

AN OUNCE OF PREVENTION:

*Making the Link Between
Health and Conservation*

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TO LEARN
MORE

TO HELP YOU
ON YOUR WAY

FINDINGS IN
PERSPECTIVE

WHAT DID
WE FIND?

WHAT DID WE
DO?

WHAT DID WE
WANT TO KNOW?

WHY STUDY HEALTH
AND CONSERVATION?

DOING CONSERVATION BETTER

BSP's Analysis and Adaptive Management Program

Exploring the relationship between health and the environment is not new. The health effects of air and water pollution, for example, have been common knowledge for decades. But looking at the links between human health and the conservation of biodiversity is a relatively new concept. Many populations around the world are keenly aware of their utter dependence on the biodiversity around them – and the need to conserve it in order to ensure their own health and development.

If there are, indeed, naturally occurring connections between community development and conservation, how can we identify and promote them? If health is a strong motivational force for conservation, how can we best harness it to reach conservation goals? What are some of the characteristics of community-based conservation and development projects that successfully link human health to conservation? What have others in the field learned about the opportunities and challenges to make this link work for conservation? These are the questions that drove our research.

This research project was a collaborative effort between BSP's Analysis and Adaptive Management (AAM) Program and Conservation International's Healthy Communities Initiative (HCI). HCI manages a portfolio of projects from Africa, Asia, and Latin America that aim to conserve biodiversity by aligning community development priorities with conservation goals. HCI's central hypothesis is that community well-being and environmental quality are linked. HCI projects address social development priorities in ways that build bridges between the well-being of people and the sustainability of the environment around them.

BSP's AAM Program was established to learn about ways to increase the effectiveness and efficiency of conservation efforts around the world. We do this by conducting practitioner-focused, applied research to clarify the conditions under which certain conservation strategies work. Our results are presented in two publication series: our Global Exploration Series presents the findings of our core, external research on high-priority issues identified by BSP's consortium partners, and our Lessons from the Field provide short, summary analyses of hot topics in conservation.

The framework we used to guide our selection of key topics in the Global Exploration Series is the BSP Analytical Agenda. This framework, which we developed in 1996, outlines the following five conditions for success in conservation:

- 1. Clarity of conservation goals and objectives**
- 2. Equitable and effective social processes and alliances for conservation**
- 3. Appropriate incentives for biodiversity valuation and conservation**
- 4. International, national, and local policies supportive of conservation**
- 5. Sufficient awareness, knowledge, and capacity to conserve biodiversity**

This publication, An Ounce of Prevention: Making the Link Between Health and Conservation, focuses on Condition #3. To complete the study, we closely examined three HCI-supported projects in Latin America and canvassed an additional 31 projects from around the world. This breadth of projects allowed us to arrive at a wide range of observations and recommendations that we hope will help clarify some key concepts, focus discussion, and spark curiosity in conservation practitioners around the world who might be considering integrating health and conservation activities. We hope that our findings also help point the way for future exploration and discovery.



Richard Margoluis

Director, BSP Analysis and Adaptive Management Program

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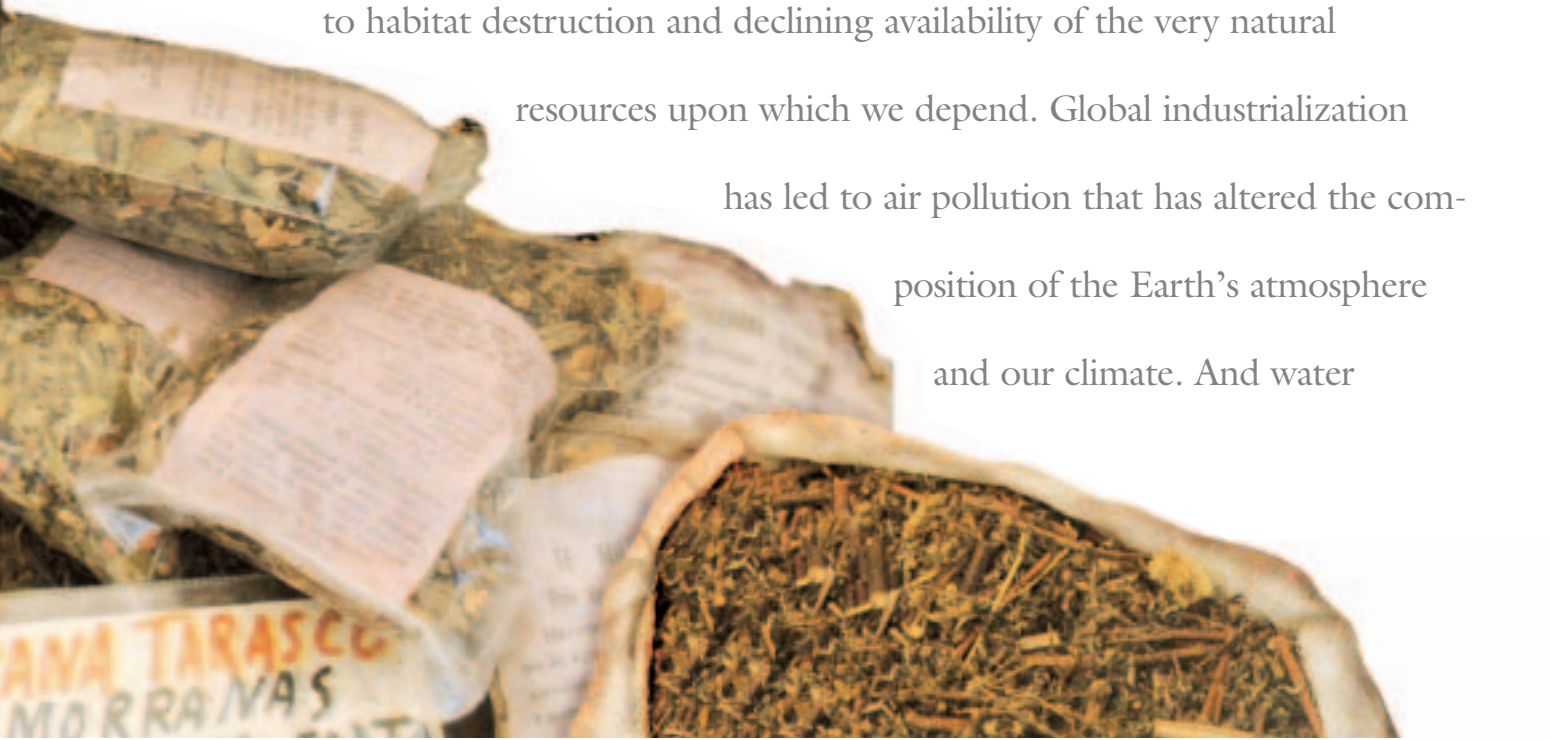
For a summary of the major findings and recommendations, see page 39.



AN OUNCE OF PREVENTION:

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Health and Conservation*

HUMAN ACTIVITY has become the dominant force shaping the face of our planet. While our exploitation of the world's natural resources has brought about great advances in human development, progress has not come without cost. Human expansion into virtually every corner of the globe has led to habitat destruction and declining availability of the very natural resources upon which we depend. Global industrialization has led to air pollution that has altered the composition of the Earth's atmosphere and our climate. And water



pollution and over-fishing have severely damaged the vitality of our marine and freshwater resources. The links between these human-induced environmental impacts and health have been debated for some time now, but even the strongest of skeptics is hard pressed to deny that, indeed, the very survival of life on Earth — including our own — is inextricably linked to the health of the environment in which we live.

Environmental degradation is not necessarily the product of malicious design. Instead, it is the sum of countless daily decisions made by people from all walks of life, at all levels of society, across the entire globe. For residents of underserved rural areas, these decisions often revolve around immediate needs to provide for themselves and aspirations to improve their future standard of living. To make conservation work, therefore, conservation practitioners must clearly understand and demonstrate the links between health and biodiversity — to promote conservation as a means to protect and improve human quality of life.

WHY STUDY HEALTH AND CONSERVATION?

Awareness about the connections between the global *environment* and human health is not new. When many of us think of this relationship, however, we tend to think of some of the more apparent negative associations such as the connection between industrial air pollution and respiratory diseases, water pollution and gastrointestinal diseases, and depletion of the ozone layer and skin cancer. Linking the *conservation of biodiversity* directly to human well-being is, however, a relatively new concept.



The results of a turtle hunt in A'Ukre, Southern Pará, Brazil. The Kayapo rely heavily on biodiversity from the surrounding forest for food, medicines, and materials.

On a global scale, there are many known benefits of biodiversity:

- **Health** – Biodiversity contributes to keeping the world's population healthy by providing the raw materials for the production of pharmaceuticals. For example, 57% of the top 150 prescription drugs sold in the U.S. are derived from plants and animals and sales of plant-based drugs in the U.S. amounted to \$15.5 billion in 1990 (Grifo and Rosenthal 1997).
- **Nutrition** – All of the world's major food crops — including corn, wheat, and sorghum — depend on new genetic material from the wild to remain productive. Seventy-five percent of the world's staple crops rely on wild animal species for pollination (Daily 1997). Biodiversity in the world's oceans is equally important for human nutrition — in 1995 alone, approximately 97 million tons of fish were commercially harvested for food and other products (UNEP 1999).
- **Climate regulation** – The Earth's oceans and standing forests serve as carbon sinks, fixing atmospheric carbon that would otherwise contribute to global climate change.

On a local scale, the relationship between biodiversity conservation and health can be even more apparent. Many of the places around the world where conservation professionals work are areas not only extremely rich in biological resources, but also home to rural subsistence families who depend on these resources for their own survival.

In these areas, conservation managers see an urgent need to protect biodiversity, and community residents feel the urgent need to survive. Because the goals of the two are often not clearly

compatible, these differences sometimes cause conservation practitioners to fall into antagonistic relationships with local people. Often, conservation professionals express frustration about the fact that the rural poor populations engage in practices that destroy the very resources they need to survive in the future. Conservationists may perceive this to be a very short-sighted view of survival. On the other hand, local residents become frustrated with conservation practitioners because they come to believe that the conservationists care more about plants and animals than people. Local residents may view this attitude as arrogant and callous.

