Collaborative conservation in practice: Current state and future directions

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Introduction

(Authors' note: this paper is a work in progress and we welcome all suggestions and comments)

About thirty years ago, diverse groups around the world began experimenting with different approaches to conservation in local landscapes and local communities. From this experimentation grew community-based conservation (CBC) and community-based natural resource management (CBNRM), which are practiced widely in many countries in the world. In the US, ecosystem management evolved, which broadened the scope and scale of conservation issues to include adaptive management of whole ecosystems and their included human communities (Meffe et al. 2002). As collaboration of diverse groups of stakeholders became more of a focus of conservation efforts in the US, scholars and practitioners of environmental conflict resolution started shaping the process of these efforts, especially when they involved conflict (Scharf 2002, Firehock in press). Some of these scholars and practitioners began to use the term 'collaborative conservation' (Conley and Moote 2001, Snow 2001) or 'community-based collaboratives' to describe these efforts (Dukes et al. in press). This paper will explore the background to collaborative conservation in the US, and its sisters in community-based approaches outside the US, and will discuss the current status and future direction of collaborative conservation, both in the US and more broadly in other countries.

One particular emphasis of collaborative conservation is the use of collaborative process to bring together stakeholders to negotiate access and use of natural resources. Some scholars emphasize this part of collaborative conservation, suggesting that collaborative conservation is different from other approaches to governance because of its focus on a particular types of *processes*, but not on particular *issues* (Snow 2001). Thus, collaborative conservation has significant value for its emphasis on conflict resolution and management.

In this paper, we support this notion of the importance of the *process* of collaboration in conservation as one way to bring together diverse views to construct lasting decisions on how to govern the environment. We propose that this process is important not only for conflict management, but for surfacing cross-cultural ways of knowing that will ultimately redefine the very essence of conservation *issues.* We further propose that collaborative conservation also widens the scope and scale of those redefined issues to include some of our most difficult and complex environmental governance and human development *issues* (cf Snow 2001). These issues include how to balance, or account for, the trade-offs (and build on synergies) in attempting to achieve broad sustainability goals that promote the cultural, economic, and political development of people in concert with conservation of the environment. By nature, once diverse interests come to the table and agree to collaborate, these trade-offs and synergies often become the heart (and sometimes the heat) of the discussion and, ultimately, the focus of action on the ground. In addition, in contrast to Firehock (in press) and others, we suggest that collaborative initiatives that focus on natural resources not only apply to public lands in the US, but

ways of owning and governing land, water, air and other natural resources in countries around the world. We also propose, like Dukes (in press), from a practical perspective, that collaboration on these difficult issues is one promising way to build the resilience and integration of human and natural communities in the face of the tremendous changes we see looking forward in the 21st century.

An evolving definition of collaborative conservation

Barbara Gray defines collaboration as 'a process through which parties who see different aspects of a problem can constructively explore their differences and search for solutions that go beyond their own limited vision of what is possible' (Gray 1989), p. 5. Su Rolle, when serving as a liaison for the US Bureau of Land Management and Forest Service, worked with an Oregon watershed group called the Applegate Partnership and defined collaboration this way: collaboration is 'a kind of awkward dance that none of us knows the steps to' (Wondolleck and Yaffee 2000), p. 64.

A traditional definition of conservation can be found in the Oxford English Dictionary as: '…the preservation or restoration of the environment and wildlife.' Here, we prefer a broaden this definition of conservation by following Aldo Leopold's thinking; conservation is the act and art 'of living on the land without spoiling it' (Leopold 1938) in (Meine 1995). Leopold writes again: '…conservation that works is conservation that works well for both people and the land. Actions that benefit one at the expense of the other are not conservation, they are something else' (Knight 2007). Leopold's definition, particularly the second one, includes the well being of people, which we think is particularly important and appropriate when 'conservation' is joined with the word, 'collaboration'.

Given these two definitions of collaboration and conservation, we offer here our evolving definition of collaborative conservation as:

> *Collaborative conservation is the process of creating a sustainable future for peoples and places by inviting diverse and inclusive groups of stakeholders to jointly solve problems through collective learning and action.*

Collaborative conservation as an environmental governance model

Collaborative conservation is one term for a model of environmental governance that uses stakeholder collaboration as one of its primary tools. Other terms include *community-based collaboratives* (Dukes et al. in press), *ecosystem management* (Meffe et al. 2002), *community-based natural resource management* (Child and Barnes 2010), *community-based conservation* (Berkes 2004), and other terms (see Appendix 1 for evolution of governance regimes). Many of the terms used to describe forms of collaborative governance emphasize a particular level of organization (community)

which then implies a primary focus on local landscapes, airsheds, seascapes or stretches of a river.

In the US, collaborative conservation started as specific collaborations involving public land managers, communities and other groups of stakeholders, often in forested ecosystems (Dukes et al. in press, Firehock in press). Some scholars suggest this is a phenomenon unique to the US (Firehock in press). We agree that there are some aspects of collaborative conservation, as practiced in the US, that differ from community-based efforts to manage natural resources in other countries (Figure 1). Generally, strong private property regimes, like those in much of the US, mean that local actors have more voice in land management decisions, than in situations, like in Africa and Asia, where people use land owned by the government or owned in common by a group. However, even in the US, many collaborative efforts involve public land that is used by ranchers through grazing leases, for example, and thus empowering local voices is still a concern. In the US, because of centuries-old tradition of democratic governance (Firehock in press), US citizens also have a strong expectation to have a voice in public decisions, including those on public lands.

