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Preserving Biodiversity and Ecosystems: Catalyzing Conservation Contagion

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1. Introduction

The natural world is in a chronic state of crisis and under constant threat of degradation, primarily by anthropogenic factors. In general, current conservation strategies have failed to effect long-range solutions to the rapid loss of biodiversity (Persha et al., 2011). Deforestation continues despite efforts by mainstream (top-down) conservation programs (Persha et al., 2011; Schmitt et al., 2009), and the effectiveness of large-scale protected areas has, at best, a mixed record of success (Brockington et al., 2008; Persha et al., 2011). Scientific disciplines, in particular, ecology and conservation biology, continue to emphasize threats to biodiversity (Schipper et al., 2008), to debate conservation priorities (Brooks et al., 2006), to advance unproven strategies (SSC, 2008), and to offer no more than hypothetical solutions to pressing problems (Milner-Gulland et al., 2010; Turner et al., 2007). The bulk of the scientific community remains tangential to the conservation needs of communities in habitat countries, with a critical lack of input and connectivity between the extensive scientific literature and ground-level practices (Milner-Gulland et al., 2010).

Resurgence of the “fortress conservation”, “protectionist” narratives (commitment to conservation programs at the expense of indigenous and other local people) promoting a 19th century wilderness ideal free of humans remains a cornerstone of much conservation thought, policy, and planning. As pointed out by Brockington et al. (2008), commitment to community-based conservation “has been downplayed from being an *approach* to conservation to becoming a *component* to justify and legitimate interventions to create new protected areas or interventions to conserve specific species”. This “back to the barriers” movement (Hutton et al., 2005), supported by many conservation biologists (Kramer et al., 1997; Oates, 1999; Terborgh, 1999), has been accompanied by an increase in conservation funding, with large conservation organizations reverting back to protectionist landscape conservation and away from community-based (ground-level or bottom-up) resource management (Hutton et al., 2005).

In his discussion of the ongoing conflicts between indigenous peoples’ movements and conservation organizations, Dowie (2009) noted: “When, after setting aside a ‘protected’ land mass the size of Africa, global biodiversity continues to decline and the rate of species extinction approaches one-thousand times background levels, the message seems clear that

there might be something terribly wrong with this plan... A better strategy might be simply to turn more human beings into true conservationists...." Community conservation projects, at the core, are based on the strategy of turning more human beings into conservationists (see Persha et al., 2011). The approach pursues this goal by working with people living in species-rich landscapes, assisting them to form networks with one another, with community-based organizations, with non-government organizations, and with government agencies for the protection of biodiversity and ecosystems (Brockington et al., 2008). When implemented according to field-tested procedures, community conservation provides an effective ground-level solution to environmental degradation and the loss of biodiversity (Horwich & Lyon, 2007; Horwich et al., 2011). Indeed, 60-85% of conserved areas are inhabited by people who are potential conservationists and who are necessary components of success (Brockington et al., 2008; Horwich & Lyon, 2007; Horwich et al., 2011; Persha et al., 2011).

One flaw inherent to debates over the community conservation approach entails the type of questions being asked: Is community conservation successful? Who should be responsible for protecting natural resources? These are not, however, the truly relevant questions. Community conservation is *one solution* to environmental degradation, deforestation and the loss of global biodiversity. The truly relevant question is: Why aren't *all* conservationists, scientists, in particular, conservation biologists, and non-government organizations actively incorporating successful community conservation models into their mission statements, policies, and programs (see Persha et al., 2011)? Community conservation projects are growing in number and in success (Borrini-Feyerabend et al., 2004; Dowie, 2009; Horwich & Lyon, 2007; Horwich et al., 2011; IUCN, 2003). Indigenous and other local groups are gaining political power and expertise, becoming conservation activists, and, in some instances, regaining management of homelands (Dowie, 2009). Indeed, many communities have initiated sustainable conservation projects (Pathak et al., 2004). There is also recent evidence that community-managed tropical forests show lower and less variable annual deforestation rates than do the traditional protected areas (Porter-Bolland et al., 2011 In Press) with potential for reducing carbon loss effecting global climate change (Soares-Filho, 2010). However, the effects of community and indigenous managed projects in terms of their geographic scale, recognition by professional conservationists, including many non-governmental organizations, as well as their economic and political influence, are not yet sufficient to mitigate the deleterious effects of increasing environmental degradation and escalating loss of biodiversity. This condition persists, in part, because regional and governmental entities, as well as non-governmental organizations, have failed to include indigenous and other community stakeholders as partners (Persha et al., 2011). There is a need for national and regional governments and non-governmental organizations to network with community-based organizations having the mission, goals, and objectives to initiate, facilitate, train, and empower communities in habitat countries to preserve and manage local resources (Horwich & Lyon, 2007; Horwich et al., 2010; Persha et al., 2011).

Unsuccessful project outcomes have been minimized by the *Community Conservation* (www.communityconservation.org) model developed over time by trial-and-error but by now tested in the field and proven to be a valid and reliable procedure with utility for other community-based programs, as demonstrated by the cases discussed below. Table 1 gives a list of 23 projects that *Community Conservation, Inc.* has either initiated or contributed significantly to in its earlier stages. Three points are important to note from this table. Most important is that the highest level of community participation has occurred by encouraging

the creation of community-based organizations to manage or contribute to the project. This also implies a high level of community empowerment. In Assam, India, the Manas Biosphere Reserve is now being protected by a network of 14 community groups (Horwich et al, 2010, Horwich et al., 2011). In this regard it is notable that the communities played a significant role in having UNESCO recently remove the “World Heritage Site in danger” listing. In the cloud forests of Peru, the Yellow Tailed Woolly Monkey Project has been stimulating community groups to create community reserves under Peruvian law. In Papua New Guinea, the Tree Kangaroo Conservation Program has created a community group that is a federation of over 26 clans. The second point is that community groups have stimulated or contributed to the creation of new protected areas or act as complementary protectors of public and private lands. Thirdly, communities can play a major role in regional or landscape protection as is occurring in the Golden Langur Conservation Project in the Manas Biosphere Reserve in Assam, India (Horwich et al. 2010), the Tree Kangaroo Conservation Program in Papua New Guinea (Ancrenaz et al, 2007) and what is evolving in the Yellow Tailed Woolly Monkey Project in the cloud forest of Peru (Shanee et al., 2007).

Project Name *indicates government-run project	Country	Start Date	Community Groups Formed	Protected Area Existed	Protected Area Created	Area (hectares)
Ornate Box Turtle Conservation*	USA	1991				-
Ferry Bluff eagles	USA	1988	1		1 private	?
Kickapoo Valley Reserve	USA	1991	1		+	3,440
Valley Stewardship Network	USA	1994	1			-
Blue Mounds Area Project	USA	1995	1			6,000
Badger Army Plant Lands	USA	1997	1		+	3,040
Community Baboon Sanctuary	Belize	1985	1		1 private	5,120
5 Blues Lake National Park	Belize	1991	1		1	1,680
Gales Point Manatee Project	Belize	1991	1		1	28,000
Temash River National Park	Belize	1994	1		1	14,921
CA River Turtle Conservation	Belize	1994	1			-
Punta Laguna	Mexico	1989		+		4,400
Chacocente	Nicaragua	1997		+		4,224
Spider Monkey Conservation	El Salvador	2001		+		606
Tree Kangaroo Conservation	Papua New Guinea	2001	1		1	82,000
Manas Biosphere	India	1998	14	+		285,000
Golden Langur Kakojana	India	1998	2	+		1,700
Ngäbe Tribal Lands	Costa Rica	2007	1	+		12,000
Tulear South	Madagascar	2007	1		2	2,600
Peru Cloud Forest	Peru	2009	8		8	35,000
Homeland of the Crasne*	Russia	1994	1	+		35,200
Nariva Swamp	Trinidad	1997	1	+		8,192
Cape 3 Points	Ghana	2011	1	+		5,100

Table 1. Updated list of *Community Conservation* projects with selected information.

Our community-based model, comprised of nine social stages, progresses as follows: (1) initial contacts with community leaders and elders to *catalyze* informal communication with village inhabitants, providing opportunities to openly and candidly discuss the significance of their resources and benefits to be gained from cooperative and participatory initiatives for conservation of their natural resources fostering (2) informal relationship-building in indigenous and other local communities leading to (3) participatory education providing (4) a window of opportunity for local conservation leaders to emerge (5) who invoke support from others, in our cases, the majority of villagers fostering (6) development of a formal infrastructure and plans within the possibilities of each community context. Eventually, (7)

as the cases presented in this article show, the lessons and activities implemented and learned in the initial target village diffuse through local networks of communication (e.g., hearsay; printed information from enlightened schoolchildren to their kin) broadening matrices of conservation activists through other modes of social transmission and problem-solving (e.g., observational learning; imitation; education; brainstorming sessions and focus groups; contacts by the target community to members of other villages inviting them to inspect their conservation efforts and to attend planning sessions, lectures, seminars, and public events; informal and formal visits from target community members to other villages). The first seven social stages of our community-based, bottom-up model have the potential to foster (8) diffusion from the target village to other communities and, beyond, to regional entities through a process that we term *conservation contagion* consolidating the *horizontal network* (e.g., community-based organizations and communities: Berkes, 2004). Finally, (9) educational initiatives, lobbying, and relationship-building with entities in *vertical networks* (e.g., regional, governmental, non-governmental, and international entities: Berkes, 2004) have the potential for linkage, creating multidimensional, multi-scale partnerships benefiting all stakeholders. Our formulations, catalysis and community contagion, are detailed below.

The objective of this Chapter is to illustrate how community conservation, when carried out in the field, using tried and proven methods, is an effective solution to reducing deforestation and the loss of biodiversity and consequent climate change and reduced carbon emissions. Section 2 defines the philosophies, concepts and practices in small projects that lead to successful results in contrast to the preponderance of large Integrated Conservation and Development Projects (ICDPs) whose contrasting philosophies, concepts and practices have resulted in mainly failures at high costs. Section 3 introduces the concept of conservation contagion and how, when it is stimulated, can lead to regional change. Section 4 complements the other sections with examples of successful projects from Belize, India and Namibia, illustrating successes that led to regional change with increased community protection resulting in increased reforestation and increases in focal species. Section 5 discusses lessons learned from the process of community conservation and its examples. Finally section 6 gives policy implications for future successful possibilities.

2. What makes a successful community conservation project (CCP)

Community conservation or community-based conservation projects under a number of names have been developed over the past two decades as important alternatives to the traditional protected areas that exclude humans. *Community Conservation, Inc. (CC)*, and other non-governmental organizations are project identifiers used in the present chapter to designate ground-level initiatives developed over the past two decades as important alternatives to traditional conservation organizations, historically prioritizing protected areas independent of human interests and often excluding indigenous and other local groups from targeted areas (“fortress conservation”). These community conservation projects have been based on ethical, theoretical, and practical arguments of conservation practitioners and social scientists (Borrini-Feyerabend, 1996; Broad, 1994; Brosius et al., 1998; Davey, 1998; Gadgil & Guha, 1993; Ham et al., 1993; Johnson, 1992; Oates, 1999; Stolton & Dudley, 1999). However, in recent years there has been growing criticism of community-based conservation programs and a call for renewal of protected areas that exclude local

communities from the programs and their management (Brandon et al., 1998; Inamdar et al., 1999; Robinson, 1993; Terborgh, 1999).

