

# Linking Theory to Practice: A Theory of Change Model of the Natural Resources Leadership Institute

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*The Natural Resources Leadership Institute (NRLI), a leadership development program for capacity building in environmental decision making, cultivates a cadre of leaders who address environmental problems collaboratively and creatively. Describing our theory of change model, this article introduces why and how the NRLI works, the theoretical perspectives that support the NRLI, and the outcomes that result when these theories are put into practice in North Carolina and Virginia.*

Environmental conflict is inherent in our society, partly because we have learned to deal with environmental issues in a controversial manner, and partly because we lack the know-how to approach environmental conflicts effectively. A continuous challenge, then, is to prepare and nurture leaders at all levels and sectors who can bring about positive change for a sustainable future—ecologically, socially, and economically. The Natural Resources Leadership Institute (NRLI), founded in 1994 by North Carolina State University Cooperative Extension (Levi, 1999) and adopted in other states or regions (including Alaska, Florida, Indiana, Kentucky, Maryland, Montana, the Pacific Northwest, and Virginia), is meeting this challenge.

Tailored by each state, the NRLIs share core design principles of multisector participation, a series of multiday sessions extended over time, a curriculum emphasizing both process and substantive content, and efforts to transfer learning to participants' communities and organizations. With

a theory of change approach, we illustrate why and how change occurs, the results of change, and the theoretical bases that inform the NRLI practice in North Carolina and Virginia.

### The NRLI Theory of Change

Our *theory of change* (Patton, 1997) describes the inputs and outputs used to effect change in how people manage environmental conflict. We use a logic model to describe our theory of change, a graphical depiction of the underlying assumptions in which the undertaking of one activity leads to another activity or event (Millar, Simeoneb, and Carnevalec, 2001; United Way of America, 1996). It provides a way of describing and evaluating how a program responds to a situation while illustrating the relationships among the activities undertaken and the changes that result.

