9-2007

Other Voices, Other Ways, Better Practices: Bridging Local and Professional Environmental Knowledge

Kim M. Wilkinson

Susan G. Clark

William R. Burch

Other Voices, Other Ways, Better Practices

Bridging Local and Professional Environmental Knowledge

Kim M. Wilkinson, Susan G. Clark, and William R. Burch

Other Voices, Other Ways, Better Practices

Bridging Local and Professional Environmental Knowledge

Kim M. Wilkinson, Susan G. Clark, and William R. Burch

"The idea that one's view of reality is the only reality is the most dangerous of all delusions."

A. Hunter (1983: 243)

"Indigenous people and their communities, and other local communities have a vital role in environmental management and development because of their knowledge and traditional practices."

From Principle 22, Rio Declaration on the Environment and Development (1992 United Nations "Earth Summit")

"The only way we can protect the environment is through a true, locally-based democracy."

Bobby Kennedy

"All of us is smarter than one of us."

African Proverb

Table of Contents

Acknowledgements

This publication originated in a graduate course at Yale University's School of Forestry & Environmental Studies taught by Professors Bill Burch and Susan Clark, organized by Teaching Fellows Victoria Critchley and Kim Wilkinson. Critchley and Wilkinson came to Burch and Clark with the idea and syllabus for the seminar. Invited presenters shared knowledge, experience, and insights with the class through presentations and in discussions. We are deeply grateful to Mac Chapin, Domingo Medina, Susan Morse, Gil Inoach Shawit, Roger Sidaway, Jake Swamp, and Judy Swamp for what they shared with us. The Appendix details this seminar.

Students of diverse backgrounds and multiple talents participated in the course and carried out original research that led to this report. We thankfully acknowledge the following students for their commitment, inspiration, and contributions to this work:

Victoria Critchley, Australia
Alice Bond, U.S.A.
Alicia Gray, U.S.A.
Amina Soud, Kenya
Azalea Mitch, U.S.A.
Bruce Ho, U.S.A.
Catherine Byun, U.S.A
Cesar Moran-Cahusac, Peru
Cynthia May, U.S.A.
Dan Stonington, U.S.A.
Elizabeth Deliso, U.S.A.
Fuphan Chou, U.S.A.
Godfred Ohene-Gyan, Ghana
Ines Angulo, Peru
Jason Pielemeier, U.S.A.

Jocelyn Hittle, U.S.A.
Melissa Andersen, U.S.A.
Michelle Murdock, U.S.A.
Nicole Rousmaniere, U.S.A.
Perrine Punwani, U.S.A.
Po-Yi Hung, Taiwan
Radha Kuppalli, U.S.A.
Rebecca Reider, U.S.A.
Rosi Kerr, U.S.A.
Rugameleza Nshala, Tanzania
Shawn Walker, Japan
Stephan Dorondel, Romania
Sue Ely, U.S.A.
Wei-Chien Lai, Taiwan
Zoe Ju-Han Wang, Taiwan

Introduction: Problem Statement

Making rapid advances towards sustainability is of importance to all people. How can we humans, wherever we live, best create a viable and healthy relationship with nature?[1] To find workable answers, we need to find ways to integrate "professional" knowledge, typically held by the university-trained Western "outsider," with the local insider's expert viewpoint and approach into an overall understanding of the challenges at hand. As well, we need to integrate what to do about the challenges in equitable, practical, rational, and justified ways.

Relying on the ability of scientific theories and scientific "progress" alone to address environmental problems leads to solutions that are at best only partial, and at worst erroneous and divorced from their local context. There are many well-documented cases of "scientific" management leading to disastrous consequences for nature and humans (e.g., Scott 1998, Botkin 1990). Reductionistic scientific theories about how to define and solve problems often neglect to include "the indispensable role of practical knowledge, informal processes, and improvisation in the face of unpredictability" that are vital to a functional and healthy society (Scott 1998: 6).

A profound and intimate understanding of nature, culture, and the local context is an essential prerequisite to perceiving and addressing problems successfully. However, deep and accurate local knowledge and time-honored practices alone do not always guarantee that a human society will live in a harmonious relationship with nature. Mismanagement, environmental degradation, and even cultural collapse have been well-documented in many societies that possessed extensive, detailed knowledge of ecology and place (e.g., Berkes 1999, Diamond 2004). Local knowledge alone is not necessarily enough, and Western scientific knowledge alone is not enough. A way forward is to integrate diverse worldviews and perspectives in searching for sustainability.

We can integrate multiple ways of knowing, top-down and bottom-up viewpoints, generalizable theories and context-sensitive practices, to create adaptive knowledge systems that can be tried in practice. Doing this requires going beyond the realms of knowledge and information alone. It requires an examination of social, decision-making, and learning processes at play, including the myth systems, values, and beliefs in place. How to achieve this integration and adaptability is a key to finding sustainability.

We use the term "professional" and "environmental professional" to mean those with university training in environmental paradigms, including that of Western

[1] In this essay we will use this common shorthand for "non-human" nature. We are aware there is nothing "unnatural" about humans, their societies and their artifacts. Humans are no less natural than pine trees, floods and copperheads. Yet, sometimes our understanding of the world may be enhanced when we arbitrarily separate human and non-human domains of nature. The trick is to remember they are both part of the same interrelated "natural" circle of life.

science. Usually "professional" knowledge is learned from a body of formal theory in *acontextual* ways, within disciplines at a university, and using a single epistemology.

We refer to "local experts" and "local knowledge" to reflect expertise acquired in and from the place where that person lives and works. This form of knowledge is highly *contextual*. We recognize that any attempt to categorize or divide these different approaches is problematic and somewhat artificial. For example, of course a local commercial fisherman is a "professional" as well as an "expert," but with a different epistemology and notion of professionalism. Also, though we discuss potential tensions between different worldviews, it should be recognized that there is no black-and-white division between different kinds of professionals or experts. For example, for many individuals, the tension between the "local expert" and "environmental professional" is internal, as a person may have both an intimate knowledge and deep connection to one place, and some training and requirement to translate what they know and feel into professional actions, generalizable results, or scientific terms.

We think this report will be useful for introspective and interpersonal purposes. It can help with the challenge of integration, sustainability, and adaptability across knowledge and skill divides. Integration and adaptability will not happen by themselves. They require motivated people, with awareness of their own standpoints and biases, a commitment to mutual respect, and the skills to find common ground. This publication should be useful not only for professionals who wish to work with local people, but also for local people who wish to work with environmental professional people.

The authors are committed to human dignity for all people through genuine democratic process. Regarding the interface between environmental professionalism and local expertise, we see many problematic aspects with the situation that exists all too often today. One common problem is recurring patterns in the way professionals participate in conservation efforts in the United States and many other countries (Clark 1993). These patterns are evident in professionals' interaction with local people and the local context, which is too often one of conflict, with professional knowledge attempting to override local knowledge in disrespectful ways. Too often the way professionals frame problems as proffered by science contradicts local people's experience of their lives and their environment (Jasanoff 1997).

Conflict can ensue when local knowledge of nature gained through non-scientific activities (e.g., hunting, gathering, fishing, farming, grazing) collides with assumptions and operations of Western scientific models. Without good-faith efforts to explore divergent perspectives between professionals and locals, mutual distrust can result, with differences translated into uncertainty about what to do. For example, professionals may over-rely on the narrow lens of positivism[2] and scientific management and under-appreciate the context of problems – all the factors that surround and lead up to specific problems in their work. Context may include the inherent social and decision processes involved in conservation, as well as myth systems and values involved in the process.

Problems arise when professionals, in an effort to make problems tractable, oversimplify complex issues and use only selected fragments of knowledge. These

[2] Positivism is a philosophy that is based solely on the positive data of sense experience; empiricism. A system of philosophy, originated by Auguste Compte, which is based solely on positive, observable, scientific facts and their relation to each other and to natural laws; it rejects speculation on or search for ultimate origins. (Webster Unabridged, New Twentieth Century Dictionary. Second Edition)

knowledge fragments may induce the professional to overlook or misconstrue important contextual aspects of the problem at hand. Integration of professional and local knowledge becomes impossible as a result. This is one pitfall that people can succumb to when they get too caught up in their own view, or when they don't question their own standpoint and role in the situation.

> "The difference that exists between science and indigenous knowledge about nature management and conservation lies in the fact that scientists look to precise formulas and predictions, that are often built upon philosophies of dominance and divorce from nature. Scientists working in biodiversity management and protection often believe that their knowledge is more advanced than that of indigenous groups. They direct biodiversity management, whilst their closest contact with nature are their house plants and walks in the forest.
>
> I am sure that over the past few years all of the students in this hall have learnt a great deal from university professors. However, it is important to remember that it is possible to continue learning from indigenous peoples who, although they may be illiterate and lack formal education, they posses a deep knowledge of nature. Why then, do scientists typically not recognized the wisdom of indigenous peoples? It is time for 'hard' scientists to accept the limitations and strengths of their discipline, and to broaden the scope of conservation to, not only include indigenous knowledge systems, but to facilitate the empowerment of indigenous peoples to actively participate in conservation efforts."
>
> *From Gil Inoach Shawit, Co-Founder, La Coordínadora Permanente de los Pueblos Indigenas del Perú, Yale seminar discussion leader, 2005*

A logical starting point, given a good faith desire to work effectively with other people who hold different worldviews, is to examine the conventional environmental professional's viewpoint and the role that professionals often assume when trying to address environmental problems.

Typically professionals are so deeply embedded in the knowledge system, personality, worldview, and problem-solving process in which they were raised and trained that they are blind to it. "Blind spots" are invisible. They go unseen, unquestioned, and unexamined. While all knowledge systems have blind spots, and mutuality of learning should be sought from all sides, our report focuses primarily on the professional, who may seem to have more legitimacy and power than the local expert in the current dynamics of problem solving. A lack of awareness of ingrained professional "blind spots" has had and is having profound negative impacts on the effectiveness of conservation and sustainability efforts. Repercussions of acting on blind spots are felt at local, national, and international scales as an inability to effectively address the challenge of integrating multiple views of the world while addressing the problem of creating a healthy human/nature relationship.

We will examine some of these professional blind spots and suggest ways they may be overcome. Whereas integrating different worldviews is a huge challenge of global proportions and importance, success will only be found case-by-case in each unique, local context. Thus our approach is to begin on the individual level and proceed to organizational and societal levels as we scale up our survey. Our report is a philosophic and practical examination of what happens when environmental professionalism meets local expertise, and what we as individuals can to do to find the best paths towards successful integration and adaptability. This will open new opportunities and accelerate advances toward sustainability practices – the vital challenge of our time.

Searching for Integration: Overcoming "Blind Spots"

Behind all conservation and sustainability efforts lies a fundamental problem – how do we humans create a healthy and appropriate relationship with nature? (Doremus 2000). Finding this relationship is basic and integral to the life of every human being (Doob 1995). Our very future depends on it regardless of where we live. The search for this relationship occupies the work, discussion, and learning of growing numbers of people over all continents and many local settings. The effort to create this relationship is not the work of just one person, one profession, one movement, or one society. The work of searching for a sustainable relationship with nature is a responsibility that belongs to everyone (Giller 2005).

Ultimately, a viable, healthy human-nature partnership must be realized on the local level in people's daily lives. For this reason, local people and their knowledge and skills are central to the process of securing sustainability in practice. This requires finding ways to integrate multiple views of our world as we identify and address the challenges that face us. This entails coming to mutual respect for one another's worldviews and efforts to find a meaningful, opportunity-rich, sustainable life. Integrating diverse views and knowledge into democratic, adaptive learning processes is a means to creating sustainability. One root cause of failures to meet this challenge successfully is personal and professional "blind spots" that exclude, ignore, or hinder the vital contributions of others.

Ultimately, a viable, healthy human-nature partnership must be realized on the local level in people's daily lives. For this reason, local people and their knowledge and skills are central to the process of securing sustainability in practice.

PROFESSIONAL KNOWLEDGE

The desire to create a healthy relationship with nature (and evidence of mounting failure to do so) gave rise historically to the conservation and environmental

movements, development of disciplines of natural resource management, including conservation biology, and to university programs to train professionals through new or modified departments and more recently "environmental studies" programs. Typically these efforts are rooted in the traditional Western worldview (i.e., paradigms, myths), that is dominated by positivistic science, its method, and a view of science's special role in society and policy (Berkes 1999, Brunner et al. 2005). While universities that train professionals in this tradition have come under constructive criticism (Schon 1983, Clark 1997, 2000), this worldview has been institutionalized in government bureaucracies and in many non-governmental groups under the banner of "scientific management." This worldview often assumes a dominant and nearly exclusive role in decision making for sustainability.

Often the "scientific management" approach has helped to improve societal awareness of ecological issues and resolve problems; still, success has been limited. Alone the Western positivistic mindset and scientific enterprise has not been enough to address successfully the problem of humanity's emergent dominance of non-human nature. Of necessity, positivistic science requires a "narrowing of vision" in order to "bring into sharp focus certain limited aspects of an otherwise far more complex and unwieldy reality" (Scott 1998: 11). While this narrowed vision allows for a simplicity of perception that makes problems seem more tractable, it also can exclude vital aspects of reality and the larger context.