Figure 1. Contrasting focus of US collaborative conservation initiatives and community-based natural resource management (CBNRM) initiatives in the developing world.

By contrast, many community-based efforts in Africa, for example, were often initially driven by national or international concerns over conservation, which have deep roots in the colonial past (Neumann 1995, 2002, Nelson 2010). Some of these efforts have evolved, in the last two decades, into efforts with significant community control, with a strong focus on political empowerment and land rights (Reid et al. 2009, Nelson 2010). In addition, in some African countries, local communities do not have a long tradition of democracy and thus have less ability to influence the decisions of powerful central governments about land and natural resources.

Despite these differences, we think that collaborative conservation, as practiced in the US, is close enough in practice to community-based approaches in other countries to suggest that collaborative conservation is a global phenomenon. Further, we propose that this concept applies more broadly to: 1) the diversity of earth ecosystems including forests, grasslands, wetlands, deserts, mountains, the sea, rivers, lakes and others; 2) a diverse range of ecosystem services (like water, biodiversity, energy, food, minerals, carbon, timber, fish, game), 3) a broad range of human land uses like rangelands, farmlands, community gardens; 4) scales from local to regional to global, 5) most conceivable combinations of different types of stakeholders; and 6) a wide range of resource ownership types (private, public, communal, etc).

A core difference between collaborative conservation and other forms of environmental governance is its focus on the diversity and extent of participation of interested stakeholders. In the most simple case (Figure 2), with only two types of types of decision makers (in this case, central government and local communities), collaborative conservation lies on a continuum of participation, somewhere in the collaborative space between these two stakeholders. Many collaborative initiatives involve much more diverse sets of stakeholders, but the point remains the same: collaborative conservation attempts to be widely inclusive, even actively recruiting stakeholders who often do not participate in decision making.

Figure 2. Simple schema of the levels of participation of central government and the public (here, local communities) in environmental governance (we are grateful to Maria Fernandez-Gimenez for an earlier version of this schema).

But this schema is far too simplistic. Participation in collaborative conservation has emerged amidst a shift (in the ecological sciences and beyond) from focus on individual parts of social-ecological systems (like elephants or household incomes) towards a

systems perspective of integrated social-ecological systems (Berkes 2004). The complexity inherent in such coupled systems calls for diverse stakeholder participation, often across scales. (Berkes 2007) advocates that participation at the local or community level be part of a pluralistic and multi-level approach to conservation that "involves networks and linkages across various levels of organization," (p. 15188). Community-based collaboration, at the most local scale, is often a wise entry point to finding solutions to complex resource issues for the purposes of legitimacy, strengthened civil society, adaptive capacity, and other associated values discussed throughout this paper (Dukes in press).

Importantly, most collaborative conservation efforts attempt to go well beyond traditional conservation goals to include a wide range of social, economic and cultural goals as well. For example, the Diablo Trust, in northern Arizona, is a collaborative effort of ranchers; federal, state and local land managers; university researchers; environmental activists; and concerned citizens (Muñoz-Erickson et al. 2010). The land is used for cattle grazing, recreation, fishing, hunting, wildlife management, firewood and watershed protection. The goals of Diablo Trust include landscape conservation but also quality of life, good relations among stakeholders and continued production of beef and firewood from the land (Diablo-Trust 1999). In east Africa, the community-based Kitengela Land Leasing Program promotes a win-win by encouraging landowners to keep land open for both livestock and wildlife grazing (Nkedianye et al. 2009). This program pays pastoral households to keep fences down and collect poachers' snares; payments are sufficient to double the income of poor families in the difficult dry seasons when livestock incomes are low. Thus collaborative conservation is not only an environmental governance model, it is a model for civic action on issues that involve human development issues.

This broadening of goals to include social, economic, cultural (and other) goals implies that the word 'conservation' should be replaced by a broader word that includes the notion of sustaining cultures and society, like 'sustainability'. But because of the broadness of the word, sustainability, we prefer instead to use the word, conservation, and broaden its meaning, as we did above.

Why do (or not do) collaborative conservation?

What motivates people to *do* collaborative conservation? We think groups come together to collaborate on conservation action both because of the *process* of collaboration and with the *issues* of conservation addressed. On the process side, intractable conflict can drive stakeholders to try a new, less adversarial, process of deliberation. In many (but not all) cases, the collaborative process involves wider and more inclusive participation and an empowering of more local and diverse voices (Firehock in press). As Karen Firehock explains, collaborative groups:

> *'are seeking to change the power dynamics of a system that for too long has failed to provide adequate arenas for informed dialogue, debate, and deliberation, in which values can be recognized and discussed… These groups are proliferating*

across the United States because communities have come to realize that the only way to understand complex issues, to have local knowledge considered, and to tackle the intricate socioecological problems they face is to bring together disparate parties to work collaboratively toward a solution that all can live with.' (Firehock in press), pages not available)

On the issue side, in the last two decades, we have realized that many management issues must be tackled at least on the scale of whole ecosystems, landscapes or watersheds (Meffe et al. 2002). We also know that some issues must be addressed even more broadly at the regional or even global scale, across many ecosystems, landscapes or watersheds. Collaboration is one way to address the full complexity of the conservation issues we face and the connections among them.