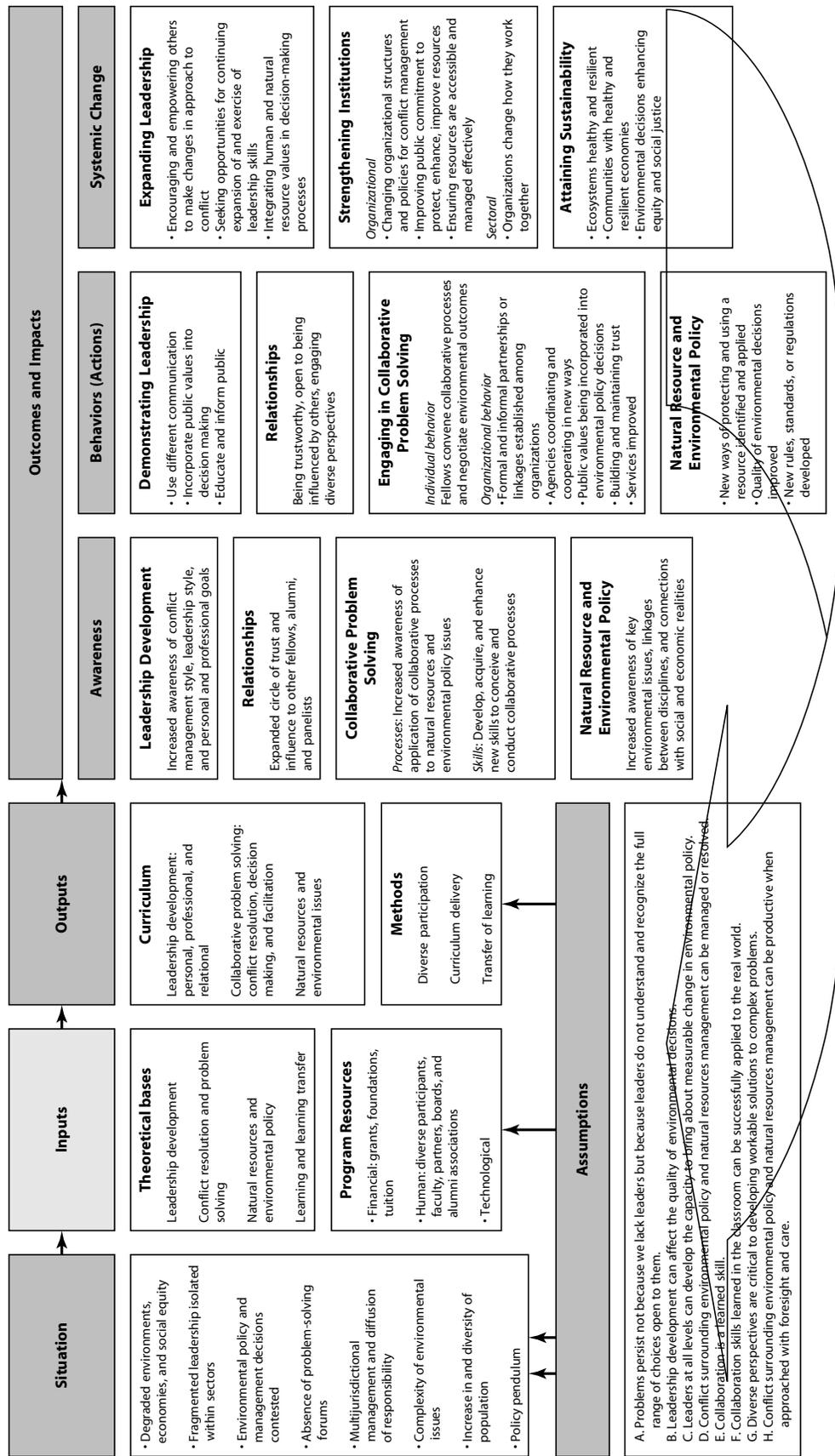
Our NRLI theory of change comprises five major elements: assumptions, situation, inputs, outputs, and outcomes and impacts (see Figure 1). Briefly, we theorize that the *assumptions* are the impetus for action on the *situation*, the identified problems the NRLI is intended to address. *Inputs* are the theoretical bases and program resources that support the NRLI. The theoretical bases, or what we understand about leadership development, conflict, environmental policy, learning, and learning transfer, inform our curriculum choices and program delivery methods. *Outputs* include *what* is to be learned by NRLI Fellows (graduates), as well as *how* it is learned. It is through application of inputs and outputs within the given context or situation that outcomes and impacts arise. We identify *outcomes* in three causal phases: *awareness*, which leads to *behaviors or actions* that result in *systemic change*. These phases are analogous to the immediate, intermediate, and ultimate goals of the NRLI.

### Situation and Assumptions

One premise of the NRLI is that complex disputes arising in the environmental arena often produce unsatisfactory outcomes for some or all concerned: impaired ecosystems and scenic vistas, loss of jobs or species, costly lawsuits, disproportionate exposure to environmental damage by race or social class, inefficient waste disposal and recycling systems, and intergenerational harm to human health and biodiversity.

Our inability to deal effectively with environmental problems has many causes. Prominent among them are inadequate understanding of

Figure 1. Theory of Change Model: The Natural Resources Leadership Institute



complex issues, limited financial resources and enthusiasm for mobilizing and maintaining involvement, a diverse population and social values, fragmented communication among agencies and the public, ineffective leadership, overlapping or incomplete jurisdiction, mistrust of collaborative processes and their advocates, and piecemeal legislative policy subject to competing political priorities. One core NRLI assumption is that these problems persist because we lack leaders who understand and recognize the full range of choices open to them. With broader awareness about themselves and others and the various approaches for resolving environmental conflict, more productive outcomes can result.

## Inputs

Inputs, the basic components from which the NRLI is designed, organized, delivered, and evaluated, include the theoretical constructs that inform curriculum, curriculum delivery, learning transfer, and the resources that support program implementation.

### *Theoretical Bases*

The conceptual underpinnings of the NRLI stem from four major theoretical bases: leadership development, conflict resolution and problem-solving, natural resources and environmental policy, learning and learning transfer.

***Leadership Development.*** A wealth of literature exists regarding leadership, how it is defined and conceptualized, and how leaders can develop. Fundamentally, leadership is a process that facilitates change and movement toward a goal in a group context (Northouse, 2004; Gardner, 1990). As a process, leadership is not about authority or position. Rather, it is the relationship that occurs between the leader and followers as the will of the group is expressed, as characteristics or capabilities are developed to enable others and their actions and behaviors to bring about change. The outcomes of leadership depend on the group and the context. Gardner (1990) stated that most leadership skills are learned, reflecting a basic tenet of leadership development scholars: that one can learn effective leadership through acquisition of skills, personal reflection, assessment, and challenges, with mentoring and continuing development in association with others.