Since the 1980s, there has been a shift in the thinking of the conservation community away from strict protection and towards the incorporation of social and economic development activities into conservation projects as a strategy to reach conservation goals. For example, some conservation approaches have focused on putting a monetary value on biodiversity in hopes that local residents would see that it was in their own economic best interest to conserve natural resources. Other strategies have concentrated on environmental education under the assumption that getting people to conserve was mostly a challenge of improving knowledge and changing attitudes. Still other strategies have focused on changing policies and regulations as a means of compelling local people to act in ways that protect biodiversity. But despite these many examples, true integration of conservation and development at the community level has been an elusive goal.

There are many ways in which local populations rely on the conservation of biodiversity to ensure their good health. These include, for example:

- **Traditional medicines** – Traditional medicine, based primarily on the use of local plants and animals, is the basis of health care for about 80% of the people living in developing countries. More than 5000 species of plants and animals are used in China (as cited in Margoluis 1996).
- **Food** – Much of the world's rural populations rely on hunting and fishing for food. For example, 75% of protein consumed in the Congo comes from wild sources. In areas of Botswana, over 50 species of wild animals provide approximately 40% of people's dietary protein (as cited in Margoluis 1996). In a Piaroa forest community of Venezuela, residents receive on average 83% of their protein and 72% of their fat from wild plant and animal sources (Melnyk 1995).
- **Ecosystem services** – Biodiversity serves an important role in many ecosystem services upon which local populations depend. Intact ecological systems are sources of clean drinking water: they help to form and retain soil, and they maintain crop yields by supporting populations of pollinators.



Finding opportunities to simultaneously address human needs and conservation issues are challenges that many conservation projects face.

conceptually and operationally. We believe that it is possible to nurture and capitalize on these connections in ways that simultaneously advance both human development and biodiversity conservation.

If there are naturally occurring connections between community development and conservation, how can we identify and promote them? If health is a strong motivational force for conservation, how can we best harness it to reach conservation goals? What are some of the characteristics of community-based conservation and development projects that successfully link human health to conservation? What have others in the field learned about the opportunities and challenges to make this link work for conservation? These are the questions that drove our research.

In this document, we examine human health at personal, family, and community levels as a motivating force for conservation. We do this because, as conservation practitioners working for conservation organizations, we are looking for ways to make conservation activities work. We are particularly interested in determining the extent to which community-based health interventions can provide conservation benefits. For the purposes of this study, therefore, we define a *health and conservation project* as one that is designed to address a particular human health problem or set of problems with the explicit intention of having some defined conservation impact. While this study generally concentrates on the relationship between health and conservation, our specific focus is on the ways in which health interventions can influence conservation outcomes and not *vice versa*. We firmly believe however, that the relationship, in fact, truly goes in both directions. That is, we believe that addressing conservation needs can be in the best interest of health, and addressing health needs can be in the best interest of conservation.

It is clear that many local populations rely directly on the biodiversity around them for survival, and that they prefer not to destroy it. How then can the conservation community take advantage of this naturally occurring incentive to conserve? Are there areas of mutual interest and common ground in which conservation and community-based development goals are truly compatible, or better yet, can work together in synergistic ways? This is where we believe that the relationship between health and conservation can play a vital role. There is compelling evidence suggesting that there indeed can be very strong connections between health and conservation, both con-

WHAT DID WE WANT TO KNOW?

There is a wealth of available information on environmental health, biodiversity and health (Grifo and Rosenthal 1997), and conservation medicine (Society for Conservation Biology 2000). Most of what is available describes and analyzes *what* the relationships are between human health and the environment or biodiversity. But what is missing in the field of conservation is an understanding of *how* to link health and conservation in very real, practical, and programmatic terms.

Looking to build from the premise that health can serve as a natural motivation to address issues related to biodiversity conservation, some conservation organizations have begun to explore strategic alliances with organizations that work in the health field. In some cases, conservation organizations themselves have begun to integrate health-related projects into their conservation portfolios. Little is known in the conservation community, however, about the conditions under which health and conservation can be successfully integrated at the community level. If addressing health needs is going to be a successful component of conservation strategies, we must learn how to maximize its effect.

One program that has attempted to directly integrate health projects into its conservation activities is Conservation International's (CI) Healthy Communities Initiative (HCI). HCI was created in 1997 with support from the Mulago Foundation. Today, HCI has a portfolio of projects across Africa, Asia, and Latin America that aim to conserve biodiversity by aligning the social development priorities of communities with regional conservation goals. HCI works under the central hypothesis that community well-being and environmental quality are linked. HCI projects attempt to address social development priorities in ways that build bridges between the well-being of people and the sustainability of the environment around them. Drawing on the expertise and methodology of the community development field, HCI helps communities to first prioritize their own needs and then find solutions to those needs that are compatible with the long-term health of their surrounding ecosystem. HCI staff deliver tools and methods for engaging communities in ways that ensure community ownership of projects. Communities lead the process and help HCI staff better understand the local connections between conservation and pressing social development issues.

To learn more about Conservation International's programs, visit <http://www.conservation.org>.

HCI's present projects differ widely in content depending on the particular needs of the communities, encompassing such community concerns as health, education, family planning, and land tenure. As a portfolio, projects are united in a linked network, promoting opportunities for rich exchange about successes and failures, effective tools and approaches, and ultimately the links between conservation, health, and development.

To learn more about the Biodiversity Support Program and its Analysis and Adaptive Management Program — including its publications series, visit [www. BSPonline.org](http://www.BSPonline.org).

One of the main goals of the Analysis and Adaptive Management (AAM) program of the Biodiversity Support Program (BSP) is to learn about the conditions under which specific strategies, presently used by the conservation community, are effective in reaching conservation goals. To do this, AAM conducts and supports applied conservation research and widely disseminates what it has learned so that the rest of the conservation community may benefit. The framework that AAM used to guide its selection of research topics includes five general conditions for success (Margoluis and Margoluis 2000) — one of these conditions is appropriate incentives for biodiversity valuation and conservation. Our research into health as an incentive for conservation fits within the context of this condition.

Seeing mutual benefit in collaboration, the BSP-AAM and CI-HCI teams combined forces to do this research. Our main purpose for doing this project was to clearly define the state-of-the-art in linking conservation and health. We hoped to bring some conceptual clarity to the discussion of health and conservation and we wished to provide real world examples of actual projects making the link so that conservation and development practitioners around the world could see how it is done. With these ideas in mind, we designed our research to address the following goals:

1. **Document examples in which community-based health has been used as motivation to conserve biodiversity.**
2. **Analyze approaches that link conservation to health at the community level.**
3. **Show examples in which community health and conservation issues have been simultaneously and successfully addressed.**
4. **Document observations about linking health and conservation.**
5. **Provide recommendations on integrating health and conservation at the community level to help guide project managers.**

WHAT DID WE DO?

One of the main reasons why we undertook this study was because little is known about the best way to programmatically link health and conservation within projects in a way that optimizes conservation success. As we embarked on this collaborative project, however, we were surprised to find how little is documented on the subject. Moreover, what we did find led us to conclude that there is even less consensus than we anticipated on how to link health and conservation effectively in community-based conservation and development projects.

Because of the lack of documentation on how to conceptually or operationally link health to conservation, we recognized that we were essentially going on an expedition into the unknown. For this reason, we chose a research design that was open and flexible. This would not be a hypothesis testing study, but instead would tend to be more exploratory and descriptive in nature. By looking at a sample of current health and conservation projects, we hoped to find some common patterns and lessons that could inform us about ways in which the conservation community could better integrate health and conservation in community-based projects. We also hoped that our study would generate some specific questions that could guide future research in order to move the field of health and conservation forward.

Our Sample

To learn about the relationship between health and conservation, we chose a sample that would provide us the opportunity to survey a wide range of projects that take place in a variety of conditions and that implement many different types of health and conservation activities. To get a first-hand, detailed look at some of the links between health and conservation, we selected three HCI-supported projects in Latin America. These projects are found in Brazil, Guatemala, and Peru. To get a more general understanding of how health and conservation have been combined at the community level at other sites from around the world, we canvassed 31 additional projects. In Table 1, we list the regions and countries in which these additional projects are found.

*For details on the entire sample of projects, see the section **Complete List of Projects Included in This Study**, at the end of this publication.*

Data Collection

In the analysis of our sample of projects, we focused on three sources of data:

- **Published literature and unpublished project documents** – We carried out a review of available books and articles that included materials on making the link between health and conservation in projects implemented at the community level. We searched the internet, and we reviewed as many project documents as we could that were unpublished.

*For the complete literature review, go to **www.BSPonline.org**.*

Table 1: Non-HCI Projects Surveyed, by Region and Country

Region	Number of projects surveyed
<i>Africa and Madagascar</i>	7
Cameroon/Nigeria	1
Guinea	1
Madagascar	3
Tanzania	1
Uganda	1
<i>Asia and Pacific</i>	11
China, Tibet	2
India	3
Indonesia	3
Lao PDR	1
Nepal	1
Vietnam	1
<i>Latin America and the Caribbean</i>	13
Brazil	5
Costa Rica	1
Ecuador	1
Honduras	1
Mexico	2
Paraguay	1
Peru	2
Total	31

- **Key individuals** – Based in part on our review of published and unpublished documents, we identified as many projects as possible that seemed to be truly attempting to integrate conservation and health. Where possible, we tracked down and interviewed — either verbally or through written correspondence — individuals who worked as project managers or otherwise had some direct involvement in the project.
- **Site visits** – In the cases involving projects from the HCI network, we undertook site visits in order to get additional information on different approaches to and challenges of functionally linking health and conservation at the community level. This sample included HCI projects in Guatemala and Peru. While we had intended to visit all three HCI projects selected to be included in this study, in the end, we were not able to visit the project in Brazil. We were, however, able to complete interviews with the primary project managers of the Brazil project through written correspondence, telephone interviews, and personal interviews in the United States.

During the design phase of the project, we developed two topic guides to direct the interviews of project managers and other personnel relevant to the projects. For the HCI projects we visited, we used a topic guide that covered themes such as how projects were designed; how community needs were assessed and incorporated into project development; and the extent to which project managers perceived relationships between community health and the environment. This topic guide also included questions for community members and other project participants that we encountered at each site. For the projects we did not visit, we used a topic guide based on the one described above to conduct primarily phone and e-mail interviews.