The reason for this new and wider focus is that many of our natural resource problems cross both human-made and ecosystem boundaries. Even within a single watershed, our human habit of imposing a complex matrix of administrative or ownership boundaries creates problems when we want to sustain natural resources or processes that cross the entire watershed and beyond (Knight and Landres 1998). It is rare to have an entire watershed or airshed or ecosystem or landscape within one human ownership or management unit. Thus there is a mismatch of ecological and social boundaries (Cumming et al. 2006). These large-scale natural resources and associated processes are often 'flows' like fire, insect infestations, animal migrations, diseases, water, or air.

When these resources cross the human boundaries delineating rights of use, access or ownership, they become a common-pool resource, one that needs to be managed in a group or collective manner (Ostrom 1990, Agrawal 2003). Complexity occurs when these flows cross many boundaries of land owners or managers that have different goals, like public and private land. For example, in many western American or Canadian watersheds, water starts at the top of the watershed on land managed nationally or regionally by centralized governments and then flows down through a patchwork of public and private land, often owned and managed by a diverse set of people or organizations who manage land to different goals (Knight and Landres 1998). Thus, management of these types of resources is a joint affair and collaboration across those boundaries at larger scales can be one approach to span those boundaries.

But collaboration has the potential to span far more than just natural resource boundaries. The process of collaboration can span the social and psychological boundaries of people from different walks of life and different economic levels. It can span boundaries among stakeholders who prioritize their values in different ways, like environmentalists, land developers, mining companies, ranchers and government managers. It can bring together academics from different disciplines like economists, anthropologist, ecologists and engineers. In a single group, collaborative efforts can bring together people who are local and non-local, indigenous and non-indigenous, powerful and powerless, rich and poor, young and old, male and female. It can also span boundaries horizontally among peoples or organizations and vertically, among peoples or organizations in a hierarchy (Berkes 2004).

Some of these boundaries are especially difficult to cross and thus many collaborative efforts coalesce around a major threatening event that makes the differences among stakeholders easier to bridge. The clearest example is the regional-scale negotiation (and sometimes collaboration) that often occurs on long river systems around the world, where thousands of stakeholders use and affect the quality and quantity of water in that river for users downstream, which include innumerable individuals of millions of species including humans. Another example at the landscape-scale (and international scale) is the management of the 1.4 million-strong wildebeest migration in the greater Serengeti-Mara ecosystem of Kenya and Tanzania. This mass of animals walks from Kenya in the north through private ranches and farms, group-owned ranches, county-owned game reserve to Tanzania in the south a national park, a national conservation area, several national game reserves, pastoral village land and farmland (Sinclair and Norton-Griffiths 1979). When deforestation upstream reduces the amount of water available for wildlife and livestock in the dry season in the only perennial river flowing through the ecosystem, many stakeholders must come together to negotiate (and hopefully collaborate) to find a solution (Reid et al. in review).

Despite these motivations, collaboration is far from a conservation panacea, and there are many cases where it is neither needed nor appropriate. In the simplest cases, we think collaboration is not needed when the issue of concern is restricted in scale and does not cross human or ecological boundaries, or the conservation problem is not important enough to warrant the time and energy collaboration takes. Collaboration is not appropriate when there is no negotiation space and one side holds all the power (Snow 2001). Collaboration is also not appropriate when conflicts among stakeholders are intractable and stakeholders not ready to work together. And it is possible for collaboration to engender conflict, which is not necessarily negative, but can be.

Roots of collaborative conservation

Practitioners and scholars of collaborative conservation in north America trace its origins to conflicts over management of public lands involving federal agencies, private landowners and others over the last two decades (Wondolleck and Yaffee 2000, Snow 2001). While collaborative conservation in this form appears to be largely north American, collective (and negotiated) decisions about the use of natural resources on land by those with a ‘stake’ in their use is an ancient tradition in many cultures around the world. For example, in what is now the US, Native Americans negotiated and fought over the use of natural resources on land different tribes used in common for thousands of years before a national government was established. Private and exclusive (and non-negotiated) ownership and use of these lands is a product of the colonization of north America by Europeans, which was overlaid upon the older, more fluid use of land in common. Thus, in some ways, collaborative conservation is bringing old ways of governance into new settings, where collaboration is needed to bridge the boundaries imposed by people on landscapes by ownership. Appendix 2 shows a timeline of the evolution of the approaches to ‘knit’ landscapes back together in north America.

The conceptual roots of collaborative conservation today are multiple (Figure 3), which creates an interesting image of key concepts (see Appendix 3). We see broad philosophical and disciplinary roots to this work (Conley and Moote 2001) that include: participatory democracy, international development, ecosystem / adaptive management, landscape ecology, watershed management, political ecology, social justice, property rights, indigenous knowledge, ecological economics, environmental history, restoration ecology and others.