Proponents of more positivistic science and more top-down, professional-driven solutions to environmental problems have come under intense criticism recently for alienating those who do not share or endorse their approach, including farmers, ranchers, and other rural people (e.g., Roosevelt 2005), indigenous people (e.g., Chapin 2004, Dowie 2005), hunters and fishers (e.g. Williams 2005), and urban and ethnic populations (e.g., Shellenberger and Nordhaus 2004). These local people often hold non-positivistic ways of knowing, perceiving the human-nature relationship in unique ways, and solving environmental problems as seems best to them. Given that all knowledge is incomplete and tentative, effective discourse among diverse knowledge systems and cultures maximizes chances for a more holistic understanding of problems and likely solutions. Integrating professional knowledge, as appropriate, with valuable local knowledge is an open-ended, adaptive knowledge system that can aid our search for sustainability.

Integrating professional knowledge, as appropriate, with valuable local knowledge is an open-ended, adaptive knowledge system that can aid our search for sustainability.

LOCAL KNOWLEDGE

Local knowledge, experience, and perspectives, whether held by a rural rancher, an inner-city justice worker or an indigenous forest resident, are rooted in a strong sense of place, often won from years of experience with one's place and what practices best

fit the ecology and culture of that place. This kind of practice-based local knowledge can maintain or restore a healthy human-nature relationship. Not only are local ways of seeing and understanding legitimate in and of themselves, they are absolutely vital to finding and securing sustainability. Local people make connections and gain insights that are typically beyond the purview of Western positivistic science, and they incorporate them into their cultures and practices. For example, they may make connections and integrate emotion, history, meaning, values and beliefs, local ecology, and community into insights that science alone cannot make (Little Bear 2000). Also, with regard to the accuracy and usability of information, context-sensitive knowledge gained from practical experience is necessary to provide a more complete picture than what can be gained from theory or reductionistic scientific research. However, while a profound and intimate knowledge of place is a necessary prerequisite to a healthy relationship with nature, it is not sufficient in itself.

"The mere possession of knowledge does not guarantee that a given human group will live in harmony with its environment. There are many well documented cases of environmental mismanagement by traditional societies" (Berkes 1999: 59). Failing to perceive, understand or learn from the signals coming from human interactions with nature has led to the decline of many societies both before and after the arrival of Western science on the scene (Diamond 2005). In other words, local knowledge and problem-solving processes can have "blind spots" too.

> "For the Haudenosaunee, both past and present, these shared memories link us to our ancestors. In one sense we can still see their foot prints on this earth. They laid out a path for us to follow. It is not an actual trail, but it is the shared memory of why we are walking the same path of life they did. We call this path the original instructions. Those instructions have become our shared memories about how humans are to conduct themselves on this land we call North America. These instructions provide a frame of reference for looking at our relationship to the sacred universe – our first extended family. The celestial beings are our relatives. They are alive with spirit, just as we are. We are connected to a great web of life. In that life there is no racism, no prejudice, and no discrimination. There is only the common human duty to do good in the world.
>
> The original instructions also discuss our relationship to the earth, our original mother, who continues to support us as we walk about. Our long term health and well being is dependent upon the health and well being of the earth. Our instructions also explain our relationship to the plants, animals, fish, birds and other creatures with who we share this great place of life. Our shared memories of the past explain very clearly the relationship of people to one another. This web of life includes all living creatures and all people of the world."
>
> *From Chief Jack Swamp, Wolf Clan Sub-chief of the Kahniakchaka (People of the Flint), Mohawk Nation, Founder, Tree of Peace Society*
> *Yale seminar discussion leader, 2005*

SEARCHING FOR INTEGRATION AND ADAPTABILITY

Knowledge – professional and local – is important, but even more important is the ability to learn and adapt by integrating what we know into good choices. This brings up questions about the processes we use to integrate, learn, and adapt. To improve both process and outcomes, there are calls worldwide for better integration of local people, their knowledge and skills into conservation and sustainability efforts. Calls for integration come from grassroots people and from national and international groups, organizations and professionals. They come from people in urban and rural areas, indigenous and community organizations, and governments and the United Nations. The motivation behind these calls reveals an interest in finding common ground among differing approaches, and ultimately in creating enduring, democratic solutions to the environmental challenges wherever they are.

In practice, however, when professionals trained in conservation or natural resource management in the positivistic tradition encounter local people and their knowledge and skills, which can be dramatically different from their own, interactions can be problematic, even highly conflictual. The disconnect between professional and local, indigenous or traditional views regarding nature and our place in it can be profound, in some cases seemingly unbridgeable. People with a sincere desire to understand and work with each other's modalities of thought, meaning, and practices are faced with a serious challenge in such situations as they search for sustainability in a cooperative way with one another.

The challenge may also reflect a reworking of colonial history to spin favorable myths for present practices. As Neuman (1998: 30-31) notes:

> "In North America, the national parks were intended to, among other things, preserve a sample of the 'national heritage'; that is, to preserve the memory of an idealized pioneer history as an encounter with 'wilderness' that was conquered by enterprising Europeans. With the aid of national parks, the history of the conquest of humans – the Native American societies that occupied the continent for thousands of years – was transformed into the conquest of nature. Parks help to conceal the violence of conquest and in so doing not only deny the Other their history, but also create a new history in which the Other literally has no place. Indeed, much recent research demonstrates that the entire landscape of the Americas at the time of European arrival was not a non-human, 'untouched' landscape but one totally altered by human action." (Mann 2005)

Previous scholarly analysis of the knowledge/worldview integration challenge and the search for adaptive solutions has focused mainly around three areas: (1) using local knowledge as an information source; (2) configuring power relationships between Western and other ways of knowing; or (3) seeking consensus-building processes. The first focuses on differences between local knowledge systems and those of Western science. Emphasis has often been on legitimizing and finding ways to use the knowledge (information) available in management and policy decision-making.

The second focuses on broader political and social conditions or contexts that influence who is included or not in decision-making. For example, this includes examining ways of knowing that represent a challenge to the established power elites when they are ignored, denied legitimacy or worse (Berkes 1999). The third focuses on consensus building, finding common ground through effective governance approaches that integrate or balance demands when there is conflict (Sidaway 2005, Adler and Birkhoff 2005, Brunner et al. 2005). Whereas each of these methods of analysis has utility, our concern is more basic and universal.

A WAY FORWARD

Our desire is to facilitate effective interactive processes between environmental professionals and locals. We believe that this can come about most appropriately through processes that promote self-awareness, new knowledge, and enhanced interpersonal and analytic skills. This report examines overlooked or conveniently dismissed assumptions about the professional standpoint and its role in problem recognition and solving, especially in diverse cultural settings. These assumptions are problematic when they are acted upon without regard for context. They cause "blind spots" in thinking, in perception, and in practice. These "blind spots" are about several things. First, they are about what we know, how we see the problem at hand. Second, they are about the myths, stories, and value systems that shape our thoughts and behavior around perception of the problem. Third, they are about the organizations, institutions, and cultures in which we are all embedded. The next three sections of our report focus on these subjects – epistemologies, myths, meanings, value systems and unquestioned processes and roles.

1. Epistemologies are about the mind's ways of knowing about itself and the world. The study of knowledge focuses on what is known, how it can be known, and how we know that we know. The dominant epistemology of Western science and problem solving is "positivism." Positivism asserts the primacy of objectivity, theory, reductionism, and quantification. It is promoted in conventional disciplinary training, including in most universities and nongovernmental organizations. The epistemology of positivism includes other biases, including dismissing other ways of knowing, such as local experiences and cultural stories, because they do not meet the standards of positivism.

2. Myths and value systems are about humans' relationships with nature and one another. Myths shape the entire perceptual field for humans as people make meaning for themselves using their myths and epistemologies. All thought and action are influenced by myths and values. Myths include unquestioned assumptions, the stories we tell ourselves (often subconsciously) about life and its purposes. Myths (belief systems, paradigms, world views) inform our sense of values, what is important and worthwhile in life: what is to be sought and what is to be avoided, and

how power is to be used in society. One dominant myth of the Western world views humans as separate from (not an intrinsic part of) nature.

3. Unquestioned processes and roles are about professionals and their thoughts and actions within the wider context of society. Certainly all professionals operate under epistemologies and myths, as do all nonprofessionals. All professionals occupy and live out roles as part of societal processes. Professionals unconsciously embedded in these roles and processes may be little aware of their own position, actions or the consequences of their work. In turn, professionals assume who can and should engage in problem-solving, how the process should work, and how learning should take place.

CHALLENGES TO ANY SOCIAL GROUP

In the following exploration the readers will remain better informed if they recognize that all groups are seeking to sustain themselves and, like the larger societies within which they operate, they will use the linguistic tools of myth and rhetoric.

Throughout the history of our species we have developed a wide variety of ways for 'knowing' or methodologies for uncovering the significant meaning in given situations, actions, and behavior regarding specific objects, places and processes. These ways of knowing or methods cycle in terms of acceptance and dominance of a people's preferred or conventional way of responding to their world. The table simply notes some of the varieties of methods that we have used over the life of the species. Most of these modalities of knowing co-exist in the same place and time. However, often one particular method may be dominant, such as spiritual or folk knowledge. The peasant farmer does all that can be done to ensure a good crop — soil, light, seeds, fertilizer — but, just in case, there are rituals and sacrifices as extra insurance.

As Mary Hesse (1989) some years ago noted, our language is outrun by the billions of infinite possibilities:

"Neurons come in billions and their possible linkages in megabillions, while the words of a language come only in thousands and sentences cannot in a lifetime be long enough to match the antics of the neurons." She concludes, "Clearly the whole imperialist aim of theoretical science to be the royal and single road to knowledge has been a profound mistake. Perhaps we should be looking in another direction. Scientific theory is just one of the ways in which human beings have sought to make sense of their world by constructing schemas, models, metaphors and myths. Scientific theory is a particular kind of myth that answers to our practical purposes with regard to nature. It often functions as myths do, as persuasive rhetoric for moral and political purposes."

We should, also, recognize that the fundamental challenge for any enduring social group is how to maintain order and stability and how to contain and direct difference. All such human social desires rely upon two conceptual techniques –

myth and rhetoric. Although we often talk as if rhetoric and myth were linguistic displays of some unseemly thoughts and action, they are ubiquitous and essential elements in the survival of human social groups. That is, our species "by nature" does not respond to events directly, but instead has those events filtered by the existing symbol system of a specific culture. Of course, like other tools for sustaining social relations, in the hands of a scheming "prince" they can blind us into following a destructive means to achieve social cohesion, such as stereotyping the "evil doing others" in contrast to our "generous and democratic selves" who have the right to forcibly change these "others." Myth and rhetoric, like eating, are essential – still, too much of the wrong sort can be deadly. If we are to understand the distortions of how we label the world we must recognize necessary functions as well as negative ones.

Table 1 Illustrating Some Likely Modalities of Knowing

Method (modality of knowing)	Base of Legitimacy	Application
Forensic	Advocacy position is based upon selective evidence	Courts/litigation/ law define meaning of reality
Spiritual	Faith	Explains unexplainable reality meaning
Normative	Consensus	Sustains social solidarity through re-enforced reality
Folk knowledge	Tradition	Group experience sustains reality of ancestors approaches
Kinship	Family bond	Loyalty sustained by the reality of blood relationship
Aesthetic	Form follows function	Looks right, is right defines reality meaning
Scientific	Controlled experiment	Empirical is 'reality'
Emotion	Intuition	Feeling directs Meaning of reality

In all social life there are unanswerable questions that must be answered. How did we come to be as we are? Why do the young die and the evil live on? What does it mean to be one of the "People?" What is the nature of our goodness? The evil of our enemies? What is our place in nature and why is it that way? Myths provide an order

and reliability in answers to such questions. They permit us to accept the death of loved ones and to continue fulfilling our social obligations (Burch 1971; Cassirer 1945,1957; Burke 1955,1960,1954; Levi-Strauss 1978)

Rhetoric is the ability to find the available means of persuasion in situations of fixed difference − gender, wealth, ethnicity, race. The rhetorician draws upon topoi or commonplaces (Aristotle) that resonate to all parties. As Mary Hesse notes in the quote above, science is equally a party to such needs (e.g. the peer review, transparency, replication, objectivity and so on). The community of science is regularly challenged when some scientist or group of scientists fakes or fiddles with the data to get a desired outcome. Again the point of mentioning these matters is that all methods and forms of explanation developed by persisting social groups have a particular set of myths and rhetorical styles to sustain the order of the community and to overcome inherent difference. (Burke 1954; Burch 1971).

Burch (1971) has argued that nature is often the apt metaphorical means for building strength of a group myth and for persuading us that our essential differences are really and "naturally" common to us both.

"Malinowski's Trobiand Islanders infuse the landscape with myth, and, in turn, the landscape demonstrates the tangibility of the myths. . . . Ethno-graphic studies illustrate how myths which are primarily concerned with perpetuating tribal unity have equal consequence for nature. The normative prescriptions and proscriptions governing relations between men are also the prevailing directives for responding to nature."(Burch 1971: 67-68)

Leaders will call the group's attention to the founding myths of the organization and they will insist that the "within" differences are more a matter of perception than reality. Indeed, the nature of the social group and the nature of the environment in which it operates are a unity. Members who see otherwise are a threat to the established order and to their own personal well being. Indeed, coercion is the last refuge of a failed rhetoric by leaders. The leader has been unable to find and to articulate the unity to be found in the diversity of their population.

