Problem-Framing: A Perspective on Environmental Problem-Solving

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ABSTRACT / The specter of environmental calamity calls for the best efforts of an involved public. Ironically, the way people understand the issues all too often serves to discourage and frustrate rather than motivate them to action. This article draws from problem-solving perspectives offered by cognitive psychology and conflict management to examine a framework for thinking about environmental problems that promises to help rather than hinder efforts to address them.

Problem-framing emphasizes focusing on the problem definition. Since how one defines a problem determines one's understanding of and approach to that problem, being able to redefine or reframe a problem and to explore the "problem space" can help broaden the range of alternatives and solutions examined.

Problem-framing incorporates a cognitive perspective on how people respond to information. It explains why an emphasis on problem definition is not part of people's typical approach to problems. It recognizes the importance of structure and of having ways to organize that information on one's problem-solving effort. Finally, problem-framing draws on both cognitive psychology and conflict management for strategies to manage information and to create a problem-solving environment that not only encourages participation but can yield better approaches to our environmental problems.

Environmental issues present a challenging arena for problem-solving. They are complex, plagued with uncertainty, and extremely political. Particularly difficult has been garnering an involved populace to help address issues that must be decided in the public forum. While they are becoming more aware of the issues, people's emerging knowledge has its liabilities. All too often, the way people understand the issues only overwhelms and discourages them. We can ill-afford a population that feels helpless and inconsequential in the face of these issues (see Garber and Seligman 1980).

This article presents a framework for thinking about environmental problems that acknowledges their pervasive, often urgent nature, but that promises to facilitate rather than undermine how effectively people address them. Referred to as problem-framing, this framework is about what makes for good problem-solving. It emphasizes focusing on the problem definition and on consciously examining different interpretations of that problem.

To examine problem-framing, this discussion draws on two different problem-solving perspectives—the theoretical vantage offered by cognitive psychology and the more applied one of conflict management. Cognitive psychology provides an empirical and theoretical look at how humans use information and solve problems. It lays the groundwork and presents a generic vocabulary for explaining why problem-framing works. The conflict management vantage offers a real-world arena for dealing with the dynamic, political, and volatile aspects of addressing environmental issues. Its strategies reflect a pragmatic awareness often lacking in theoretical work. Before looking at the contributions of these two perspectives, it is important to understand what makes environmental problems so hard to solve in the first place.

Why Environmental Problems Are So Hard to Solve

Like most social problems, environmental problems seem intractable because they are ill-structured or as Mason and Mitroff (1981) put it "wicked." There are many ways of looking at the problem, many paths worth exploring, and rarely is there one "right" solution. The effects of those solutions play out over different time frames, and inevitably, with each resolution, comes a new array of problems. The risks are high and the consequences of our actions potentially long term and irreversible. A report of the thirty-eighth meeting of the American Association for the Advancement of Science characterized the complex, insidious nature of many environmental issues:

The bad feeling [there] emanated from the simple presence of massive

uncertainty—and the clearly enormous difficulties of integrating data and concepts that have no more in common than brick and cotton (Odell 1982, p. 2).

Solving environmental issues entails more than finding a technical solution. Environmental choices reflect politics, social values, and expectations as much as scientific facts (Ehrlich 1980, Schnaiberg 1980, Sampson and Hair 1990). Decisions depend on what priorities and trade-offs we, as a society, choose. They imply what risks and changes we are willing to accept. The complexity of the issues calls for the reconciliation of disparate, often contradictory information from many fields. Given the difficulty of incorporating a diversity of views, conflict is inherent in environmental problem-solving.

What Conflict Management and Cognitive Psychology Can Offer

There has been growing dissatisfaction with traditional, often adversarial forums for addressing these conflicts:

When decisions in a dispute are seen as choices between winners and losers or when decisions are based on narrow procedural grounds, the interests of one, and sometimes all, of the parties to the dispute often remain unsatisfied. Instead, environmental disputes usually need solutions that make both good economic and good environmental sense (Bingham 1986, p. 2).