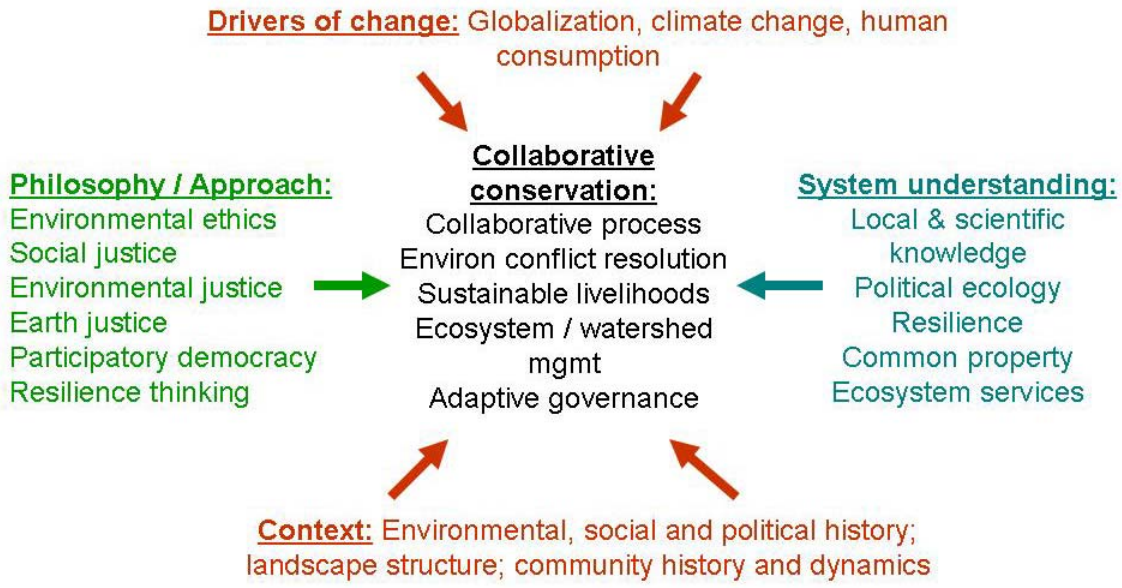

Figure 3. The roots of collaborative conservation come from different approaches and disciplines.

Collaborative conservation today

Given this definition, where are people doing collaborative conservation today? Even if we focus only at the community-level or watershed-scale, we know of no listing or count of these initiatives around the world. We suspect they exist in most countries of the world and address issues in most major ecosystems. If we narrow this further to only watershed-based partnerships, these are reasonably well documented in the US (Leach and Pelkey 2001). These groups exist in all 50 states (EPA 2011), including 72 groups in Colorado (CWA 2009), 50 in Montana (MWCC 2011), at least 304 in the states of Idaho, Washington and Oregon (Chaffin 2009). In addition to watersheds, there are groups that focus on rangelands (Cash 2001, McDonald 2002, Reid et al. 2009), farmlands (Koontz 2003, Taylor 2009), forests (Cheng and Mattor 2006), rivers, the sea (Davis 2011), and lakes. There are also regional coalitions that span large landscapes or water-scapes (Lee 2011), cross international borders on mountain chains (Raimer and Ford 2005, YTY

2011), cross multiple countries along coastlines (Ukwe and Ibe 2011) and many others (Table 1).

Diverse groups and individuals initiate collaborative conservation partnerships. Group initiators and facilitators include NGO's (Knight 2002, Knight in press), local government (Knight 2002), researchers and academics (Reid et al. 2009), national government, concerned citizens (Moseley 2001). Initiatives are often led by 'charismatic champions' who are deeply imbedded in their communities, who help a group create a collaborative vision. Some groups have informal or professional facilitators (or even third party neutrals), usually once they acquire some substantial funding. But, in our experience, most of the activities of the collaborative conservation initiatives are facilitated by community members with little formal training in negotiation or mediation.

Is collaborative conservation different when practiced in different environments such as forests, rangelands, watersheds or marine systems? We do not know of any comparative literature to answer this question. Our observations suggest that collaboratives based almost exclusively on common property resources, like ocean fisheries, are fundamentally different than partnerships based on a mix of individual and common property resources like a rangeland partnership that relies on both private and public land. Even those that work only with common property resources differ in how likely they are to be successful in creating groups that sustainably self organize for long periods. It is more likely that groups will be successful managing common property resources over the long-term if: 1) the group is working with a resource that is predictable (like forest, not fish / range), 2) the resource covers a smaller area, 2) the group agrees to clearly defined use rules, 4) most group members participate in decision making, 5) the group effectively monitors the resource, 6) the group has ways to manage conflict that are cheap and easy to access, and 7) the central government permits groups to organize (Ostrom 1990, 2009).

What else makes a collaborative process successful? Successful collaborative partnerships tend to have the following characteristics (Wondolleck and Yaffee 2000, Brick et al. 2001, Leach in press). They spend a lot of time talking with each other, building relationships and trust and learning from each other. They work best when they have a sense of place or community and they share their problems and fears with each other. This sharing can, over time, become some common ground to act together upon. Effective and enduring processes of interaction are important, like good facilitation, well-managed meetings, efficient organizational structures, and eventually, they institutionalize collaboration. In highly conflictual situations, third party neutral facilitators are important to carry out carefully crafted negotiations. It helps if groups take a systems or holistic view of the situation and focus on the problem rather than their personal positions on an issue. Successful groups address issues of power and strive to address inequalities. These groups work hard to turn 'I' and 'they' into 'we' and 'us' (Snyder 2009). Successful groups experiment with different approaches, learn, adapt and experiment again.

It is not clear (yet) whether collaboration reaches conservation goals more or less effectively than more traditional command-and-control or newer market-based

approaches to governance (Koontz and Thomas 2006). It is entirely possible, for example, that collaboration would improve social goals but worsen environmental ones. It is also difficult to connect collaborative action to change in a conservation outcome, partly because changes usually occur over the long term and it is difficult to disentangle the effects of collaboration from, for example, the effects of other actions, policies, or events. Collaborative groups often report on intermediate impacts like the number of conservation easements or agreements or meetings. But few measure real environmental outcomes like increased species populations, improved water quality or expansion of wildlife habitat.