CONCLUSION

Integrating professional and local knowledge is really about integrating epistemologies, myths, values, symbolic meaning, and roles and actions in society. In many instances, the challenges to this intention can be overwhelming in actual working situations. In examining these vital subjects and how best to consider and integrate them in real world problem-solving, we seek practical alternatives. We are interested in expanding the "box" of conventional professionalism, even getting "outside the box" and leaving it behind. We are interested in improving problem solving and professional and local effectiveness in ways that are equitable, effective, and sensitive to the context and to the overriding goal of human dignity for all.

In doing so, we ask many questions, for example:

- What is the proper role and standpoint for the professional in solving problems?

- How can a person with intensive technical training escape from the "trap" of a (narrow) acontextual focus of attention and a search for technological fixes to complex social problems?

- How can professionals foster high quality, respectful information, exchange, and learning, including a commitment to integrating community wisdom, without insisting on reductionism, positivism, and technocracy?

- How can we help to recognize, frame and re-frame specific challenges to be most equitable, inclusive, integrative, and effective?

- How do we integrate multiple and sometimes competing realities and ways of thinking, understanding, and finding meaning to clarify goals in terms of the common interest?

What Do We Know? Paradigms of Knowledge and Practice

A goal of successful problem-solving is effectiveness. This typically requires open communication and cooperation in social settings containing multiple knowledge systems. Practical problem-solving by necessity must be sensitive to the context of the problem. Ideally, professionals and locals must possess a framework that accommodates diverse perspectives, problem-solving styles, and decision-making processes to be effective. Actually, this rarely happens. In contrast, conventional professionals are often advised to stick to the "facts" and avoid entering the realm of non-negotiable beliefs and values (Sidaway 2005, personal communication). This perspective functions as a barrier to integration because what people accept for "fact" is deeply rooted in their beliefs and epistemologies. Questions of "What do we know? How do we know it? How do we know we know it?" are at the heart of understanding, problem-solving, and all paradigms of knowledge (Brunner 2005, personal communication). Conflict occurs when professionals insist that only "science" can define reality and other paradigms are irrelevant.

WHAT HAS HAPPENED AND WHY?

What exactly is science? It is a theory of knowledge called positivism, and it is "based on natural phenomena and their properties and relations as verified by the empirical sciences" (Merriam-Webster 2003: 968). Its epistemology emerged out of Europe in the 1500's and it is the dominant way of knowing in many parts of the world today. Many people believe it to be superior to other theories and methods of knowledge.

What do people do when they do positivistic "science?" They systematically pursue knowledge through application of the scientific method:

- formulating a hypothesis based on theory and observation;
- using a method for testing the hypothesis (i.e., collecting data via observations, systematizing, and quantifying data);
- subjecting data to statistical rules, a mathematical basis for hypothesis rejection;

- analyzing data, concluding something about cause and effect relationships;

- offering predictions for the future, and perhaps, further revision and hypothesis testing.

Science of this type is one way to organize human experience. Positivism is a doctrine and formula that seeks to understand the world and make meaning of it. In other words, it is a myth system that some people believe. In vital ways, it has paid off in medical and agricultural advances, for example. At its best, there are many virtues to this system of knowledge. Standards are clear: be systematic, quantitatively rigorous, and assume a reality that we can all understand. Methods are transparent and can be shared, replicated, and debated publicly. New information can lead to change and self-correction, sometimes even a basic paradigm shift (Kuhn 1962, 1977). It embraces ideals, such as that knowledge ought to be for the benefit of all, and that everybody ought to be able to contribute to the scientific discourse. Ideally, no one is asked to accept anything on faith. Skepticism and questioning are built into this epistemological and social system, at least in theory.

WHAT'S THE PROBLEM?

Problematic aspects of positivistic science come from two sources: (1) how views of science and scientists play out in the broader societal context, especially in management and policy, and (2) how science is practiced, particularly when carried out in a reductionistic, positivistic way to try to solve problems in complex, socially dynamic contexts. Concerning the first issue, a societal belief has developed that scientists are the only ones who are sufficiently trained to engage in the scientific enterprise, and that this method is the only way to get to the "truth." Therefore, it follows that scientists should have a special role in decision-making and in society. As a result, democratic ideals lose ground to the idea that there are "authorities" and "experts" whose knowledge trumps other, non-positivistic knowledge (Kitchner 2001). Belief in technical authorities and the authority of science is a societal belief, not an intrinsic part of the scientific method itself. It is an artifice of the sociology of science in real political contexts. In fact, ideally, claims of "authority" should be irrelevant (Sagan 1997). However, not only has society forwarded the idea of scientific authority, some scientists actively perpetuate it because it privileges them. Again, the scientific method is simply a tool that positivists use. It is a tool being wielded by human beings in actual socio-political contexts for many different motivations. Human beings operate in a wider societal context of social and value dynamics, including power, wealth, and respect dynamics. Sometimes "science" is invoked purportedly to get at "the truth," but in reality it can be used to forward a value-laden agenda. Sometimes the values at play are not visible even to the promoters of "science." The agenda may be a special interest or it may be one that is genuinely in the common interest.

Belief in technical authorities and the authority of science is a societal belief, not an intrinsic part of the scientific method itself. It is an artifice of the sociology of science in real political contexts. In fact, ideally, claims of "authority" should be irrelevant (Sagan 1997). However, not only has society forwarded the idea of scientific authority, some scientists actively perpetuate it because it privileges them.

Concerning the second issue, in order to reduce a subject to something that can be studied (e.g., nutrient cycling in a watershed), variables must be limited to a small number in a controlled situation. This requires reductionism and a degree of acontextuality. A few targets for manipulation are selected, for example nitrogen flows and trout populations. Only these variables are studied, thereby ignoring the full, unique context of other factors which are assumed away, discounted. In this way complicated relations that are embedded in a rich ecological and social fabric are reduced to overly simplistic, technical problems. Ecology may aspire to be holistic, but often becomes reductionistic in practice (Brunner 2005, personal communication).

> "Local knowledge is land and resource management systems, social institutions, world views. Not just knowledge of a plant. It is a whole system. And, it can be violated in so many ways . . ."
>
> *Domingo Medina, Investigator, Ecotonos/Asociación Venezolana para la Conservación de Areas Naturales (ACOANA), Yale seminar discussion leader, 2005*

Another problem is the assumption of objectivity of the person carrying out the study, and the assumption that there is an objective "truth" or reality that can be ascertained. Numerous authors have deconstructed this belief in objective rationality. It is false to assume that there is an objective, value-neutral observer (Westrum 1986). For example, deeply held beliefs and myths that some people hold, for example about the relationship between human beings and nature, and about how the natural world works, are deeply embedded in the structure and practice of the science of ecology (Botkin 1990, Allen and Hoekstra 1993, also see section below on myth). These foundational beliefs are often "invisible" to positivists, who may prefer to think of themselves as free from myths and biases.

We gain an idea of what is missed in a pure positivist approach to understanding from Barry Lopez's (1986: 204) observation at an Arctic research station:

> "We desire not merely to know the sorts of things that are revealed in scientific papers but to know what is beautiful and edifying in a faraway place. Considering the tradition of distant travelers, the range of their

interests and the range of their countrymen's desire to know, the government camp on Cornwallis Island seemed an impoverished outpost. There were no provisions for painters, for musicians, for novelists. And there were no historians there. If the quest for knowledge in any remote place is meant in an egalitarian sense to be useful to all, then this is a peculiar situation. Yet it is no different from what one would find in a hundred other such remote places around the world. Whenever we seek to take a swift and efficient possession of places completely new to us, places we neither own nor understand, our first and often only assessment is a scientific one. And so our evaluations remain unfinished."

When a problem is made into a positivistic "scientific issue," an answer is sought using the positivistic methodology. The processes through which questions are framed, and the larger societal processes or context in which information is used and decisions are made, are largely ignored as are other forms of knowledge. Errors arise when professionals in an effort to make problems tractable oversimplify a complex problem and use only fragments of knowledge (Clark 1993). These knowledge fragments are usually selected due to disciplinary and technical biases. When this is the case, even the best "scientific" methods and technical sophistication will not prevent errors. If important contextual information is overlooked or misconstrued in the first place, technical sophistication merely compounds the error.

Nevertheless, a number of environmental groups have bought into the idea of the scientific method as the path to good conservation (as well as their own legitimacy), which further legitimizes the belief in the method (Ascher 2005, personal communication). But in practice, because of the limits of the reductionistic tool, the trust that some sectors of society place in the scientific method is excessive. Those attempting to strengthen and legitimize the role of science in solving problems "may be attempting to legitimize a technique that will never get there" (Ascher 2005, personal communication).

Western science is also historically linked to the ideology of "high modernism" – the belief that progress as advanced by science will improve our lot and make the world a better place (Scott 1998). The changing status of scientists and the role of science in society are part of the dance between "modernizing" trends and anti-modernity reactions (Burch 2005, personal communication, Dove 2005 personal communication). Trends of high modernism lead knowledge away from local and contextual information, emphasizing instead generalized theories and information with no context. High modern thinking historically used traditional, indigenous, and local knowledge as a foil to modernity. In other words, other kinds of knowledge were regarded as backward, static, or outdated traditions (sometimes denigrated, for example, as "old wives' tales") (Dove 2005 personal communication). High modernism was forwarded as the antidote to this perceived backwardness (Dove 2005 personal communication, Scott 1998).

As a backlash against the modernizing trend there has emerged a positive valuation of indigenous and local knowledge, validating and emphasizing the vital

aspects of contextual information, especially for dealing effectively with resource use. For example, when the concept of "indigenous knowledge" was forwarded, it was in reaction to the high modernist's denial of the possibility that indigenous knowledge existed and was useful. The more exaggerated the modernizing claims were, the more exaggerated the claims about the value of other forms of knowledge became, so their claims could get appropriate recognition (Dove 2005 personal communication).

The more exaggerated the modernizing claims were, the more exaggerated the claims about the value of other forms of knowledge became, so their claims could get appropriate recognition.

Scientists today are often not aware of the historical trends of high modernism, the political role of their profession in that trend, and the backlashes against it outside of science. Scientists therefore may participate unwittingly in their high modernist role. Scientists are "modernizing intellectuals" with special education and skills. They operate on three levels (Ascher 2005, personal communication):

1. **Ideologues**, who often seem to be academically-based people that develop and argue for the primacy of one paradigm. This one paradigm is usually positivism, and may also include subparadigms or disciplines within the paradigm. For example, sometimes in the field of economics the use of cost-benefit analysis is forwarded as a way to measure what people care about.

2. **Method developers**, who may be based in academia or in government or nongovernmental organizations, who usually don't question the paradigm but spend their time developing and refining its methodology. An example would be people who spend their time refining ways to use cost-benefit analysis in different forms.

3. **Appliers**, such as researchers, contractors and government personnel, who carry out the methods forwarded by ideologues and developed by method developers. For example, a person whose job it is to collect data and perform a cost-benefit analysis in order to try to determine how a local community values the nearby wetland is an applier.

Most of these scientists or "modernizing intellectuals" are not ideologues, and don't regard themselves as powerful (Ascher 2005, personal communication). They tend not to question the positivistic myth, its formula, and operating norms inside of which they work. They perceive their role as contributing to "progress" in an objective way, and they believe that progress will make the world better (Scott 1998). In so doing, they validate the importance and appropriateness of the technique they are using, and justify their expertise. If they can do this "successfully," then they can enhance their self-image and possibly their public credibility. They lose credibility when the utility of their methods is questioned, so they seek to be rigorous and

produce generalizable results (Mattson 2005, personal communication). Part of their modus operandi is to marginalize seeming less rigorous epistemologies, methods, and other competitors for public attention and resources. In so doing, they are part of the social process and its inherent politics.

WHAT HAPPENS AT THE INTERFACE?

If scientists believe their way is the only way they can get to "reality," understand problems, and solve them, they will of course discount other ways of knowing. Even if presumed understandings come from other Western scientists using different scientific epistemological paradigms and methods, scientists "tend to dismiss understandings that do not fit their own" (Berkes 1999: 12). How much more difficult it is, then, when positivistic scientists encounter different paradigms well outside the realm of Western scientific thought – for example, when people know what they know through stories, intuition, or their own lived experience, through their dreams, or information passed down from ancestors, or from a centuries-old culture of systematic inquiry and observation quite distinct from conventional Western science? The automatic dismissal of these perspectives is especially problematic when these other forms of knowledge capture aspects of human-nature relationships, such as "sacredness, livingness, and the soul of the world" that fall outside the purview of one discipline (Little Bear 2000: xii).

How much more difficult it is, then, when positivistic scientists encounter different paradigms well outside the realm of Western scientific thought – for example, when people know what they know through stories, intuition, or their own lived experience, through their dreams, or information passed down from ancestors, or from a centuries-old culture of systematic inquiry and observation quite distinct from conventional Western science?

However, "*every* system of knowledge is also a system of ignorance" (Westrum 1986: 36). Anytime we attempt to reduce the complex world around us to a tractable problem and an area of focus, we risk forgetting that we put on blinders in order to be able to focus. The positivistic epistemology of science has been addressed in this report because it is central to the standpoint of many, if not most, environmental professionals. All human beings need and create myth, a framework and organization to make meaning of their own world. All myths/knowledge systems do this. But when we choose one framework, no matter what it is, we become almost always, at least temporarily blind or partially blind to other ways of knowing.