The NRLI is primarily based on transformational leadership theory, which suggests leaders can influence others to achieve change in any

organization, at any level (Bass, 1990; Burns, 1995). Drawn in part from early work of Burns (1995) and Bass (1990), the initial curriculum developed around transformative skills such as building trust, self-discovery, shared decision making, conflict management, and empowerment (Levi, 1999). Program design draws from major leadership theorists, notably Bennis (2003); Brookfield (1986); Chrislip and Larson (1994); Covey (1990); Gardner (1990); Greenleaf (1977); Heifetz (1998); King (1988); Kouzes and Posner (2002); Wren (1995); and Yukl (1998).

***Conflict Resolution and Problem Solving.*** Environmental conflict and conflict resolution theory may be divided by scale as micro-, meso-, and macro-level. The *micro* level refers to the dynamics of interpersonal and intragroup behavior, or how individuals behave and engage one another in conflict. The *meso* level refers to the dynamics of large group and community conflict and how groups and institutions behave. The *macro* level refers to larger societal processes, such as schisms along racial, gender, class, and ethnic lines, that affect a particular dispute. All three dimensions are applied in the NRLI.

At the micro level, we draw on the theory of personal conflict styles (Blake and Mouton, 1970), which suggests that people favor a particular approach to conflict regardless of its suitability in a given situation. Conflict theory at the micro level also draws heavily on communication and social psychology (see Folger and Jones, 1994), explaining how communication breaks down and can be reestablished, how attitudes and perceptions form, and how trust develops or is broken.

We also find valuable lessons from group dynamic theorists such as Argyris and Schön (1974) and Lewin (see Smith, 2001), who describe how and why behaviors emerge in small groups and how to work with emergent group behaviors and dynamics. Fisher and Ury's work on principled negotiation (1981), especially the powerful distinction between positions and interests, constitutes a practical model for NRLI Fellows.

At the meso level, we find explanation for how public disputes emerge through "triggers," how escalation dynamics can be self-reinforcing, and how interest groups coalesce. At this level are prescriptions for resolving public disputes through multistakeholder, consensus-based processes (for example, Potapchuk, 1991; Cormick and others, 1996; Carpenter and Kennedy, 1988; Susskind and Cruikshank, 1987). We see how consensus-based processes are applied to group decision making in public policy (following Clark, 2002). Theories of rational choice, value, and uncertainty (Savage, 1954), as well as game theory (von Neumann

and Morgenstern, 1953), set a normative context for how people should make decisions in an interactive yet structured setting. By relaxing the idealized assumptions inherent in game theory, we find application of negotiation theory in joint decision settings to be especially fruitful (after Raiffa, 2002). Here the focus is on promoting an understanding of problems, confidence and justification for decisions, and satisfaction of outcomes. Decision processes occurring in a joint or collaborative context are less technocratic, more deliberative, and consistent with a systems-thinking approach (Daniels and Walker, 2001).

Also at this meso level we find explanations for why people become disengaged from public activity. People care deeply about public life but become engaged only in areas where they believe they will be heard and make a difference (Kettering Foundation, 1991). When businesses, public agencies, or communities offer a chance for such engagement, people generally respond (Langton, 1978).

At the macro level are theories of conflict that address structural issues found across entire classes of environmental disputes. Even though all public disputes reflect conditions unique to their particular situation, most also reflect deeper societal divisions of race, gender, class, sexual orientation, and so on. Theories of governance (Barber, 1984) explain how conflict is played out in a pluralist democracy.

Also at the macro level are theories of complex systems. Complexity science permits insight into evaluating consensus-building processes by recognizing complex systems as open to external influence as well as influencing external situations (Innes, 1999). Systems are adaptive and complex as well as growing and evolving (Capra, 1996; Gunderson and Holling, 2002).