While many critics of community conservation projects are biologists (Oates, 1999; Terborgh, 1999), social scientists have also criticized these projects (Belsky, 1999; Brechin et al., 2002). Most of the criticism has been directed toward large integrated conservation and development projects (ICDPs) while the successes of small community-based projects have been overlooked (Horwich & Lyon, 2007). Even practitioners of ICDPs, however, have been disappointed by their limited achievements (Robinson & Redford, 2005) and are attempting to learn from their failures to maximize future success (McShane & Wells, 2004; Rhoades & Stalling, 2001). What seems clear at present is that ICDPs have been adhering to a faulty paradigm and have much to learn from community conservation and community-based forestry paradigms (Shepard, 2004).

The philosophies of community conservation, community-based conservation and integrated conservation and development projects “originated from a shift in protected area management away from keeping people out by strict protection and toward more sympathetic treatment of local communities, including efforts to share benefits from the conservation of biodiversity” (Wells et al., 2004). However, the philosophy and methods by which activities are carried out are extremely different between large ICDPs and smaller community conservation projects. These different postures have resulted in the lumping of unjustified criticism of our community conservation projects (Belsky, 1999, 2000) resulting in curtailed progress. Thus, it is important to differentiate the two organizational models.

Community conservation projects are centered on conservation of natural resources and the role they play in the lives of indigenous and other local, rural peoples. Dealing with people on a one-to-one basis at a community scale has been a primary focus of *Community Conservation's* projects. Optimally, the limited resources of community conservation projects, especially finances, are best distributed over a long time-period in order to use them efficiently and prudently. While natural resource conservation is central to *Community Conservation's* priorities, it is followed closely by the needs of rural indigenous and other local populations, not only economic, but also social ones, emphasizing quality of life.

There are some fundamental differences between how successful community conservation projects and most ICDPs approach a project (Table 2). Community conservation projects are holistic. Flexibility and the expectation of change are important to their success; thus, practitioners must be adaptable, learning from problems as well as successes. Regional planning can be accomplished by building on, and expanding from, small community projects, from the specific projects to the general goals, objectives and mission that fits the composite project and region. Community conservation projects focus more on doing than on planning. The primary role of community conservationists is as catalysts to educate, motivate, and reinforce residents and communities in habitat countries to protect and conserve their natural resources both for themselves and for the rest of the world. While projects should be long-term and on-going, the catalytic role generally ends once community members are prepared to assume responsibility for programs in their communities and regions. ICDPs, instead, generally have been pervasive in time and space, with no plans to exit their initiatives or to transfer leadership to indigenous and other local residents (Sayer & Wells, 2004).

financially in those terms. However, major outlays of money and other resources for short time-periods have proven to be ineffective, inducing greed, waste, mismanagement and corruption. It may also highlight differences between the community base and corrupt western affluence (Gezon, 1997). More importantly, in order to work successfully with small rural communities, initiatives must cooperate at the lowest levels of community and regional organization, engaging personal, face-to face communication involving the thoughts, emotions, beliefs, attitudes and values of indigenous and other local stakeholders who are the voices of most decision-making, problem-solving and negotiations. The rural poor embody the same desires to assume responsibility for and to manage their own affairs as others, regardless of economic position. As a result, community involvement is an important ingredient for all conservation projects. Even when protecting large landscapes, community conservation projects can be effective at the regional scale by dividing initiatives into ground-level components for the retention of person-to-person interactions fostering trust and friendship. This process is exemplified by the case study of a community-based project in Assam, India (Horwich et al., 2010).

2.3 Community conservation projects – below the “conservation radar”

While ICDP enthusiasts have undergone some soul searching because of the backlash and criticism from biologists and sociologists, they have rightly begun to learn from ICDP failures (McShane & Wells, 2004). Unfortunately, small community conservation projects have been neglected and are “below the radar” of the mainstream conservation community (see Horwich & Lyon, 2007) notwithstanding published accounts of successes as well as problems of such projects (Horwich, 1990a, 1998, 2005; Horwich & Lyon, 1988, 1995, 1998, 1999; Horwich et al., 1993; Lyon & Horwich, 1996). Despite documented successes of community-based initiatives, funding for these projects has also been under the conservation radar, remaining at very low levels.

Similarly, published articles have also ignored benefits to local communities from conservation of forests and their resources upon which indigenous and other local groups may depend (Shepard, 2004). Shepard (2004) notes “ conservation organizations themselves form their own international environment in which they talk to and argue with one another. Because they spend so much of their time in this company, there is too little exchange of ideas with those engaged in the forestry and poverty worlds.” She goes on to state that “ICDPs and the conservation bodies that manage them have been out of the mainstream of changing thought about forest management and rural livelihoods and now risk getting stuck with an old-fashioned paradigm. Though it will always be difficult to persuade people to abandon some of their old assumptions, it is now urgent that they consider doing so.” (Shepard, 2004).

2.4 Community participation

Level of participation - Communities are complex, heterogeneous groups of people with conflicting goals, aims, and desires. Complexities based on gender, politics, class, patronage, ethnicity, age, social standing and religion often have complex social histories that include exploitation, marginalization, and conflict (DuPuis & Vandergeest, 1996). For the last decade, the terms of community conservation, community participation, community-based conservation became buzz words as community conservation projects and ICDPs were in

vogue. However, what has never often been clearly differentiated is that community involvement can occur at many levels in a continuum from top-down management through informal and formal consultation to formal advisory committees and ultimately to community co-management and indigenous management (see Horwich & Lyon, 2007; Horwich et al., 2004) as discussed by Arnstein (1969), Berkes (1994), Barrow (1996) and Stevens (1997). Thus in any project, the level of community participation must be clearly identified. The main thrust in the projects that we sponsor is to facilitate, particularly by persuasion and education, creation of an empowered community-based group capable of continuing a project once we have left it (Table 1). The lowest levels of government involvement and the highest levels of community participation, as represented by indigenous and other local community co-management, allow for strong partners in decision-making and project control. Co-management allows for government checks and balances and support; as well, indigenous and other local management is currently working well at one of our projects, the Community Baboon Sanctuary in Belize, discussed below.

Incentives for community participation - Top-down government management or private ownership are not the only ways to conserve and protect natural resources. Historically, many successful indigenous communal systems were working before Europeans came to dominate most natural landscapes. Singleton (1998) mentions institutions used by the Pacific Northwest Native Americans before the Europeans reached those shores. There have since been many struggles of poor people to regain those rights (Guha, 1989). Thus community conservation efforts have the potential to redefine and restructure managerial systems. This provides an enormous incentive for community participation and as has been shown by many forest projects (Poffenberger & Gean, 1996), and other Self Help development programs (Wilson, 2002), villagers have responded by being empowered to assume responsibility for their resources. On the other hand, efforts of ICDPs, offering a wealth of developmental possibilities to these same rural residents, often failed generally because of the limitations discussed below.

Uphoff and Langholz (1998) present a model of three basic categories of incentives for people to conserve or exploit protected resources: 1) legal, 2) financial or 3) social/cultural. According to these authors, if initiatives incorporate all of these elements, they have a high probability of being adopted. Projects lacking the features have a low likelihood of being adopted. The authors noted that rewards from ICDPs' conservation tactics "amounted to tacit bribes" for getting villagers to adopt new practices depending upon an infusion of outside resources. These "bribes" seemed to undermine community practices for the conservation of resources. An integrated balance of these three factors is needed to induce conservation. Uphoff and Langholz (1998) make a strong case for the importance of social values leading to stewardship of natural resources, echoing what we have found in our experiences with community-based conservation. Although money was one motivator in our project at the Community Baboon Sanctuary in Belize, community members consistently demonstrated pride in their conservation efforts, especially their flagship "baboons" (the local term for black howler monkeys, *Alouatta pigra*). In Assam, the pride of achievement was integral to project success exemplified by local leaders reporting their accomplishments in developing Self Help Groups and forestry committees. These entities continue to provide important social functions for meeting and talking, for practicing thrift, and for receiving information on a short term basis (Wilson, 2002). More importantly, they have "a more

powerful purpose: to gain and share information, to take social action, and to link to government resources.” (Wilson, 2002). It is that power that has stimulated some of the local forestry groups in Assam to actively protect their forests for themselves and for the pride to convey their actions to project partners. There is also no surprise that rural villagers also appreciate natural areas for their beauty and greenness and enjoyed walking and sitting in the shade and seeing wildlife (Allendorf, 2007).

Despite what we have found, the conservation community has focused on poverty and economic incentives as a prime motivator of poor rural communities. Indeed, a great deal of money has been spent on ICDPs and “despite this high level of investment and effort, we can only point to some individual, localized successes. Taken as a whole, we have had little impact on stemming or even slowing the rising tide of biodiversity loss.” (Kiss, 2004). In addition, little money from the large grants ever reached the beneficiaries on the ground level (Sayer & Wells, 2004). Indeed, when we look at the levels of funding in comparison with small successful community conservation project budgets, the failures in spending are extensive, almost obscenely wasteful.

From 1990 to 2004, Kiss (2004) notes that the World Bank has supported 226 conservation-related projects internationally with a total budget of \$2.65 billion (from a variety of funding sources). In terms of prudent financing, \$2.65 billion divided by 226 projects and by 14 years gives an average annual project budget of some \$837,547. In comparison, two small successful community conservation projects annually averaged \$12,035 (Community Baboon Sanctuary) for six years and \$22,367 (Golden Langur Conservation Project in Assam, India) for seven years. ICDPs spent over 40 times that of the community conservation projects. While it is difficult to assess the total impact of all the World Bank projects relative to the two community conservation projects noted, it is clear that the scale of funding is dramatically different.

Despite this financial information, many of the tenets that hold for successful community conservation are paradoxical. However, research has shown that rural people do not always act rationally and in their own interests (Ariely, 2010). Indian rural villagers were asked to do various tasks for three levels of pay. Those who could earn the equivalent of one day’s pay or two weeks pay did not differ. However, those who could earn the equivalent of 5 months pay did the task significantly worse. Ariely (2010) noted that using money to motivate people could be counter-intuitive. For tasks requiring cognitive ability, low to moderate performance-based incentives can help. But if financial incentives are too high, the attention to the reward becomes distracting and creates stress that reduces the level of performance.

2.5 Project implementation

Planning versus implementation - ICDPs have invested a great deal of time and energy in project preparation, often executed by outside experts. These practices increase budgets and restrict program flexibility (Sayer & Wells, 2004). *Community Conservation* projects, in contrast, initiate ground-level efforts immediately, with some research, preparation and planning integrated into the early stages of a project. From the beginning, formal, expert knowledge and information have been united with local expertise throughout every stage of our programs as documented in the cases detailed in the present report.