Tying conservation outcomes concretely to the implementation of health related projects proved to be extremely difficult. This was due in large part to the absence of sound, precise monitoring and evaluation data that would have been required to judge this correlation directly. In most cases, the best we could do was look at apparent associations between interventions and outcomes. Our sample was not unique in this respect; attributing causality between development interventions and conservation success is a common challenge in conservation and development projects in general.

Some Things to Keep in Mind

As you read through our findings, please keep in mind the following caveats to help you interpret the results as accurately as possible.

- **Our focus is on community-based health and conservation projects.** While much has been written about the overall relationship between health and the environment, our focus was on community-based conservation and development projects. Because we found little information written on the topic of health and conservation that had practical relevance to conservation project managers, we chose to focus our efforts on providing project managers with clear insights on how to best encourage and support the linkages between health and conservation. We were, therefore, interested in highlighting our observations about the relevant conceptual links between health and conservation and the ways in which project managers might operationally link health interventions and conservation outcomes within community-based projects.
- **Causality is difficult to assess.** Our research design was cross-sectional — that is, we collected our data at one point in time — rather than longitudinal. Our approach was descriptive and we did not set out to precisely determine the degree to which various health interventions lead to specific conservation outcomes. The exploratory nature of the design of this research and the type of data we were able to collect make it difficult to determine cause-and-effect relationships.
- **Our sample is not random.** From the HCI network of projects, we selected three sites in which direct health interventions were being integrated into conservation projects. These examples are different enough that we felt they would give us a look at a range of relationships between health and conservation. Selection of the additional sites we included in our general survey of health and conservation projects was similarly opportunistic: we included any project found in our worldwide search that had attempted to integrate conservation and health at the community level.
- **Our analysis is based primarily on secondary data and informal interviews.** As we mentioned earlier, a great deal of our analysis is based on published and unpublished project documents and interview data from key informant interviews and informal discussions with project staff. Therefore, the data and information we used in our analysis are relatively subjective and primarily qualitative. Given the scope of our study, it was not feasible to collect highly precise quantitative primary data.
- **Our data are limited.** We have attempted to be as methodical and precise as possible in our treatment and analysis of the data and we have endeavored not to overstep the bounds of interpretation. In our analysis, we indicate where there is strong support for our conclusions. At the same time, where our analysis is inconclusive, we have attempted to indicate this but still postulate about possible connections or relationships that we believe are suggested by the data available to us.
- **These are preliminary findings.** In the end, we are satisfied that our analysis has helped to clarify some key concepts in the relationship between health and conservation. But our research has left us with more questions that need further exploration. Our results are preliminary and are intended to give a general orientation to health and conservation projects. These results, we hope, will encourage others to explore more deeply the linkages between health and conservation in order to help us move forward collectively in a more focused and efficient manner.

WHAT DID WE FIND?

In this section, we provide summary profiles of the three HCI-supported sites we included in the study and a sub-sample of six of the 31 additional community-based projects we surveyed from around the world. We provide the example profiles of our additional projects to give you an idea of the breadth of the projects we canvassed during the literature review and key informant interview phases. All of the additional projects we canvassed, however, were included in the analysis phase of our research.



Women breaking brazil nuts to extract oil for sale in the international market.

Healthy Communities Initiative Projects

Each of the three HCI projects described in this study is, in fact, integrated into larger projects or programs within Conservation International. The majority of HCI projects represent just one component of a larger in-country conservation strategy, filling the specific niche of addressing community development and the social development priorities of key communities in important conservation areas.

In Brazil for example, the Kayapo Health Project is one part of a larger strategy of developing conservation alliances with the Kayapo Indian Nations. Other activities conducted in collaboration with the Kayapo people include the maintenance of a biological research station and income generation through enterprise projects. HCI also provides technical support in conservation monitoring and enforcement.

Similarly, in Guatemala, the Health Promoter and Midwife Training Project in Paso Caballos is just one element of a multi-faceted

approach to conservation in the department of the Petén. Conservation International activities include ecotourism, enterprise training, and policy development, in addition to the health interventions.

In some cases, HCI projects represent all of the CI work being done at a particular site. This was initially the case with HCI's work in the community of Mayapo in Peru. Because the region is remote and CI's involvement there was relatively limited, early efforts focused exclusively on HCI activities. More recently, however, CI has expanded its involvement to include a larger project, funded by the Global Environment Facility (GEF), that will work with all 37 communities in the region.

The Kayapo Health Project

Project Location: Southern Pará, Brazil

Collaborating Partners: Conservation International (CI), The Body Shop, Brazilian National Health Fund (FUNASA), and Brazilian National Indigenous Foundation (FUNAI)

Project Goals: The HCI project seeks to address the health needs of the residents of A'Ukre in order to encourage the community's continued participation in conserving the nearby Pinkaiti Biological Reserve.

Project Description: The indigenous Kayapo community of A'Ukre is located on the Upper Xingu River of Southern Pará. A'Ukre's population of about 250 people unofficially controls a territory of approximately 300,000 hectares. In 1992, CI-Brazil began working with A'Ukre to implement a plan to sustainably manage the harvesting of mahogany from the forest around the community. CI-Brazil founded the Pinkaiti Research Field Station upriver from A'Ukre in an 8,000 hectare biological reserve. Through its activities at the research station, CI works with the A'Ukre village to maintain the reserve conducting biological research and addressing the development needs of the community.

CI-Brazil staff conducted a needs assessment in 1997 in order to determine how a project could best benefit the entire community. According to this assessment, health was one of the greatest concerns of the community, and malaria, respiratory diseases and chronic diarrhea were the most critical diseases that needed to be addressed. CI looked for a way to combine health and conservation activities so that both community well-being and conservation could be served.

Community residents expressed the need for greater access to health services and medicines. CI negotiated an arrangement with the residents of A'Ukre in which needed drugs and health services would be provided to the community in exchange for its assurances that it would work to protect the biological reserve. CI, in collaboration with the community and FUNASA, developed a list of medications that were needed to treat the highest priority health concerns as identified by the needs assessment. CI then developed a system in which biology and conservation researchers visiting the field station bring to the community approved medicines or the money to buy medicine when they arrive to do their field work.

Educational skits that CI has developed with the community focus on presenting ways to avoid contracting malaria (e.g., not bathing during dawn or dusk) and teaching proper hygiene as a way to decrease intestinal illnesses. These education activities are carried out in coordination with FUNASA.

In return for these health services, the community has agreed to refrain from logging and hunting in the biological reserve. If the community does decide to log or hunt in the biological reserve, CI has made it clear that it will withdraw from its current activities.

Project Results: The community has received a substantial amount of medicine since the project began. In 1998 alone, researchers and visitors brought in US\$3,000 worth of medicines, principally for malaria. According to project staff, there has been a decline in the prevalence of malaria, and an increase in the awareness of how the disease is transmitted and prevented.

In an effort to reduce malaria, CI works with A'Ukre residents to encourage them to bathe at times when mosquitoes are not active.

Project staff also believe that providing medicines to the community has been fundamental in protecting the biological reserve. They report that community residents attitudes have changed about the field station and conservation in general. One clear indication of this, they report, is that the community has elected to increase the size of the reserve from 8,000 hectares to 10,000 hectares.



A researcher from the Pinkaiti Research Station and his Kayapo assistant measure a tortoise as part of biological monitoring.



Health Promoter and Midwife Training in Paso Caballos

Project Location: The Maya Biosphere Reserve, Guatemala

Collaborating Partners: Conservation International (CI), Guatemalan National Park Service (CONAP), community health promoters and midwives, with support from the Summit Foundation

Project Goals: The HCI project was designed to provide the Paso Caballos community with health services in order to catalyze its active participation in sustainable development initiatives within its land concession. In addition, the project works to lessen demographic pressure on the Maya Biosphere Reserve by decreasing family size through family planning.

Project Description: Paso Caballos is one of the Q'eqchi' communities that invaded the Laguna del Tigre National Park in the Maya Biosphere Reserve in the mid-1990s. Instead of relocating the communities, CONAP insisted that the communities develop sustainable land management plans in exchange for permission to remain in the park. CI was assigned the task of providing technical assistance for this project. Community residents were initially distrustful of CI and feared losing their land concession. In an effort to gain the community's confidence, CI-Guatemala staff conducted a needs assessment to determine areas in which it could work to foster a trusting relationship. Community members identified access to health and education services, land security, transportation, access to markets, and food security as their priority needs. Project activities have focused on the community's health priorities, specifically maternal and child health. The first community activity was to construct a health post, and soon after, training programs were established for midwives and health promoters. CI has also supported a medicinal plants project.



Young mothers participate in a wellness clinic for their children with CI-trained midwives.

The community selected residents to participate in the community health worker project. Nine health promoters and eleven midwives completed 14 weeks of training (one week per month over a 14 month period) led by a team of Q'eqchi' public health workers. The health promoter training concentrated on common primary health care issues such as preventing and treating chronic diarrhea, malaria, and dengue fever. Family planning was included in the curriculum, but was not the main focus. The midwife training curriculum focused on reproductive health, including topics such as human anatomy, assessing risks during pregnancy and birth, methods for birth spacing, hygiene, and nutrition during and after pregnancy. During both types of training, the importance of conservation and its relation to the possibility of long-term subsistence was stressed.

The medicinal plant project promotes the use of medicinal plants to demonstrate the value of the forest and promote the linkage between the Petén's biodiversity and the health of its inhabitants. For this activity, project staff interviewed traditional healers and midwives in Paso Caballos and neighboring communities to document common medicinal plant usage. With this information, staff created a training manual for health promoters and midwives. The manual, organized by illness, describes symptoms, prevention, available traditional treatments, recommended dosages, and when it is important to seek formal medical attention. The manual includes illustrations to help people properly identify plants and outlines ways to maintain good nutrition and hygiene.