> "None of this is easy, but one thing that seems clear to many of us who have worked in the field is that if we are to make any headway, cooperation among groups and sectors is crucial. There are still some among us who strongly believe that conservation cannot be effective unless the residents of the area to be conserved are thoroughly involved. This is not solely a matter of social justice, which must in any case be a strong component of all conservation work. It is also a matter of pragmatism." (Chapin 2004)
>
> *Mac Chapin, Director, Center for the Support of Native Lands,*
> *Yale seminar discussion leader, 2005*

All knowledge is incomplete and tentative. Each one of us is blind in some way to some degree, but there are degrees of impairment (Lasswell 1971). This is why focusing on "just the facts" as a positivist might see them is too narrow a foundation for real-world problem-solving. The key to successful joint problem-solving is to recognize the strengths and limitations of the focus we each may have, and to create a process wherein many voices and multiple methods and streams of understanding are valued and used – a democratic process to find common ground.

ALTERNATIVES: WHAT DO WE NEED?

Clearly the attitude of "we know and you don't" is highly problematic whether it is held by a professional or by a local person. Because every system of knowledge has "blind spots," multiple methods are necessary to best get an adequate fix on "reality." Alternative epistemologies provide a way to minimize errors. Ideally, mutual exchange and learning among different worldviews is mutually advantageous, if one is open to empiricism. Whether current epistemologies and social processes are designed for and capable of achieving this goal is addressed below.

A self-awareness of one's own view or standpoint on knowledge, its origin, reliability, and utility in real world contexts is necessary to engage in genuine mutual learning with other worldviews. Sensitivity to context is essential (Brunner et al. 2005). Table 1 highlights some attitudes towards knowledge.

As far as epistemology goes, abandoning positivistic science is not the answer. Science is a powerful, insightful, self-correcting tool. However, it must be recognized as one way to organize experience and create understanding. It is important not to get stuck in thinking that its practitioners have a monopoly on truth.

As far as epistemology goes, abandoning positivistic science is not the answer. Science is a powerful, insightful, self-correcting tool. However, it must be recognized as one way to organize experience and create understanding. It is important not to get stuck in thinking that its practitioners have a monopoly on truth.

Table 2   The Perry (1985) Scheme of "Critical Thinking"

Feature	Dualism: Level 2	Early Multiplicity: Level 3	Late Multiplicity: Level 4	Contextual Relativism: Level 5
View of knowledge	All knowledge is known. There is a certainty that right and wrong answers exist for every-thing. Knowledge is a collection of information.	Most knowledge is known, all is knowable. Certainty that there exists a right way to find the right answers. Realization that some knowledge domains are "fuzzy".	In some areas, we still have certainty about knowledge. In most areas we really don't know anything for sure. Certainty that there is no certainty (except in a few specialized areas) hence all opinions can be just as valid or invalid as all others.	All knowledge is contextual. All knowledge is disconnected from any concept of Absolute Truth. However, right & wrong, adequate & inadequate, appropriate & inappropriate can exist within a specific context and are judged by "rules of adequacy" that are determined by good thought processes.
View of the role of the instructor	Source of knowledge. A role is to give the knowledge to student. Good instructor equals absolute authority and knower of Truth.	Source of Right Way to find knowledge, of how to learn. Role is to model the "the way" of process.	Source of the process of thinking – modeling the use of supportive evidence and good methods of scholarship. Instructor can also be completely discounted.	A guide within the framework of "rules of adequacy" and within context. Mutuality of learning is sought.
View of the role of the student	Role is to receive the information or knowledge and to demonstrate having learned the right answer.	Role is to learn how to learn, how to do the processes called for, to apply oneself, and to work hard.	Role is to learn to think for oneself, to learn to use supportive evidence. Independence of thought is valued.	Role is to exercise the use of the intellect, to shift from context to context, and to apply rules of adequacy to information, concepts, perspectives, judgments.

When working with conservation and sustainability issues, there is a way to be systematic and empirical without being reductionistic and positivistic. This is called being "practice-based" (see Brunner and Clark 1997). With practice-based learning, we know what we know through empirical observation. We have some sort of logic of inquiry, a systematic framework for asking questions, and a theory, hypothesis or generalization about what is happening. However, we recognize it as just a theory and don't get stuck in the box of the theory if it is not matching up with the facts (Allen and Hoekstra 1993). Generalizations and theories are helpful as procedures for arriving at a solution to a problem, but they are not necessarily a proof.

Other modalities of knowledge are legitimate and vital to public discourse and problem-solving. A key aspect of any knowledge system is that it be appropriate for the context, and usable. Usable knowledge is "relevant, timely, appropriate in scale and accuracy, and defensible" (Burch 2005 personal communication). This is key to adaptive knowledge systems. People who choose to use Western science need to be able to discuss and back up what they say in a way that other people understand. In the most effective consensus-building processes, "all information (whether it is scientific, technical, traditional, cultural, local, or remembered) is subject to respectful questioning about validity, accuracy, authenticity, and reliability. Every type of knowledge has standards of quality that can be examined, debated or shaped" (Adler and Birkhoff 2005: 7). Those with a Western scientific background need to cultivate the ability to question in a respectful and sensitive way. Many scientists see it as their job to be skeptical, and are also accustomed to having their own information questioned. But when they go into other contexts, they need to achieve what Carl Sagan calls an "exquisite balance" of skepticism with openness (Sagan 1987, as quoted in Shermer 2002):

In the most effective consensus-building processes, "all information (whether it is scientific, technical, traditional, cultural, local, or remembered) is subject to respectful questioning about validity, accuracy, authenticity, and reliability. Every type of knowledge has standards of quality that can be examined, debated or shaped" (Adler and Birkhoff 2005).

"It seems to me what is called for is an exquisite balance between two conflicting needs: the most skeptical scrutiny of all hypotheses that are served up to us and at the same time a great openness to new ideas. . . . If you are only skeptical, then no new ideas make it through to you. . . . On the other hand, if you are open to the point of gullibility and have not an ounce of skeptical sense in you, then you cannot distinguish the useful ideas from the worthless ones."

Beyond dialogue about information and epistemologies are issues regarding the larger context in which information is valued, appreciated, and acted upon. Humans do not make decisions based strictly on information. In fact, information itself has no intrinsic value. People value information (including scientific information) to the extent that it furthers their own values. Emotions, intuition, values, and myth systems are all at play in the decision-making process and mutual learning, as discussed below.

How Do We Relate with Nature? Myths, Values, and Meaning

If the goal of integrating professional and local knowledge is to solve problems, then it is important to engage in open, equitable, effective dialogue about ecological and other issues with people who hold different views than our own. In order to do this, we must first understand the myths and values that are the foundation of our own interactions with nature and people. Underlying much of the dialogue, policy, and practice of the environmental movement to date has been a basic assumption that human beings are separate from nature (Burch 1971). This view is rooted in myths and belief systems, which in turn shape how issues are perceived and acted upon. Myths are created, reaffirmed, and revalidated over time, in many cases over millennia. Individuals can become so steeped in their culture that they may be largely unaware of the myths they live by. "What locates a person in his/her world, what makes his/her responses appropriate, and what makes something a fit object or value for him/her to seek is a myth" (Clark et al. 2001: 1). Mythologies shape the way people approach problems or deal with fear and uncertainty (Debnam 1998). In general, myths are a way for individuals, groups, and societies to find meaning in their lives. Myths also provide guidance for people in their relationships with each other and their relationship with the natural world (Clark et al. 2001). Values also arise out of myth systems, and they shape our actions.

WHAT HAS HAPPENED AND WHY?

Myths translate into metaphors, the stories we tell ourselves about how the world is. Holly Doremus, a legal scholar, examined three dominant metaphors in environmental rhetoric. Doremus has a special concern regarding how metaphors are reduced to sound-bytes for the purpose of political debate, and how these metaphors "limit our ability to respond to, and even our ability to fully perceive, the problem of nature protection" She breaks the stories into three prevalent metaphors (Doremus 2000: 73):

1) **"The Ecological Horror Story,"** rhetoric derived from works such as Rachel Carson's *Silent Spring* or Paul Ehrlich's *The Population Explosion.* As sound bytes, stories like these depict nature as "a bundle of resources for human

consumption or convenience." Disciplines arising from this metaphor include paradigms of sustainable development and the use of the cost-benefit analyses to value nature. A limitation of this discourse is it can allow people to "ignore the loss of nature short of catastrophic ecological collapse." The dialogue revolves around material and utilitarian values.

2) **"The Wilderness Story,"** rhetoric derived from the writings of John Muir, Henry David Thoreau, or Aldo Leopold, for example, which espouses the metaphor of pure, primeval places defined by the absence of human beings. As a sound byte, the wilderness story leads to the view that nature equals a place with no people, the effect being to establish a limited number of strict, exclusive nature reserves. The dialogue revolves around well-being or esthetic values.

3) **"The Noah's Ark Story,"** rhetoric derived from Aldo Leopold, for example, which makes the case that it is a moral duty to protect other life forms, beyond their value to humans. It is simply the "right" thing to do. Giving rise to disciplines such as conservation biology, laws such as the Endangered Species Act, or practices such as conservation in gene banks and zoos, this sound byte is limiting when it creates a perception that the problem is a "short-term crisis" solvable by technical fixes. The dialogue revolves around values of rectitude or morals.

The discourses behind these sound bytes are valid and necessary. Advocates for nature and sustainability have achieved tremendous gains in raising awareness and expanding perceptions about crucial issues. However, as a movement, environmentalism needs to be able to grow out of limiting rhetoric. What is limiting about all these stories is that they fail to perceive and address the fundamental question, "the crux of the modern nature problem, which is where people fit into nature" (Doremus 2000: 73). In other words, while the stories and vocabulary are to some extent necessary for engaging in the larger political arena, the stories also limit the ability to perceive and address larger issues.

Ecologist Daniel Botkin (1990) also challenges environmentalism and ecological science to examine its fundamental myths and assumptions in order to address the same challenge raised by Doremus, that of engaging appropriately in a healthy relationship with nature. Botkin argues that it is the underlying myths and metaphors that shape our understandings, not a shortage of technical or scientific knowledge, that hinders our ability to perceive and constructively address key issues in our relationship with nature. "Both those arguing for progress and those arguing for protection of the environment have shared a world view, hidden assumptions, and myths about human beings and nature that dominated the industrial era. Neither point of view has gotten to the roots of the issues, which lie deep in our ideas and assumptions about science and technology, and go even deeper in myths and ancient world views" (Botkin 1990: 6).

Citing many examples from ecological study and natural resource management practices where facts have been made to fit theory, and not the other way around, he

demonstrates how beliefs about how nature works have not kept up with new understandings. In other words, the scientific endeavor of ecology is itself grounded in myth and beliefs about nature (Allen and Hoekstra 1993). For example, beliefs in the value of pristine nature and relatively stable ecosystems for many years dominated resource management paradigms, to the detriment of ecosystem health and with disappointing results in the protection of nature. What managers and scientists believed was happening often trumped what was actually, observably happening. Botkin is concerned with management, which he considers to be "understanding our proper role in nature" so that "we can successfully achieve our goal: people living with nature, neither poisoning it nor destroying its reproductive capabilities" (Botkin 1990: 11). Like Doremus, Botkin points to a need to question underlying assumptions (i.e., myths) in order to access the fundamental problem of creating a viable, healthy, satisfying relationship with nature. "We have not settled on the right metaphors, images, and symbols" to facilitate this relationship (Botkin 1990: 13).

WHAT'S THE PROBLEM?

All human beings create stories, metaphors, and myths to give meaning and understanding to our experiences. The problem is when people get "stuck" in a metaphor (i.e., put themselves in a box), especially when the story about what is happening does not empower people to effectively address what is actually happening. In this "scientific" age with so much focus on facts, we can forget to examine deeply held beliefs that underlie our understanding of ourselves and the world. Notions that humans are somehow outside of nature have dominated myth and metaphor in the environmental movement. The science of ecology itself originated in studies of ecosystems without people, or where human interactions were considered only as "disturbances" or "perturbations," not as an intrinsic part of the system. This myth often clashes with the deeply held beliefs of many other cultures, and creates a debilitating blind spot in attempting to address the core problem of human beings creating a healthy and satisfying relationship with nature.

Western environmentalism, like other social movements, runs the risk of becoming stuck in its own unexamined myths, metaphors, and stories, thus limiting the ability to perceive, understand, and engage in effective dialogue about the central challenges at hand. This can be a confining trap that is difficult or impossible to escape from. Estimating the challenge or defining "the problem" is a cognitive and perceptual process that involves values, myths, and identity.

Defining problems is one of the most critical phases of any process, because the way the problem is defined shapes all the subsequent action to reach a solution. However, often, the problem definition is not fully considered, or stated explicitly. It is embedded in the mindset of what participants believe is 'the problem.' Perceptions of problems can often flow from unquestioned myths and beliefs. The agenda arising from the myth that humans are separate from nature has tended to be narrow and exclusive, unable to find traction on issues central to the lives of most human beings. When this view is linked to power structures that displace, reeducate or simply ignore

humans, such as creating "conservation refugees" via the establishment of parks (Dowie 1995), the "dark side" of environmentalism emerges (Burch, personal communication 2005). Instead of building fences and posting "no trespassing" signs, engaging in effective dialogue about environmental issues requires insight into one's own beliefs and values, and openness to reconsideration.