As a result, more consensual approaches, referred to as dispute resolution or conflict management, have gained momentum in the environmental field.[1] Parties concerned about issues—be they land use (Talbot 1983), siting of solid-waste facilities (Bellman 1980), or establishing energy policy (Lake 1980), voluntarily work to arrive at a mutually acceptable decision.

A major focus in dispute resolution is on helping a group effectively problem solve. While the field asks what procedures and strategies can guide and structure that process so that the subsequent decisions make "good sense," there is relatively little theory that applies to the aspects of problem-solving raised here. Furthermore, these efforts must not ignore the individual problem-solvers, people often daunted by the information they receive and with different values and concerns related to those issues. Here, cognitive science has some

useful insights. Its tradition of looking at problem-solving offers theoretical perspectives that explain people's responses and can illuminate why certain approaches work better than others.

Problem-framing represents a synthesis of these two vantages. Although incorporating lessons learned from conflict management with insights about how people approach information seems a natural linkage, the connection has rarely been made. Cognitive theory needs a real-world testing ground; conflict resolution represents a concrete mandate for implementing that theoretical understanding. Furthermore, being informed by a cognitive perspective provides the conceptual framework to guide that effort. The following discussion begins with a brief overview of a cognitive perspective on the problem-solver. It then examines problem-framing, as a way of approaching the problem-solving effort that draws on the theoretical and applied aspects of these two perspectives.

Understanding Problem-Solvers

Just knowing is not enough. In the face of problems that are urgent, complicated, and far-reaching, people often fail to respond with the enthusiasm and commitment one might expect. The seemingly logical assumption that giving them the necessary knowledge will lead to appropriate action overlooks some basic informational and psychological concerns. Knowing how people perceive and use information is central to understanding how they solve problems.

People are not computers. They cannot store and access all the information they receive. At their best, people can handle only about three to seven (5 ± 2) different units of information or thoughts at a time (Mandler 1975). They selectively use information from their environment relying on mental models or "cognitive maps" they have built through life experience. The information that is stored is that which reinforces or builds on those maps—that information seems relevant.

People also are not passive receptors of this information. They use these maps rapidly, almost automatically to access a reservoir of organized information with which to interpret and respond to their environment. Because models make decisive action possible, people place a high premium on using those they already have. While eager to extend or enhance what they already know about, people are far more reticent to give up the models they have.

When it comes to problem-solving, this commitment plays itself out as a bias towards the familiar. People tend to solve problems in ways that fit into their preexisting maps; they do what they did before. At its best,

[1]The terms environmental conflict management, dispute resolution, etc., are used very generally here. The literature in this field is extensive (see Bingham 1986 for bibliography). There is, however, relatively little theory emerging from the field itself that applies the conceptual, problem-solving perspective level proposed here.

this means one has an adequate map for dealing with a new situation.

Unfortunately, this also means that new problems may be cast as old ones and more effective options overlooked. Many environmental issues are identified as "just like" something else. For example, the analogy of the city as a tree has misguided urban design (Alexander 1965); and transporting the New England landscaping "solution" to Arizona is threatening the viability of that ecosystem because the environmental realities of the two locales do not match.

There are times, of course, when the models one has cannot accommodate the new information. One feels confused. Confusion is painful, and people strive ardently to quiet it, i.e., to make things understandable. Oftentimes, this striving manifests itself as a tenacious persistence to "get things straight." At other times, however, people jump to conclusions without adequately examining the problem. Their discomfort with the uncertainty is such that any solution will do. Moreover, if these efforts fail to bring cognitive closure, people typically respond emotionally with frustration, anger, helplessness, or apathy. Neither jumping to conclusions nor any of these affective states result in very effective problem-solving. Interaction Associates (1986) has provided a summary of problem-solving tendencies, which, even if exaggerated, suggests the real world implications and frustrations of an inadequate problem exploration. They claim: 90% of problem solving is spent:

- Solving the wrong problem
- Stating the problem so it cannot be solved
- Solving a solution
- Stating problems too generally
- Trying to get agreement on the solution before there is agreement on the problem.