Project Results: Paso Caballos submitted a management plan to CONAP in early 1999. The health post was constructed from June through October 1998 and the promoters and midwives completed their training in December of 1999. According to project staff, the health post and training program have been the catalyst in building a relationship of trust with the community, which will in turn further CI's work in the more contentious area of conservation and land management. The midwives continue to assist with births and discuss family planning with community women, while the promoters continue to administer the health post and provide health services. At the time of our site visit, eleven women were registered in the health post as using family planning methods. In addition, committees have been established to promote agroforestry, watershed protection and sanitation, and to provide environmental education.

Health and Conservation in the Machiguenga Community of Mayapo

Project Location: Apurimac Reserve Zone, Cuzco, Peru

Collaborating Partners: Conservation International (CI)

Project Goals: The HCI project seeks to address community-identified health needs while advocating community participation in regional conservation efforts.

Project Description: The Apurimac Reserved Zone (ARZ) is located in eastern Cuzco between the Urubamba and Ene Rivers. CI-Peru began working in the ARZ in 1996 to get the government to change the legal status of the ARZ from a temporary to a permanent protected area. This change in the zone's status would prohibit logging and mining but would allow the indigenous communities continued access to the protected area to engage in traditional, subsistence practices. Project activities began in three communities that form part of the ZRA buffer zone: Mayapo, Camana, and Puerto Huallana. CI launched its work in Mayapo by conducting a socioeconomic study and a needs assessment to identify possible areas of intervention.

The needs assessment was conducted by community members with support from project staff and led to community capacity-building and empowerment. As part of the needs assessment, project staff and community teachers recorded the health history of primary school children in the community. The information they collected for each child included the diseases they recently had and the types of treatment they received. After analyzing the results, CI-Peru staff and the community determined that the most commonly reported illnesses included diarrhea, upper respiratory infections, and malaria. Based on these results, the community decided to do something about the high rates of diarrhea.

At the time of CI's arrival to Mayapo, the community was using the nearby Picha River and the Aanari Gorge for all of its water needs including drinking, bathing, and washing. By participating in the project, the community concluded that their own use of the river and the presence of communities living upstream contributed to the contamination of the water and caused their children to have diarrhea.

CI saw the opportunity to demonstrate the importance of conservation through the support of a health project. Mayapo's residents were well aware that the sources of their rivers were in the heavily forested mountains above them. Discussions between CI and the community led Mayapo to decide to construct a potable water system – which relied on the natural springs high in the mountains – to help decrease water-borne illnesses. With CI's assistance, they became more aware of the potential destructive impact that commercial logging and mining could have on their watershed. They saw the need to work with CI to create a national park that would protect them from external threats and ensure their access to clean water.

A second concern that emerged during the needs assessment was that traditional knowledge of medicinal plants was being forgotten in Mayapo. CI designed a project to document and revive medicinal plant usage in an effort to reinforce residents' perceptions of the importance of biodiversity and maintain alternatives to western medicine. Project activities included conducting walks in the nearby forest with school aged children to identify those plants and trees believed to have medicinal properties.

Project Results: The water system was successfully completed in 15 days with full collaboration from the community in June 1999. With its construction, all 300 residents of Mayapo secured access to clean drinking water. Community members have reported a decrease in the amount of diarrhea in their families that they attribute to the new water system. And according to project staff, the residents are more aware of the importance of conserving the biodiversity of their watershed and may be more likely to take action to do so in the future.



A Machiguenga family from Mayapo.



Mayapo community residents dig ditches to lay pipes for their water system.

Additional Projects from Around the World

In addition to the three HCI projects we described above, we have included, as examples, descriptions of six of the 31 other conservation and health projects surveyed from around the world.

Promoting Community Fisheries and Palm Management to Protect Biodiversity and Improve Nutrition, Health, and Food Security

Project Location: *Pacaya-Samiria National Reserve, Peru*

Collaborating Partners: *The Nature Conservancy (TNC), Pro Naturaleza, fishing cooperatives and palm management committees, with support from Johnson and Johnson Foundation*

Project Goals: *To balance communities' health and economic needs with biodiversity conservation through the sustainable use of natural resources.*

Project Description: *The Pacaya-Samiria National Reserve spans 2.1 million hectares of rainforests and wetlands. The Nature Conservancy and Pro Naturaleza, with support from Johnson and Johnson, facilitated palm harvesting and community management of fisheries in order to conserve these resources while maintaining valuable food and income sources. The project addresses both the poor nutrition of community members and the protection of important food resources that were threatened with over-exploitation, such as fish and palm fruits. The implementing organizations have worked with the communities to form fishing cooperatives, which are responsible for managing specific zones. A total of 6 cooperatives involving 116 families have been formed. Each cooperative has set up harvest quotas and patrols the reserve. The families involved both eat and sell the fish. Four percent of the profit from the sale of fish is used to buy medicines for the communal medicine post and for other community needs.*



Local residents of Pacaya-Samiria rely on fish as a major source of protein in their diet.

*Similarly, palm management committees have been formed for sustainable palm management. Eight groups, with 200 villagers participating, have designed palm management plans; for example, they planted 300,000 *Euterpe precatoria* palms up to 1997 and 90,000 palms in 1999 alone.*

Project Results: *The NGOs have been working in the area since 1991 on fishing and forest management, sanitation, and education activities. According to project staff, the participant communities have a better standard of living than non-project communities. Also, as a part of the fishery and palm management activities, a community natural resource protection program has been established to patrol and prevent harvesting by outsiders. Project managers report that fishing cooperatives and reforestation projects are successful, as demonstrated by increases in wildlife populations.*

The project's final report stated that local communities had an understanding of the conservation value of the National Reserve. Project managers attribute adoption of sustainable resource management to staff living and working in the area. They worked from Centers of Conservation and Development. According to project staff, this presence raised community awareness and encouraged participation. As a result of the meetings facilitated by Pro Naturaleza and TNC between community members and government officials, the communities felt that they had benefited from increased access to health services and sanitation.

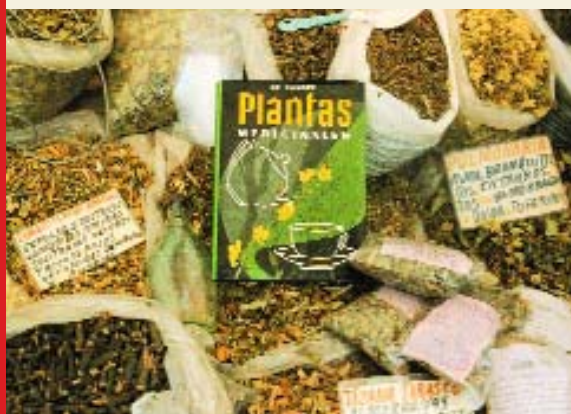
Monitoring health and conservation results is being planned in order to analyze which activities have the greatest health and conservation benefit.

Medicinal Plant Utilization and Conservation in Eastern Amazonia

Project Location: Paragominas, Brazil

Collaborating Partners: Mulheres da Mata

Project Goals: To assist local communities in understanding the values of biodiversity, especially the health benefits of medicinal plants, while promoting the conservation of these resources.



Recently, many groups have begun to document medicinal plant use as a way to preserve traditional knowledge.

Project Description: This project led by the grassroots NGO, Mulheres da Mata, linked the health benefits derived from medicinal plants with community participation in forest conservation. Dialog with community members began when the Rural Workers Union of Paragominas asked for assistance to help answer questions about forest values, conservation and use (Shanley and Rodrigues Gaia 2000). Health was a major concern of the community because 50% of households' income was spent on purchasing costly pharmaceuticals. The income to pay for pharmaceutical drugs was earned from logging employment. As income from logging declined, the families resorted to using their local medicinal plants, "thus giving renewed value to their traditions" (Shanley pers. comm.).

The project also worked with pharmacologists, phytochemists, and botanists to document the most effective plant remedies

from a scientific viewpoint. The medicinal plants that proved to effectively treat the most frequent ailments were promoted in the communities. Recommended treatments were based on one plant only as the pharmacological effects of mixing plants is not well understood.

The findings were described in a booklet for rural and urban populations titled *Receitas sem Palavras: Plantas Medicinais da Amazonia, Belem* (Recipes without Words: Medicinal Plants of Amazonia) (Shanley et al. 1996). Information was also disseminated through workshops led by local residents with similar background and experience as the participating villagers. The workshops included skits that compared the cost of local medicinal plants versus pharmaceuticals and explained the use and preparation of the plants.

Project Results: The activities have been successful in promoting health and conservation. Through medicinal plant workshops, women learned how to treat specific ailments. Other communities also frequently request the booklet. Furthermore, community members decided to stop cutting high-value medicinal oil trees, such as copaiba (*Copaifera* spp.), while other communities began to plant medicinal oil trees such as andiroba (*Carapa guianensis*).

Project implementers believe that a factor of the project's success was the effort made in returning the information and research results to communities in a form that they could easily understand. The booklet's rising demand is an indication of the importance and usefulness of the project. There were some difficulties in distributing the information to the more remote forest communities.

The Pendeba Program

Project Location: Qomolangma (Mt. Everest) National Nature Preserve, Tibet, China

Managing Partners: Management Bureau of Qomolangma National Nature Preserve, Shigatse, Tibet, China; county governments of Tingri, Dingri, Nyalamu, Jilong, local village councils

Collaborating Partners: Future Generations, Tibet Academy of Social Sciences, Tibet Department of Health, World Concern

Project Goals: To create healthy communities through using improved family health (lowering child mortality and care of trauma) as an entry activity to improve 1) local wood lots for fuel and fodder; 2) family water supply; 3) family nutrition (through gardens); and 4) income opportunities.

Project Description: The Qomolangma Nature Preserve, located in Mt. Everest, was established in 1989 in the Tibet Autonomous Region and became a National Nature Preserve (QNNP) in 1994. From 1989 to 1992, a Master Plan defining activities was undertaken and field surveys of the social conditions, economic development, natural resources and history were conducted. As the area is very isolated, it was decided that there would be no outside wardens. Instead, villagers, with supervision from village councils and government officials, would be responsible for the Preserve's management and would receive development assistance in exchange for their stewardship.