Flexibility and adaptability - While the ICDP paradigm attempts to reduce uncertainty through over-planning and preparation (Sayer & Wells, 2004), the community conservation

approach is resilient and capable of adapting to change. Although general planning is necessary, too much emphasis on planning and accompanying financial investments have plagued ICDPs and often left them with a legacy of inflexibility (Sayer & Wells, 2004). Further, it is likely that one disadvantage of the mainstream ICDP model is that it establishes unrealistic expectations and levels of resource-access for community members. With generalized goals from the initiation of our projects that are adaptable to the features of different local projects, we maximize flexibility and influence by relying primarily upon local resources, providing models that can be sustained by indigenous and other local groups over the long-term. In addition, since resource efficiency was necessary, particularly due to our limited funding, we developed contingency plans in the event that opportunistic responses were required.

Funding and project length - Many mainstream ICDPs arguably wasted large amounts of money, often because of utilization of templates applied to all situations regardless of differences from locale to locale and project to project and also because, seemingly paradoxically, promiscuous infusion of resources unsuited to differing project scales has the effect of compromising the planning, efficiency, "goodness-of-fit", and effectiveness of programs. Furthermore, resources often fail to impact the intended beneficiaries and their resources, directed, instead, into staff and consulting fees, centralized planning, and problem-solving and decision-making divorced from local community realities, requirements, criteria, and contingencies (Gezon, 1997; Sayer & Wells, 2004). In some cases, large amounts of resources were invested in small regions for short periods of time, draining critical resources for wider and more judicious efforts (Sayer & Wells, 2004). ICDPs generally forecast 3-5 years per project, a standardized time-frame often too brief, on the one hand, or unnecessarily extended, on the other, for successful implementation of their goals and objectives. Furthermore, ICDPs often fail to project and plan exit strategies, sometimes leading to abrupt termination of or unproductively extending involvement with community projects (Sayer & Wells, 2004). Our community-based conservation projects, instead, utilize modest funding consistent with local economies, maximizing project realism, "goodness-of-fit", and successful long-term persistence. It is our position that both community conservation projects and ICDPs entail costs as well as benefits and that cooperation among these networks has the potential to minimize the disadvantages and maximize the advantages of all tactics and strategies.

Project sustainability - While ICDPs were initiated with the hope of financial sustainability (Wells et al., 2004), our community conservation projects often have, as a goal, partial sustainability. In developing countries, entrance and user fees earned, for example, by ecotourism, classes on ethnobotany, or small businesses (e.g., restaurants serving and selling traditional foods) might promote village sustainability, pride in efforts supporting local conservation programs, expansion of the local economy, and imitation by other groups. Success of programs is not necessarily correlated with predictions from conservation biology or other scientific approaches, e.g. mathematical modeling, because factors critical to short- and long-term successes often arise as spontaneous, condition-dependent events. For example, the residents of the Community Baboon Sanctuary suggested a plan for sustainability based on mandating residents to take turns as local guides, denoting a more mature stage of project implementation as well as a potential template for other community conservation projects. With an increase to 6000 tourists, visiting the Community Baboon

Sanctuary, base-level financial sustainability became a reality, with additional programs requiring and stimulated by short-term grants (Horwich & Lyon, 1998). In reality, community or government protected areas in developing countries still need richer nations to infuse conservation efforts with financial and other resources (Wells et al., 2004; Balmford & Whitten, 2003); alternatively, other creative ideas such as trust funds or direct payments need to be considered (Kiss, 2004). Social sustainability of most *Community Conservation, Inc.* projects occurred because of sufficient, motivated, and prepared social capital combined with social and other (e.g., modest and targeted economic) incentives (Uphoff & Langholz, 1998; Wilson, 2002). Although the Community Baboon Sanctuary has experienced significant challenges over time, it has persisted for over twenty-six years because community-based conservation became a guiding ethic in the minds and lives of local people. When the Community Baboon Sanctuary reached a turning-point in 1998, a local group of women formed the Woman's Conservation Group to ensure its continuity and long-range stability (Horwich et al., 2011).

Integrating conservation and development - While there is no question that, consistent with the mission of ICDPs, conservation and development should be integrated, community-based organizations have not developed explicit proposals for how the integration should be structured and implemented (Sayer & Wells, 2004). ICDPs maintained the false assumption that helping communities develop economically would lead to the conservation of natural resources (McShane & Newby, 2004). However, the opposite often happened as discussed above. A holistic approach of integrating conservation and development is, *ceteris paribus*, effective because economics is only one of the incentives communities respond to. A holistic plan may be a highly productive approach to integrating social incentives, development and conservation through facilitating the development of networks consisting of ground-level associations (individual and group) of community-based organizations and non-governmental organizations based on trust.

Financial donors - While donors provide the essential financing for successful projects and want their contributions recognized, it is to the benefit of community-based organizations if they provide a mentoring rather than a "hands-on" or otherwise controlling posture, particularly because community-based operations often require opportunistic responses to local conditions and processes that cannot easily be detailed in an application for funding and for short-range assessment by funding agencies. Donors to ICDPs often had controlling interests in these projects (Sayer & Wells, 2004). *Community Conservation, Inc.*'s project finances have been modest, falling under the "conservation community radar" as noted earlier. As a result, donor agencies generally did not attempt to maintain control of their investments; however, they rarely publicized successes of the community conservation projects, emphasizing, instead, large, "flagship" funding recipients likely to reinforce powerful and influential national and international networks.

Non-governmental organization role - Non-governmental organizations can facilitate the empowerment of community-based organizations by providing seed money or by acting as a financial and tactical mentor. They can also provide management training for the community-based organizations (Horwich et al., 2004). Training would optimally be a combination of long-term mentoring combined with, for example, short-term seminars (Bernstein, 2005). Although others are skeptical that local communities are the best managers of their natural resources (McShane & Newby, 2004), *Community Conservation*

takes the position that indigenous and other local populations are, with training and other support (e.g., interactive networking), capable, even ideal, stewards of biodiversity in and surrounding their traditional lands because of the nature and degree of their historical connections with and investments in these habitat domains.

A powerful and effective function of non-governmental organizations is to catalyze and facilitate communities to protect their natural environment (Horwich, 1990a; Horwich et al., 2004) and to help them create new community-based organizations whose mission is environmental conservation (Agrawal & Gibson, 1999). Non-governmental organizations should retreat after the community-based organization develops capacities to function independently. However, non-governmental organizations should continuously monitor the progress of projects, providing additional advice and support when required and solicited. In 1989, subsequent to catalyzing a community conservation project around the Temash River in Belize, a biologically important mangrove habitat, the government was not supportive of our organization's contingency plans. By 1997, three years after the zone was designated a protected area, our re-catalyzing the project through a meeting involving all stakeholders (Producciones de la Hamaca & Community Conservation Consultants, 1998) led to a newly formed indigenous Belizean non-governmental organization managed by Belize nationals in cooperation with local communities, creating a comprehensive project (Horwich, 2005; Caddy et al., 2000).

2.6 Stimulating regional change from the bottom up

In an effort to revise the role of ICDPs, it has been suggested that they are well situated to work at a landscape scale, integrating with networks at this level (Robinson & Redford, 2004). However, small community conservation projects should not be excluded from these plans since they can be employed at a regional scale by initiating a number of community level projects within a region and having them collaborate, eventually unifying them into a larger project or federation that would include all of the participating community-based organizations, non-governmental organizations and government agencies (Horwich et al., 2010). An ultimate goal should be integration of networks and clear delineation of functions (e.g., managerial, social, political, economic, etc.) at all levels of organization.

Even though ICDPs often have functioned on the false assumption that national governments would embrace the idea of community involvement and pass laws and regulations to facilitate the community involvement in natural resource management (McShane & Newby, 2004), working with governments and their agencies to revise old and develop new policies remains an important objective. In Belize, successes of and publicity about the Community Baboon Sanctuary led other motivated communities to adopt that model, sometimes with modifications, creating their own conservation project, adapted to their own circumstances. Additionally, communities lobbied the Belize government to create new sanctuaries, using existing laws to create community-based sanctuaries and protected areas and the Belize government eventually adopted a community co-management policy (Meerman, 2005). Because the government of Belize recognized significant progress at community levels, forestry and fisheries agencies contracted with community-based organizations and non-governmental organizations to sign memoranda of understanding. Currently, approximately twenty village and town groups have signed or are in the process of negotiating such agreements (Young & Horwich, 2007) (Figures 1 & 2).

In Assam, India, the Golden Langur Conservation Project, initiated by *Community Conservation*, Natures Foster and Green Forest Conservation in 1998, targeted the full Indian range of the golden langur in western Assam. Through village meetings, seminars and general meetings the project brought civil authorities, non-governmental organizations and communities together. As communities participated in the project they formed community-based groups leading to conservation contagion. Early on, the project focused on the Manas Biosphere, the largest main habitat of the golden langur in India. The project brought attention to the Manas Biosphere through a series of four celebrations throughout the Biosphere finally resulting in participation of 20,000 and then 35,000 attendees. A number of community groups formed and began carrying out forest protection patrols that were later funded by the Bodoland Territorial Council. Eventually, the project stimulated the organization of a network to meet and discuss protection of the entire Biosphere. Collectively, this led to regional change resulting in an increase of forest renewal and an increase of the targeted species throughout its Indian range from 1500 to now over 5600 golden langurs (Horwich et al., 2010, 2011). There are also indications of an increase of both the elephant population (Ghosh, 2008b) and the tiger population (Anonymous, 2011). This community protection network played a major role in the UNESCO delisting Manas as a World Heritage Site in danger.

3. Catalyzing conservation contagion

Community conservation practitioners must view themselves as catalysts to stimulate and guide indigenous and local people, building their capacity and encouraging them to assume responsibility for creating solutions to the natural resource challenges in their communities. In the parlance of chemistry, catalysts (e.g., *Community Conservation* personnel) reduce the so-called energy of activation (i.e., ignorance of, passivity to, disinterest in, or resistance to conservation initiatives) to stimulate a reaction (e.g., progressive and sustainable conservation programs). In our experience, programmatic initiatives have the potential to spread to other communities and, often, throughout regions by a process of diffusion that we term *conservation contagion*. Sometimes conservation contagion diffuses more broadly, influencing protectionist policies at the country-wide or even international levels. Initially, these objectives may require non-governmental organizations to take a prominent, leading role. However, as a community becomes increasingly empowered and independent, the practitioner-organizers become less and less visible, and members of the community emerge as primary leaders. Although our 9-stage social model incorporates a number of catalytic factors facilitating the occurrence of conservation contagion processes (e.g., building trust with village members, infusing information *via* local networks), in reality, on the ground, they are intimately integrated with the social and cultural process, what Berkes (2004) terms “social-ecological systems”. Thus, successful development, management, and stabilization of horizontal networks are not automatic, linear processes but complex and dynamic ones over time and space. Our case studies from Belize, Namibia, and India exemplify individuals, community-based organizations, and non-governmental organizations *catalyzing* indigenous and other local people to participate in conservation initiatives followed by conservation contagion resulting from application of our 9-stage model. Catalyzing conservation contagion alone does not guarantee program success without application of all stages in our model that, although a dynamic process, significantly

tempers the programmatic, unstructured, and unpredictable state that Westley et al. (2006) call, "getting to maybe".