WHAT HAPPENS AT THE INTERFACE?

If the myth is that "nature" is defined by the absence of human beings, and "wilderness" is a pure state devoid of humans, what does that say about human beings who live close to nature, or in what the Western-trained mind perceives as "wilderness?" Similar myths, metaphors, and misconceptions are applied to those human beings. As Firket Berkes points out in his book *Sacred Ecology*, "More than many other disciplines, indigenous knowledge has to contend with popular and academic myths about traditional peoples" (Berkes 1999: 145). He classifies these myths into three simplistic metaphors that are often espoused by Western environmentalists regarding traditional peoples (Berkes 1999: 145). They are the:

1) **"Exotic Other,"** idealized "ecologically noble savages," who live in a primitive, pristine state in timeless harmony and balance with their environment, where they can do no wrong. (Popular with Western environmentalists, this myth also espouses the now-refuted notion of stable ecological "climax," as discussed in Botkin 1990 and above.).

2) **"Intruding Wastrel,"** regular humans like the rest of us, i.e., unnatural, alien, "despoilers of pristine ecosystems" who may have been forced so far to live in balance due to ecological constraints, but do not possess any special knowledge or relationship. This belief shows itself when resident peoples are forced out of a "protected" nature area.

3) **"Noble Savage/Fallen Angel"** duality. In this view, they are dwelling in total harmony with their environment, or they were, until recently, or they will as long as they don't get access to, say, metal utensils, chainsaws, guns or off-road vehicles. In this view, resident peoples might be allowed to remain inside the boundaries of a protected area, but only if they remain "primitive" and manage the environment in the idealized way envisioned by Western environmentalists. Any evidence to the contrary, and they will probably get kicked out like the rest of us.

These exclusions are sometimes expanded to include others who live close to the natural resources they manage, such as hunters, farmers, or ranchers, who may be demonized and/or idealized by environmentalists. These myths are not only overly simplistic and inaccurate, they can be highly problematic and damaging when they play out politically. These oversimplifications cloud the intricacy of the issues. It certainly seems to be the case that living close to the land with an intimate knowledge of it is necessary for a healthy relationship and good management; but such knowledge is sometimes not sufficient in itself (Diamond 2005, Berkes 1999), as we discussed earlier.

. . . The democratic ideal [is] that people ought to be involved in decisions that affect their lives . . . [This runs] counter to the 'decide, announce and defend' school of public consultation, an approach that still appears to be endemic despite its failures. It is based on the principle that experts plan for people, rather than with them." (Sidaway 2005, Chapter 7)

"Trust develops over years, not just through some short-term participatory meeting. Be prepared to listen and understand what the community wants. Trust in agencies is dependent on their consistency, honesty, integrity, and respect for the community."

Roger Sidaway, Author of From Conflict to Consensus: Resolving Environmental Disputes *(2005), Yale seminar discussion leader, 2005.*

The above understandings of traditional peoples are also in play in a wider political context. For example, sometimes indigenous identity must be articulated as an oversimplified, idealized sound byte from within (or sometimes outside) the indigenous group out of political necessity and expediency, in order to enhance the legitimacy of the group (Dove 2005 personal communication). But, as always, the danger is that deeper meanings can get lost in the metaphors. Each of the above metaphors is clearly limiting in terms of engaging in genuine dialogue with those who live close to the land.

UNDERSTANDING VALUES: SOME BUILDING BLOCKS FOR A NEW DISCOURSE

In consensus-building and other forms of equitable dialogue, directly confronting the myths and deeply held beliefs of participants often leads quickly into non-negotiable territory. In other words, when working with people, it may be best not to address fundamental assumptions and world-views head-on. However, one of the ways that myths and beliefs express themselves is through values. Understanding the values at play in human relationships with nature and with other people can provide some key building blocks for creating more effective dialogue.

The three metaphors discussed by Doremus depict an emphasis on aesthetic, utilitarian, and moralistic values. Understanding other forms of relationships and value systems regarding an intimate human/nature relationship may be important building blocks for effective dialogue about this relationship. A somewhat broader set of values and differences have been noted in the work of Stephen Kellert (1993) who contrasted the perceptions of Americans with those of Botswanans, German, and Japanese, and concluded that most Americans have a more limited understanding of nature and natural processes than many of their counterparts in other places.

While that opinion may be controversial, any sensitive environmental professional may have encountered this problem anecdotally in the field. Gil Inoach Shawit, a

Peruvian native from the Amazon, addressed it this way: "For a person in our village living on the land, everything in the environment around him is part of his life and himself. Your nourishment, food, medicine, university education, part of your spirit, culture, your wisdom, your home, your hope, your tomb, are all within the territory where you live. When a scientist comes from somewhere else to try to teach us what to do, I wonder what in the natural environment he interacted with that day? Maybe his house plant?" (Inoach, personal communication 2005). The development of more appropriate myths, symbols, and beliefs for relating with nature will certainly involve cultivating a more intimate personal connection with nature.

Another fundamental building block of effective dialogue is an understanding of human values as people relate to each other. For example, some conservation and sustainability efforts have been promoted in moralistic language that obscures, rather than illuminates, important human values that can be satisfied by these efforts (Meffe 1997). Indeed, because of a failure to speak to basic human values in the human relationship with nature, environmentalism has even come to be perceived as a special interest instead of a common one (Shellenberger and Nordhaus 2004).

Table 3   Values for Human Beings (from Clark et al. 2001: 44, based on Lasswell 1971)

Value	Definition
Power	To give and receive support in making decisions that affect one's life
Enlightenment	To give and receive information and knowledge
Wealth	To give or receive the opportunity to control, access, or own resources, such as land, money, other people
Well-being	To give or receive the opportunity for personal health, comfort, and safety
Skill	To give or receive the opportunity to develop proficiencies or talents into professional, vocational, or artistic operations
Affection	To give and receive love, loyalty, friendship, or intimacy in relationship to others
Respect	To give and receive recognition or deference in a relationship, profession, or community
Rectitude	To give and receive appraisals of integrity, of ethical or responsible conduct

The policy sciences posit eight "values" that all people seek regardless of age, culture, nationality or gender (Table 3). Harold Lasswell, a founder of the policy sciences, described the processes that societies and individuals undergo as follows: "*participants* (individuals or groups) seek to maximize values (gratify outcomes) by utilizing *institutions* that affect *resources*" (Lasswell 1971). The eight base values are

WILKINSON, CLARK, AND BURCH   33

described in Table 3. When a person has enough of all of these values, he or she can be said to have freedom. In other words, they are then free to pursue whatever value seems best to them at the time. However, if certain values are threatened or denied, those values will be sought.

The important thing to realize is that these value systems are in play, reflecting on an interpersonal level what people believe is happening at deeper levels of myth. It is also important to understand that different people seek different values when they engage with the world around them. Scientists, for example, often have personality traits that cause them to seek enlightenment (information, data) and are often motivated by data that is provided to them. However, most other people are not motivated by data. As another example, environmental activists are sometimes perceived as elites who fight for what they value (rectitude) while unmindful of the possibility that they may deprive others of their values for material well-being or, in the case of indigenous groups or other local people, power and respect. Mindfulness of differing value systems and how these values play out in the political arena, is one key to building effective dialogue.

YALE SCHOOL OF FORESTRY & ENVIRONMENTAL STUDIES

What's the Context?
Adaptive Knowledge, Mutual
Learning, and Democratic Processes

In the preceding pages we have examined fundamental aspects of standpoint and bias, including how we gather, perceive, and legitimize information, and how our myths, problem definitions, and values underpin our perceptions and actions. Understanding systems of knowledge, beliefs, and values is necessary for engaging in effective inclusion and integration of multiple worldviews. Awareness and self-reflection regarding these aspects of our own biases is as important as our attempts to understand the viewpoints of others. Still missing from the discussion is an awareness of how different values and desires play out in process. The ability to learn and adapt to new information, the willingness to trust and be trustworthy, openness to interacting with others, the capacity to engage in civil dialogue and democratic processes, are also necessary components of mutual learning and adaptive knowledge systems. Democratic processes occur when people with different values, myth systems, knowledge processes, interests and demands can come together in a way that promotes civil, mutually respectful dialogue and learning in order to find their common interest and common ground.

Adaptive knowledge means that "different kinds of knowledge are treated as 'tentative' and processes are set up to continually collect information that might in turn change the project itself" (Adler and Birkhoff 2005: 9). In other words, knowledge is not a collection of facts, it is a process of bring forth new knowledge (Maturana and Varela 1998). Knowledge gathering may take place on an individual level, but the learning process also takes place within an organization or society. This section discusses what facilitates or impedes adaptive learning and collaborative processes.

ORGANIZATIONAL CULTURES

Individuals may be embedded in organizational or cultural environments that facilitate or hinder the process of learning. Sometimes individuals are not very aware of the learning or cooperative aspects of the culture in which they are embedded. Many of the recent criticisms of ideas and rhetoric of "environmentalism" have in fact

been leveled at some of the large nongovernmental organizations (Chapin 2004, Dowie 2005). One aspect of adaptive learning within an organization is the ability to build bridges between other sources of knowledge, to be open to new information, and to occasionally revisit and question fundamental assumptions, even if doing so may mean changing the way things are done within the organization. However, not many organizations are structured in this way.

"Organizations do not (or cannot) normally "double-loop" learn – that is, challenge and replace their own premises. Viewed as inquiry systems, organizations are designed to ask certain questions to the exclusion of others. Organizations simultaneously collect and suppress data. Underlying premises – those premises that problem redefinition would seek to challenge – govern what actions an organization takes, as well as the realm of conceivably relevant information and knowledge" (Dery 1984: xii-xiii). Table 4 summarizes some ways that organizations may or may not be set up for adaptive learning

Table 4   How Organizations Treat Information (Westrum 1994: 333)

Pathological Organization	Bureaucratic Organization	Generative Organization
Don't want to know	May not find out	Actively seek information
Messengers are shot	Messengers are listened to	Messengers are trained
Responsibility is shirked	Responsibility is compartmentalized	Responsibility is shared
Bridging is discouraged	Bridging is allowed but neglected	Bridging is rewarded
Failure is punished or covered up	Organization is just and merciful	Inquiry and redirection
New ideas are crushed	New ideas present problems	New ideas are welcomed

"Generative" organizations are set up with the ability to learn and an openness to bridging and questioning. On an individual, organizational, and societal level, the willingness and ability to build bridges, welcome new ideas, and engage with others, are key. Without this ability, an organization or profession may create cohesion and an internal sense of unity through shared knowledge and belief systems, but can also create barriers and culture clashes when that group engages with 'outsiders.' In any profession (for example police, doctors, firefighters, scientists) there is a possibility of 'professional chauvinism' – a recognized hindrance to consensus building (Sidaway 2005 personal communication).

SOCIAL CAPITAL

This difficulty on a social, organizational, and individual level is related to the concept of social capital forwarded by Robert Putnam in his book *Bowling Alone: The Collapse and Revival of American Community*. Social capital is a theory that social networks

have value and affect productivity, similar to physical capital or other kinds of capital (Putnam 2000). Like any other form of capital, social capital can be used in negative or positive ways. On its positive side, trust, cooperation, mutual support, and openness are the result of social capital. The negative side is excluding, narrow, and self-interested. Putnam makes an important distinction between "bridging" and "bonding" social capital dimensions – both are to some extent necessary and can be healthy, but bridging social capital is inclusive, network-building, "outward looking and encompass people across diverse social cleavages" (Putnam 2000: 23).

"One way we can engage local communities in conservation planning is to strive to engage all kinds of people within a given community. A shared concern for wildlife can be a powerful rallying point that brings all segments of a community together. Keeping Track® deliberately invites all kinds of people to participate in our habitat monitoring program. A sample class which we offer at its best will include a marvelous mix of people including farmers, urbanites, hunters and anti-hunters, teachers, loggers, poets and massage therapists. What is both fun and profound about Keeping Track® is that by the end of our training all sorts of people that normally don't get along put their differences aside and work more effectively towards our common goal – collecting reliable data to appropriately guide community planning and habitat conservation."

Susan Morse, Founder, Keeping Track®, Yale seminar discussion leader, 2005

Healthy social capital (Putnam 2000: 288):

- "allows citizens to resolve collective problems more easily;"

- "greases the wheels that allow communities to advance smoothly . . . where people are trusting and trustworthy;"

- "improves our lot . . . by widening our awareness of the many ways in which our fates are linked."

On an individual and organizational level, the concept of social capital brings home the importance of trust, honesty, integrity, inclusiveness, openness, credibility and mutual respect. While Putnam's study demonstrates that American society may be less capable of being civil and considering others in the decisions we make due to a downward trend in social capital, it also contains the seeds of awareness for revitalizing these important social connections.