Should initiatives in collaborative conservation be expected to reach the same conservation outcomes as other governance models? We think great care has to be taken to make sure the measures of success match the goals of the governance model. For example, we cannot expect a conservation collaborative to reach conservation goals that match or exceed those of a wildlife-only protected area because the former must balance conservation goals with social goals, while the protected area usually does not. If we so make this comparison, should we then ask if protected areas reach social, economic and cultural goals as well as conservation collaboratives do?

Despite this, we think it is important to continue to keep trying to achieve the elusive win-win-win of social, cultural and conservation outcomes, and even more important to understand the trade-offs and synergies among them. Even so, reaching all three goals will be rare (Berkes 2007, Child and Barnes 2010, Oldekop et al. 2010). Despite its difficult nature, we think self-organizing groups will continue to find ways to have a voice and a hand in determining the fate of their resources and the quality of their lives, as suggested by Dukes (in press). In order for CC to grow and evolve, the conversation needs to not only include the more direct questions of whether and how it works and but also careful scrutiny of its potential for contribution in different contexts, at different scales (particularly for common pool resources), and within larger frameworks of governance (Berkes 2007).

Then, how should CC efforts be evaluated? There are the usual evaluative metrics, such as goal attainment, case study comparison, and outcomes analysis. As mentioned above, if the goal is to evaluate outcomes, which outcomes are of most interest: environmental, socioeconomic, or process outcomes? (Conley and Moote 2003). While equal attention to all three is ideal, it has proved challenging (Shackleton et al. 2010). Koontz and Thomas (2006) suggest we now know that collaborative efforts can reach social and process outcomes and that the attention should now shift to evaluating their ability to reach the 'conservation' part of their mandates.

Finally, the style of evaluation used for collaborative conservation interventions must be able to cope with complexity. Evaluations (formative or summative) with an overly rigid focus on defined outcomes may miss valuable insights or emergent properties of the system. Particular attention should be paid to monitoring how the process itself changes over time. Such longitudinal observations may yield important lessons and help to incorporate adaptive management into collaborative processes (Shackleton et al. 2010).

Collaborative conservation: Strengthening participatory democracy?

One of the most notable and oft repeated virtues of collaborative conservation is its emphasis on social justice, equity and participatory democracy. The principles of participation at the heart of this form of environmental governance certainly do reflect ideals of participatory democracy and engaged citizenry. Civil society is in ascendance worldwide; speculation as to why seems to point to the role of globalization in diminishing the power of centralized authorities, meanwhile allowing diffuse networks of communication and shared knowledge (Berkes 2004, Innes and Booher 2004, Dukes in press). Highly resource-dependent rural communities in particular have much to gain from the empowerment that accompanies an active hand in managing their own resources.

It is not clear if collaborative approaches should be made part of institutional practice or remain in the more flexible and nimble world of ad hoc practice. Dukes (in press) suggest that institutionalizing collaborative governance will then support it. Specifically, he asks "is it worth developing the laws, regulations, agency structures, funding mechanisms, skills and capacities, evaluation procedures and norms and processes to grow and develop [collaborative governance] the right way?" (p.2). Brick (2001), on the other hand, expresses concern that by institutionalizing local collaborative processes, these groups will lose their ability to advise agencies and find innovative solutions to seemingly intractable disputes. An interesting topic for research might be whether or not intentionally redesigning institutional arrangements to be more adaptive, flexible and accommodating of collaborative initiatives shapes and encourages more meaningful democratic participation.

Cross-cultural ways of knowing

We think that collaborative conservation will only be a useful concept if it more deeply addresses cross-cultural ways of knowing. One part of this is developing a true sense of place, another is seeing the world through the eyes of many different cultures. This need to cross cultures also exists in science, as western science and indigenous science encounter one another, in conservation and more widely.

The power of place is understood and embraced differently by different peoples. Dr. Christine Black, an Australian Aborigine, believes that the land itself contains a law that is not portable from one place or country to another. The land is the law and the land is the source of all law. Judicial systems, on the other hand, are only half-law (Black 2011).

When Christine Black says that for the Australian Ngarinyin, the world is received and transmitted through direct communication with nature, she is talking about relationship and connection that differ from the customary western science perspective. The Australian Ngarinyin say that a relationship with nature is best achieved by listening to the elements of nature and receiving knowledge subjectively. Feeling, defined as the

sensing of primordial energy, is the relationship which constitutes law (Black 2011). Many western scientists believe that the best environmental decisions are made objectively and are measurable; land or nature is a quantifiable economic resource, surely a commodity subject to property rights (Stetson 2010). Many indigenous cultures do not see land as a commodity or property (Stetson 2010), but as a superior informant (Black 2011).