Understanding Problems

An examination of effective problem-solving suggests that there may be ways of handling information and of changing one's perspective that preclude the difficulties of the confusion discussed above. At the crux of problem-framing, as presented here, is the problem definition.

Importance of Problem Definition

A problem-solving effort involves several stages:

1. Building an understanding of the problem: defining the problem-space
2. Establishing some initial criteria for the goal
3. Searching for solutions

4. Deciding among solutions
5. Evaluating progress: comparing initial goals to and monitoring the solution

The last four steps often dominate the focus of problem-solving efforts, but the problem definition—how one sees the problem—has the most profound effect on where one ends up (Miller and others 1960).

The initial representation of a problem may be the most crucial single factor governing the likelihood of problem solution. What may appear as a formidable problem in one representation may be solved immediately in another format. A mere change of representation may by itself provide a solution. Whether a problem is solved or not, and how long the solution will take depend a great deal upon the initial representation [Posner 1973, p. 149].

The problem definition ramifies throughout the problem-solving process, reflecting values and assumptions, determining strategies, and profoundly impacting upon the quality of solutions.

1. The problem definition implicitly embodies preconceptions and assumptions that underpin how one approaches the problem. Viewing the environment as an inheritance to be spent, for example, evokes a different range of attitudes about its treatment than does considering the environment something borrowed from one's children. Both are legitimate, but the choice of perspective shifts one's outlook.

2. The problem definition guides the strategies and actions taken to address the problem. How something is categorized has important consequences for the way it is treated. Things that are seen as fixed or uncontrollable "will tend to be monitored, measured and judged, whereas controllable things that are important will tend to be acted on and developed" (Dweck and Leggett 1988, p. 266).

In the environmental field, the information one receives can dramatically shape these perceptions. Studies in risk perception have found that how odds are presented can alter the kind of options, i.e., risks people are willing to take (Allman 1985). In his provocative essay on what cognitive psychology can offer environmental policymakers, Fischhoff (1981) notes, ". . . the particular or peculiar way that issues are posed by nature, scientists, politicians and the media may have great power over just what responses emerge as apparent expressions of people's values" (p. 180).

3. Exploration of aspects of the problem influences the quality of solutions. Most evidence for this claim comes from studies comparing expert and novice problem-solvers. Experts, those with considerable experience in a certain field, can deal very efficiently with the subject matter. They devote a large proportion of their problem-solv-

ing time to conceptualizing the problem and can figure out what is central to understanding it. As a result, they have a perspective that helps them foresee consequences, new problems that might arise, and the implications of the solutions they propose. Novices, lacking that familiarity, find it difficult to sort through information to determine what is important and how the different parts may fit together. This means they may have trouble seeing the "big picture" or making connections between ideas that seem second nature to experts. Their problem-solving process appears more halting, and they typically develop specific, stop-gap solutions (Voss and others 1983).

The familiarity implicit in being an expert has its shortcomings, as mentioned earlier. Experts may see new problems as "just like" an old one, thereby overlooking the unique aspects of the new problems (Kaplan and Kaplan 1982). Nevertheless, in terms of the problem-solving process, the experts' ability to focus on problem-definition clearly enhances the problem-solving effort.

Redefining the Problem

A water resource controversy in Colorado began over a proposed dam (Bingham 1986). Some parties refused to discuss how to build the dam, until the question of whether or not the dam was even needed was settled. Redefining the problem to ask: "How much water do we really need?" encompassed the concerns of all parties.

As suggested by this example, an adequate problem definition is a critical first step to effectively solving complex problems. The process of reframing or redefining a problem enhances one's understanding of that problem. Shifting one's perspective changes

... the conceptual and/or emotional setting or viewpoint in relation to which a situation is experienced and places it in another frame which fits the 'facts' of the same concrete situation equally well or even better, and thereby changes its entire meaning (Watzlawick and others 1974, p. 94).