***Natural Resources and Environmental Issues.*** The ultimate goal of the NRLI is *sustainability*. By that we mean healthy and resilient environmental, economic, and social systems. A prerequisite to attaining sustainability is collectively defining it (Atkinson and others, 1997; Costanza, 1991; Gilpin, 1996; Howarth, 1997). A challenge for building environmental consensus at the meso level is often posed by the myriad perspectives on sustainable development brought consciously or subconsciously to the process by stakeholders. Activist citizens tend to harbor cherished notions of what a sustainable ecosystem, community, and world look like and how they should function.

To reach consensus on sustainable outcomes, stakeholders must understand others' perspectives, values, experiences, and insights into what

constitutes sustainable development. Hence it is helpful to examine the history and leading theories of the sustainability concept (MSNBC, 2002; WCED, 1987). Two prominent schools of thought about the path to sustainability are “hard green” and “soft green.” Hard green approaches rely on human imagination and technological advancement to increase energy production, extend resource longevity, and enhance public safety (Huber, 1999). Soft green approaches rely on lifestyle changes, urban planning, and neighborhood design to reduce consumption, reward energy conservation, and foster a sense of community and shared destiny (Hawken, Lovins, and Lovins, 1999). These seemingly exclusive paths to sustainability are an exercise in resolving conflict by seeking to understand complementary sides of the situation, that is, increasing supply and decreasing demand. Common denominators between the two strategies are the ecological, economic, and social equity dimensions that necessitate integration and harmonious management for the outcomes to be sustainable (Young, 1992).

Enmeshed in concepts of sustainability are aspects of environmental justice. As characterized by Bullard (1993), Bass (1998), and others, environmental justice requires fair treatment and meaningful involvement of people—regardless of race, color, national origin, or income—in developing, implementing, and enforcing environmental laws.

Basic policy science concepts are applied in the NRLI for framing thought and action and for guiding analysis of environmental and natural resources issues (Laswell, 1968). As Brunner and Brewer (1971) suggest, policy analysis is useful for organizing and evaluating information from rational, political, and moral perspectives, and composing an educated opinion on the policy in question.

***Learning and Learning Transfer.*** An assumption of the learning environment is that learning new skills and knowledge will result in the participants changing the very situation the NRLI is designed to address. Instruments of this change are the facilitators or instructors of the learning environment (Brookfield, 1986). Requiring contextual knowledge about the situation and the people involved, facilitators also require understanding about their own motivations, capabilities, and ethical responsibilities to assist the learning of others. To bring life to the content and the learning environment, facilitators are familiar with instructional methods that promote experienced center learning and active participation and that accommodate individual learning styles, motivations, needs, interests, and goals. The concept of bringing life to the learning environment derives from the theory of andragogy (Knowles,

1990), facilitating the art and science of how adults learn. Learning is enhanced when adults (1) are valued for the wealth of life experiences and expertise they bring to the learning environment and acknowledged for how their experiences enrich and inform the curriculum and learning; (2) have autonomy and self-direction with respect to individual interests; (3) perceive the learning is goal-oriented, with established expectancies; (4) perceive the learning is relevant and has direct personal benefits to them, both personally and professionally; (5) are ready to receive and apply lessons to deal with real-life situations; and (6) are supported, inspired, and motivated by internal goals and pressures to enhance professional and personal development.

Planning for learning transfer is a complex and multifaceted component of leadership development (Broad and Newstrom, 1992; Caffarella, 1994). It facilitates the learner's ability to apply what has been learned. Caffarella (1994) suggests three important elements of planning for successful learning transfer: knowing when to initiate effective learning transfer strategies (before, during, and after the learning experience for reinforcement and retention), knowing which strategies to apply (such as self-designed action plans or mentoring), and identifying who should support learning transfer (learners willing to make personal changes, peers and supervisors willing to support the change).

### *Program Resources*

A variety of financial, human, and technological resources create a solid base of support for the NRLI. For example, financial donations are used to fund participant scholarships. This enables broader class diversity, to create active and meaningful engagement in and outside sessions; it also supports implementation of applied learning projects. An advisory board, composed of leaders from a number of professional affiliations, champions NRLI to future participants. Moreover, an alumni association serves as a catalyst for renewal, fellowship, and continued professional development. Fellows also champion future participants, provide continued program feedback, and identify critical natural resource issues and approaches for program and leadership development.

