rate of cancer in the area. "The Central Cancer Registry has continued to monitor Beulah Fork since the original study," said Dr. Denise Brown, director of the state's cancer registry.

"Our statistical review has been examined by outside epidemiologists. At this time, Beulah Fork does not appear to have a cancer problem."

Beulah Fork residents don't believe a word of it.

So far, county officials say there is little indication that residents have been exposed to dangerous levels of gasoline contaminants. Inspectors tested 377 drinking water wells in the area. Only one has shown contaminants traceable to the tank farms, said Bill Jones, head of the County Public Health Department. At least 43 other wells, though, have elevated levels of toxic solvents, some of which are suspected carcinogens. Because many of these solvents—particularly trichloroethylene—have been widely used by garages, dry cleaners, and homeowners, county officials doubt there is a link to the gasoline terminals.

Whatever the testing shows, some Beulah Fork residents say that they can smell petroleum in their water. "You can smell it nearly every day," said Mary Davis, who lives about a half-mile from the tank terminals. Like other Beulah Fork residents, Davis blames the oil companies for her ailments. She was diagnosed with lung cancer in March.

To add to the mix of distrust and suspicion, this year the state legislature amended the state groundwater contamination law, primarily to prevent the Petroleum Spill Trust Fund from going bankrupt. The Fund – established through a \$.01 per gallon tax on gasoline purchases – pays for cleanup of petroleum leaks and spills. The old law required cleanup of *all* petroleum-based groundwater contamination incidents. The new law requires that cleanup be done only in cases where human health is at risk. With the change in the law, the State Department of Environmental Protection (DEP) recently announced new administrative rules governing cleanup of petroleum spills. The new rule ranks contaminated sites using a new risk analysis framework and establishes a cleanup priority

list. The DEP held a public hearing a month ago to announce and gather feedback on their cleanup priority list. When the 200 Beulah Fork citizens who attended the hearing learned that they didn't even make the list, they nearly rioted.

Since the public hearing, the DEP has contacted the County Public Health Department, stating that the citizens of Beulah Fork could petition the state to be placed on the priority list. Once on the list, the Petroleum Spill Trust Fund would be available for some sort of cleanup effort, including the provision of new water sources. In the Beulah Fork petition, citizens must show evidence that public health is at risk, and that the risk is caused by *petroleum* contamination. The tank farm owners, recognizing that they could be held liable for damages if the county can make such a case, have quietly moved to block the petition.

The citizens of Beulah Fork are afraid to drink their water and don't understand why government officials won't believe that the source of their problem is the petroleum tank farm. They don't trust what the oil companies and the state government are telling them. They want the oil companies and the state to pay the bill to extend municipal water lines to their homes. They believe they can prove their case, but are hampered by an onslaught of conflicting scientific studies and bureaucratic red tape.

You are the County Extension director, and Beulah Fork is in your county. Your county public issues education program is known throughout the state Cooperative Extension system as one of the best. You've also run an exemplary drinking water education program for the past three years. **Your County Extension Advisory Board wants you to prepare and carry out an educational program to deal effectively with this issue.** The objective of such a program should be to clarify what is known about this issue and to work with county officials and Beulah Fork residents to develop a plan of action for creating a safe water supply.

### **Your Task Today**

For this exercise, you are to identify and describe activities, techniques, and practices that you would use to deal with issues of powerlessness and unequal knowledge. In particular, consider the following questions:

1. *How might you design a process to both provide information and help the county and community develop an action plan?*
2. *How would you structure and manage technical presentations and group discussion?*
3. *How might you balance "local knowledge" and "scientific fact"?*

Review the "Tools and Techniques" provided in Handout 4.

Discuss this case and prepare a short oral presentation to the rest of the class.





## References

---

- Adler, P. S., R. C. Barrett, M. C. Bean, J. E. Birkhoff, C. P. Ozawa, and E. B. Rudin. (2000). *Managing Scientific and Technical Information in Environmental Cases: Principles and Practices for Mediators and Facilitators*. Washington, DC: RESOLVE, Inc. Online: <http://www.resolve.org/press/index.html>
- Carpenter, S. and W.J.D. Kennedy. (1988). *Managing Public Disputes*. San Francisco: Jossey-Bass.
- Daniels, S. E. and G. B. Walker. (2001). *Working Through Environmental Conflict: The Collaborative Learning Approach*. Westport, CT: Praeger.
- Montague, P. (1999, July 1). *Rachel's Environment & Health News*, No. 657. "The Uses of Scientific Uncertainty." New Brunswick, NJ: Environmental Research Foundation. Online: <http://www.rachel.org/>
- Moore, C.W. (1986). *The Mediation Process*. San Francisco: Jossey-Bass.
- Raffensperger, C. and P. de Fur. (1997, Mar. 6). *A Paradigm Shift: Rethinking Environmental Decision Making and Risk Assessment*. Paper presented to Risk Analysis Policy Association Meeting. Online: [http://www.biotech-info.net/paradigm\\_shift.html](http://www.biotech-info.net/paradigm_shift.html)
- Stanfield, R.B. (Ed.). (1997). *The Art of Focused Conversation: 100 Ways to Access Group Wisdom in the Workplace*. Toronto: Canadian Institute of Cultural Affairs.
- Tickner, J., C. Raffensperger, and N. Myers. (1998). *The Precautionary Principle in Action: A Handbook*. Windsor, ND: Science and Environmental Health Network. Online: <http://www.biotech-info.net/precautionary.html>

115 copies of this public document were printed at a cost of \$1,141.80 or \$9.92 per copy.

---

Distributed in furtherance of the acts of Congress of May 8 and June 30, 1914. North Carolina State University and North Carolina A&T State University commit themselves to positive action to secure equal opportunity regardless of race, color, creed, national origin, religion, sex, age, or disability. In addition, the two Universities welcome all persons without regard to sexual orientation. North Carolina State University, North Carolina A&T State University, U.S. Department of Agriculture, and local governments cooperating.

---