It means asking questions that explore different aspects of the problem: "It is amazing how rarely the question *what* is seriously asked. Instead, either the nature of the situation is taken to be quite evident, or it is described and explained mainly in terms of *why* by reference to origins, reasons, motives, etc., rather than to events observable here and now" (Watzlawick and others 1974, p. 84).

The issue is not that one vantage or definition is necessarily the best; neither guarantees a "right solution." Rather, focusing on different aspects of the

problem "simply makes us aware of the options and encourages more thoughtful analysis. Hopefully, it will increase the probability of designing successful solutions and minimize the likelihood of negative outcomes" (Rappaport 1986, p. 6).

Redefining the problem is implicit in dispute resolution. Its aim of achieving mutually acceptable solutions recognizes that parties have to agree on the problem before they can agree on a solution (Carpenter and Kennedy 1985). The parties in the example above had different assumptions and were asking different questions, so their perception of the problem was different. The dispute-resolution process entailed finding common ground, i.e., a perception of the problem to which all parties could agree.

Redefining Problems: Other Examples

Being able to problem-frame, to adopt different perspectives on a problem, makes people better able and more willing to think about and creatively address it. The following examples, although they oversimplify the complexity of these issues, briefly trace how a shift in perspective can change not only one's perception of what is the problem, but how it can dramatically alter the alternatives one fathoms.

Water. Returning to the water resource example presented above, the problem scope (how and where to build the dam) was defined in terms of a solution (building a dam). This initial decision emanated from assumptions such as "we are going to run out of water" or "we don't have enough water." The alternatives that flow from such an assessment revolve around satisfying that need and getting more water—perhaps by rerouting waterways, building dams, or constructing canals. Accomplishing this task would require vast expenditures of money and mobilization of a huge infrastructure. The solution is stop-gap; given no change in patterns of water use, it is only a matter of time before another reservoir or water source would be required.

An alternative problem perspective, "we are using too much water" places emphasis on use rather than procurement. The challenge then becomes conservation and utilizing the resource more efficiently. Addressing the problem at this level involves a broader spectrum of people, since conservation begins with the individual.

The problem perspective used in this specific case offered an even more comprehensive perspective on the problem. Asking "how can we meet our future water needs" resulted in a large scale, long-term joint planning effort for the entire area. While it acknowledged the possibility of accessing new water sources, this plan

also incorporated conservation efforts, more efficient systems, and other innovations into the equation.

Energy. A similar shift in problem definition can be made for energy. As "energy crisis" implies, a typical perception is that we are "running out" of energy. The questions elicited by that observation ask how we will continue to meet our energy needs, what other energy sources we can tap, etc. The mechanisms for addressing the problem, again, tend to be large-scale and inaccessible to the average person, or, the prospects look dismal. We can build more plants, which present environmental concerns themselves, or inflict draconian conservation measures. It is little wonder the prospect of cold fusion so enamored us. It promised the "perfect" solution—we could maintain our energy use but have a source that was safe, nonpolluting, and cheap.

A reframing of the issue that looks at how and why we use energy opens up new vistas. From this vantage, the amount of energy we have available, if used more efficiently, can more than adequately meet our needs. In fact, a number of these needs could be met without additional energy inputs at all. Many of the alternatives that would have come from the first problem perception—for example, more nuclear plants—would be unneeded (Lovins 1977). Furthermore, the notion of efficiency supports multiple energy sources—appropriately using different kinds of energy for what they do best (e.g., solar for heating, fossil fuels for high-energy output, etc). While less "simple" than energy supply on the large scale, this "soft" energy approach provides a number of access points, again promoting, input at many levels.