## Outputs

With a rich theoretical framework and program resources serving as inputs, primary outputs of the NRLI theory of change model are the curriculum and methods for delivering it.

## Curriculum

The NRLI curriculum consists of three components integrated into every session: leadership development, collaborative problem solving, and natural resources and environmental issues. Building a natural learning progression, the curriculum moves from developing self-awareness and opportunities for leadership to understanding the role of conflict in social change, to learning how to productively manage conflict, to recognizing the complexity of the interconnections among ecological, economics, and social systems.

**Leadership Development.** The first curriculum component, leadership development, is intended to foster leadership in all dimensions, from sharpening personal and professional goals to improving the capacity for meaningful personal and professional relationships. By furnishing both a theoretical context and practical applications through exercises and applied projects, the curriculum allows fellows to expand their circle of influence and develop the attitudes and habits important for leadership.

**Collaborative Problem Solving.** The second curriculum component aims to increase the fellows' capacity for managing conflict productively. For personal development, the curriculum sharpens communication skills for conflict management and builds understanding about conflict management styles. For professional development, a range of collaborative problem-solving processes and skills are learned, among them facilitation, appreciative inquiry, balancing advocacy with inquiry (Senge and others, 1994), consensus building, the parallel thinking of *Six Thinking Hats* (de Bono, 1999), and interest-based negotiation skills.

**Natural Resource and Environmental Issues.** The third curriculum component is designed to broaden fellows' knowledge of, and insight into, natural resources and environmental issues within a political, social, and economic policy framework. At each workshop session, local geographical natural resource and environmental issues are explored for depth (to understand the complexities of the issue) and for breadth (to develop awareness of the multiple perspectives and how the issues are variously perceived). As a result, the fellows continue to inform and expand their own expertise regarding ecological, economic, and sociological concepts.

## Methods

The NRLI uses three methods for achieving curriculum goals: diverse participation, experience-centered and interactive curriculum delivery, and

transfer of learning. This combination of methods draws maximum value from the diversity of the learner's experience and expertise as well as the experience and expertise of the faculty and other professionals who help instruct the sessions. It also ensures transfer of learning, the ability to use the learned information in real-world situations, which is fundamental to the capacity-building aspect of NRLI.

***Diverse Participation.*** Recruitment of diverse perspectives in gender, age, race, and professional and life experiences is essential to NRLI. The diversity in affiliation is crucial to NRLI, as in perspectives from business and industry; state and federal natural resource agencies; local government; academia; and environmental, civic, and grassroots organizations. This diversity of perspectives and experiences advances the fellows' capacity for interacting with and being challenge by different-minded people in a safe learning environment. Able to understand how people with differing perspectives can arrive at mutual beneficial decisions, the fellows are confident and motivated to apply their understanding and collaborative problem-solving skills. They are also more likely to rely on and expand the professional networks they create in NRLI, furthering interagency collaborations and other collaborative initiatives while continuing to learn from each other.

***Curriculum Delivery.*** Methods for curriculum delivery complement the curriculum content. The NRLI uses standard conflict and dialogue training tools. However, the unique characteristic of our approach is how these training tools are sequenced and reinforced over time and combined with the program elements of participant diversity and learning transfer.

Salient aspects of curriculum sequencing are the series of workshops held in various geographic locations for the fellows to learn from one another within the context of the surroundings, and real-world examples such as the issue of beach renourishment or the complexity in negotiating hydropower relicensing. Current events and situations are also integrated into exercises and role plays. This enables the fellows to seize the relevance of the lesson and its application to other situations and circumstances. In addition, sequencing of sessions gives fellows an opportunity to test new concepts on issues they face at home or in their workplace in between sessions, and then reflect on them at the next session.

Multiple instructional methods are included at each session to convey the knowledge and skills, and to maximize the value of fellows' past

experiences and expertise. From recognition of the importance of using the learner's experiences to coach and motivate learning, determination of the various instructional methods is based on the session's objectives as well as the learner's needs. Examples of instructional methods applied in the three NRLI curriculum components are in Table 1.

***Transfer of Learning.*** A third output of the NRLI is the transfer of the learning experienced in the classroom to the participants' own environment. The NRLI attracts highly motivated and practiced individuals, interested in self-improvement and in affecting change within their organizations and communities. Table 2 gives examples of applications for transfer of learning.