Conservation contagion may sound like a fuzzy or murky concept, but, when one sees the results, it is an important phenomenon that deserves study and the awareness of community conservation practitioners. The word contagion has both a negative meaning, as in the spreading of disease, and a more neutral meaning, as the rapid communication of an influence. In a sense, the phenomenon of trends that are communicated rapidly may be thought to spread like epidemics with three characteristics: 1) contagiousness, 2) small causes can have large effects and 3) change happens not gradually but at one dramatic moment (Gladwell, 2002). Given these characteristics, research on such phenomena would be difficult. However, studies on human networks (Christakis & Fowler, 2009) may give us some insight into conservation contagion.

Since we have not carried out any research on the communications, social networks, or person-to-person interactions important in creating instances of conservation contagion we have observed, we can give only a start to understanding conservation contagion by listing and discussing some anecdotal observations that both seem to play a role in the phenomenon and show that contagion is occurring. We have identified eight facets: 1) copying of methods to initiate other projects, 2) person-to-person contacts, 3) presentations and responses to them, 4) formation of new community conservation organizations, 5) requests by communities or community groups to join an existing project, 6) knowledge of a project and requests for help by other communities, 7) large crowds at events and 8) creating project publicity within the country. Examples of some of these will be described and discussed in the following sections on Belize and Assam, India.

4. Examples of successful community conservation projects

4.1 Belize

In the early 1980's, cooperative organization and planning among Horwich, Lyon, and members of a community in Belize District, northwest of Belize City, led to the establishment of the Community Baboon Sanctuary dedicated to preservation of the endangered black howler monkey (*Alouatta pigra*) and its moist tropical forest habitat (Horwich & Lyon, 1988). This project led to development of a local ecotourism industry (Horwich et al., 1993). By 1990, the Community Baboon Sanctuary spawned creation of the country's first rural museum, managed semi-independently under the umbrella of the Belize Audubon Society (BAS). At this time, Horwich and Lyon formed *Community Conservation* (Horwich 1990a, 2005; Horwich & Lyon, 1995, 1998, 1999; Young & Horwich, 2007), initiating what would become an international network of ground-level, bottom-up programs.

In the Community Baboon Sanctuary project, *Community Conservation* and other non-governmental organizations functioned as catalysts, first by initiating locally-based programs and, subsequently, by educating village leaders about the short-, mid-and long-range value of biodiversity preservation. At a later stage, community leaders employed their legitimate authority to influence village residents and to disseminate information, often through delegates. Once this stage successfully affected participation in conservation efforts and established community-based infrastructures devoted to conservation, committed villagers were recruited to serve as workers dedicated to managing and sustaining conservation programs (e.g., as office workers or guards to eject poachers from protected

lands). Outside organizers (e.g., *Community Conservation* personnel) were subsequently freed to devote attention to additional community-based conservation enterprises while continuing to maintain contact with and provide support to villages when required and solicited. In some cases, a small cadre of organizers maintained a physical presence in or near communities with viable conservation infrastructures, continuing to serve as facilitators and advisors, at least over the short term. In other instances in Belize, former organizers remained in villages as researchers or employees.

In the 1990s, through a process of conservation contagion, formal publicity and informal dissemination of information about the Community Baboon Sanctuary stimulated and influenced many rural Belizean communities to cooperate, exerting pressure on central government for participation in their conservation initiatives. These events ultimately influenced the Belizean government to create a series of protected areas (Young & Horwich, 2007) as well as a country-wide network of Special Development Areas including indigenous and local groups inhabiting the newly protected landscapes (McGill, 1994). In 1994, the Belize government coordinated an ecotourism seminar (Vincent, 1994), published a community tourism booklet, and created a video on community-based tourism. In addition, the Belize Departments of Forestry and Fisheries began to negotiate informal and, later, formal co-management agreements with communities (Young & Horwich, 2007). Cooperative development of the Community Baboon Sanctuary catalyzed a series of reactions (conservation contagion from local level to central government: a “vertical network”) arising from our community-based conservation model. By 1991, communities led by St. Margaret’s Village, adjacent to Five Blues Lake, lobbied the government of Belize to create Five Blues Lake National Park and other protected areas in response to the country’s rapidly developing ecotourism industry (Young & Horwich, 2007). In 1992, the Minister of Tourism, Glenn Godfrey, embraced the Gales Point Project, subsequently leading government to include it in a new Special Development Area, a step preliminary to creation of a protected area in the region (McGill, 1994).

In 1997, the Inuit Council of Canada visited Belize’s southern Toledo District, an area of Mayan concentration, to coordinate a seminar on co-management with the Kekchi Council of Belize (an indigenous Mayan organization), citing the Community Baboon Sanctuary as an example of community co-management. Eight years earlier in 1989, however, *Community Conservation* gathered signatures of local governments in three Toledo villages to initiate a cooperative plan for a Toledo Biosphere Reserve, composed of the Temash River, an important mangrove habitat, the Columbia Forest Reserve, and the Sapodilla Cayes (Horwich, 1990b). At that time, there was community support for the plan, but regional politicians showed no interest.

Following the central government’s creation of the Sarstoon-Temash National Park in 1994, independent of input by communities impacted by the plan, Horwich traveled to Toledo in 1997 to re-catalyze and revive a component of the Toledo Biosphere initiative. A strategy was devised whereby Horwich would work with Judy Lumb, a resident of Belize with ties to the Garifuna community in southern Belize, to organize a conference on community co-management for the Sarstoon-Temash National Park stakeholders (see Producciones de la Hamaca & Community Conservation Consultants, 1998). From that event, the Sarstoon-Temash Institute of Indigenous Management (SATIIM), an indigenous-based non-governmental organization created by Mayans and Garifuna, was developed to coordinate impacted communities and to manage the National Park using our model.

Based on the success and aftermath of the conference, Horwich and Lyon obtained a United Nations Development Project (UNDP) grant for the Belize-based Protected Areas Conservation Trust (PACT, 1998) to create a community co-management park system. In contrast to the Namibian case described below, PACT's steering committee significantly modified project goals, leading to failure and abandonment of plans for the initiative (Catzim, 2002). However, a concrete result of our community-based conservation efforts in Belize was the central government's eventual adoption of community co-management as national policy (Meerman, 2005) and signing of agreements with communities to co-manage at least a dozen protected areas distributed throughout Belize - both terrestrial and marine (Figure 1). Thus, implementation of the *Community Conservation* model generated the process of a conservation contagion that proved successful beyond anyone's projections. Eventually, the Government of Belize supported enhancement of local natural resource management and production of systemic changes in conservation policy at the national level. However, it should also be noted that minimal government resources and political commitment (Catzim, 2002) have left many communities with insufficient support and no interconnected co-management system despite their interest in and will to proceed with conservation initiatives. Thus conservation contagion must be coupled with appropriate and sustainable support to achieve maximum impact.

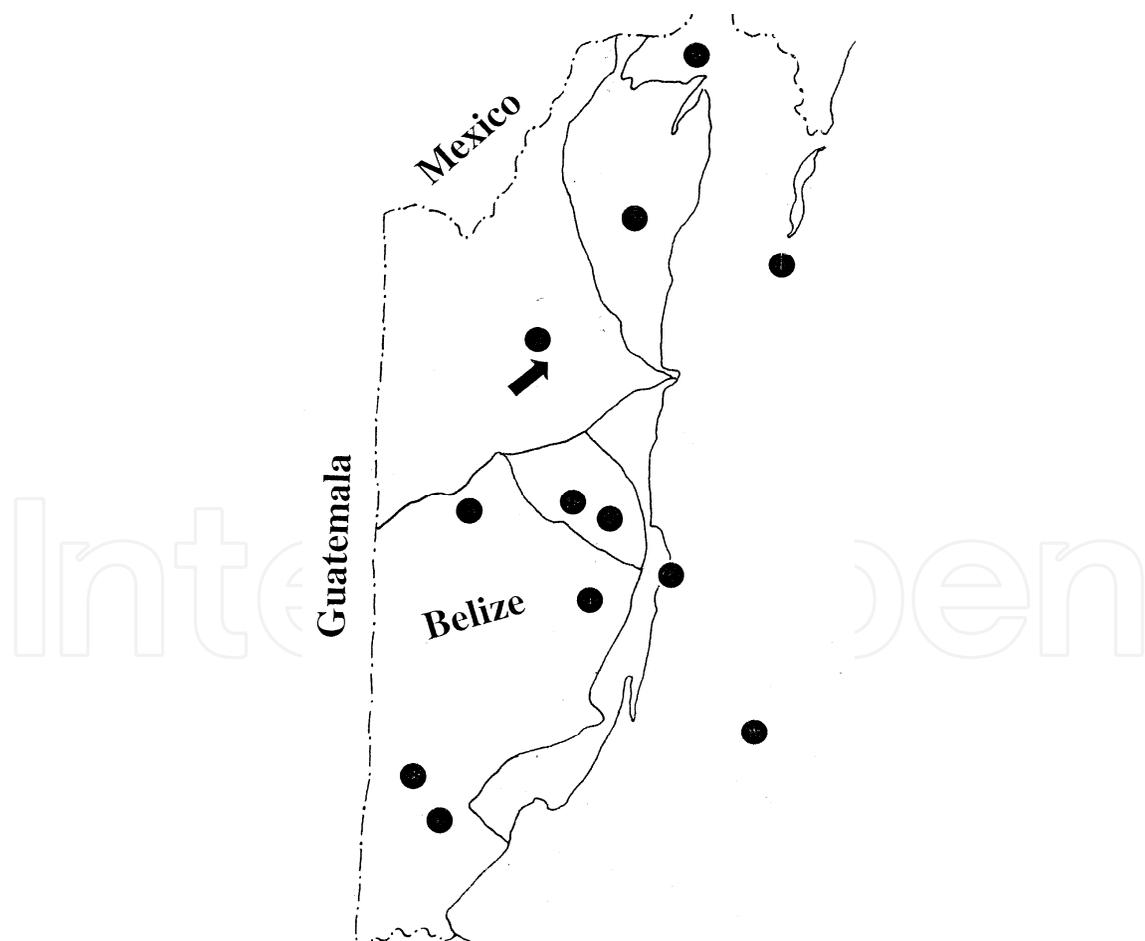
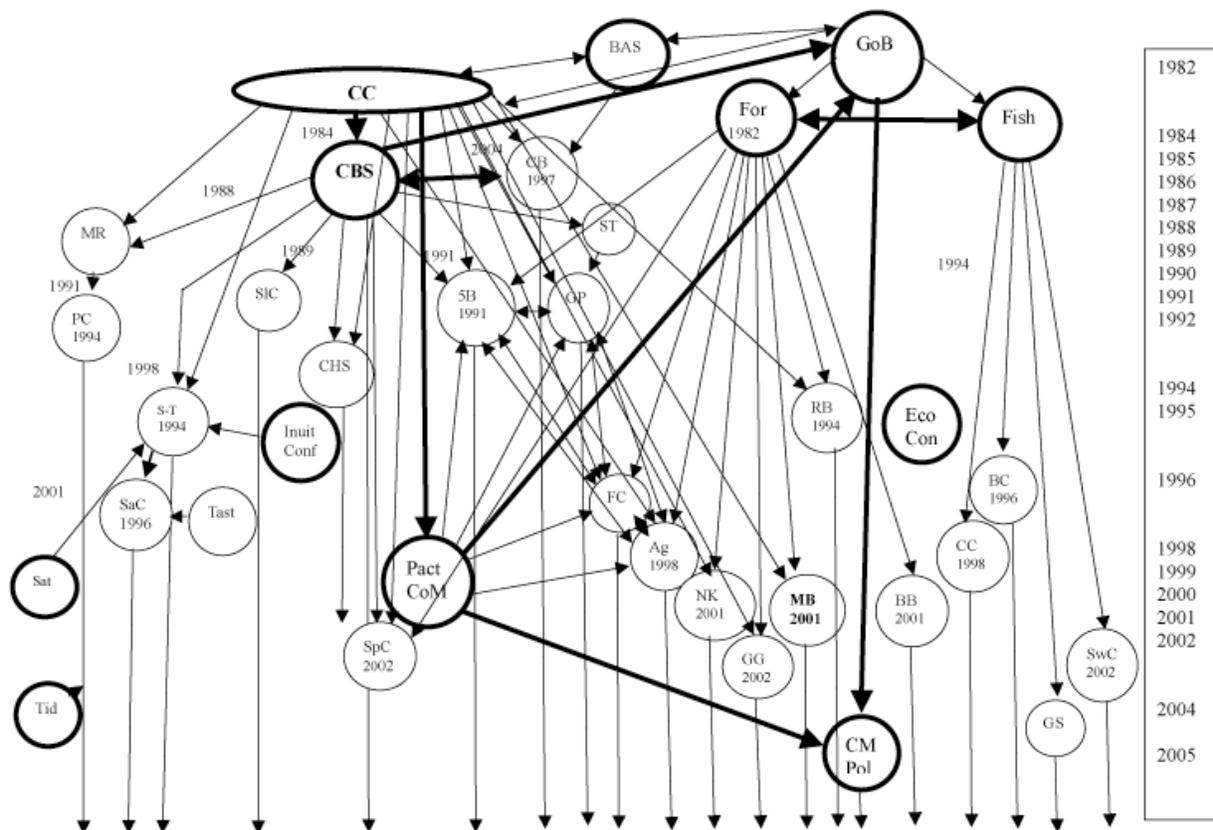