The goals of western science and native science are very different, but they are not incompatible. Both have developed a comprehensive analysis of the natural world (Deloria 2006). (Note: There are numerous Native American tribes whose environmental science standards either meet or exceed those set by the Environmental Protection Agency (Scharf, unpublished manuscript)). The questions being asked by both approaches to science are questions that matter to all human beings--how do we as human beings live well together on this earth? (Farella 1990); the questions, however, are being asked from different vantage points. It is already well understood that western science is primarily one of approximation and measurement, yet culturally influenced and relative. Data is not just data (Burchfield 2001). What is not so well understood is native science is experientially directed to the part of our world infused with energy and dynamic processes that are not so easily measurable (Deloria 1999). Gregory Cajete (Laguna) proposes a dialogue and/or participatory research projects between western science and native science practitioners, saying that both stand to gain from such a dialogue and research (Cajete 1999). For such an enterprise to be successful, however, parity among the disciplines is necessary, as is a power balancing process to create a mutually beneficial, collaborative relationship.

Who speaks for nature? Deloria also wonders about who "will listen to the trees, the animals and birds, the voices of the places of the land?" (Deloria 1973). Christine Black says that many indigenous peoples relate to the land itself as a superior informant (Black 2011). In the United States, the question of how to bring Nature "to the table" as a stakeholder when Nature has no legal standing has puzzled practitioners of collaborative conservation for decades (Scharf 2002).

Engaging in and structuring such a collaborative exchange between differing world views involves risk, a risk that mediator John Paul Lederach sees to be one of four principles required for any well-constructed collaborative process (Lederach 2005). A well-constructed collaborative process requires several things, primarily the capacity to imagine something rooted in the real world yet capable of giving birth to that which does not yet exist. It also requires that we imagine ourselves in a web of relationships that includes those with whom we disagree, the ability to sustain a paradoxical curiosity that embraces complexity, and a fundamental belief in the value of creative energies. If such collaborations can be approached with what the Maori call humarie, a spirit of accommodation, which embraces change within the traditions of both Western and Indigenous science world views, we may be able to see and be in the world in a new way. And, then, conservation may equate, simply, to life (Deloria 1973).

Future directions for collaborative conservation

As discussed earlier, collaborative conservation is not to be envisioned as a panacea for every complex environmental challenge involving people in ecosystems, nor will it be appropriate for all situations in the future (Koontz and Thomas 2006, Berkes 2007, Dukes in press). And given the breadth of governance structures that fall under the umbrella of the term *collaborative conservation* (CBNRM, CBCs, etc), there will no doubt continue to be many stumbling blocks, dead ends, and much controversy. However, as Dukes (in press) argues, community-based collaboration is of critical importance for developing place-based decision-making processes that have the potential to shape and manage the changes we are causing.

We think one of the biggest challenges for the future will be the integration of different ways of knowing, especially science, as described above. As the diversity of stakeholders participating in the planning and managing resources continues to increase, different knowledge systems will collide more often. On the one hand, there is the challenge of finding ways to make western scientific knowledge credible, salient and legitimate to non-scientists (Cash et al., 2003). Western science will also need to increasingly integrate with indigenous science to create hybrid ways of knowing. And western scientists will need to find more inclusive ways to harness the expertise of local or indigenous expertise (Carolan, 2006). Beyond co-creating shared vocabulary respectful of multiple knowledge systems, fundamental shifts in ways of understanding and relating to nature and society may be necessary in order to engage in genuine cross-cultural collaboration.

Western scientists must come to grips with deep-seated and systemic barriers that have resulted from a long history of marginalization and a scientific paradigm only recently emerging from its colonial hangover (Sherman and Pickering Sherman, 2011). The development of the empowering and culturally appropriate natural resource management framework known as the Indigenous Stewardship Model (Sherman and Pickering Sherman, 2011) offers hope for new ways to ameliorate cultural perspectives, reduce conflict, and stem the tide of indigenous exclusion from the land and resources upon which they depend.

In addition, it will become increasingly important in the future to distinguish between different tiers of participation in conservation. Shackleton et al. (2010) suggest that greater precision in these distinctions (community outreach vs. co-management, for example) would clarify the social and environmental outcomes each might yield. This will allow clear evaluation of initiatives so that like can be compared with like. A typology of community-based interventions might take into account 1) who has the power and momentum in the initiative; 2) who owns, uses and negotiates rights over resources; 3) who receives resource benefits and whether they equitably shared; 4) what managing the resource entails (such as fences, adaptiveness, etc.); and 5) who is responsible to implement and monitor management (Shackleton et al. 2010). Also, there is a need to document and assess collaborative group processes, as well as to complete a broad-scale census of collaboratives and their scope (Firehock in press). There is also a

need to pull information and case studies about collaborative conservation efforts into a database (Schuett et al. 2001). One new effort to do this is the online Collaborative Conservation Learning Network (see www.collaborativeconservation.org), to be released in the fall of 2011, which will serve as a clearinghouse, discussion forum and platform for a community of practice.

Other recurring challenges in collaborative conservation in the future will include:

- Does collaborative conservation serve to reinforce inequalities of power instead of level them? (Bidwell and Ryan 2006).
- Can indicators of process and social outcomes be linked with those of environmental outcomes *at different scales*?
- When collaborative conservation involves public lands, is it appropriate for local communities to have more influence over their management than other citizens in a nation? (Koontz and Thomas 2006, Firehock in press)

We predict that community participation and distributed networks of expertise will continue to increase in importance as the population grows and the social and ecological impacts of climate change are made manifest. The challenge remains to harness and share the research, case studies and lessons learned in order to 1) reveal the conditions that determine whether or not it works, and 2) improve application of CC on the ground. That will mean bridging gaps between research and practice, adjusting expectations to be more realistic, and finding ways to maneuver collaboratively when authorities are unwilling to devolve and share power (Shackleton et al. 2010). The development of typologies, virtual communities of practice and improved documentation mentioned earlier will do much to further our understanding of the circumstances that allow collaboration to flourish.