Village surveys identified three priorities: energy, health care, and transportation. Planners chose to tackle health priorities because it appeared to be the easiest service to provide. Dr. Carl Taylor of Future Generations then led a collaborative planning process with QNNP and hospital staff in Tibet and in the United States to find ways to provide health services as an incentive for communities to participate in environmental protection and income generating activities. A three-way partnership was developed among villagers, leaders and experts. Plans were made using site-specific data, and needs were matched with human and economic resources. They developed the concept of pendeba, "the worker who benefits the village." Two more years were spent designing the pendeba program and training.

Guidelines were developed that stated the need to thoroughly explain the program's benefits to communities and that the community was responsible for selecting the pendeba volunteer. The guidelines also stipulated that preference should be given to women in choosing the pendebas. The selected pendebas are trained in and responsible for preventative health care, distribution of medicines, environmental protection, eco-tourism, poverty alleviation and income generation. The villagers were also responsible for raising the money to pay for medical supplies. Future Generations assisted in building the necessary capacity for these activities. After some time, it was found that there was a great deal of information for individual pendebas to absorb and the program began looking to simplify training as well as to repeat training sessions in order to reinforce the material taught.

In 1997, there was a management review with villagers and government representatives. They were all pleased with the program and wanted to expand it. As a result, their goal was to establish 10 pendeba training centers throughout the area and train at least one pendeba for each village. At that time, there were 100 pendebas, within a year the number had increased to 254. They also decided to establish village co-operatives to generate additional income. The number of cooperatives increased from 4 in 1997 to 50 in 2000. By spring 2000, 196 out of 320 villages were served.

Project Results: According to staff and associates, the program has been successful in improving the health of local residents and conserving the biodiversity of the Preserve. After five years, the number of child deaths decreased by one-half as health improved and diarrhea incidence declined. As a result of strict enforcement



A pendeba family in the Qomolangma Nature Preserve.

against poaching, project staff report that wild animal populations have doubled, deforestation has been reduced by two-thirds, and tree nurseries are producing thousands of seedlings. Work on a road that would have allowed access to loggers was also stopped in the area.

Because the existing local government administration was used to protect the Preserve and no new management structures had to be created, operating costs were 50% lower compared to other protected areas with the added advantage of integrating conservation with local development objectives within a single administration.

According to staff, a key to success was the partnership among the communities, government, and NGOs. The project had support from all levels of government, and the time frames set up for planning were realistic. The activities were designed by villagers and based on each village's individual needs. Training centers are close to the villages served to make participation convenient. Discussions are taking place about expanding the pendebea program throughout Tibet.

APPROPOP: Appui au Programmes de Population (Population Support Project)



Family size plays a role in both the health of the family and the extent to which it utilizes natural resources. The APPROPOP project in Madagascar works to integrate family planning with conservation.

Project Locations: Zahamena Integral Reserve, Ranomafana National Park and Andohahela National Park, Madagascar

Collaborating Partners: Conservation International (CI), the Madagascar Institute for the Conservation of Tropical Environments, State University of New York (Stony Brook), the World Wildlife Fund (WWF) and the Association Santé Organisation Secours (ASOS) with support from United States Agency for International Development (USAID)

Project Goals: To integrate family planning with conservation.

Project Description: Management Sciences for Health (MSH) was responsible for the overall APPROPOP project supported by USAID for five years beginning in 1993. The goal of this larger project was to improve and increase family planning services in Madagascar. Most sites were in urban areas; however, a grants program provided support for family planning in rural areas including those near protected areas. Grants were awarded separately to CI, the Madagascar Institute for the Conservation of Tropical Environments through the State University of New York (Stony Brook) and WWF for integrated conservation and development in the buffer zones of Zahamena Integral Reserve, Ranomafana National Park, and Andohahela National Park, respectively.

The programs provided health care services and supplies, family planning, and health staff training and development activities such as agricultural extension, forest and park management, water management, and ecotourism. Project activities were carried out from 1995 to 1998. The assumption of the environmental organizations was that by contributing to

family planning, there would be a reduction in population and hence reduced pressure on natural resource exploitation. Dan Whyner, University of Michigan Population and Environment Fellow, worked to link health and environmental organizations; for example, by advocating the participation of the Ministry of Health in the National Environmental Action Plan. The environmental organizations collaborated with the Ministry of Health to form mobile health teams. Ninety-three conservation and development field staff were trained in family planning outreach. They discussed family planning with households during their site visits to promote conservation and development. The environmental organizations also provided family planning information to and through existing village organizations such as village credit organizations.

Project Results: As a result of the grants, 1,141 people became users of contraceptives, which represented an increase of contraceptive prevalence rates from approximately one to five percent.

An analysis of the projects found that working with local partners such as the relationship WWF had with the local health NGO, Association Santé Organisation Secours (ASOS), was an important factor for successful implementation. The WWF/ASOS partnership at the Andohahela Reserve utilized local outreach workers who were responsible for managing projects and reaching goals. Also, those projects with the most family planning success were those with community-based distribution systems. This success was due to villagers' greater trust in their neighbors than in people they did not know. Contraceptive user associations were established in Ranomafana National Park. These associations raise funds for contraceptives through, for example, membership fees that enable the users to continue to buy contraceptives with or without outside support.

Environmental Health and Community Organization

Project Location: Guaraqueçaba, Brazil

Collaborating Partners: The Nature Conservancy and the Society for Wildlife Research and Environmental Education (SPVS) with support from Johnson and Johnson Foundation, municipal government of Guaraqueçaba, regional association of rural teachers, and local health outposts

Project Goals: To seek solutions to social and environmental problems, while simultaneously helping to address the most critical short-term health issues.

Project Description: The Nature Conservancy and the Society for Wildlife Research and Environmental Education (SPVS) assisted fishing communities on the island of Ilha Rasa in Guaraqueçaba, Brazil with potable water and sanitation projects to promote conservation. The island had 750 inhabitants with high rates of infant disease and mortality. The villagers were beginning to overexploit forest resources, part of Brazil's rare Atlantic Rainforest ecosystem and were also over-fishing in the Guaraqueçaba Bay.

SPVS collected both bio-physical and socioeconomic data on the island and its residents. From the information it gathered, SPVS decided to use health as an entry or "taking-off point" for conservation and assisted the communities in organizing themselves to press the government to construct water systems and provide potable water. Furthermore, SPVS worked with the community on sewage disposal through building latrines, trash disposal and improving basic hygiene. SPVS and villagers worked together to sustainably harvest mangrove crabs and construction materials from the forest with the goal of "conserve to use." An environmental education program is also being implemented that includes recycling, reforestation of native species, and the use of medicinal plants.

SPVS is expanding the program using health to engage other coastal and mainland communities in conservation objectives. They are partnering with existing networks through the municipal government's education ministry, school teachers and health outposts to accomplish this task.

Project Results: According to project documents, sewage treatment and access to potable water decreased diarrhea and dysentery cases by 90% and dehydration by 75% in Ilha Rasa. Families have planted vegetable gardens, and schools have started a *Calophyllum brasiliense* (guanandi) nursery. This species was chosen for its importance to the survival of the red-tailed parrot.

According to these same documents, SPVS "worked successfully with the community to translate progress on quality-of-life issues and awareness of environmental health matters into a broader agenda dealing with the sustainable use of the island's natural resources" (The Nature Conservancy 1999). SPVS is also implementing a Community Health, Education and Conservation Project that trains local residents in health.

Proyek Pesisir (Coastal Resources Management Project), North Sulawesi Sub-Program

Project Location: North Sulawesi, Indonesia

Collaborating Partners: Coastal Resources Center of the University of Rhode Island with support from USAID, the Indonesian government, and local communities

Project Goals: The purpose of Proyek Pesisir is to contribute to decentralized and strengthened natural resource management in Indonesia. The project goal in North Sulawesi is to establish participatory and community-based coastal resources management.



Proyek Pesisir established Indonesia's first community-based marine sanctuary and assisted in providing clean drinking water in the village of Blongko.

Project Description: Proyek Pesisir is a cooperative initiative of the government of Indonesia and USAID that is implemented by the Coastal Resources Center of the University of Rhode Island. Its activities promote village-based integrated coastal management plans, community-based marine sanctuaries, village ordinances and participatory early actions.

The coral reefs in the area are under threat from unsustainable harvesting and destructive fishing practices. While planning conservation activities, Proyek Pesisir addresses community development needs such as health issues in site planning activities.

In 1995, the project began with a survey of coastal resource management needs. While establishing field offices, it carried out consultations with local government and non-governmental organizations and communities to begin a process of community-based planning. To build support for this planning and longer-term conservation, participatory early actions were carried out to

address short-term community needs. These actions are facilitated by community-based extension officers who live and work full-time in the community.

For example, while establishing a community-based marine sanctuary in Blongko, North Sulawesi, project staff encouraged community members to write proposals for projects to address coastal management problems. Some of the proposals project staff received were related to health, such as constructing latrines and wells, and a small-scale supply of drinking water. Addressing these proposals were early actions aimed to gain the trust of the community as well as to build capacity in marine sanctuary management. Additionally, capacity was built through training in accounting and reporting. The water pumps and clean drinking water provided immediate benefits to communities. According to project managers, this approach showed results quickly and acted as an incentive for communities to participate in more long-term coastal resources management (Ian Dutton and Holly Ferrette pers. comm.).

Project Results: The marine sanctuary was established in Blongko and is Indonesia's first community-based marine sanctuary. Management plans for village development and resource use have been approved. The process of establishing the sanctuary was participatory and took one year. The project worked with local and national government officials to recognize the community's authority. Community members were trained in coral reef monitoring and mapping. They are responsible for managing activities and enforcing rules. In Blongko, there was an improvement in the availability of drinking water and it is reported that fish are becoming more abundant.

PUTTING THE FINDINGS IN PERSPECTIVE

In this section, we present the results of our analysis. After a discussion of two major themes, we present some general observations about the relationship between health and conservation that emerged from our sample. We then present some recommendations to help project managers who may be considering trying to link health and conservation. Also included is a summary of our findings and suggestions for next steps in an ongoing inquiry into the links between health and conservation.

Major Themes

In order to understand the links between health and conservation, we found it was important to distinguish between two types of linkage in projects — conceptual and operational.