Fig. 1. Map of Belize showing distribution of the 12 community co-managed protected areas (dots) and the Community Baboon Sanctuary (arrow)

Figure 2 shows a synopsis of the catalyzing influences and social network of interactions that were occurring in Belize that led to the conservation contagion (for details, see Young & Horwich, 2007). The Community Baboon Sanctuary was initiated in 1985 in affiliation with the Belize Audubon Society, the latter having been commissioned by the Belizean government in 1984 to administer the existing park system. This partnership led to meetings between the Community Baboon Sanctuary Manager, the late Fallet Young, and the Director of the Cockscomb Basin Wildlife Sanctuary, Ernesto Saqui, an employee of the Belize Audubon Society. With the Community Baboon Sanctuary becoming widely publicized nationally and internationally, it had a conservation influence on rural communities country-wide (Government of Belize, 1998). In 1988, Young addressed the village of Monkey River, eventually catalyzing that community to move the government to create Payne's Creek Wildlife Sanctuary, that had a significant population of howlers (Horwich et al., 1993). By the early 1990s, three other projects were developed using our model: Slate Creek and Siete Milas village project in 1991 in the Mayan Mountains (Bevis & Bevis, 1991), a sea turtle nesting project initiated on Ambergris Cay by Greg Smith which was moved to Gales Point in 1992 when we initiated the Gales Point Manatee project (Lyon & Horwich, 1996); and, the Community Hicatee (turtle) Sanctuary along the Sibun River in 1994. Siete Milas later worked with Itzamna, a community-based organization co-managing the Elio Panti National Park in the Mayan Mountains.

Many rural communities in Belize, seeing the efforts of the Community Baboon Sanctuary villages, realized that they too could participate in the growing conservation/ecotourism movement and stimulated the government to create protected areas adjacent to their communities (Horwich & Lyon, 1999). St. Margaret's village initiated the establishment of Five Blues Lake National Park on Earth Day 1991 (Horwich & Lyon, 1999). We tried unsuccessfully to initiate a community-based project that included the Sarstoon-Temash mangrove forest area in 1989. Then, in 1994, it became a National Park without community input. The government held an ecotourism conference in 1994 and produced a movie and a booklet on community ecotourism (Horwich & Lyon, 1999). In 1995, the Association of Friends of 5 Blues Lake National Park signed a formal co-management agreement with the Government of Belize. In 1997, the Inuit Circumpolar Conference sponsored a co-management workshop in Toledo featuring the Community Baboon Sanctuary as an example of co-management. Later that year, *Community Conservation* initiated the process for a stakeholders workshop for the Sarstoon-Temash National Park (Producciones de la Hamaca & Community Conservation Consultants, 1998).

Stimulated by that conference, *Community Conservation* developed a proposal for a community co-managed park system that was to include Freshwater Creek Forest Reserve, Five Blues Lake National Park, Gales Point Manatee and Aguacaliente Wildlife Sanctuary (PACT, 1998). As a result of this project, when the Government of Belize created the Protected Areas System Plan in 2005 it had a section on community co-management. They presented the plan to the conservation community in early 2006 (Government of Belize, 2005). These actions were some that initiated the conservation contagion. Figure 2 gives a visual representation of a complex network that contributed to the conservation contagion that resulted throughout the small nation of Belize. Figure 2 demonstrates the complexity of social connections that occurred over the years contributing to the conservation contagion.



Government – GoB - Government of Belize, For - Forestry Department, Fish - Fishery Department, PACT Coman - Protected Areas Conservation Trust co-management grant, Cmpol – Co-management policy, Eco Con - Ecotourism Conference, NGOs – CC – *Community Conservation*, BAS - Belize Audubon Society, Inuit Conf-Inuit Conference, Sat - SATIIM, Tast - Taste, Tid - TIDE, CBOs/PAs - Ag - Aguacaliente Wildlife Sanctuary, BB - Billy Barquedier, BC - Bacalar Chico, CB - Cockscomb Basin Wildlife Sanctuary, CBS – Community Baboon Sanctuary, Cc – Cay Caulker, CHS – Community Hickatee Sanctuary, FC – Freshwater Creek Forest Reserve, 5B – 5 Blues Lake National Park, GG - Gra Gra Lagoon, GP – Gales Point, GS - Gladen Spit, MB - Mayflower Bocwina National Park, MR -Monkey River, NK -- Noj Kaax Meen Eligio Pantí National Park, PC - Paynes Creek, RB - Rio Blanco National Park, SaC - Sapadilla Cayes, SwC – Swallow Cay, SIC- Slate Creek, SpC - Spanish Creek Wildlife Sanctuary, ST- Sea Turtle Project, S-T – Sarstoon-Temash National Park.

Fig. 2. Network connections of *Community Conservation* and their relationships with community-based organizations and Protected Areas, non-governmental organizations and government organizations.

4.2 Namibia

In the early 1980s in northern Namibia, wildlife was severely depleted by poaching (Hoole, 2010). At the same time that the Community Baboon Sanctuary was developed in Belize, a non-governmental organization in Namibia, the Namibian Wildlife Trust, appointed Garth Owen-Smith, a former government game ranger, to respond to the poaching crisis in the northern area of the country by collaborating with village headmen who shared concern for the loss of wildlife (Hoole, 2010; Jones, 2001). Using village contacts from his prior career, Owen-Smith began to establish relationships with local headmen. Working with the government conservator, Chris Eyre and in cooperation with village leaders, Owen-Smith

instituted informal community game guard protection of wildlife, leading, over time, to increased population densities of large mammals threatened by poaching (Jones, 2001). In the mid-1980s, Owen-Smith and anthropologist Margaret Jacobsohn negotiated agreements with safari operators to pay the community a US\$5 fee per tourist visiting the area to view game (Jones, 2001). In both Belize and Namibia, conservationists initiated their efforts by responding to environmental problems in discrete, manageable regions, engaging with stakeholders as allies having common interests and goals to preserve biodiversity. These associations also addressed resistance and other challenges arising within, between, and outside of village networks.

By 1989-1991 a community game guard program was firmly established, and Owen-Smith and Jacobsohn moved on to initiate a second program in northeastern Namibia (Jones, 2001). While projects in Belize had informal support from local politicians, there was no formal support from government because lands were privately owned by subsistence farmers. Their practices, especially "milpa" (slash-and-burn) or clear-cutting methods of land clearance, were often destructive to habitat and organisms inhabiting forests. In Namibia, before independence, the South African government viewed Owen-Smith's liaison with black communities suspiciously, ultimately terminating support for his programs (Jones, 2001). By 1990, however, the Namibian initiative proved to be on the right side of history (Westley et al., 2006) when the country gained independence, extending rights over wildlife to the majority black government, thereby terminating private ownership of land by white farmers (Hoole, 2010). The post-independence government engaged the non-governmental organization, Integrated Rural Development and Nature Conservation (IRDNC), formed by Owen-Smith and Jacobsohn, to develop a community-based natural resource management program (Hoole, 2010). This was similar to the process transpiring in Belize at approximately the same time.

The pioneering projects in Belize and Namibia had similar trajectories, with conservationists and small non-governmental organizations acting as catalysts, initiating locally-based programs and educating villagers. In both cases, through disseminated information initial projects led to broad-based regional conservation efforts. This seemingly paradoxical role is the foundation of reliable and replicable tactics and strategies of community conservation, including features characteristic of *Community Conservation's* 9-stage model.

Namibian independence in 1990 removed the obstructionist South African regime, and the new Namibian government invited Owen-Smith and Jacobsohn to resume and to expand their work. Namibia's community-based natural resource management program had been modeled after other African initiatives such as Zimbabwe's Communal Areas Program for Indigenous Resources (CAMPFIRE) and Zambia's Administrative Management Design for Game Management Areas program (ADMAD) (Hoole, 2010). Zimbabwe's conservation efforts, however, were obstructed by resistance at lower levels of government, a condition opposite to that in Namibia (Murphree, 2005). With major financial support from World Wildlife Fund (WWF) and the United States Agency for International Development (USAID, 2005) as well as backing from the central government, Namibia's Communal Conservancy Program caught on rapidly, exhibiting the conservation contagion seen in Belize and Assam, India (Horwich et al., 2010). By 2009, Namibia was managing 59 registered conservancies cumulatively, covering 12.2 million hectares (Figure 3; 2009 map from www.nacso.org.na). Wildlife populations in the northeast conservancy regions increased markedly and money was generated from eco-projects (NACSO, 2009) with long-term potential for financial

sustainability. While the Namibian case demonstrates that our model for the implementation of reliable community conservation projects is not the only one capable of sustained success, the *Community Conservation* template is explicitly detailed by stages characteristic of all community-based conservation initiatives. We base this statement upon our documentation of the methods and outcomes of other programs compared and contrasted to our own model.