Structure and Process in Problem-Framing

Problem-framing, then, refers to a concerted effort to focus on one's understanding of a problem. As implied above, this is not easy. People tend to want answers, especially when faced with uncertain and complex issues. To accomplish this, one needs a usable structure, or way of organizing information related to that problem, and an effective process, with strategies for managing the problem-solving effort.

Organizing the Problem: Building Structure

Structure relates to how one shapes a problem definition or understanding, i.e., the cognitive map one uses for the problem. Having even a beginning structure can make a big difference in how one approaches a problem. This structure establishes the domain of the problem, thus providing some parameters for selecting and classifying new information. The more

coherent one's map, the easier it is to step back and explore the dimensions of a problem.

The affective consequences of not having any structure are confusion, even feelings of helplessness (Kaplan and Kaplan 1982). The understanding implied in having a model lowers that discomfort. As a result, the pressure to achieve some kind of closure is less pressing. When people feel less inclined to jump to a solution, they can focus on the problem.

A number of studies highlight the impact of having structure on effective problem formulation. World-class chess players see the chessboard in terms of patterns, game-relevant configurations rather than as individual pieces (DeGroot 1965). Voss and others (1983) found that better problem-solvers spent more time on problem definition, forming early, tentative hypotheses to guide their search and reduce their problem to a manageable size. Once achieved, their potential solutions came quickly. These solutions were fewer, more abstract and conceptual, but also included arguments and explanations.

The less effective problem-solvers, on the other hand, spent most of their time listing reasons and/or solutions, "thus representing the problem only as a set of specific causes requiring solutions" (Voss and others 1983, p. 219). Apparently, the better problem-solvers could access a familiar mental model that allowed them to work with the problem. The others lacked the maps and adequate ways of organizing information to begin building one. Literally having nothing else to think about, they moved on to solutions.

Managing the Process

To effectively problem-solve, then, one needs some content; familiarity with content is the stuff of which maps are made. One also needs a meaningful coding and organization of that content, i.e., structure. Finally, one needs ways of managing or dealing with and acting on that information. The discussion here will look at some general strategies for redefining the problem.

Staving off solutions. In order to focus on problem definition, one needs to be able to avoid solving the problem too quickly. Although staving off solutions may seem the same as focusing on the problem (except that it works from the other end), it is not as inclusive. One cannot hope to keep people off solutions unless they have something else on which to work. Simple-minded as it sounds, this strategy uniquely acknowledges that "fighting the itch for closure" is very difficult (Elbow 1981). This tendency to push for closure or a solution works well for many problems and is appropriate for the environments humans encountered in their evolutionary past. Thinking too much at the wrong

time or being confused and not doing something probably meant starvation or being eaten (Kaplan and Kaplan 1982).

This inclination towards action and people's discomfort with indecision become problematic when it means they pass over, the problem definition too quickly in order to get on with the solution. In their haste, people may define the problem inadequately or inaccurately; they overlook other alternatives or define the problem in terms of a solution. In short, they may do a bad job of problem-solving. Maier (1967) calls this tendency "solution-mindedness:"

[It] reflects an anxiety to reach a solution to the problem as given ... [the] attitude leads to a premature evaluation of solutions, which tends to inhibit the exploration of novel avenues of attack on the problem, and the generation of new or inventive ideas about the problem" (p. 390).

From the conflict management perspective, solution-mindedness is manifested in positional stances (Fisher and Ury 1982). Positions are what people have decided on, which means they have already defined the problem and established a solution. To counter this, emphasis is placed on exploring the interests—the needs and concerns—that lay behind those positions. People will find that they have many shared or at least noncompeting interests that were obscured by positional stances. Thinking about the problem in terms of satisfying those interests changes its definition.

A classic example involves two children fighting over an orange. Their mother intervened and, gave each half. One child ate the pulp and threw away the skin; the other tossed the pulp and grated the skin for a cake. The interests of the two were different and compatible. By not exploring them, however, neither got all that he or she could have.