Conceptual linkage refers to the extent that priority health issues in a community are directly related to the maintenance of intact biodiversity in the local environment. Understanding these kinds of relationships requires looking at the root causes of the health priorities and assessing to what degree they are affected by the state of the local environment. In our analysis, we explored the extent to which community health concerns were perceived to be conceptually linked to biodiversity by both project implementers and community members.

Operational linkage describes the ways in which project managers utilize health activities to achieve conservation outcomes. Understanding these relationships requires looking at the ways that conservation practitioners functionally connect health interventions and conservation outcomes in project design and implementation. As we will see in the following sections, such connections can be defined whether or not the proposed activities address health concerns that are directly related to intact biodiversity. In other words, operational linkage is not dependent on conceptual linkage.

Degree of Conceptual Linkage

Many conservation practitioners and researchers have explored the relationship between community development and conservation in an effort to determine what works, what doesn't, and why (Western et al. 1994). More specifically, many studies have looked at the degree of linkage between development activities and conservation outcomes as a critical ingredient of success (Wells and Brandon 1992; Salafsky and Wollenberg 2000). Researchers looking at the connections between community-based conservation and income-generation projects, for example, have focused on the extent to which community livelihood is directly dependent on the existence of biodiversity in

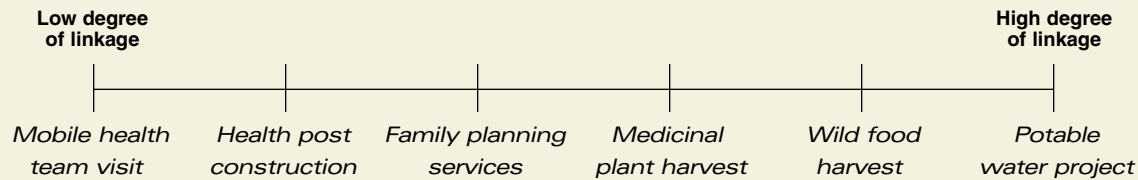
a given site. In these examples, a livelihood was considered to be completely linked if it could only exist in the presence of specific biodiversity. It has become increasingly apparent that non-economic factors – such as health – may also be linked directly to biodiversity and may, therefore, offer additional incentives to conserve (Salafsky et al. 1999).

At the conceptual level, the degree of linkage between health and conservation must be assessed from two perspectives:

1. the extent to which project staff perceive the health priorities of communities to be dependent on the existence of certain biodiversity, and
2. the extent to which community members perceive the interdependence between their own health priorities and conservation, either presently or in the future.

The degree of conceptual linkage between health and conservation is best thought of as occurring along a scale (Figure 1).

Figure 1: Various community-level health interventions and degree of conceptual linkage to conservation.



For illustrative purposes, it is useful to think about the two ends of this scale, defined as follows:

High degree of conceptual linkage between health and conservation

– A high degree of conceptual linkage between health and conservation occurs when the health priorities of the community members in a given area are completely connected to or dependent on the maintenance of specific biodiversity at the site. Evidence of this linkage can come from many sources – past scientific research, local knowledge passed down from generation to generation, or recorded observations by project managers and staff. In this scenario, both project managers and community residents perceive that the community’s present and future health is dependent on the conservation of the biodiversity that surrounds them.

Many communities rely on the wild harvest of plants and animals for subsistence.



From our sample, the projects that capitalize on a high degree of conceptual linkage between health and conservation include:

1. Providing clean drinking water dependent on watershed protection.
2. Maintaining habitat to protect wild plants and animals required for food and traditional medicines.

Low degree of conceptual linkage between health and conservation – Low degree of conceptual linkage between health and conservation occurs where the health priorities of community members in a given area are completely unrelated to or independent of the status of the biodiversity at the site. Promotion of the interdependence of priority health concerns and biodiversity cannot be effectively developed because, in fact, there is no evidence that the relationship exists. Community residents, therefore, do not perceive that their health status is related to the condition of the biodiversity that surrounds them, and no potential exists for project managers to create a conceptual link. As we will see, the absence of such direct conceptual linkage requires a different strategy for connecting health activities with conservation outcomes.

From the projects we analyzed, those that are based on issues that exhibit a very low or nonexistent degree of conceptual linkage include:

1. Providing health services or medicines to residents in areas of high biodiversity.
2. Training community health workers exclusively in health related topics.

Degree of Operational Linkage

When we started this project, we were aware of various strategies that project managers have used to link conservation and development projects in the past. As we designed the study, the fundamental characteristics of some of these general strategies helped us think about the questions we needed to ask in order to explore the relationship between health and conservation. The topic guides and our review of the literature were designed to help us clarify and define the scope of the possible operational strategies, as well as to understand the extent to which they are related to the degree of conceptual linkage and conservation success.

While it may seem that a high degree of conceptual linkage is desirable in community-based health and conservation projects, it is not always naturally present. In our sample, we found that many project managers implemented health interventions based on the stated needs and priorities of the communities with whom they worked. Some communities identified health needs that were unrelated to the state of the biodiversity around them. In these cases, no matter how hard a project manager may try to establish a perceived connection between a health intervention and a conservation outcome, it simply may not be possible. But even if a high degree of linkage cannot be attained in a health and conservation project, this does not mean that conservation project managers should abandon such an approach. We believe that there are at least four strategies by which project managers might functionally link health and conservation.

The Barter Strategy

This strategy involves promoting biodiversity protection by providing particular health services in exchange for community involvement in conservation activities. This approach essentially trades the provision of some community “benefit,” such as providing health services, for behavior that sustains biodiversity conservation. Within this approach, there is little emphasis on building community capacity. The barter approach has been used in other conservation and development projects and is sometimes referred to as a “quid pro quo” approach (Brown and Wycoff-Baird 1994; Mittermeier 1999). An example of the barter approach is when an organization provides medicines to a community in exchange for an agreement not to cut primary forest in a nearby, protected area.

The Entry Point Strategy

In this strategy, an organization provides health services or undertakes a health project in order to build a relationship with community residents that hopefully will result in future collaboration on conservation activities. The implementing organization involves itself in a health intervention as an opportunity to gain the trust of a community and as a gesture of goodwill. A potentially important component of this strategy is building capacity for collective decision making and community mobilization. This capacity can then be drawn upon to meet conservation challenges. In its many different forms, this approach has been referred to as a “vehicle,” “catalyst,” “taking off,” or “Trojan horse” approach (Larson 1998; Lane 1988). An example of the entry point strategy is constructing a health post and providing medical services with the express intention of building a strong relationship with a community while galvanizing the community into collective action. Then, once trust is established and a community process has been catalyzed, project staff seek to direct some of this momentum towards conservation-related themes.

The Bridge Strategy

In this strategy the implementing organization undertakes a health intervention with the intention of linking it conceptually to conservation activities. Communities may initially only see the health benefit of the project, however in the future, they may realize the connection between their own health needs and conservation. This perception, it is assumed, will prompt community residents to participate in more specific conservation activities in the future. An illustration of this strategy might be a project designed to ultimately reverse aquatic habitat degradation that begins by addressing the lack of sanitation systems in communities along the banks of a river. Community members may perceive their greatest need to be the control of schistosomiasis, a debilitating parasitic disease transmitted through contact with water contaminated by poor sanitation – usually while bathing in rivers and lakes. A conservation organization may opt to support a latrine construction project to immediately address the communities’ needs for better sanitation, and at the same time, begin a community educational campaign that illustrates the relationship between sanitation, aquatic habitat quality, and health.

The Symbiotic Strategy

The symbiotic strategy involves developing project interventions based on known common ground between the health needs of a population and its conservation goals. It is based on the premise that there are certain critical health issues that are directly and immediately dependent on the surrounding environment or to some ecological service provided by the environment, and that these provide ideal incentives for conservation. For example, community members living in a mountainous area may be completely aware of the need to protect the quality of the forest above them to ensure adequate supplies of water. These residents may clearly understand how water is produced from rain and condensation on trees, retained and stored in the ground, and transported to natural springs that they rely on for drinking, washing, or irrigating crops. A conservation organization may help to reinforce this knowledge and assist the community in dealing with external threats such as commercial logging and road construction.

Observations

In this section, we summarize observations from our analysis that we hope will provide useful insight to conservation project managers:

There is a relationship between the degree of linkage and the choice of strategy.

In Table 2, we summarize the conceptual and operational linkages likely to be found in each of the four strategies outlined above. Neither the barter nor the entry strategies inherently require that conceptual linkages exist. The entry point strategy places more emphasis on gaining credibility and building local capacity while the barter approach relies on a simpler model of compensation for conservation behaviors. In the bridge approach, either the project staff perceive a linkage that community members are unaware of or vice versa, and education will play a critical role in creating shared perspective on the ways in which priority health conditions are related to intact biodiversity. And finally, in the symbiotic approach, both project managers and community members see conservation efforts as directly connected to priority health concerns.

Table 2: Types of Linkage Related to Different Strategies

STRATEGY	OPERATIONAL LINKAGE	CONCEPTUAL LINKAGE
<i>Barter</i>	<i>Health activities are undertaken as direct compensation for conservation action taken by community members.</i>	<i>Conceptual linkage is not necessary.</i>
<i>Entry Point</i>	<i>Priority health needs are addressed initially as part of building credibility and trust and increasing community capacity for collective decision making. These will then be used as a platform from which to undertake future conservation efforts.</i>	<i>Conceptual linkage is not necessary.</i>
<i>Bridge</i>	<i>Usually there is a staff perception of conceptual linkage between a priority health concern and intact biodiversity. Project staff work with community members to address health and conservation objectives while simultaneously focusing on education with the hope that community members will come to understand these efforts as mutually supportive.</i>	<i>Conceptual linkage is perceived either by project staff or community members.</i>
<i>Symbiotic</i>	<i>Project staff seek to mobilize community members around health priorities.</i>	<i>Conceptual linkage is perceived by both project staff and community members.</i>

Strategies are dynamic.