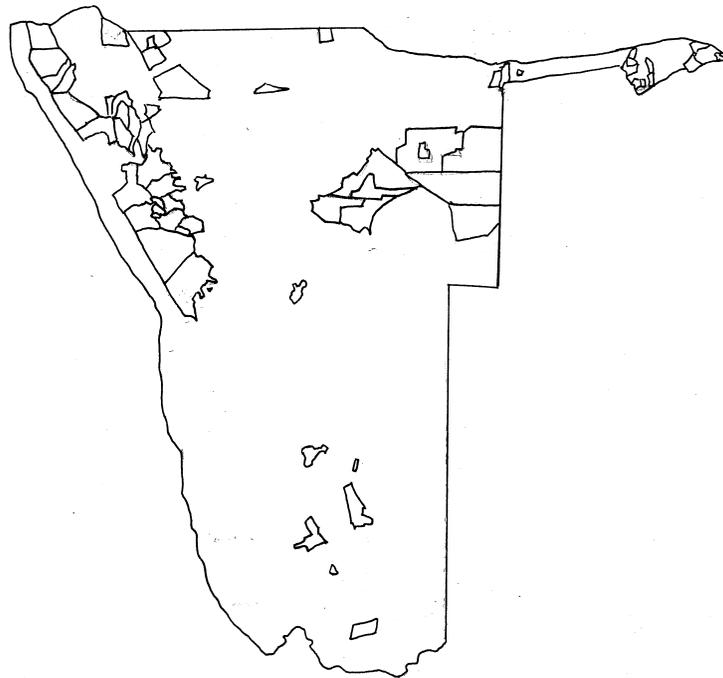


Fig. 3. Map of Namibia's 59 Community Conservancies in 2009 (redrawn from 2009 map on www.nacso.org.na).

4.3 Assam, India

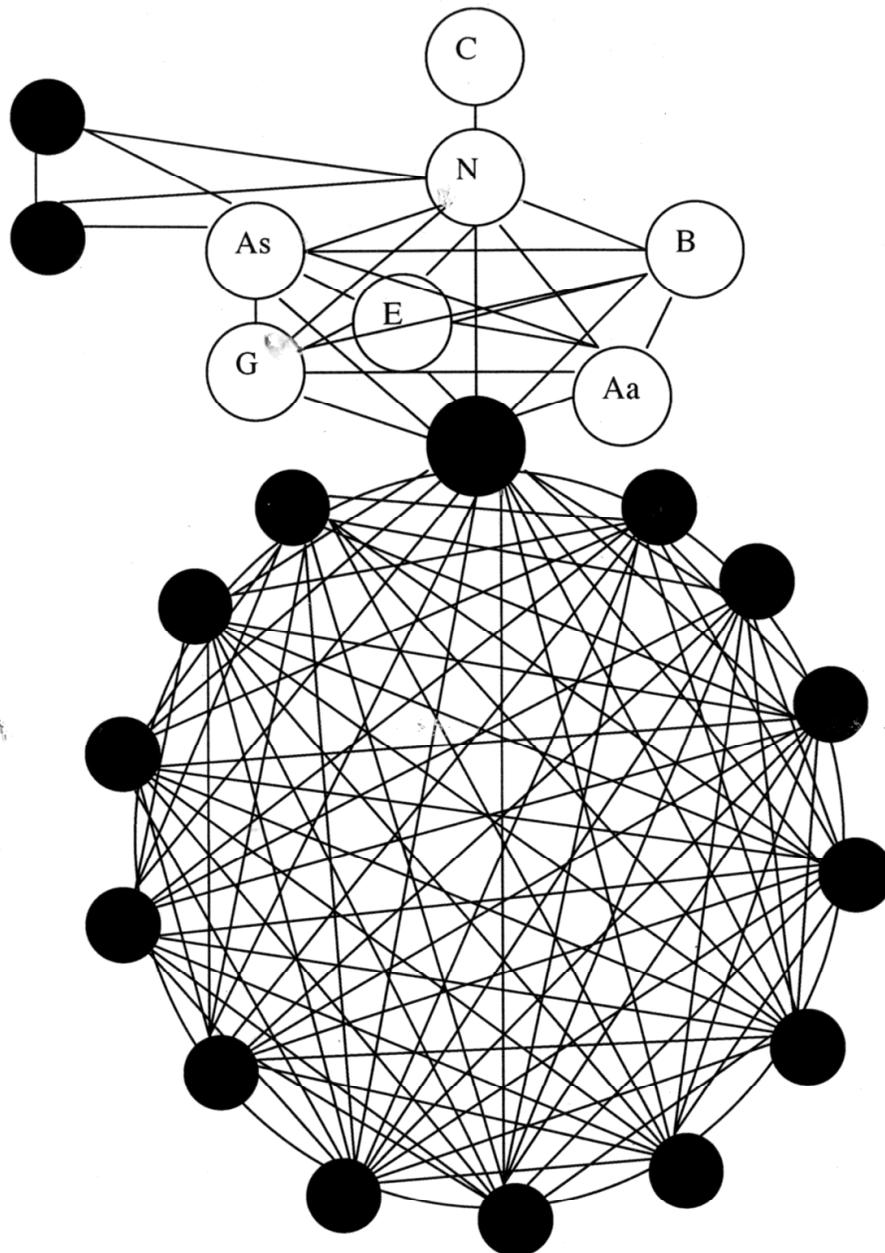
The Golden Langur Conservation Project was initiated in 1998 to protect the Manas Biosphere Reserve and the golden langur (*Trachypithecus geei*), a folivorous monkey. Forests of the Manas Biosphere Reserve have been threatened by illegal logging since the early 1990s, and, in the last 15 years, approximately one third to one half of the three reserve forests (~200,000 ha) making up the reserve (Ripu, Chirrang, and Manas), were deforested by clear-cutting (Bose & Horwich, unpublished data). Based on transect surveys, including interviews with residents in and near the reserves, these three reserve forests, a group of southern isolated reserve forests, and the Royal Manas Sanctuary on Bhutan's northern border are presently the primary range of the golden langur. Understanding the potential of conservation contagion to create regional change, *Community Conservation* included local communities, non-governmental organizations, and agencies of the governing body of Assam in planning meetings and seminars to discuss the conservation project. While the Assam Forestry Department showed some interest in the effort, it was not until a new tribal government, the Bodoland Territorial Council (BTC), was formed in 2004, that community conservation was embraced, leading rapidly to the contagious spread of support for our proposals noted earlier, ultimately attracting crowds of 20,000 to 35,000 people (Figure 4) to our informational programs (Horwich et al., 2010).



Fig. 4. Crowd Attending the Manas Biosphere Celebration at Ultapani

An important aspect of the Assam project is the manner in which a second tier of catalysis arose from activities of community-based organizations and non-governmental organizations. In 2006, Forest Protection Forces were created within the Manas Biosphere Reserve with support from the Bodoland Territorial Council. Subsequently, conservation contagion gained momentum, culminating in cooperative management by 14 community groups forming the Unified Forest Conservation Network of Bodoland, supported by local and governmental networks (Horwich and Bose, personal observation). A schematic representation of connections between the three forests making up the reserve is presented in Figure 5. The lower circular configuration representing the Unified Forest Conservation Network of Bodoland that protects the Biosphere mimics the military squad network topology of Christakis and Fowler (2009). This ring network topology experimentally was shown to facilitate problem solving (Christakis & Fowler, 2009).

Similarly, contagion occurred around the Kakoijana Reserve Forest where community members inhabiting or proximal to the reserve forest, housing a small golden langur population, were attracted to the conservation project. Today, by contagious processes, 28 communities surrounding Kakoijana Reserve Forest (Figure 6) have created two federations (Nature Guard, Green Conservation Federation) to protect the 17km² reserve (Bose & Horwich, personal observation). These are represented by the two upper, left spheres in Figure 5. Most importantly, these community protection efforts resulted in an increased Indian golden langur population from 1500 to almost 5600 langurs (Figure 7). The Kakoijana Reserve Forest increased its forest from 5% to 70-80% canopy (Figure 8) accompanied by an increase of golden langurs from less than 100 to over 500 langurs (Horwich et al., 2010; Horwich et al., 2011, Bose and Horwich unpublished data).



Government: As - Assam Forest Department, B - Bodoland Territorial Council
 NGOs: Aa - Aaranyak, C - *Community Conservation*, G - Green Heart Nature Club, N - Natures Foster,
 CBOs (black spheres): Biodiversity Conservation Society, Green Forest Conservation (larger black
 sphere), Manas Agrang Society, Manas Bhuyapara Conservation and Ecotourism Society, Manas
 Maozigendri Ecotourism Society, Manas Souci Khongar Ecotourism Society, New Horizon, Panbari
 Manas National Park Protection and Ecotourism Society, Raigajli Ecotourism and Social Welfare
 Society, Swarnkwr Mithinga Onsai Afut and four other unnamed community organizations.
 CBOs around Kakoijana Reserve Forests (black spheres upper left) Green Conservation Federation,
 Nature Guard

Fig. 5. Network Connections Established by the Golden Langur Conservation Project in Assam, India Between Government, Non-Government and Community Organizations.

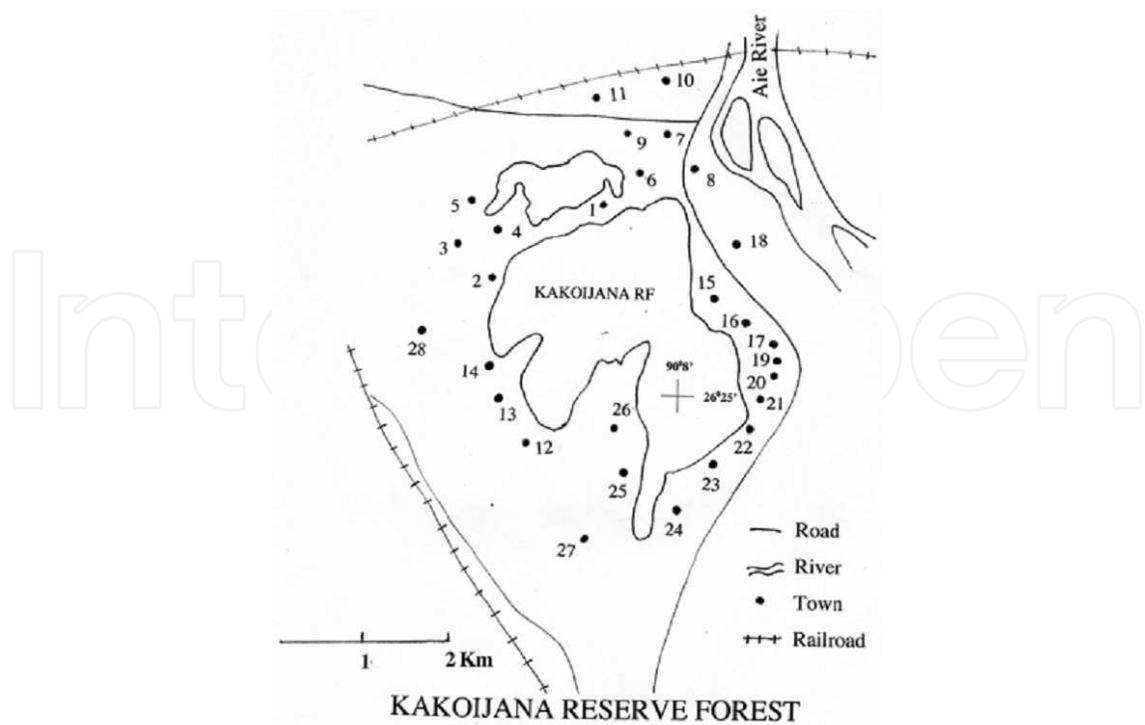


Fig. 6. Map of Kakoijana Reserve Forest surrounded by 28 villages composing the Green Conservation Federation and Nature Guard that protect the reserve forest