Focusing on interests and underlying concerns, then, pulls people back from solutions. As simple a question as "what" or "how" can move the discussion to interests and, consequently to redefining the problem. Focusing on interests changes the flavor of that definition from one that is merely descriptive to a broader, prescriptively useful one. In terms of the water example discussed above, it means not thinking about the problem in terms of the solution—we have to get more water. Instead, one first looks at the underlying parameters— what kinds of water needs do we have? what are some alternate ways of satisfying these needs? The problem frame here is much larger. Rather than focusing on one option and how to execute it, this problem formulation allows for a number of alternatives.

Limiting information. Acknowledging our cognitive limitations means respecting the fact that it is people's attention, not information that is the scarce resource (Simon 1978). Overwhelming people's ability to understand and absorb information is detrimental to a problem-solving effort. Information needs to be managed: "In a world where information is relatively scarce, and where problems for decision are few and simple, information is almost always a positive good. In a world where attention is a major resource, information may be an expensive luxury, for it may turn our attention from what is important to what is unimportant." (Simon 1978, p. 13). Especially for those unfamiliar with the situation or topic, "playing" around with ideas is difficult. It may even seem threatening if one is barely managing to pick up the basics. Having some constraints plays a central role in the delicate dynamic between being so overwhelmed by a problem that one gives up and feeling capable of effecting some change.

Conflict management approaches need to be especially sensitive to the hazards of too much information because disagreements over risks and about the objectivity, accuracy, and comprehensiveness of data are an inevitable part of environmental problem-solving. A potentially important element in the successful resolution of a dispute has parties agree on what facts and on the complexity of the technical issues will be used (Bingham 1986). The parties may decide to exchange information, joint fact-find, or even sponsor new studies. Straus (1981) contends that a first step in managing complex problems is to simplify the information available. He sees the process of agreeing on a common data base as helping parties become familiar with a shared set of data, thereby "increasing mutual awareness of hidden assumptions and different interpretations" (p. 5).

These efforts, however, need to be handled carefully. First of all, novices, be they citizen groups or newly involved parties may not have the depth of understanding and familiarity with the issues needed to assess what facts to find or simplify. Secondly, as Straus (1981) points out, "Simplification can be both a tool for creative collaborative problem-solving as well as a weapon for advocacy. As a weapon, it can be used to illuminate only one side of the question while shrouding the other in darkness" (p. 4).

Choosing levels. Another aspect of managing information involves choosing what Mason and Mitroff (1981) call an appropriate "universe of discourse." One gathers information that is relevant to the level at which a problem is being addressed. How one selects an appropriate level or problem scale is more sticky. While the approximate scale for a given situation must encompass enough of the problem to provide perspective and

lookahead, it cannot be so global that one has no access to specifics.

From a cognitive perspective, one would expect this level to be that for which one can divide the problem into 5 ± 2 meaningful chunks. What is included in these chunks will vary, of course, with one's familiarity with the subject—an expert's chunk, for example, is far more complex and compact than someone just learning about a topic. There are several factors to consider:

Fit. The skills and abilities must be adequate for the task at hand. The scale at which one addresses a problem matches the structures or maps one has for that problem. For instance, success of urban barn-raising efforts hinges, in part, on how effectively people's skills are matched with what needs to be done (Williams 1986).

Linkage. The linkage among levels provides a context in which one's actions are a part of a larger framework or scheme of things. A "higher-level" community emphasis on recycling through curbside pick-up, for example, adds an additional motive for individual efforts (De Young 1984).

Personalization. Issues that relate to one's own circumstances and needs are difficult to ignore. As pressing and urgent as many global problems are, they often seem too remote, too big, and too complicated for one to have any hope of influencing them. Concerns that hit closer to home are more concrete, and tend to offer more tangible results. The NIMBY (not in my backyard) response exemplifies people's motivation to take a stand, in part, because they can relate to the issue at a scale that is meaningful and empowering (Freudenberg 1984). Of course, without good linkage and feedback from other levels about "how we are doing," that very proximity could be all the more discouraging.