We believe that you should not look at the four strategies we described in the previous section as discrete “models” to be emulated. Rather, these strategies fall along a continuum and represent important characteristics of different approaches for addressing a variety of conditions. The different strategies are also not mutually exclusive — a given project could include activities that fall under more than one strategy. And strategies are not static — project managers may start with one strategy only to learn that conditions have changed, a new opportunity has arisen, or simply that staff and community members have developed a better understanding of existing conditions. Any of

these conditions could lead to the choice of a different strategy. Thus, while we've described these strategies as discrete entities, in reality the approach that a health project takes will be flexible and dynamic, changing over time and possibly incorporating more than one approach.

Analyzing stated health priorities may reveal unseen opportunities for conservation.

In all of the projects we reviewed, community residents viewed health as one of their top priorities and stressed the importance of health during community needs assessments. Improving the health status of the community is often a practical concern, because rural poor populations often have little access to health care. The expression of a need for particular health care services may, however, reflect deeper social issues. By looking more carefully at what these expressed needs might represent, project managers may uncover new opportunities to make the link between health and conservation, as well as identify the most efficient and effective approaches for intervention.

In Paso Caballos, Guatemala, Q'eqch'í midwives and health promoters requested a health post or a meeting room to carry out health-related activities. At first glance, this request might be easily dismissed because of the high costs and the unclear relationship to conservation. However, looking more closely at this request in the context of the social history of the Petén reveals a potential link to conservation. Most of the people in Paso Caballos arrived since 1990 as migrants in search of land. According to a 1999 needs assessment conducted by CI, legalization of land ownership and official government recognition of the community were among the highest perceived needs of residents. Their interest in creating physical structures may, therefore, reflect a need for legitimacy or permanence — building physical structures in Paso Caballos likely represents a way of establishing a sense of place and a relationship with the land. Recognition that a community's health priorities may be interwoven with other underlying needs provides an important clue to project staff. It helps them better connect health work to conservation, for example by opening the door for discussions about land management and conservation. It also helps them evaluate potential interventions more effectively so that they might address not only practical health needs but deeper social issues as well.

Organizational capacity and site conditions should influence choice of strategy.

The strategy a conservation organization chooses to take is based on a complex set of factors. The availability of funding, for example, may affect which strategy is selected. Often, funding to support the implementation of development activities — even as a mechanism to reach conservation goals — is not readily available to conservation organizations. In some communities, the availability of services can affect how a health strategy might be received by community residents relative to other interventions. For example, community members may view a conservation organization as their only hope for receiving health services if they have no access to other health-related resources. If services exist in theory but not in practice, communities may be willing to enter into agreements with conservation organizations as a way to gain more ready access. The background and training of staff are also factors when selecting interventions. While some staff may have the necessary training and experience to carry out development activities, designing and implementing sound health projects are tasks that often require

specialized expertise. For all of these reasons, it is important to do a thorough assessment of your strengths and weaknesses before entering health projects, and to evaluate the potential benefits of pairing up with other organizations in the project area. Conservation organizations may find it easier to work in partnership with other health or development organizations, or in conjunction with government agencies.

Health and conservation projects can address both internal and external threats.



External threats, such as commercial logging can sometimes be addressed by examining their health impacts on local communities.

Health and conservation projects can address both internal and external threats to biodiversity. Internal threats are those threats caused by community residents. External threats are caused by outside forces. Conservation and health projects may seem more likely to affect internal threats than external ones, because they are primarily related to changes in behavior. In theory, when community residents see that it is in the best interest of their health to conserve biodiversity, they will be more likely to modify their actions to be more compatible with conservation.

In some cases, however, health and conservation projects may prove effective in countering external threats. In the CI-Brazil project, one of the explicit intentions of taking a barter approach was to prevent the potential external threat of large logging concessions in the great expanse of intact forest. Often, in the face of external threats, the most difficult task of a conservation project manager is to convince community members that long-term solutions to human health and environmental degradation are potentially more beneficial than short-lived economic benefits that may be derived from immediate biodiversity exploitation.

Early results are important no matter which strategy is chosen.

Making the connection between conservation and health often means changing knowledge, perceptions, and attitudes, which may take time. Some key informants we interviewed stressed the importance of having quick tangible results in order to gain the trust of local residents or to help them see the links between health and conservation early on — regardless of the approach taken. According to Jenny Ericson who has worked in the Calakmul Biosphere Reserve in Mexico, “Projects working on health can produce immediate results and tangible benefits for communities that are an indication of the sincerity of the conservation organization.” (Ericson et al. 1999). For this reason, some project managers opted for projects such as building a health post, training health promoters or midwives, or constructing potable water systems. These visible results, some project managers believed, seem to build trust and promote the long-term engagement of community members in projects.

In addition to building relationships and galvanizing community involvement, early results can help to build community capacity. Intermediate outcomes that promote improvements in collective decision making, advances in equity, or increases in knowledge and understanding can be helpful because they empower communities for future action. Projects that don't identify intermediate steps related to the process of community development may fail to achieve the necessary community ownership and understanding that will catalyze long-term conservation involvement and sustainability.

Environmental education is important regardless of the strategy chosen.

Health and conservation projects are usually designed to change knowledge, attitudes, and behavior — and environmental education can be an effective mechanism to bring about these changes. Indeed, environmental education activities were conducted in just about all of the health and conservation projects we reviewed.

Conservation projects are generally comprehensive undertakings involving the simultaneous implementation of different interventions. The success of most of the strategies we defined above is dependent on project managers' abilities to make a connection between a health project and conserva-

tion in the minds of community residents. Instead of treating environmental education as a separate and discrete activity, many of the projects we reviewed attempted to integrate it into everything they did. By doing this, a project manager can more easily get community members to support project activities and understand their relationship to conservation.

Monitoring of both health outcomes and the impacts of health interventions on conservation outcomes is essential.

Some of the health and conservation projects that we reviewed ended up focusing heavily on the health intervention and not the conservation outcome. In many cases, it seems like project managers lost site of conservation goals. This happened in part, we believe, because some project managers were not clear or explicit about the relationship between the health intervention and the intended conservation outcome from the beginning of the project. Without clarity of the connection between health and conservation, whether at the conceptual or operational levels, health projects have little hope of meeting conservation goals in a direct or efficient manner and at best will only influence health outcomes.



Environmental education plays a key role in making the health and conservation link.

Recommendations

Our last goal of this study was to provide recommendations on integrating health and conservation at the community level to help guide project managers to employ health projects as an effective mechanism to reach conservation goals. We have organized our recommendations into three sections related to components of a typical project cycle: design, management, and monitoring.

Project Design

Start with the community's highest priorities — these are often health-related.

Rural poor populations living in or around areas of high biodiversity often have little access to health care either because it is simply not available or they cannot afford it. This often makes health a high priority. It is difficult for conservation organizations to ignore the urgency of the health needs expressed by a community. Sometimes, addressing health concerns is a necessary precursor to achieving conservation because it helps alleviate the health problems of the people who are most dependent upon biodiversity and who have the most important role in conserving it. In the HCI project in Brazil, for example, project staff worked on health issues of the A'Ukre community for two reasons. First, they recognized that the Kayapo were the best protectors of the land, and that maintaining their health and strength was in the best interest of conservation. In addition, they recognized that they needed to address the requests of the Kayapo in order to simply maintain necessary good standing with the community. Providing medication to address what the Kayapo call the “white man’s diseases” — such as malaria — aimed to achieve both of these ends. In other scenarios, when people are not healthy, biodiversity conservation is not usually a priority concern of theirs. As a villager told Future Generations’ staff in Tibet, “We first take care of our needs.” (Taylor-Ide and Taylor in press).

In Peru, CI’s long-term objective of involving the communities in the process of establishing and demarcating protected areas needed to accompany activities that provided the community with tangible development-related results in the short-run. HCI project staff found that developing the Mayapo community’s confidence in CI as an institution was essential in achieving project goals. Building a water system and helping the community to record its traditional knowledge of medicinal plants helped prove to the community that CI was a legitimate institution that intended to work with them to achieve mutually beneficial goals.



During community needs assessments, health often emerges as a high priority.

Proyek Pesisir worked to address communities' development needs at the same time as it was developing participatory community-based coastal resource management. While establishing a community-based marine sanctuary in Blongko, Indonesia, Proyek Pesisir encouraged community members to submit proposals for projects that would address coastal management. Some of the community proposals were directly related to health, including proposals to construct latrines and wells to maintain clean drinking water. The project responded by providing water pumps to address this community need. Residents saw clear, immediate health benefits that acted as an incentive for them to participate in more long-term coastal resource management.

Seek out priorities that build on the conceptual linkage between health and conservation.

A high degree of linkage between health interventions and conservation objectives often works to the benefit of project managers who are trying to design and implement health and conservation projects. Once a community has defined its priorities, working on those that are highly linked conceptually is often a good place to start. In cases where community members are already aware of the interdependence of health and biodiversity they may be more open to getting involved in conservation-related activities. When possible, therefore, conservation organizations should pursue opportunities for health and conservation projects that take full advantage of natural connections between the two issues.

In the Pacaya-Samiria Reserve, Peru, people suffered nutritional deficiencies because food resources such as palms and fish were over-exploited. The Nature Conservancy and Pro Naturaleza recognized that the management of these natural resources would be important to both local diets and conservation. These NGOs worked with community organizations to help them sustainably manage their palm and fish resources in order to improve local livelihoods based on sound conservation.

In Paragominas, Brazil, communities had become dependent on commercial pharmaceuticals but their cash income sources were beginning to decline. With the assistance of researchers and Mulheres da Mata, they worked together to find and use locally-available medicinal plants to cure common ailments. The use of these medicinal plants became an important incentive for forest conservation.

Recognize that inappropriate health interventions can do harm.

Projects that include health components have the potential to do as much harm as good if improperly designed or implemented. There are many examples from the health and development fields in which health interventions — designed with the best of intentions — actually ended in failure. In some cases, this resulted from project staff not adequately trained to implement health projects. There is a danger that conservation professionals addressing health concerns in a community may misdiagnose the cause, and miscalculate the solution — particularly if health is not their realm of expertise.

Sometimes, projects are designed in a way that generates unrealistic dependence on outside inputs and, therefore, they are not sustainable over time. Because there is an underlying assumption that conservation will be more likely when there is a positive health outcome, it is especially critical that health interventions succeed. If they do not and if community members feel cheated, disillusioned, or treated unfairly, it is highly unlikely that they will engage in subsequent conservation activities. In fact, they may be more inclined to oppose conservation activities or collaboration with conservation organizations if the project has falsely raised expectations or implemented poor quality health interventions.