More broadly, Courtney White (2009) underscores the imperative to develop a new economic strategy for conservation that will elevate the movement from one driven by altruism or fear of catastrophe to one driven by incentives. Paraphrasing Wendell Berry, White describes a new economic arrangement that "will be place-based; will work within natural limits; will provide care and respect for nature; will emphasize food, family, and community." Commitment to place and community, voluntary restraint, and mindful decision making, in tandem with the emergence of new markets such as payments for ecosystem services, are innovative approaches to cope with the severe changes we are already beginning to see.

Appendix 1:
Evolution of some environmental governance regimes

Traditional Resource-based Management

People start to realize that the land is not an infinite sink of resources

Based on the theory of unlimited supply or "frontier economics"- treats nature as an infinite supply of physical resources (i.e., raw materials, energy, water, soil, and air) to be used for human benefit, and as an infinite sink for the by-products of the consumption of these benefits, in the form of various types of pollution and ecological degradation. Manages for output of a specific resource (Colby 1991).

Command and Control Management

Begin to protect species and resources

Definition: Command and control management utilizes a linear problem solving approach where a perceived problem is solved through controlling devices such as laws, threats, contracts and/or agreements (Holling & Meffe 1996).
Goals: improve product extractions, establish predictability and reduce threats
Management techniques: use of herbicides and pesticides to safeguard crops in order to harvest more products; the culling of predators in order to obtain larger, more reliable game species; and the safeguarding of timber supply, by suppressing forest fires
Used to manage for output of a specific resource or protect a single species

Landscape Management

Focus moves from protecting a single species or resource to protecting the system

Precursor to ecosystem management
Definition: Landscape level conservation is a method that considers wildlife needs at a broader landscape level scale when implementing conservation initiatives (Boyce & Haney 1997)
Management techniques: key species, wildlife corridors

Ecosystem management

More value placed on understanding the system and its functions

Leopold started this movement- "Land ethic"

Definition: a resource management system designed to maintain or enhance ecosystem health and productivity while producing essential commodities and other values to meet human needs and desires within the limits of socially, biologically and economically acceptable risk. (American Forest Paper Association Forest Resources Board, 1993)
Reflects the paradigm shift that focuses on understanding and protecting whole systems instead of a single species or resource
Introduces the concept of sustainability

Sustainable Mangament

The environmental movement introduces the concept of sustainability—becomes an end goal for management

The idea of sustainability became popular in the 1970s with the US environmental movement
Definition: The ability to direct the course of a company, community, organization, or country in ways that restore and enhance all forms of capital (human, natural, manufactured, and financial) to generate stakeholder value and contribute to the well-being of current and future generations (Sustainability Dictionary website)

Adaptive Management

became popular in environmental management in the 1990's

Definition: structured, iterative process of optimal decision making in the face of uncertainty, with an aim to reducing uncertainty over time via system monitoring. In this way, decision making simultaneously maximizes one or more resource objectives and, either passively or actively, accrues information needed to improve future management (Dept. of the Interior)

More value is placed on indigenous people and their ways of managing land—using the community in the conservation model is tested

Community-based conservation

Became popular in the 1980s

Integrating conservation goals into the community- achieving both conservation and development on a local scale

Community-based natural resource management

became popular in the 1980s

Definition: (from CBNRM net 2001): CBNRM is the management of natural resources under a detailed plan developed and agreed to by all concerned stakeholders. The approach is community-based in that the communities managing the resources have the legal rights, the local institutions, and the economic incentives to take substantial responsibility for sustained use of these resources. Under the natural resource management plan, communities become the primary implementers, assisted and monitored by technical services.

Integrating stakeholders at all levels—encouraging vertical and horizontal linkages to solve conservation problems

Collaborative Conservation

Definition: 1) collaboration, which is a deliberate and inclusive process of two or more people, groups or entities coming together to respond to a controversial issue; and 2) conservation, which is an ongoing interaction between people and their natural environment that is meant to sustain and improve natural resources and human communities, and prioritizes sustaining diversity and resiliency to multiple stresses. Importantly, the stakeholders required to construct the collaborative are diverse and may bring different values, perspectives, and cultural worldviews to the process. The collaborative process allows groups to produce outcomes that would not have been possible without collaboration.

Appendix 2:
Ecosystem and Watershed Management Timeline

1935: *Ecosystem Ecology* established by Arthur Tansley- defined ecosystem as *"the whole system- in the sense of physics- including not only the organism-complex, but also the whole complex of physical factors forming what we call the environment of the biome- the habitat factors in the widest sense"*

Fauna of the National Parks of the US- wanted to expand park boundaries to maintain ecosystems for animals (re-attempted in 1950 but failed)

1970: Lynton Caldwell advocated using ecosystems as a basis for public land policy

1978: Holling introduces the term "adaptive management"

1979: Frank and John Craighead-in their work with grizzly bears in Yellowstone defined greater ecosystems as " area that provides the primary habitat necessary to sustain the largest carnivore in the region"

1985: People started to compare legal and biotic boundaries to reinforce Craighead's suggestions