CIVIC DISCOURSE AND DEMOCRATIC PROCESSES

Where there is trust, connection, openness, and a willingness to engage – in other words, a good stock of social capital – people with different viewpoints can come together to find common ground. When people do come together in this way, another

key component to effective process is the capacity for "civility" – the capability of being respectful, kind, and treating each other well, even if we don't share the same point of view – a capacity that, like social capital, may be in decline in the U.S. (Shils 1997, reference by Mattson 2005 personal communication). Democratic processes take place when people with different views can come together to identify their common interests and work toward viable solutions. Democratic principles and practices have their roots in the Iroquois Confederacy, which according to oral tradition may be the longest continuously running democracy in the world. The United States democracy was modeled on the practices of the Iroquois Confederacy (a long-neglected fact that has now been officially recognized in a U.S. Senate resolution (Lyons *et al.* 1992, Schaaf 2004, Swamp 2005, personal communication). When a democratic process is successful, the creativity, energy and commitment of all the players are optimized, and a common-interest agenda can be built and acted upon.

There are three fundamental principles for effective, deliberative democratic processes (O'Riordan and Stoll-Kleemann 2002: 88-89):

1. "People have a right to form an opinion, have the capacity to do so, and are free to articulate it, either in their own right or through others whom they respect and in whom they place their confidence and trust.

2. The processes of opinion sharing, and opinion resolution, are fully understood, with no distortion or bias in the manner in which opinions are transformed into final decisions.

3. All this takes place in a political arrangement in which power is diffuse and shared, and where groups can form and create a combined opinion and articulate their biases persuasively and comprehensively."

Successful process in this way would require those involved to "be aware of, and alive to, all interests involved, all relevant cultural perspectives, and how individuals relate to families, neighbors, social groupings generally and patterns of governance" (O'Riordan and Stoll-Kleemann 2002: 89). After carrying out multiple case studies into "participatory" conservation practices, the authors concluded that the conditions for democratic processes are rarely in place (O'Riordan and Stoll-Kleemann 2002).

ALTERNATIVES: WHAT DO WE NEED?

On a personal level, when engaging with local people and their knowledge and skills, there seem to be two different environmental 'professional' styles in operation:

1. to show up in a community with an answer (conventional professionalism), or

2. to ask questions based on problem analysis, develop contextual knowledge, and proceed in an equitable way with the concurrence of the community.

The first approach brings out the "dark side" of environmental 'professionalism,' when the professional may have good intentions, but can become more part of a problem than part of a solution. This happens when professionals engage in top-

down, purportedly unbiased but actually biased, processes to solve 'the problem' as they see it. If there is a disconnect between local expertise and conventional professionalism, the conventional professional might try to tweak the sound-bytes or repackage the message, instead of re-examining his or her own fundamental assumptions. Such a person might not appreciate the distinction between working *with* local people versus *using* people.

Table 5   A Comparison of Professional Standpoints (from Clark et al. 2001: 49)

Conventional Professionalism	Civic-Minded Professionalism
Participants know what they want and follow a pre-specified plan or project design; people tend to be rigid.	Participants do not know where projects will lead so work is an open learning process; people tend to be flexible.
Assumption of single, tangible reality, which is generally known to participants; "correctness" is clear and "right and wrong" actions are known.	Assumption of multiple realities; reality is partly socially constructed and must be discovered by participants; "correctness" and "right and wrong" to be decided by participants.
Method of participation tends to be singular, disciplinary, reductionistic, positivistic, and narrowly ideological (cause and effect, predictions), often with a special interest focus; thought and actions "bounded."	Method of participation tends to be holistic and interdisciplinary, broadly ideological, with a common interest focus (empirical, systematic); thought and actions "unrestricted."
Policy and information are extracted from situations that should be controlled; authority, control, and dominance are at issue.	Policy understanding and appropriate focus of attention emerge from interaction with context; authority and control are important issues, but focus is on solving common problems fairly.
Problem solving is blueprint-like; a "formula" is known and it should be used to address problems.	Problem solving is process-like; guide-lines are known to address problems as well as general standards (e.g. reliability) to aid problem solving.

In contrast, a civic-minded professional will ask how they can use their training to serve as intermediaries and facilitators, go-betweens in the arenas they are versed in (academia, science, economics, politics, consensus-building, etc.) in order to identify and best serve the common-interest goals and visions of the community in which they work. Such a professional understands that where there are multiple viewpoints in play, there is no such thing as a neutral "expert" (Berkes 2004: 624). What we can bring is our ability to learn about multiple perspectives and build bridges between them in order to integrate knowledge into equitable processes. In other words, the role of the professional is not to be an expert, but to be an "expert learner" (S. Wilson 2005,

personal communication). Multiple methods and modalities are valued not only as legitimate, but vital in achieving a more holistic understanding. Standards can also be adhered to that ensure processes that are inclusive, fair, open, appropriate to the context, and effective. Coordinating between bottom-up and top-down processes, staying aware of the goal but not being co-opted by any special interests, is the challenge of civic professionalism. The table below compares some aspects of conventional and civic-minded professionalism.

As illustrated above, effectively addressing ecological concerns is not about superimposing preconceived ideas, or simply choosing a known method to calculate an answer to a predefined question. Instead, the focus is on processes. Civic-minded professionals strive to get oriented to the context and processes in which they are located, and to position themselves at the right place and time to understand the common interest and be truly helpful. This requires an effective understanding of the knowledge systems, myths, and social processes in which we find ourselves.

Concluding Summary

The place where local expertise and academically trained professionalism meets is fertile ground for cultivating new, healthy relationships between individuals, communities, and nature. A successful dialogue between different paths of understanding is essential to identifying the common interest and developing adaptive ways to comprehend and respond appropriately to the challenges of our time. The nexus of multiple worldviews is also a fruitful place to learn more about the world, one's neighbors – and about oneself. However, even those who have a sincere desire to make new connections between local expertise and professional environmentalism, from either end of the spectrum, can get caught up in their own "blind spots" and unquestioned biases, causing a disconnect. This publication has examined some of the roots of this disconnect from the standpoint of environmental professionalism. The intention is to bridge the divides through responsible self-reflection and questioning, so we can work more effectively towards mutual learning and adaptive knowledge systems in order to achieve common goals. We examine the issue through three angles: epistemology, values and myths, and social/learning processes.

Mutual learning and adaptive knowledge are not possible until multiple methods and modalities are recognized not only as legitimate, but as vital. Staying aware of the limitations of the Western scientific method and the tendency of its practitioners to dismiss other modalities is important. At the same time, the Western scientific method itself should not be dismissed: it can be utilized in a systematic, empirical, and practice-based manner. Achieving a balance of trusting openness and respectful questioning is helpful in order to assess the accuracy and usefulness of any knowledge and information for the context. It can be helpful to integrate information from multiple sources in order to verify what is happening. One of the professional's obligations may be as a translator and a facilitator between local knowledge and what scientific knowledge can contribute, which sometimes involves looking at issues from both the "worm's eye" and "bird's eye" view. Part of the alliance between locals and environmental professionals may also involve legitimizing and communicating local knowledge in political debates. High quality, accurate information is necessary, but not sufficient in itself. Information is utilized in larger processes of decision-making that are based not only on data, but as well on emotions, values, and myths.

One way information is utilized is to try to solve what people perceive as "problems." Defining problems is one of the most critical phases of any process, because the way the problem is defined shapes all the subsequent action to reach a

solution. However, often, the problem definition is not fully considered, or stated explicitly. It is embedded in the mindset of what participants believe is "the problem." Perceptions of problems can often flow from unquestioned myths and beliefs. One myth prevalent in environmental action is that humans are separate from nature, and that human interaction with nature is a disturbance. This often leads to the "solution" of putting up fences around protected areas, for example. Shifting the assumptions and dialogue about the relationships of humans and nature will lead to a new and more holistic perception of the challenges. Myths and unquestioned assumptions also shape what people value and how they relate with nature and each other. Awareness of and a willingness to examine the role of myths and values is essential to get out of boxes of thinking and work effectively with others.

Understanding systems of knowledge, beliefs, and values are necessary building blocks to engage in effective dialogue for integration of multiple worldviews. However, these cannot be integrated without inclusive, open, deliberative democratic processes. Democratic processes take place when people with different values, myth systems, knowledge processes, interests and demands can come together in a way that promotes civility and respectful dialogue to find their common interest and common ground. When this process is successful, the creativity, energy and commitment of all the players are optimized, and a common-interest agenda can be built and acted upon. But for environmental concerns (and perhaps many other concerns in general) the conditions necessary for this process to work are rarely in place (O'Riordan and Stoll-Kleemann 2002). Awareness of process and how actions are decided upon and carried out, who is included and who is not, whose values are forwarded and who may be deprived, is necessary to remedy this situation. On a personal and professional level, the importance of integrity, credibility, trust, honesty, and respect for the community cannot be overemphasized. An authentic concern for people means being prepared to listen deeply, seek greater understanding, and to learn more.

It is vital for natural resource professionals to work at opening new opportunities for integration, mutual learning, and adaptability. Understanding previously unexamined "blind spots" can help us avoid some of the trip wires and pitfalls as we work at the nexus of multiple worldviews. Creating common-interest solutions based on mutual learning, adaptive knowledge systems, and shared respect will require improved diplomacy and democratic processes. Self-awareness is the beginning of the process towards creating healthy, honorable, and viable relations between people, and between people and non-human nature.

References

Adler, P., and J. Birkhoff. 2005. *Building Trust: When Knowledge From "Here" Meets Knowledge From "Away."* The National Policy Consensus Center Urban & Public Affairs, Suite 728 506 SW Mill Street Portland, Oregon 97207, Downloaded Oct. 30 2005 from: www.policyconsensus.org

Allen, T. F. H., and T. W. Hoekstra. 1993. *Toward a Unified Ecology.* Columbia University Press, New York.

Ascher, W., and R. Healy. 1990. *Natural Resource Policymaking in Developing Countries: Environment, Economic Growth, Income Distribution.* Duke University Press, Durham, NC.

Ascher, W., and B. Hirschfelder-Ascher. 2005. *Revitalizating Political Psychology: The Legacy of Harold D. Lasswell.* Lawrence Erlbaum Associates, Publishers, Mahwah, NJ.

Berkes, F. 1999. *Sacred Ecology: Traditional Ecological Knowledge and Resource Management.* Philadelphia: Taylor and Francis.

Berkes, F. 2004. Rethinking Community-Based Conservation. *Conservation Biology* 18: 621-630.

Botkin, D. 1990. *Discordant Harmonies: A New Ecology for the 21st Century.* NY: Oxford University Press.

Brechin, S. R., P. R. Wilshusen, C. L. Fortwangler, and P. C. West. 2003. The Road Less Traveled: Toward Nature Protection with Social Justice. In: *Contested Nature: Promoting International Biodiversity Conservation with Social Justice in the Twenty-first Century*, Brechin, S.R., P.R. Wilshusen, C.L. Fortwangler, and P.C. West, eds, State University of New York Press, Albany, NY: 251-270.

Brunner, R. D., and T. W. Clark. 1997. A practice-based approach to ecosystem management. *Conservation Biology*, Vol. 11 Issue 1, Feb '97. Blackwell Publishing.

Brunner, R. D., C. H. Colburn, C. M. Cromley, R. A. Klein, and E. A. Olson, eds. 2002. *Finding Common Ground: Governance and Natural Resources in the American West.* Yale University Press, New Haven, CT.

Brunner, R. D., T. A. Steelman, L. Coe-Juell, C. Cromley, C. Edwards, D. Tucker, 2005. Adaptive Governance: *Integrating Science, Policy, and Decision Making.* Columbia University Press, NY, NY.

Brunner, R. D. 2004. Context-sensitive monitoring and evaluation for the World Bank. *Policy Sciences* 37: 103-136.

Brunner, R. D. 2005. Personal communication.

Burch, William R. 1971. *Daydreams and Nightmares.* New York: Harper & Row.

Burke, Kenneth. 1954. *Permanence and Change.* Los Altos: Hermes Publications.

Burke, Kenneth. 1955. *A Grammar of Motives.* New York: Braziller.

Burke, Kenneth. 1960. *Attitudes Toward History.* Boston: Beacon Press

Cassirer, Ernst. 1944. *An Essay on Man.* Garden City: Doubleday.

Clark, T. W. 1993. Creating and using knowledge for species and ecosystem conservation: Science, organizations, and policy. *Perspectives in Biology and Medicine* 36(3): 497-525 + appendices.

Clark, T. W. 1997. Civic professionalism: Meeting society's needs. In *Averting Extinction: Reconstructing Endangered Species Recovery.* Yale University Press, New Haven, CT: 208-223.

Clark, T.W. 2000. Developing policy-oriented curricula for conservation biology: Professional and leadership education in the public interest. *Conservation Biology* 15(1): 31-39.

Clark, T. W. 2002. *The Policy Process: A Practical Guide for Natural Resource Professionals.* New Haven: Yale University Press.

Clark, T. W. 1997. *Averting Extinction: Reconstructing Endangered Species Recovery.* Yale University Press, New Haven, CT.

Clark, T. W. 2001. *Myth and Justification.* Yale University, New Haven, CT.

Clark, T. W., Michael Stevenson, Kim Ziegelmayer, Murray Rutherford. 2001. *Species and Ecosystem Conservation: An Interdisciplinary Approach.* Yale School of Forestry & Environmental Studies Bulletin No. 105. New Haven, CT.

Chapin, M. 2004. *A Challenge to Conservationists.* World Watch. November/December 2004.

Debnam, B. 1998. The Magic of Myth. *New Haven Register,* Sunday Comics. March 29, 1998. New Haven, CT.