There are three barriers the NRLI fellows may encounter in trying to consistently apply innovative knowledge and skills. Initially, lack of support from one's organization or workplace may exist if the concepts and practice of collaborative decision making are misunderstood or underappreciated by others in the workplace. Furthermore, fellows eager to foster a positive change in the work environment may encounter supervisors who permit little latitude to effect change in the workplace.

A second, and potentially more common, barrier can be lack of resources to support application of new knowledge and skills on problems at the workplace. If issues are complex, it may be costly to convert skills learned in the classroom to an actual situation. For example, a fellow may need to devote many hours toward a project or travel extensively to engage in a collaborative problem-solving process.

The third potential barrier is lack of motivation on the part of the participant to avail himself or herself of the opportunities provided. Fellows interested only in acquiring new process skills are often more passive in applying these skills than are those seeking to expand and develop their leadership abilities.

## Outcomes and Impacts

With more than a decade of experience, NRLI has shown resolution of environmental conflict through leadership development to be effective. Documented outcomes of the North Carolina and Virginia NRLI programs strongly indicate that positive change has occurred among NRLI fellows, their organizations, their communities, and in some cases improvement in the environment. Our logic model illustrates three categories of outcomes

Table 1. NRLI Instructional Methods

<i>Curriculum Component</i>	<i>Instruction Methods for:</i>	
	<i>Building Awareness</i>	<i>Changing Behaviors</i>
Leadership development	Personality type assessments (Myers Briggs, Enneagram) provide perspectives on individual differences.	Experiential exercises to develop trust and working relationships are achieved through perceived risk activities such as a ropes course or 360 degree leadership discussion.
	360 degree leadership assessment helps fellows understand themselves as well as how others perceive them and reinforces learning through developing action plans for personal change.	Development of a mission statement, an individual's lifetime goal, based on Covey's principle-centered leadership theory (Covey, 1990).
Collaborative problem solving	Assessment conflict style inventory instruments (Thomas-Kilmann or Kraybill) reveal one's approaches to conflict.	Discussions and exercises to improve communication skills such as active listening exercises, persuasion theory and technique, critical thinking skills, risk perception, and use of "expert" information in decision making.
	Nature of conflict discussion sets context to recognize sources of conflict and the role of conflict in creating opportunities for change.	Practice in multiparty facilitation.
	Process of consensus building, including aspects of convening.	Experimentation with or adoption of collaborative approaches in the workplace, home, and so on.
	Process of dialogue, building on active listening skills and effective aspects of inquiry.	Role plays and practice in interest-based negotiation.

Table 1. (Continued)

<i>Curriculum Component</i>	<i>Instruction Methods for:</i>	
	<i>Building Awareness</i>	<i>Changing Behaviors</i>
	Integration of scientific and technical data with stakeholder interests, values, and experience, for thoughtful and productive group decisions.	Practice applying group decision-making and decision-aiding tools and processes in facilitation, negotiation, and consensus building.
Natural resources and environmental issues	Panel presentations and field trips build awareness about critical issues and reinforce learning by making connections among social, economic, and environmental realities and disciplines.	Panel presentations and site visits create new networks and build professional relationships.

Table 2. NRLI Transfer of Learning Methods

Applied learning projects	Mentored practicum projects in North Carolina are an immediate and direct way to transfer learning to a collaborative initiative. Individually or in teams, a yearlong project is undertaken to involve them in a leadership role. Documentation of one’s “pathway to change” is a record of learning and the resulting or anticipated impacts to communities, organizations, or the environment. The Virginia program involves fellows in group or individual projects that are facilitated through faculty and fellow mentoring and journaling.
Processing and reflection time	Debrief activities to articulate and synthesize meaning and illustrate the benefits of applying the lessons to circumstances the fellows face. Reflection time—time to understand what one thinks and why—is structured into the curriculum with individualized learning journals or leadership development plans.
Evaluations and assessments	Evaluations conducted before, during, and following the curriculum sessions offer information to continuously adjust and improve the program (Russ-Eft and Preskill, 2001). Furthermore, these improvements are conveyed to the fellows and other partners to identify how the program is responding to the situation as identified and the needs of the fellows. Both internal and external program reviews are conducted to ensure program goals and objectives are being met and are essential. Participant self-evaluations enhance the fellows’ role in monitoring changes within themselves and their interaction with others.
Peer support	Peer support is furnished by a formal and informal network of NRLI Fellows.

and impacts: awareness, behaviors (actions), and systemic change. Our theory of change links development of awareness with new behaviors leading to on-the-ground outcomes. We describe the ultimate outcomes of systemic change in three categories: expanding leadership, strengthening institutions, and attaining sustainability.