Such considerations are especially salient for environmental issues, because the appropriate levels will vary with the issue and one's level of understanding. Presented at too large a scale, the problem seems unapproachable and overwhelming; if too small, it is easily dismissed. Weick (1984) stresses setting reasonable sights and working for "small wins." Although it seems to take longer, he contends the combined effect of small successes outperforms efforts to make big changes.

In conflict management, agreeing on the scope of the issue helps achieve all of the above strategies. Ideally, this agreement is at a level that addresses the parties' various interests. By focusing on their interests, the parties implicitly are focusing on the problem definition (Fisher and Ury 1981). Finally, establishing the level(s) from which to address an issue, allows parties to define a limited body of applicable information thus reducing the likelihood of information overload. Straus (1981)

discusses the challenge of coordinating various "tiers" of discussion in a conflict resolution effort.

Generating imagery. Finally, how well these strategies are executed—how well the problem is defined, how appropriate the level chosen, and how adequate the information selected—depends on how thoroughly one knows the "terrain" of the problem. The ability to manage or effectively organize information comes in part with increased familiarity with an issue. It takes experience, whether actual or conceptual, to establish patterns and a perspective from which to build various levels for looking at a problem.

There is another level at which imagery building is essential, one that applies to how we think about environmental issues in general. Best intentioned efforts to motivate people by conveying to them the urgency and pressing nature of environmental issues often leaves them feeling even more helpless. To be presented with a pattern of events without specifics that help one see different levels of that problem and possible approaches, can prove more frustrating than empowering.

The challenge of generating and sharing imagery is multifaceted. Little research has focused systematically on questions such as: What kinds of imagery help, how might they be provided, in what format, at what scale? The implicit draw of a "good" story nominates it as a potential tool for imagery building. It has a pattern, with a beginning, middle, and end. One can identify critical decision points and envision alternative scenarios.

While there are many environmental case studies and reports, they most often dwell on failures. People also need imagery for what it means to succeed. The use of "success stories" describing effective efforts to address environmental issues promises to be a powerful counterpoint to the somber tune of many environmental situations (Hobson 1989). These vignettes reflect the "small wins" mentality (Weick 1984) or the notion of adaptive muddling forwarded by DeYoung and Kaplan (1988). They tend to be small scale, sometimes counterintuitive, and often the result of someone's ability to see the problem a little differently. They help build a context—a model—for addressing environmental issues that sees them as challenges, calling for conviction and resourceful thinking, and offering useful roles for individuals.

The conflict management field itself is often presented as a "success story." It can claim a number of cases where conflictual parties were able to come up with creative solutions to a problem. However, in terms of explicitly providing imagery, the field could be more effective. While the literature abounds with case studies

that serve as a starting point for a growing body of analytic theory (Talbot 1983, Crowfoot and Wondolleck 1990), few have been collected or described in ways that would inspire or guide those engaged in the process. More examples are needed that help people analyze what worked (and did not work), offer encouragement for what it takes to make the process effective, and provide imagery of alternative solutions.

Developing metacognition. Each of the strategies described here, be it in organizing information, shifting problem levels, or relating imagery in a story to one's own experience, incorporate the notion of flexibility. Flexibility in these terms does not refer to indecisiveness; rather it means consciously having ways of understanding that reduce the ambiguity and, thus, pain of confusion. Being able to simplify a problem into a manageable number of parts, for example, implies a sense of coherence that gives one the perspective needed to put it all back together. As a strategy, one might first choose to address one level of the problem to avoid trying to deal with everything at once. At some point, however, one would consciously step back and think of the problem as a whole system.

Consciously employing these strategies requires that one monitor, watch, and guide one's own problem-solving process. Brown and De Loache (1978) call this skill "metacognition," or having strategies that allow one to extract relevant information and organize it meaningfully. Not surprisingly, experience and exposure seem to be the best teachers, as suggested in Brown and De Loache's (1978) comparison between learning in children and the novice: "Young childrens' insensitivity to their problem-solving potential is the result of lack of exposure to such situations rather than age per se, for the same problems that beset the very small problem-solver can often impede effective thinking in the adult novice" (p. 31).