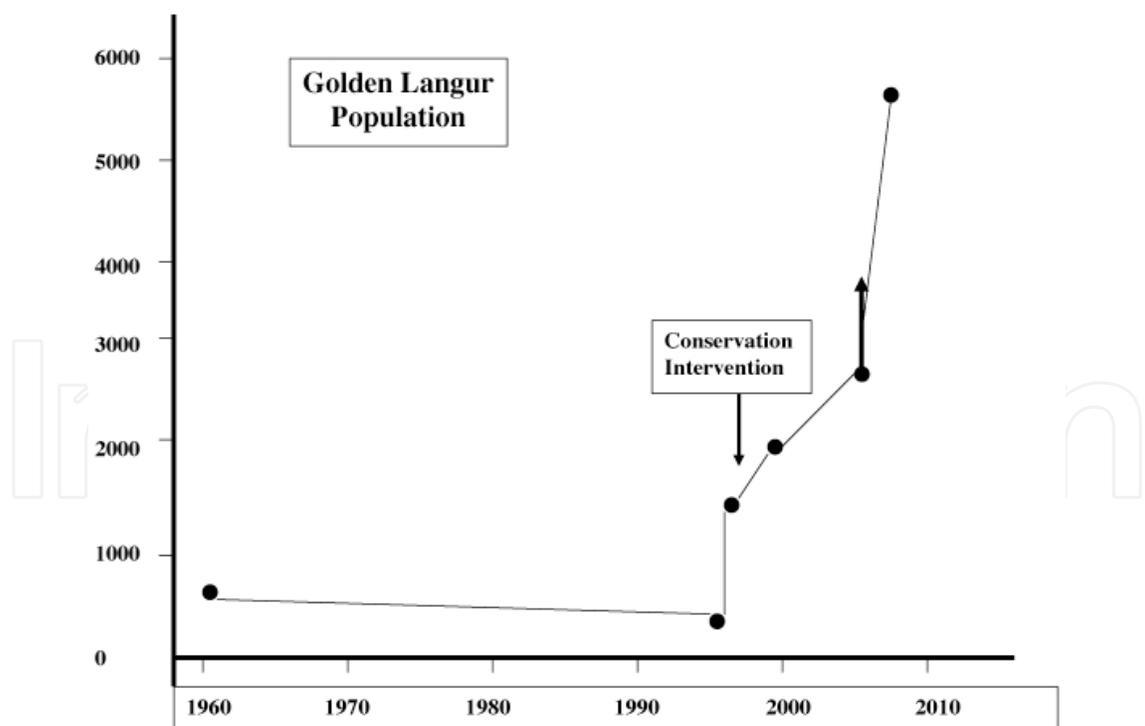


Fig. 7. Graph of Indian Golden Langur Population estimates indicating population increase following initiation of the Golden Langur Conservation Project (data from Gee, 1964 for 1960; Srivastava, et al. 2001 for 1997; Choudhury, 2002 for 2000; Ghosh, 2008a & b for 2008; Anonymous, 2009, Bose, 2007, 2008 (unpublished data), Ghosh, 2008a for 2009)

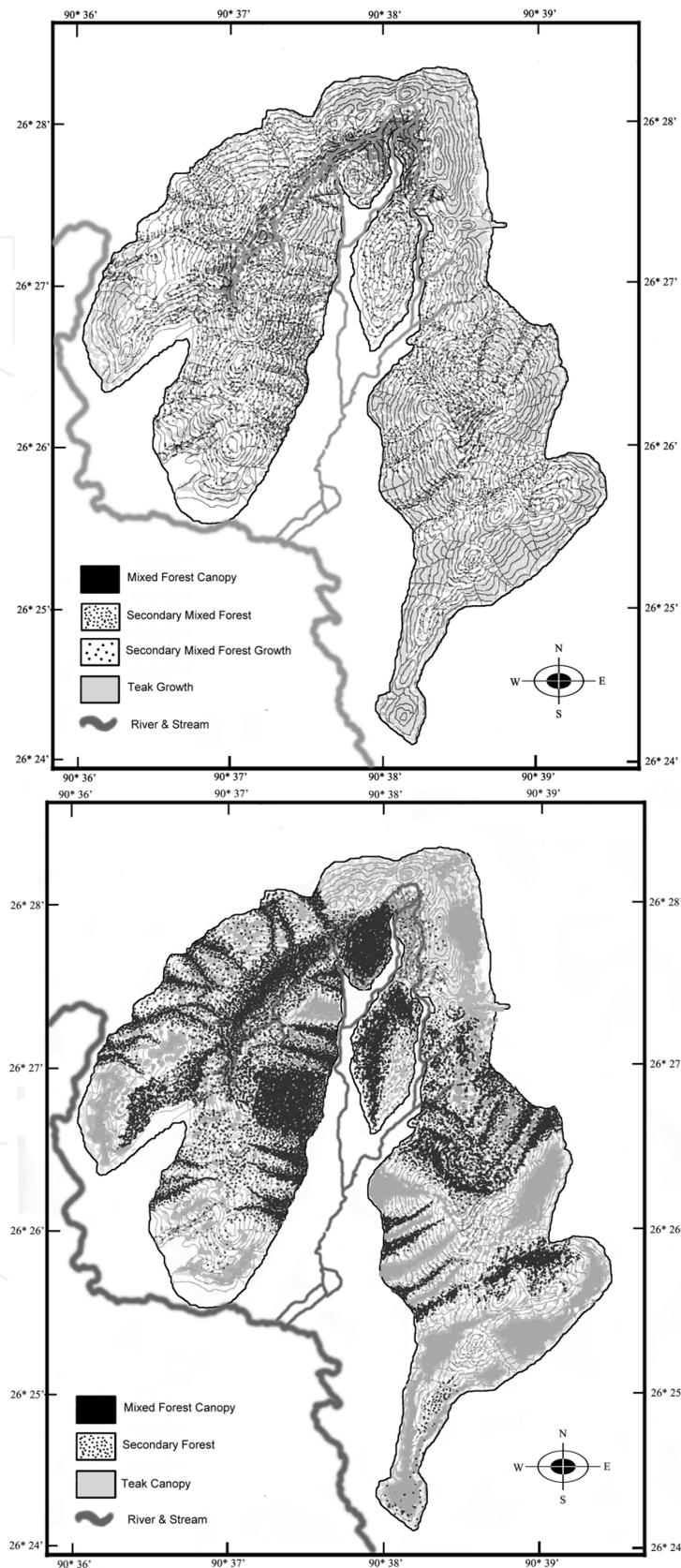


Fig. 8. Vegetation maps of Kakoijana Reserve Forest in 1996 and 2008 showing an increase in canopy cover from 5% to 70% as a result of community reforestation and protection.

In the Assam project, local villagers were trained as community organizers, community researchers, and community para-veterinarians (Figure 9). Through expansion of many programs and capacity-building, the project has influenced conservation efforts at broader regional scales, similar to the cases described for Belize and Namibia.



Fig. 9. Veterinarian Sarma training para-veterinarians near Kakoijana Reserve Forest

For example, one trained community organizer initiated self-help groups coordinating environmental awareness sessions around Manas National Park for the Pygmy Hog (*Porcula salvania*) Project (Bose and Horwich, personal observation). He is also organizing communities for the Assam Haathi Project whose goal is to mediate human-elephant conflict along the southern basin of the Brahmaputra River in Golpara District. Another local conservationist, trained in cutting-edge primate census methods by *Community Conservation* personnel, worked with the Tripura State Forest Department to census Phayre's langurs (*Trachypithecus phayrei*), leaf-eating monkeys related to golden langurs. Members of communities in these areas gained capacity and experience and were able to enhance their employability as semi-professional conservationists, disseminating project goals and procedures throughout the region. They currently perform a role similar to trained parataxonomists in Papua New Guinea, in Guyana, and elsewhere (see Basset et al., 2000). In other locales, community members have been trained by a veterinarian as para-veterinarians (Figure 9), similar to bare-foot doctors supporting the Hen Can Change a Man Program organized to increase the income of villagers engaged in poultry husbandry around the Kakoijana Reserve Forest. These examples of effective educational initiatives reinforce our suggestion that all community-based conservation programs, *ceteris paribus*, are characterized by features similar to our 9-stage model because, due to psychological, economic, political, social and other comparable constraints, there are a restricted number of tactics and strategies likely to lead to sustained success. Training and capacity-building for both individuals and non-governmental organizations, then, have been integral and critical parts of expansion of community conservation programs on a range of fronts. Following the definition of catalysis presented above, energy inputs required to activate and effect initial stages of community-based conservation were decreased as a result of increased efficiency

resulting from skill- and evidence-based organization. The broad regional success in Assam and elsewhere is dependent upon community conservation contagion traceable back to a modest, small-scale starting point in local areas. Our model, then, schematizes the trajectory of successful bottom-up conservation programs, creating stable “horizontal networks” capable of developing productive associations and activities with components of “vertical networks” (Berkes, 2004).

5. Lessons learned from practice

There is a current dearth of articles comparing and contrasting community-based conservation, community conservation, collaborative management, ICDPs, etc. These terms have, effectively, become buzz-words with biologists and sociologists referring to "new conservation" models incorporating community-based conservation practices. With so many different approaches, it has become difficult to know what works best and what doesn't. First hand practical experience with 23 small on-going community conservation projects over the past 26 years have given us insights about what factors are most critical for achieving program success (Table 1).

Rural communities are a major resource for a new breed of conservationists. Since they live where the highest concentration of natural resources exists, can easily exploit them with traditional practices, have additional knowledge about their habitats and people, and are experts in their own right, mainstream conservationists must create incentives for indigenous and other local people in order that their talents, knowledge, expectations, desires, and persistence can be utilized for their own benefit and that of the forests and wildlife. Conservationists can use existing rural institutions or can help rural people create new institutions to deal with modern problems (Agrawal and Gibson, 1999).

To be most effective, practitioners need to be catalysts of community conservation, helping community-based organizations to form in local communities, monitoring them, building capacity and re-catalyzing them when needed. When initiating a community conservation project, a well-crafted proposal may have major power to interest community members, government officials, donors, and other stakeholders to become involved. Enlisting a support coordinator and seed money are important to get a young project started and to help a fledgling community-based organization.