We describe the first two outcome phases (changes in awareness and changes in behavior) and follow with indications that the NRLI has resulted in systemic change.

### *Awareness and Behaviors*

Changes in awareness and behaviors resulting from participation in the NRLI were identified by postprogram evaluations of NRLI Fellows. We documented four dimensions of change: leadership development, new relationships, conflict resolution and problem solving, and knowledge of natural resource and environmental issues.

***Leadership Development.*** NRLI fellows grow in their ability to lead through a renewed sense of self-awareness, as well as their application of new skills and knowledge to problems. Evaluations consistently reveal increased self-awareness in a majority of the participants. Fellows report having gained considerable knowledge of substantive issues and deliberative processes, increased understanding of natural resource conflicts and their own approach to conflict, and gains in personal insights and growth. They report enhanced skills in communication, group process and facilitation, conflict management, and principled negotiation.

NRLI Fellows report that leadership skills gained through the program have enhanced their ability to perform their jobs and community activities. Many identify increased confidence in dealing with tough issues, improved ability to prioritize, and overall improvement in leadership. The most common response reported is an increased ability to work, communicate, and resolve problems with others who hold differing ideals and perspectives. Stated one graduate: "I have increased my ability to communicate openly and directly about interests without making as many assumptions and inferences." Another reported: "I am no longer as defensive as I once was about issues. Now I truly try to understand what someone else's concerns are and look for consensus." Many graduates report that learning to listen and communicate with others is the most important benefit gained from their participation in the program.

***Relationships.*** The NRLI experience gives each participant opportunities to form new relationships and networks. Unique bonds may develop because of

such an intense learning experience. Although the program does not attempt to make individual participants like one another, evaluations demonstrate that these relationships have great meaning to many fellows. One of the most cited benefits reported by NRLI Fellows is establishment of new professional networks. A typical comment is “an unforgettable 18-month experience with other motivated professionals . . . we made very positive impacts during our time together.” The fellows distinctly report that they are able to call on other NRLI Fellows for assistance, and numerous examples show that they do.

In terms of actual behaviors, fellows confirm the importance of being trustworthy. They report being more open to the influence of others, better able to listen, and more likely to engage diverse perspectives rather than close ranks when confronted with problems. For example, in Virginia a political candidate reported his NRLI experience helped him improve relationships with political opponents. In another example, a citizen activist reported she changed how she launched and designed a community dialogue about community growth and development, to apply inclusive, peaceful, and creative means.

***Collaborative Problem Solving.*** The experiential approach to building capacity in collaborative problem solving gives NRLI fellows a powerful springboard for applying these skills in their immediate work environment to affect organizational behavior. One fellow said that facilitation of an interagency meeting on water quality would not have occurred without his participation in NRLI. Another reported resolving an active problem between a group of state employees and a contractor providing service to the public. Others report designing full-scale change efforts in their organizations. Over time and as these skills are improved and shared with colleagues, it is envisioned that program impacts will extend deeper into the organization and into other organizations, much like outward ripples from a pebble thrown into a pond.

***Natural Resources and Environmental Policy.*** Reliance on current, critical environmental issues as a context for process skill development results in the participants’ increased awareness of current environmental issues; linkages between disciplines; and connections between ecological, social, and economic realities. Fellows begin the program with expertise or fundamental knowledge about environmental and natural resource issues, honed by years of academic and professional experience. Yet they complete NRLI reporting increased awareness of environmental issues from a broader perspective.

They also acquire increased appreciation for knowledge about the resource gained from cultural and social experiences that complements

science-based knowledge. This results in new and adaptive approaches to natural resources and environmental policy issues and the potential for improvement in decision-making quality. For example, a fellow changed how the Division of Water Quality undertakes its revision of water quality rules and now uses a negotiated rule-making procedure; a county employee reported that he conducted an outreach program with residents living near a landfill and meets regularly with community members to develop consensus on how to resolve environmental problems if and when they occur.