In the context presented here, metacognition would involve not only using these strategies, but also understanding how humans respond, especially in the face of complexity and uncertainty. De Young and Kaplan (1988) discuss the implications of taking a view of humans not as "rational," but as clarity-seeking, with cognitive constraints and some highly motivating informational needs. Such an understanding yields more realistic expectations about addressing environmental problems.

Conclusion

Underlying this article is the concern that the pervasive conceptions many people hold of environmental issues offer little in terms of action. On one hand, there is denial that the problems are real and pressing, on the other, a fatalistic pessimism that the problems are so big nothing can be done. While people need to understand the severity and pervasive nature of environmental issues, it is also essential that their understanding fosters involvement and a sense of efficacy rather than helplessness.

Being able to problem-frame, to manipulate how one looks at a problem and at one's role in dealing with that problem plays a central role in one's sense of competency. Since problem definition is critical to the subsequent organization of one's understanding of and approach to that problem, a shift in the way one perceives problems and his or her role in them can have dramatic impacts. Thus, problem-framing offers a means of approaching problems that might otherwise have been avoided, forsaken, or just solved poorly.

Facilitating this empowerment means being sensitive to how people use information and problem-solve. It is essential to recognize both their cognitive strengths and limitations in terms of information. People are prodigious map-builders. In order to improve or build new, acceptable understanding, people need access to information in a way that relates to the models they have of the world.

[For the models we have mirror] the strengths and weakness of our current conceptions and of our imagination . . . and reasonable behavior at any level of influence and responsibility [will] depend upon an adequate grasp, upon a comfortable comprehension of the constraints and possibilities that define the available choices. Information and its sharing are thus central to defining the space within which we can solve problems and make decisions [Kaplan and Kaplan 1982, p. 163].

In addition to substantive knowledge and skills, the kind of imagery people have of the problem and of what they see as possible and appropriate influence their response.

Furthermore, the information environment must support people's problem-solving efforts so that, rather than coping, they feel proactive and capable of meaningful participation. Both the empowerment and participation literature stress the impact of context, be it social or informational, on an individual sense of accomplishment. Just as a larger social community can reinforce and enhance individual efforts, a supportive cognitive environment would provide structure for one's understanding and for shaping expectations. At the same time, it ideally would allow the freedom to explore, to try again.

What would an environment that can provide structure and encourage experimentation look like? A conceptual version of Carroll's (1982) "exploratory environment" promises such a setting. In an explor-

atory environment, one has a sense of choice. Carroll describes a learning environment structured enough to support the generation of options and ideas and flexible enough to encourage experimentation and tolerate failure. In other words, this environment nurtures map-building.

Application of such a mindset to environmental issues could help address many of their more insidious challenges to one's involvement and sense of efficacy. Within an exploratory environment, one has or knows how to get the requisite tools or knowledge and skills. In terms of flexibility, this might involve looking at different levels of the issue and at a variety of avenues to address it. Structurally tempering that understanding would be an outlook of "optimistic realism" that both acknowledges the realities and inheres the conviction that the effort is worthwhile.

The conflict management arena has the potential to create such a problem-solving environment. Many of its strategies incorporate a recognition of people's cognitive constraints and information needs with what we know about effective problem-solving. As a collaborative problem-solving setting, it can offer the social support—the community—needed to support exploring alternatives.

Finally, these strategies have implications for how environmental issues are resolved in the public forum, and how they are taught in schools and conveyed in the media. They emphasize considerations that may make people not only more responsive to calls for environmental action but more effective as problem-solvers. Both aspects are essential. We urgently need a public that not only has the energy and optimism to approach these problems as challenges, but also has the skills and understanding to approach them creatively and with competence.

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