Diamond, J. 2004. *Collapse: How Societies Choose to Fail or Succeed.* Penguin, NY, NY.

Doob, L. W. 1995. *Sustainers and Sustainability: Attitudes, Attributes, and Actions.* Pralleger, Westport, CT.

Doremus, H. 2000. *The Rhetoric and Reality of Nature Protection: Toward a New Discourse.* Washington and Lee Law Review. Winter 2000, V57N1. Lexington, Virginia: Washington and Lee University: 11-73.

Dery, D. 1984. *Problem Definition in Policy Analysis.* University of Kansas Press, Lawrence, KS.

Dowie, M. 2005. Putting People Last: Big Conservation Groups are Failing Even as They Succeed. *Orion.* Nov/Dec 2005.

Flores, A., and T. W. Clark 2001. Finding common ground in biological conservation: Beyond the anthropocentric vs. biocentric controversy in *Species and Ecosystem Conservation: An Interdisciplinary Approach*, Yale School of Forestry & Environmental Studies, Bulletin 105: 241-252.

Giller, C. 2005. The environment's new bling. Editorial, *The Boston Globe*, April 21, 2005. Downloaded November 30, 2005 from http://www.boston.com/news/globe/.

Hesse, Mary, 1989. Models, Metaphors and Myths. Editorial. *New York Times.* October 22.

Jasanoff, S. 1997. "NGOs and the environment: From knowledge to action," *Third World Quarterly* 18(3): 579-594.

Kellert, S. R. 1993. "The Biological Basis for Human Values of Nature." In *The Biophilia Hypothesis*, E. O. Wilson and S. R. Kellert, eds. Island Press, Washington, D.C.

Kellert, S. R. 1996. *The Value of Life: Biological Diversity and Human Society.* Island Press, Washington, D.C.

Kitcher, P. 2001. *Science, Truth, and Democracy.* Oxford University Press, London.

Kuhn, T. S. 1962. *The Structure of Scientific Revolutions.* University of Chicago Press, Chicago.

Kuhn, T. S. 1977. *The Essential Tension: Selected Studies in Scientific Tradition and Change.* University of Chicago Press, Chicago.

Lasswell, H. D. 1971. *A Pre-View of Policy Sciences.* American Elsevier Publishing Co., NY.

Levi-Strauss. C. 1982. *The Ways of the Masks.* S. Modelskiu, trans. Seattle: University of Washington Press.

Little Bear, L. 2000 "Foreword" in Cajete, G., *Native Science: Natural Laws of Interdependence.* Santa Fe, New Mexico: Clear Light Publishers.

Lopez, Barry. 1986. *Arctic Dreams – Imagination and Desire in a Northern Landscape.* New York: Bantam Books.

Lyons, O., J. Mohawk, V. Deloria Jr., L. Hauptman, H. Berman, D. Grinde Jr., C. Berkey, and R. Venables. 1992. *Exiled in the Land of the Free: Democracy, Indian Nations, and the U.S. Constitution*. Clear Light Publishers, Santa Fe, New Mexico.

Malinowski, Bronislaw. 1948. *Magic, Science and Religion*. Garden City: Doubleday.

Mann, Charles C. 2006. *1491. New Reelations of the Americas Before Columbus*. New York. Vintage.

Maturana, H.R., and F.J. Varela. 1998. *The Tree of Knowledge: The Biological Roots of Human Understanding*. Shambhala, Boston.

Meffe, G. 1997. Biodiversity and base values. *Oryx* 31(2): 78-80.

Merriam-Webster. 2004. *Mirriam-Webster's Collegiate Dictionary*, Eleventh Edition, Mirriam-Webster, Incorporated, Springfield, MA.

Neumann, Roderick P. 1998. *Imposing Wilderness – Struggles Over Livelihood and Nature Preservation in Africa*. Berkeley: University of California Press.

O'Riordan, T., and S. Stoll-Kleemann. 2002. "Deliberative democracy and participatory biodiversity." Chapter 5 in: O'Riordan, T. and S. Stoll-Kleemann, eds. *Biodiversity, Sustainability, and Human Communities*. Cambridge University Press, London: 87-113.

Perry. W.A. 1985. Different worlds in the same classroom: Students' evolution in their revisions of knowledge and their expectations of teachers. *On Learning and Teaching* (May): 1-17.

Putnam, R.D. 2000. *Bowling Alone: The Collapse and Revival of American Community*. Simon & Schuster, New York.

Roosevelt, T. 2005. "Why is Rural America at Loggerheads with the Environmental Movement?" *Patagonia*, January 2006.

Sagan, C. 1987 lecture: "The Burden of Skepticism." Cited in Shermer (below.)

Sagan, C. 1997. *Demon-Haunted World: Science as a Candle in the Dark*. First Ballantine Books, NY, NY.

Schaaf, G. 2004. *The U.S. Constitution and the Great Law of Peace: A Comparison of Two Founding Documents*. CIAC Press, Santa Fe, New Mexico.

Scheuer, J., and T. W. Clark. 2001. Conserving biodiversity in Hawaii: What is the policy problem? in *Species and Ecosystem Conservation: An Interdisciplinary Approach*, Yale School of Forestry & Environmental Studies, Bulletin 105: 159-184.

Schon, D.A. 1983. *The Reflective Practitioner: How Professionals Think in Action*. Basic Books, NY, NY.

Scott, J.C. 1998. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed.* Yale University Press, New Haven and London.

Shellenberger, M., and T. Nordhaus, 2004. *The Death of Environmentalism: Global Warming Politics in a Post-Environmental World.* The Strategic Values Project, CA.

Shermer, M. 2002. Skeptic: The Exquisite Balance. *Scientific American Magazine*, May 2002.

Shils, E. 1997. *The Virtue of Civility: Selected Essays on Liberalism, Tradition, and Civil Society.* Liberty Fund.

Sidaway, R. 2005. *From Conflict to Consensus: Resolving Environmental Disputes.* Earthscan, London.

Stokes, D. E. 1997. *Pasteur's Quadrant: Basic Science and Technological Innovation.* Brookings Institution Press, Washington, D.C.

Westrum, R. 1986. "The blind eye of science: Every system of knowledge is also a system of ignorance." *Whole Earth Review*, Fall: 36-41.

Westrum, R. 1994. An organizational perspective: designing recovery teams from the inside out, in T.W. Clark, R.P. Reading, and A.L. Clarke, eds. *Endangered Species Recovery: Finding the Lessons, Improving the Process.* Island Press, Washington, D.C.: 327-349.

Williams, T. 2005. "Guns & Greens." *Audubon Magazine* January 2005.

Wilson, E. O. 1986. *Biophilia: The Human Bond with Other Species.* Harvard University Press. Boston, MA.

Wilson, S. M. 2003. *Conservation on the Edge: Recovering Grizzly Bears Across Contested Landscapes.* Northern Rockies Conservation Cooperative NEWS. Autumn 2003,16: 3-5.

Appendix: The Story of the Yale Seminar Course

This publication was distilled from the exploration of a semester-long graduate course at the Yale School of Forestry & Environmental Studies. A course on "Local Knowledge in Conservation and Land-Use Planning" was conceived by graduate students Victoria Critchley and Kim Wilkinson in the fall of 2004. The origin of the course began with these two students – an Australian (Critchley) who had been working with Aboriginal land rights, an American (Wilkinson) who had been working with traditional Hawaiian resource management. The two professors, one a social ecologist (Burch) and the other a wildlife biologist and policy scientist (Clark) were keenly interested in the subject and both had worked with local peoples and professional experts in over a dozen countries. We four publicized what we were planning to the student body. On receiving great interest, we organized a graduate-level course to explore how to bridge multiple paradigms of practice, understandings of nature, our place in it and use of it, for effective discourse and problem-solving in the common interest. Student meetings discussed what the course should cover and drew a large number of supporters who shared an interest in the theme of the seminar. We focused on how conventional Western professionalism interacts with local people and their expertise.

SEMINAR COURSE DESCRIPTION

The official course description and goal was:

> "Local ecological knowledge, deeply rooted in a strong sense of place, can help sustain and even restore healthy ecological and human communities. However, the people who possess this knowledge, whether First Nation natives, inner city gardeners, rural ranchers, or local people anywhere in the world, are too often excluded from scientifically-based conservation and sustainability efforts and paradigms, and by top-down, bureaucratic decision making processes. This seminar is designed to explore this problem and cultivate the ability to overcome differences in worldviews, values, and practices across these diverse peoples. We want to recognize, honor, learn from, and collaborate with local people who have a deep knowledge of place to find common ground."

We sought to:

- Overcome boundaries separating professional and local knowledge, including examining conditions behind historical exclusion of local people and their knowledge in conservation and sustainability efforts. This included appreciating the importance of values and myths in the development of an effective integrative conservation agenda, with enhanced human dignity as an overriding goal.

- Find practical strategies for improved mutual learning and shared problem solving through creative conservation processes that are open, inclusive, contextual, equitable, timely, comprehensive, and fair.

- Become more skilled problem solvers and learners ourselves so that we are able to build partnerships in the common interest focused on cultivating a deeper connection to place within our communities and ourselves.

STUDENTS AND PERSPECTIVES

The master's, doctoral, and law student participants from 12 countries had diverse backgrounds in social sciences, biological sciences, and law. Many had experience with non-governmental, private, and governmental organizations. The group committed itself to exploring challenges of local and indigenous people's "expert" knowledge in conservation and land use management and its relationship to university-trained or "professional" knowledge. Because the problem existed at the nexus of different worldviews, our own version of professionalism must be considered part of the problem. So we looked at ourselves too. Thus, participation in the course required a willingness to question ourselves and examine our own beliefs and values. Key to our explorations was direct, personal interactions with our guest speakers from different cultures with varying perspectives on nature and humans, professionals and local experts, and myths and values.

COURSE FORMAT

Students met weekly on Thursday afternoons from January 13 through April 28, 2005. The four course organizers facilitated interactions and discussion. Guest speakers invited for the seminar presented for about an hour and a half, followed by a half-hour discussion and questions. In one case, the guests spent three days with the class. In another case, the guest spent six hours with students. Students, professors, and guests were invited to a student's home for dinner after the seminar, allowing dialogue to continue in a more open, informal setting. Each student wrote a one-page summary of each speaker that reflected key lessons learned.

GUEST SPEAKERS/SHORT SUMMARIES OF THEIR PRESENTATIONS

Gil Inoach Shawit, Cofounder of la Coordinadora Permanente de los Pueblos Indígenas del Perú and a native representative with Concertación

entre el Estado y Pueblos Indígenas para la creación de la Comisión Nacional de Pueblos Andinos, Amazónicos y Afroperuanos (CONAPA), shared a traditional story from his childhood. It was the legend of *Nungkui*. On the surface, the narration described a girl who could magically produce abundance for her village, but when the girl was abused by other children, she disappeared. Although the villagers tried to get a baby the girl had left behind to produce, it was too young to produce for them, and so the people were hungry and had to work very hard to survive. Gil pointed out how this story communicated important lessons about caring for the earth, and the soil, and the consequences of abuse. He pointed out the convergent evolution of his culture's beliefs as reflected in this story, and that of soil scientists. Despite being expressed in very different ways and achieved through a different path, his culture and scientists could fully agree in practice to conserve soil. Gil then led a discussion into the challenges of ensuring that environmental organizations respected local traditional environmental approaches and related their messages to the social structure of his community.

Gil Inoach Shawit
Cofounder
La Coordinadora Permanente de los Pueblos Indígenas del Perú
c/o Calle Zamora 908
Yurimaguas
Perú

Susan Morse has been tracking and interpreting wildlife uses of habitat for thirty years. In 1994 she founded Keeping Track®, where she is now the program and research director. She is also known for her superb wildlife photography. She spoke of Keeping Track's mission to inspire community participation in the long-term stewardship of wildlife habitat. This includes teaching adults and children to observe, interpret, record and monitor evidence of wildlife habitat in their communities, and supporting the use of monitoring data by citizens in local and regional conservation planning. The programs build community by involving people from all walks of life. Susan also discussed opportunities and current barriers to including the kinds of knowledge collected by citizen groups such as Keeping Track chapters in conservation processes.

Susan Morse
Director
Keeping Track, Inc.®
PO Box 444
Huntington, VT 05462
http://www.keepingtrack.org/

Domingo Medina, Investigator with the Asociación Venezolana para la Conservación de Areas Naturales (ACOANA), Venezuela, described his work with indigenous groups in his country, particularly regarding the nexus of science, research, and local knowledge. He examined the challenges of commodifying local knowledge, what that means, and the dangers of extracting knowledge and facts without comprehending the larger context of a culture's ethics, worldviews, and cultural viewpoint. "What is your role as an environmental professional?" was a key challenge from Domingo.