1988: First book-length report on ecosystem management (EM) and its applications- presented a theoretical framework- both general goals and processes for achieving goals- "dynamic pattern and process view of nature"

First definition EM- "involves regulating internal ecosystem structure and function, plus inputs and outputs, to achieve socially desirable conditions"

Outlined essential elements of EM as:
- Ecologically defined boundaries
- Clearly stated management goals
- Interagency cooperation
- Monitoring of management results
- Leadership at the national policy level

1989: Keiter presented the important legal aspects of EM

Society of American Foresters introduced "preservation of ecological integrity" to their code of ethics

1990: First interagency attempt to apply EM to a federal lands project in Yellowstone- not successful

1992: USFS altered resource based management focused goals to be more holistic and ecosystem focused

Norton- explores paradigm shifts in EM and highlights the importance of interdisciplinary scientist and the collaborative process

Outlines paradigm shifts:

- Move away from the theory of "climax communities" as ideal
- Move away from notion of "restoring land to pre-European settler state"
- Recognize evolutionary and ecological purpose of multiple ecosystem stages and attempt to maintain multiple stages in management
- Ecosystems are recognized as open systems
- Scale, both temporal and spatial becomes an integral component for managers and scientists

1993: *Compass and Gyroscope*- introduces the idea of adaptive management into EM and emphasizes the need to combine the democratic process with scientific management

1994: *What is Ecosystem Management?*- specific goals of EM:

1. Maintaining viable populations
2. Ecosystem Representation
3. Maintaining Ecological Processes
4. Protecting Evolutionary Potential of Species and Ecosystems
5. Accommodating Human Use

Also introduced the following as essential elements of EM:

- Hierarchical context
- Organizational change
- Humans embedded into nature
- Incorporation of values

Provided a working definition of EM: *"the integration of scientific knowledge of ecological relationships within a complex socio-political and values framework toward the general goal of protecting native ecosystem integrity over the long term"*

18 federal agencies in the US had adopted EM as a guiding policy

1995: *Barriers and Bridges to the Renewal of Ecosystems and Institutions*- identified the management pattern of:

1) exploitation
2) conservation
3) crisis
4) reconfiguration

Emphasized the idea that crisis is almost inevitable because agencies designed to regulate environmental variables tend to become more entrenched and rigid over time

1996: New definition of EM by the Ecological Society of America- *"management driven by explicit goals, executed by policies, protocols, and practices, and made adaptable by monitoring and research based on our best understanding of the ecological interactions and processes necessary to sustain ecosystem composition, structure, and functions…sustainability must be the primary objective, and levels of commodity and amenity provisions adjusted to meet that goal"*

Ecosystem Management in the United States-Highlighted the need to broaden the philosophy and scope of management
Focuses on scale and including both public and private sectors at all levels
Also encourages training and education in ecosystem management

Adaptive Management: Promises and Pitfalls: Advocates for the use of technology in the form of multiple systems models, GIS, and remote sensing to help scientists and managers predict and evaluate the outcomes of their actions in the adaptive management process

The Role of the Public in Adaptive Ecosystem Management: states that public participation is necessary for success of projects
Identifies two different approaches to adaptive ecosystem management:

- Participation-Limited: public generally excluded
- Integrated Adaptive Management

Outlined guidelines for involving the public:

- Involve the public early and maintain continuous involvement
- Use diverse involvement methods and be inclusive
- Emphasize small group activities
- Recognize and incorporate local knowledge
- Rely on the public to define social values
- Make information accessible and be flexible
- Clearly define roles, responsibilities, and realistic expectations
- Promote Facilitative Leadership
- Provide open dialogue for information synthesis and evaluation

1998: *Stewardship Across Boundaries*- identifies different types of administrative boundaries, such as boundaries between different public agencies, within one agency, and those that divide public and private land and discuss how legal, social, and ecological considerations interact in causing boundary impacts and why those factors must be integrated to improve land management
Other boundary types discussed:

- Ecological
- Political
- Generational
- Ownership

1999:*Watershed Councils: An Emerging Form of Public Participation in NR*

Management- example of the shift to collaborative, bottom-up, citizen-led and citizen- organized approach to public participation in natural resources management

The Politics of Ecosystem Management- identifies 4 basic themes in EM:

1. Socially defined goals and objectives
2. Holistic, integrated science
3. Adaptable institutions
4. Collaborative decision making

Explores policy paradoxes in EM:

- Paradox of decision making- how to balance the principles of adaptive management and collaboration with the need for decision making that is politically responsive and publicly accountable
- Paradox of scale- EM calls for management on the landscape scale but encourages small-scale management
    - Decentralization and budget cuts for agencies that are encouraged to focus on collecting and analyzing--- lack of resources
    - Ecological vs. human time frame
- Paradox of Sustainability- decrease of the production of goods and services while the human population increases
    - Cannot manage for both preservation and use

Historical and Socio-political Context of Western Watershed Management-explore trends and themes in western watershed management with watershed initiatives:

- The "New West" –urbanization and shifts in management policy and practice
- Building private and public partnerships with agencies
- Shift towards managing at regional scales
- Stresses collaboration, open participation, and consensus

2000: *The New Watershed Source Book*- highlight the role localized resource governance and problem-solving, and more specifically, the use of a relatively new class of arrangement termed herein as the "watershed initiative" in watershed management

Watershed initiatives as "collaborative groups"

Appendix 3:
Wordle image of the words in foundational papers in collaborative conservation

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