Through integration of technical information, policy, planning, economics, and social justice in the NRLI curriculum, fellows begin to mentally connect these dimensions of the policy framework. Interaction with other program participants is no doubt the strongest, most enduring impact with respect to heightened awareness of the issues. Fellows report increased understanding of others' interests and more refined understanding of natural resource issues. For example, a field trip to the North Carolina Outer Banks to view recent hurricane damage and meet with people who lost property added a new dimension to the issue of government-funded programs to replace lost beach sand. The field trip inspired several participants to conduct additional research on the issue and circulate new information to fellow class members.

### *Systemic Change*

Most systemic change in behavior, organizations, social structures, and ecosystems is evolutionary, is incremental, and takes time. Tracking these changes to connect systemic social and environmental outcomes to the design and implementation of leadership development is challenging. Although we have only begun to monitor the NRLI for long-term impacts, there is significant indication that systemic change is occurring along three dimensions: expanding leadership; strengthened institutions; and ultimately sustainability of social, cultural, economic, and ecological systems. Our hope is that this first attempt to define indicators for systemic change will inspire studies and thereby generate further feedback for the NRLI.

***Expanding Leadership.*** By expanding their leadership and influence, we can expect NRLI Fellows to effect change in three ways. First, they can empower colleagues within and outside their organizations to develop conflict management skills and understanding of public participation processes. Graduates consistently nominate colleagues to enroll in the NRLI and have sought additional training in mediation, facilitation, and negotiation for

themselves and coworkers. Second, they can seek opportunities to expand their leadership abilities within and outside the organization. Outside the organization they involve themselves in more complex public policy issues. Graduates report a higher confidence level and greater willingness to either initiate or participate in collaborative efforts. Inside the organization NRLI Fellows advance in their careers, filling key leadership positions and enhancing their ability to bring about change. Many fellows have attained important positions of influence following their participation in the program; they attribute their participation as a positive determinant in their career mobility. Third, they can better integrate human and natural resource values into decision-making processes. As their collaborative process skills improve, NRLI Fellows have found new ways to integrate human values into natural resource policy and management. This is particularly evident among resource managers who work in the rural-urban fringe, where disputes over resource management are prevalent.

***Strengthening Institutions.*** Evidence of institutional change brought on by the actions of NRLI Fellows can be traced to changes in specific organizations as well as to how organizations work together. NRLI Fellows have brought new knowledge and skills to their organizations, instigating change in policies and procedures for managing conflict and involving the public. For example, fellows in North Carolina instituted the practice of and procedures for negotiated rule making in water quality decisions. These practices and procedures were subsequently adopted by other divisions within their department, fundamentally changing how the agency involves citizens in decisions affecting environmental protection and management. In the long run, practices and procedures that effectively involve the public in decision making may increase their commitment to protecting and enhancing natural resources. As was documented earlier, the NRLI has been successful in creating new networks among organizations in the private, government, and nonprofit sectors. As NRLI fellows develop, enhance, and solidify their organizational networks, they strengthen their own institutions by enabling them to work more effectively with one another. Following the ripple effect outward, we may find evidence that increased interagency cooperation and information exchange leads to improved resource protection and management.

***Attaining Sustainability.*** The ultimate goal of the NRLI is sustainability, by which we mean healthy and resilient environmental, economic, and social systems. However, the scope of the goal remains to be determined. Neither Virginia nor North Carolina has yet adopted indicators of sustainability by

which progress might be measured. Furthermore, it will be difficult to demonstrate a causal connection between NRLI inputs and indicators of sustainability. However, there are signs that the NRLI is having a lasting effect. For example, a new partnership among local, state, and federal agencies spawned by three NRLI Fellows resulted in significant conservation agreements in an important ecological region in North Carolina.

## Conclusion

Impacts of the NRLI program will need to be monitored and evaluated in the long run to determine whether leadership development is supporting healthy and resilient ecological, economic, and social structures. It is also important to assess how those impacts are changing the initial situation the NRLI was developed to address, and how those impacts can contribute to and improve our theoretical understanding, once again linking theory to practice.

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