Seed money and money for simple project maintenance is essential. Looking for a simple mechanism for partial financial sustainability is very difficult, but, when found, adds a great deal toward continuity and longevity, preventing community discouragement. Using a guiding, entrance, or membership fee for protected areas can create a minimal budget to keep the project going. Community ecotourism, while a double-edged sword, can provide potential in this direction.

While financial sustainability is to be strived for, project continuity and longevity depend on creating social incentives. Properly equipped volunteers are very important to keep incentives going. Discontinuity of funds or other incentives discourages community members. Although projects may pass through ups and downs, if the original incentives were good, there is a recycling effect; a project is only a failure if it totally disappears. Establishing model projects is extremely important to encourage other projects and can have a regional effect. A replication of techniques from one project to another helps to propagate ideas and models.

Connection to land is important to rural residents and ownership contributes greatly to this. Thus, historical land tenure may be problematic or can be a source for positive conservation alternatives. While private landowners can make important contributions, encouraging communal and tribal or clan ownership, where in place, has a greater relevance for project longevity and long-term environmental protection, especially if there is a strong formal or informal institution in place. Since private landownership has its limitations, formal land protection mechanisms for private lands can create a long-lasting effect. There is a difference between land ownership and management and community groups can achieve some benefits from management alone. Land use planning provides an important vision for future conservation and protection.

While governments are often slow to move, may be corrupt, or can hamper a project, there is a great need for balanced community-government communication. Too much government reduces community initiative. However, effective, strong laws can provide strong legal land protection. Additionally, once government sees the advantage to involving communities, their tactical and financial support can provide project sustainability. Co-management of protected areas can thus be an important balanced conservation solution.

Non-governmental organizations have an important role (Agrawal & Gibson, 1999) as intermediaries and community trainers and educators. They can provide an initial open communicatory link between communities and government. Often, they can provide expertise and motivation that governments cannot. Non-governmental organizations can provide networking to connect communities to the resources they need to develop a stronger community-based organization. In any effective system that involves communities, non-governmental organizations, and government, there is a need to strengthen all partners, especially the weaker ones.

6. Policy implications for the future

Comprehensive, multi-scale, and resilient policies are required to respond effectively to social, political, and economic networks facilitating successful catalytic incidents and the emergence of conservation contagion. In this chapter, we have documented a resilient community-based model whose successes have resulted from the expansion of existing ground-level networks into a broader horizontal matrix by capitalizing on catalytic events and subsequent contagious diffusion. These tactics and strategies operate along with indigenous and other local values, beliefs, folkways, resource use, and political structures as well as social, cultural, and economic activities in order to capitalize on opportunities to build complex horizontal networks (see Berkes, 2004, Christakis and Fowler, 2009). In these cases, we have observed that a critical mass of complexity (e.g., by increasing inter-individual and multi-scale interactions) may lead to a threshold response at which a tipping point is reached, leading from one state of relative equilibrium to another (Gladwell, 2002). These non-linear events may have negative as well as positive outcomes from the perspective of conservation goals and objectives. Indeed, some studies suggest that increased complexity may lead some community members to resist or abandon active engagement with conservation initiatives (see Hoare and du Toit 1999 in Berkes, 2004), a dynamic state of affairs providing challenges to community-based organizations but capable of being addressed by components of our model applied to community-based organization programs by trained facilitators.

Community-based initiatives and their practitioners deliver specialized, reliable tactics and strategies to indigenous and other local communities for empowerment of community networks and, ultimately, transfer of power to these entities. Paramount to success is remembering that indigenous and other local communities are necessary components for solutions to the worldwide biodiversity crisis. We have demonstrated that application of our model and treating indigenous and other stakeholders with consistent and reliable respect and humility, valuing their folkways, habits, and cultures, their knowledge, leadership skills, and significant expertise without patronizing attitudes and behaviors, a majority of local stakeholders become willing and active participants in conservation programs (see Persha et al., 2011). If these factors are obtained, trusting, enduring relationships between horizontal and vertical networks can be built having the potential to establish multi-scale, multidimensional, complex, and dynamic associations, incorporating indigenous and other local people as co-conservationists (Haldane & May, 2011; Persha et al., 2011). In addition to consolidating horizontal and vertical networks, *Community Conservation's* mission and the successful implementation of our 9-stage model that we extend to other community-based organizations, has promoted the success of our programs by providing incentives, fostering pride, advancing program self-sufficiency, and effecting sustainable project ownership.

Our case studies demonstrate applications of the 9-stage paradigm that have influenced non-governmental organizations and/or central governments to adopt community-based conservation as policy, an outcome with the potential to impact conventional top-down environmental procedures linking horizontal with vertical networks. It is important to emphasize that successful implementation of our strategies depends upon careful, calculated planning resulting from the training and expertise of *Community Conservation* personnel. Equally important are the social and other skills, attendant traits, and motivation of indigenous leaders and other local individuals providing the initial commitment and impetus for successful implementation of our model and, later, cooperatively designed plans. Further, the flexibility and resilience of our 9-stage paradigm permits accommodation and adjustment to a range of local conditions, contingencies best evaluated stage by stage throughout the dynamic process of the multi-stage implementation of programs.

An example of the flexibility and resilience of our 9-stage plan involves the different contexts and challenges encountered when community members of low socioeconomic rank prove, initially, to be the most committed to implementation of conservation projects. In our experience, when the principal innovators and drivers of change in a target community are of relatively low socioeconomic or other status compared to, for example, group leaders, a longer period of time is required for the broader community and region to absorb, integrate, and respond to new ideas and ultimate project success. The cases we describe emphasize the need to adopt a flexible, resilient, and holistic systems perspective including social, economic, and political components of values and practices of indigenous and other local agents' relationships to their environment given the short-, mid- and long-range goals and objectives.

Currently, indigenous or other local people with lower socioeconomic status, including some men, most women, and youth, are assuming key roles in *Community Conservation's* community-based conservation projects. Large international non-governmental organizations may see the potential of using a catalyst method by adopting our 9-stage paradigm as a component of their conservation policy. Incorporating plans such as

Community Conservation's tactics and strategies would permit non-governmental organizations, central governments, and other entities to modify their methods, developing paradigms representative of their own circumstances and complying with the goals, objectives, and philosophies of their particular organizations. For example, World Wildlife Fund began innovative community conservation projects in southern Madagascar and Namibia. Conservation International is supporting the Tree Kangaroo Conservation in Papua New Guinea (Ancrenaz et al., 2007). The Nature Conservancy has shown innovative community projects in Papua New Guinea and the Solomon Islands (Mayer and Brown, 2007). Similarly, the Wildlife Conservation Society works with local communities to protect the critically endangered Cross River Gorilla (*Gorilla gorilla diehli*) limited to a restricted area along the Nigerian-Cameroon border (Nicholas et al., 2010). Successes can be documented; however, community conservation projects may not always be sufficiently comprehensive, ambitious, or efficient in time and energy to persuade non-governmental organizations with large budgets to invest in relatively small-scale conservation activities (Brockington et al., 2008). Furthermore, in our experience, large-scale non-governmental organizations rarely advertise their small community conservation accomplishments, and, if this policy were reversed, community-based conservation would likely be poised to gain a significant degree of legitimacy with non-governmental organizations and other entities in vertical networks. Attempts to evaluate the outputs and successes of historical policies and practices of protective programs and the field of conservation biology suggest that these entities lag behind most other policy fields because of their resistance to and slow incorporation of participatory philosophy and models (Ferraro & Pattanayak, 2006; also see Milner-Gulland et al., 2010). Yet there is growing recent data that show the effects of community and indigenous projects in reducing deforestation. Recent studies by Porter-Bollard et al. (2011), comparing 40 tropical protected areas to 33 community managed forests, indicated that the community managed forests showed lower and less variable annual deforestation than the protected areas. Soares-Filho et al. (2010), focusing on Brazil's recent push to reduce Amazonian deforestation by expanding the Amazon protected area network of 1.9 million km², showed a generalized inhibitory effect on deforestation in protected areas which would greatly reduce carbon emissions which in turn would effect climate change. However, they used a broad definition of protected areas. Looking closer at these 595 protected areas, only 90 or 15% were in the strictly protected category used by Porter-Bollard et al. (2011) while 494 or 83% were in the sustainable use (176) and indigenous lands (318) categories. Thus the positive results are mainly due to sustained use and indigenous lands, indicating the importance of community conservation. New conservation policies incorporate and embrace community conservation as one approach to biodiversity and ecosystem conservation, necessitating involvement and active participation by horizontal networks, including community and other stakeholder entities, community-based organizations, regional and national agencies, central governments, non-governmental organizations, conservation biologists, and other conservation practitioners (e.g., forest guards and rangers; scientists conducting research in habitat countries and hotspots) and stakeholders. Connecting horizontal and vertical networks among conservation entities has the potential to increase network diversity, scale, and resilience, maximizing likelihoods of success of conservation programs. Such connectivity also has the potential to compensate for limitations of agents and entities in both horizontal and vertical networks since bottom-up entities have generally lacked the resources to invest in the

creation, management, and sustainability of global organizations or in sustaining these networks if and when established. Higher-order, protectionist networks with “fortress conservation” policies have traditionally been averse to incorporating the interests, values, and bodies of indigenous and other local agents and units (informal and formal) into the goals and objectives of their mission statements and programs. This state of affairs has been maintained in large part because the morality, ethics, beliefs, attitudes, and philosophy of local people’s relationships to their natural resources has conflicted with those of vertical networks’ historical prioritization of preservation over sustainable use of forests, waterways, etc. (Berkes, 2004). When multi-level networks cooperate and establish meta-networks designed to resolve differences of vision and to consolidate communication networks and integrated representation of all stakeholders, differences and potential conflicts can be minimized through a multi-scale and multidimensional system sensitive to the interests and objectives of all network units over time and space.

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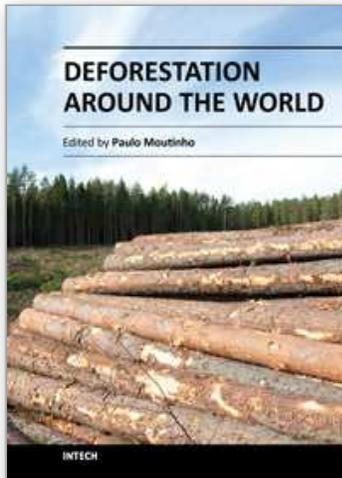
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Deforestation and forest degradation represent a significant fraction of the annual worldwide human-induced emission of greenhouse gases to the atmosphere, the main source of biodiversity losses and the destruction of millions of people's homes. Despite local/regional causes, its consequences are global. This book provides a general view about deforestation dynamics around the world, incorporating analyses of its causes, impacts and actions to prevent it. Its 17 Chapters, organized in three sections, refer to deforestation impacts on climate, soil, biodiversity and human population, but also describe several initiatives to prevent it. A special emphasis is given to different remote-sensing and mapping techniques that could be used as a source for decision-makers and society to promote forest conservation and control deforestation.

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