Domingo A. Medina
Investigador, Ecotonos/
Asociación Venezolana para la Conservación de Areas Naturales (ACOANA)
496 Whitney Ave Apt 3C
New Haven CT 06511

Roger Sidaway led an intensive, experiential workshop on resolving environmental disputes, using examples from his many and varied professional experiences. These were as diverse as urban planning in Scotland, forest resource management in Northern Maine, and resolving

Roger Sidaway
Independent Research and
Policy Consultant
Honorary Fellow, The University
of Edinburgh
Board Member, Scottish
Mediation Network
4 Church Hill Pl.
Edinburgh, Scotland EHO4BD
United Kingdom

resource disputes in Afghanistan. He pointed out some of the ways academically trained people unknowingly insult or discredit local knowledge and the people who share it, for example, by dismissing information shared in a meeting by a local fisherman as "anecdotal" (a term Roger now doesn't allow when he is working on conflict resolution). Roger walked students through the process of mapping out a fuller context of problems, including questioning which stakeholders were included in the problem-solving process, and challenging students to look at who is being excluded. He discussed and had students practice ways to build consensus instead of escalating conflicts.

Mac Chapin
Director
Center for the Support of
Native Lands
3503 13th Street North
Arlington, VA 22201
www.nativelands.org

Mac Chapin, Director, Center for the Support of Native Lands and author of *A Challenge to Conservationists* (2004) came to speak about his first-hand experiences of the disconnect between indigenous needs and rights and the large-scale conservation agenda forwarded by big nongovernmental organizations. Personal and institutional issues were discussed, as well as more viable futures for conservation planning.

Jake and Judy Swamp. For more than thirty years Chief Swamp has been a Mohawk sub-Chief and representative on the Grand Council of the Haudenosaunee, Iroquois Confederacy: Mohawk, Oneida, Onondaga, Cayuga, Seneca, Tuscarora. He and Judy are also founders of the nonprofit Tree of Peace Society. The Society builds cross-cultural understanding between Native and non-Native people, works tirelessly to preserve the culture and languages of the Haudenosaunee, and helps communities of the Iroquois people by bridging cultural differences — in the spirit of respectful dialogue and collective action — in addressing environmental and social problems. The Swamps facilitated students in a three-day immersive workshop on Respectful Cross-Cultural Dialogue. Challenging assumptions of historical and contemporary issues through stories, dialogue, and critical reflection, the workshop explored, "How can we communicate a shared relationship with nature that transcends social and cultural distinctions?" Many students later cited experiences during the three-day event as moving, powerful, life-changing, and transformative of the trajectory of their personal and professional relationship with nature and with other people.

Jake and Judy Swamp
c/o Tree of Peace Society
326 Cook Road
Hogansburg, NY 13655
http://www.treeofpeacesoci-
ety.info/

The experience of meeting guests, learning their viewpoints, and hearing details of their lives made a deep impression on course participants.

WRITTEN ASSIGNMENTS

The course required students to work in small groups to research and write a group paper focusing on practical lessons and guiding principles for professional-local knowledge integration. Each group used case studies that they had worked on in the past to reflect and gain insights into their experiences. Topics included:

- Local Knowledge and Biodiversity

- Economy and Local Knowledge

- Myth and Knowledge

- Challenges of Professional Practice

- Participatory Governance: Local Knowledge and Governance in Conservation Settings

- Local Knowledge in the Policy Context

STUDENT EVALUATIONS

Student feedback about the course was highly favourable. Many students reported that the experiences provided them with new perspectives from which to approach their own work and conservation planning and policy actions in the future. They also reported a greater awareness of their own biases as well as their own professional epistemology, myth and values, and roles in society. Comments from students about aspects of the course included:

- "Extremely helpful."

- "Excellent."

- "This course is the nexus of all the work I am doing. Few other courses here touch upon these issues."

- "Extraordinary. I can't imagine another course that could pull in the same range of speakers – including indigenous leaders without formal academic credentials and yet with a rich and deep knowledge. This course was an excellent complement to my coursework."

- "Now I have more questions than answers, but that's valuable in itself."

- "This course fit into my overall program in understanding the conservation challenge."

- "Really highlighted the importance of involving local communities in conservation and made it really tangible. Learned much from different experiences and perspectives."

- "A great experience."

- "The act of listening is one of the greatest signs of respect that anyone can offer. All of these implications of the concept of listening came through."

- "Most United Nations and world summits have objectives to revive our roots. The recognition of the indigenous people and knowledge has become the accepted solution to most of our environmental problems . . . I believe we need to be good listeners who are able to translate the stories and reach our ultimate goal of living with the environment in harmony."

- "A truly unique experience."

- "A wonderful opportunity."

- "In order to protect local knowledge and to preserve unique cultural identities, we must learn to appreciate that all systems of thought . . . offer value both as functional bodies of knowledge and as guidance to individuals and peoples in search of personal and community discovery."

- "A powerful, direct experience."

- "Mutual respect made me feel very optimistic about the interplay between local and professional knowledge."

- "An interesting and rewarding experience."

- [I gained] "a genuine respect for a kind of intelligence that seemed to exist in a whole different realm from my own accustomed way of learning."

- "One of my best times at Yale."

The course helped lay the groundwork for a lifelong process of continued learning, improved professionalism, and commitment to integrating professional and local knowledge in adaptive ways.

BIOSKETCHES OF AUTHORS

Kim M. Wilkinson is an author of several books on ecological restoration and cultural renewal, including *Agroforestry Guides for Pacific Islands* (2000), *Growing Koa: A Hawaiian Legacy Tree* (2003), *Nursery Manual for Native Plants: A Guide for Tribal Nurseries* (2007), and *Roadside Revegetation: An Integrated Approach to Establishing Native Plants* (2007). She has over thirteen years of experience working with restoration, including ten years as a land use planner, farmer, and native plant grower in Hawaii. Her work in Hawaii focused on applying traditional Polynesian agroforestry practices to sustainable farm and forestry planning. She continues to specialize in bridging multiple streams of knowledge and re-initiating natural processes in challenging conditions. She has worked and studied in the Pacific Islands, Bhutan, Ecuador, England, Costa Rica, Mexico, Ireland, and the Pacific Northwest. She holds a B.A. in Anthropology and Human & Natural Ecology from Emory University (1991), and a Master's degree in Environmental Management (2006) from the Yale School of Forestry & Environmental Studies. She currently lives in Washington State and works as a consultant, writer, and wilderness guide.

kim.m.wilkinson@gmail.com

Susan G. Clark is the Joseph F. Cullman 3rd Professor (Adjunct) of Wildlife Ecology and Policy Sciences in Forestry & Environmental Studies and fellow in the Institution for Social and Policy Studies at Yale University. Her principal interests are interdisciplinary problem solving, decision making, governance, policy process, leadership, conservation biology, organization theory and management, natural resources policy, and the policy sciences. She focuses her work on professional education and skill training for leadership, professionalism, and problem solving. She just completed *Ensuring Greater Yellowstone's Future: Choices for Leaders and Citizens* with Yale University Press. She has received various awards, including the Outstanding Contribution Award from the U.S. Fish and Wildlife Service, the Presidential Award from the Chicago Zoological Society, Denver Zoological Foundation Conservation Award, and Best Teacher from the students at the Yale School of Forestry & Environmental

Studies. She is also a member of three species survival commissions of the IUCN-World Conservation Union. She was board president of the Northern Rockies Conservation Cooperative in Jackson, Wyoming for almost twenty years and is now on the emeritus board. She is on the Executive Council of the Society for the Policy Sciences. She has written over 350 papers, many on interdisciplinary problem solving.

Her most recent books and monographs include *Averting Extinction: Reconstructing Endangered Species Recovery* (1997), and *Carnivores in Ecosystems: The Yellowstone Experience* (co-edited), *Foundations of Natural Resources Policy and Management* (co-author, 2000), *The Policy Process: A Practical Guide for Natural Resource Professionals* (2002), *Conservation and Development in the Condor BioReserve, Ecuador* (co-author, 2004), and *Coexisting with Large Carnivores: Lessons from Greater Yellowstone* (co-author, 2005). Current projects focus on large carnivore conservation in western North America, polar bear and native peoples coexistence in Canada, and others.

susan.g.clark@yale.edu

William R. Burch, Jr. is the Hixon Professor of Natural Resource Management at the Yale School of Forestry & Environmental Studies; BS, MSc, University of Oregon; PhD (1964) University of Minnesota; MA (hon) Yale University (1976). He has taught at University of Minnesota; University of Missouri, Victoria University of Wellington, New Zealand, Syracuse University, Yale University, Kasetsart University of Bangkok, Thailand; Institute of Forestry, Tribhuvan University, Pokhara, Nepal; School of Economics and Management, Beijing Forestry University, China.

He has had research or management appointments with the U.S. Forest Service, U.S. National Park Service, Connecticut Department of Environmental Protection, and USAID. He was the first Director of the Yale Tropical Resources Institute and the first Director of the Yale Urban Resources Initiative. In addition to community-based work in Baltimore, Philadelphia and New Haven, he has worked on institution development and community based resource management projects in a variety of countries – PR China, Nepal, Bhutan, Thailand, Costa Rica, Argentina, Bolivia, Paraguay, India, Bangladesh, Philippines, Taiwan, Myanmar (Burma) and Peru.

He was a co-PI, 1997-2006, with the Baltimore/Chesapeake NSF-LTER, one of two human-dominated ecosystem sites for long term research efforts (out of the total of 25 in the USA). He was PI of the Fairmount Park five-year (1998-2002) restoration monitoring and evaluation project covering five stream valley park systems in Philadelphia, PA. He has been involved in community-based urban ecology, urban forestry and natural resource research, planning and management since the 1960s in New Zealand, North America and Britain. He helped to organize the first U.S. Forest Service national conference on "Cities, Children and Natural Resources" in 1974.

judithhburch@cs.com

Cover Photo Captions/Credits

Top Row, left to right

1) A group of farmers discussing forest management in Nepal. Photo by Bhishma Subedi.

2) Farm women, paddy rice, and wild nature in Nepal. Photo by Quint Newcomber

3) Two youths in Yaxcaba, Yucatan, Mexico, carrying home the nest of a wasp species whose edible larvae are a sought-after delicacy, prepared by roasting over a fire. Photo by John Tuxill.

4) A bridge in Bhutan connecting land, water, and the sacred places. Photo by Quint Newcomer

Second Row, left to right

5) Don Victor Cob Cuxin, expert beekeeper, standing next to an apiary of Melipona beechii stingless bee hives in Yaxcaba, Yucatan, Mexico. These bees are kept in hollow logs sealed at the ends rather than in standard beehives. This apiary began through a collaborative project of the Mexican government to revitalize traditional stingless beekeeping in Mayan communities of Yucatan. Under the guidance of Don Victor, this apiary has grown in size to become one of the largest collections of stingless bees remaining in Yucatan. Photo by John Tuxill.

6) Preparation of special maize breads in Yaxunah, Yucatan, Mexico as part of a Mayan ceremonial offering in honor of stingless bees (Melipona beechii). This day-long ceremony is officiated by a Mayan religious leader (j-meen) and is traditionally held to ensure an auspicious harvest of honey. Each small round hole in the surface of the breads represents the entry hole to a stingless bee hive. Photo by John Tuxill.

7) A team of university researchers and local farmers surveys the biodiversity of a swidden field (milpa) in Yaxcaba, Yucatan, Mexico. Photo by John Tuxill.

8) Stalking bobcat kitten, whose habitat has been conserved due to monitoring by Keeping Track®. Photo by Susan Morse.

Third Row, left to right

9) Students learn to harvest cedar bark from a Western Red Cedar tree (*Thuja plicata*) that fell during a storm in Issaquah, Washington. Western Red Cedar is known as the "tree of life" for many coastal people in the Pacific Northwest. Here, the bark is to be used for basketry. Photo by Karen Sherwood, Earthwalk Northwest School of Primitive Living Skills.

10) Bill Burch and professional colleagues from ANSAB (Asian Network for Sustainable Agriculture and Biodiversity) high (12,000 ft) in the western mountains of Nepal, where 12 rural villagers have paid employment working for a community forestry group manufacturing handmade paper. The paper is made from a process that uses daphane plants and the quality of the product is so good that, although it is hauled by mule to a roadhead two days away, the company still makes a profit. The discussion was about trials to see if the plant can be produced in a more controlled and sustainable way. From Bill Burch: "It is interesting that this discussion was conducted during a period when the Maoists were in control of the Western Region. The country was at war and here we were all concerned about entreprenurial skills, marketing, jobs and stewardship . . . as if the outside difficulties did not matter." Photo by Bhishma Subedi.

11) Students practice spearfishing for carp in a pond in eastern Washington. Photo by Frank Sherwood, Earthwalk Northwest School of Primitive Living Skills.

12) An all-woman community forestry group in far western Nepal explaining their practices to visiting professionals. Photo by Bhishma Subedi.

Fourth Row, left to right

13) Classroom in China. Photo by Gary Machlis

14) Market in Ecuador. Photo by Gary Machlis

15) Don Victor Cob Cuxin in the process of collecting a wild hive of stingless bees in Yaxcaba, Yucatan, Mexico. After locating and opening the hive in the forest, he places the bee brood, wax, and honey into a specially prepared length of hollow log. He then seals the log and will leave it adjacent to the wild hive for 24 hours, so the adult bees have time to enter the log and resume their normal activities. Subsequently he will transfer the hive and the bees into his apiary. Photo by John Tuxill.

16) Part of a Keeping Track® team doing wildlife habitat monitoring in Northern Vermont. Photo by Susan Morse, Keeping Track, Inc.

**Yale School of Forestry
& Environmental Studies**
PUBLICATION SERIES

205 Prospect Street
New Haven, Connecticut 06511
USA