Kayapo welcoming a plane that brings them much needed medical supplies.

The A'Ukre Kayapo community wanted compensation from CI-Brazil for allowing researchers to work in its territory. CI staff decided, based on requests from the community, that providing medicine to the community would be the best alternative because it would benefit the entire population rather than select individuals. Malaria medicines brought in by the researchers helped to decrease the community's dependence on logging to pay to airlift sick individuals to the nearest health facilities and to pay for costly, yet inadequate, health services. The Kayapo were satisfied with the imported medicines and, in return, agreed to protect the biological reserve by refraining from logging and hunting activities. Had the

provision of medicines been unsuccessful, however, it is unlikely that the Kayapo would have agreed to provide the reserve with special protection status and possible that the developing relationship between CI and the Kayapo would have been jeopardized.

Be sure the health intervention you choose is practical.

Project interventions should be feasible based upon available human and financial resources. Consider how much time, commitment and resources are necessary to implement the intervention. Health interventions can become very costly, especially if the project revolves around distributing medicines or staffing health professionals. They can also be time-intensive and long-term commitments; it is often difficult to stop providing needed health services once a community becomes reliant upon them. Contacting other projects to hear what they have learned from implementing similar interventions may be beneficial. Or, conducting a pilot activity before launching a large-scale project may help to determine whether or not the project is feasible and practical.

The Medicinal Plant Utilization and Conservation Project in Brazil promoted simple remedies for the most common illnesses. Remedies were chosen based on those that required the preparation of only one plant. In this way, families could easily prepare the medicines in their home and it would avoid any complications arising from a multiple-plant remedy.



Training and sharing information must be done in ways that are appropriate to local conditions.

Training is another area that needs to be practical. If a project's aim is to train community members in both health and biodiversity conservation, then care is needed in the design and volume of materials presented. For example, the Pendeba Program in Tibet found that they were trying to impart too much information at one time to the pendebas. As a result, they began to simplify the health and conservation materials and repeat training sessions. These modifications enabled the pendebas to learn more effectively and carry out their work more successfully.

Make sure your team understands how the health intervention and intended conservation outcomes are related in the project.

It is difficult to promote the linkage between health and conservation if the project implementers are unaware of the linkage themselves. Project staff need to know how and why they are implementing the project. If the connections are not evident at the start, project development may require additional assessments to gain a more comprehensive understanding of the community's needs and their relationship with the environment. Integrated Conservation and Development Projects (ICDPs), in general, have received much criticism for neglecting to forge a direct and deliberate link between development and conservation activities. In the end, these projects often turn out to be merely umbrella projects under which parallel, but disconnected and disassociated development and conservation projects activities occur simultaneously. Health and conservation projects run a similar risk if project managers are not particularly vigilant in maintaining the association — in practice, and in the minds of the community members who are participating in the projects.

Ideally, health workers should understand conservation issues and conservation workers should understand health issues, or they should work closely together in order to better integrate the health intervention into the conservation project. Professionally-trained public health workers work with CI-Guatemala staff to implement the health promoter and midwife training programs in a number of communities in the Petén, including Paso Caballos.



Health and conservation issues can be integrated during visits to the local health clinic.

Because of their specialized training, they were not entirely familiar with conservation issues such as the sustainable management of limited natural resources. So, to address both health and conservation priorities, CI-Guatemala core conservation staff work alongside the health professionals to address issues ranging from agroforestry to waste management. It is important that these two groups work together to incorporate each other's messages into their respective health and conservation activities.

Be transparent about your conservation goals from the beginning.

Be up-front and honest with communities about your conservation objectives from the outset. Let them know that you are prepared to help them address their development needs

but that you need their help in reaching conservation goals too. Reiterate your conservation goals often throughout the project so that there is no confusion as to why you are there. If possible and appropriate, enter into formal agreements with participants to clearly define roles and responsibilities.

Around the Qomolangma National Nature Preserve, villagers selected their pendebea and decided together with project staff which health activities to pursue. From the beginning, when communities chose to participate in the project and nominate a pendebea for training, they agreed on an explicit social contract with project staff outlining roles and responsibilities of both community members and project staff. The project's conservation goals and development expectations were made clear as part of this social contract.

CI-Peru staff unknowingly gained a reputation among the communities in the Vilcabamba Corridor as water system implementers, once the Mayapo project was complete. When project staff arrived to talk to the neighboring community of Puerto Huallana, residents inquired when CI would be building their water system. CI-Peru staff made it clear that their mission was conservation but that they had visited the community to see how the community's needs and CI's mission could be simultaneously addressed.

In Brazil, it has been clear from the very start why CI is present in the region. Its conservation goals have never been hidden or sidelined. In early stages of the project, individuals were being compensated for work at a biological station in an effort to generate income within the community. Recognizing the potential negative impacts of focusing compensation exclusively on particular individuals, CI began exchanging necessary medicines with the

community instead. The contribution of medicines was clearly articulated as an exchange for the possibility to work on conservation issues in the area, and community members understood that detrimental logging or mining practices in the Pinkaiti biological reserve would therefore jeopardize this health benefit. At one point, when an individual leader became interested in selling logging concessions, CI drafted a letter to the community emphasizing the need to maintain intact forest for the work in the biological station — and the related health benefits — to continue. Community members opposed the sale of the logging rights, and no logging concessions were sold.

Project Management

Forge productive relationships with capable and appropriate partners including other NGOs and government agencies.

At times, the complexity of health-related projects and the degree of technical skills required to implement these health activities can be substantial or can require expertise beyond that of conservation organizations. In such situations, it is important to collaborate with health professionals for successful needs analysis, project design, and implementation. Cooperation with health professionals is important, for example, to determine what the major causes of illnesses are and the types of interventions that are appropriate under the given circumstances. This collaboration can be achieved by hiring health professionals to work alongside conservationists or by teaming up with local healthcare providers such as health and development NGOs or government agencies.

Sometimes, as in the following two examples, conservation organizations can help communities access available government services. In Brazil, The Nature Conservancy, Society for Wildlife Research and Environmental Education, and communities were able to lobby the government to supply clean drinking water to the project area. In Mexico, World Wildlife Fund and Pronatura Peninsula de Yucatan worked to improve access to reproductive health care around Calakmul Biosphere Reserve in the Yucatan Peninsula by producing radio broadcasts that informed communities about reproductive health care and the types of government services available to them (Ericson et al. 1999). While the government did provide these services in urban areas, it did not promote such services in the rural communities.

CI-Brazil worked with the Brazilian National Health Fund (FUNASA) to develop a list of appropriate medicines that researchers visiting the Pinkaiti Research Field Station should bring to the community as payment to work in A'Ukre's territory. FNS and CI-Brazil have also partnered to design and implement appropriate malaria prevention programs by coordinating resources, including personnel and databases.

Even when local health personnel are qualified and do, in fact, work in the area, it is important to form partnerships to address communities' needs in the most effective and integrated way possible. Although government health services in the area may be weak, it is important not to pursue the same objectives separate from whatever exist locally, no matter how ineffective the existing agencies appear to be (Rob Clausen pers. comm.).

Promote community ownership of health and conservation activities.

A community's true involvement and sense of ownership in the implementation of project activities can contribute to the success and continuation of a project long after a conservation organization leaves the area. The projects in our sample often used training and education as ways to have community residents carry on project activities beyond the formal life of the project. Investing in activities that can be incorporated into the fabric of the community — like the medicinal plant project promoted by Mulheres da Mata — also increases the likelihood that they will continue for a long time.

In Qomolangma National Nature Preserve, investments were made in the problem-solving skills of the local *pendeba* and his or her ability to promote activities that would address identified community needs. Community activities were designed by villagers to address each village's particular needs. For example, one village established a co-operative to raise and sell goats to purchase medicines. Another village used and sold medicinal plants, while still another worked to reforest land so that fuelwood and construction needs could be met in the future.

CI-Guatemala helped the community of Paso Caballos construct its health post. CI-Peru worked with Mayapo to assist in the construction of its water system. Each community played a major role in building the infrastructure and took great pride in its efforts. In Paso Caballos, community members boasted that the value of the labor they contributed to the project probably exceeded CI's costs for supplying the building materials. In the Mayapo village, the community took pride in the fact that building the water system — including the intake, filtration system, piping, and water basins — was completed in fifteen days. Each community's pride in its participation has translated into a sense of ownership and dedication to maintenance of the infrastructure. It is this full engagement in health activities that project managers wish to transform into full participation in conservation efforts.

Look for opportunities where building community members' capacity in health will build capacity to work on conservation-related projects.

Skills learned while participating in a health project can be easily transferred to future conservation projects. Capacity building, in areas such as collective decision-making strategies, priority setting, and a variety of skills and tools related to project management become equally useful to community-based conservation projects. In addition, this process strengthens community position within the broader society, often giving marginalized communities a newfound voice that can often make them strong allies for conservation.

Sometimes, building local capacity is viewed as a goal in and of itself, and not just the means to achieve a goal. CI-Peru staff, for example, commented that “One of the most important objectives of the project is to strengthen the capacity of the villagers, enabling them to identify and confront future negotiations, planning, and other issues. It will be the villagers, not us, who will be here to continue the project.”

During the needs assessment phase of the Mayapo project, community members assisted project staff in gathering, recording, and analyzing information. The community used this information when the Ministry of Mines and Energy visited the area to discuss the prospect of constructing solar panels to generate electricity in the community.

Having this demographic data readily available, and participating in its collection, strengthened the community's ability to negotiate with Ministry officials.

In Paso Caballos, Guatemala, training midwives and health promoters served as a mechanism for community residents to gain prestige and respect in their communities — necessary ingredients for them to become community leaders. Making investments in people's capacity through health programs, and at the same time exposing them to conservation issues can, together, result in future conservation benefits.

Incorporate local health and development workers into conservation activities.

In recent years, some conservation organizations have trained community conservation workers. Their numbers are still quite small, however, in comparison to the strong tradition of community health and development workers around the world, including health promoters, midwives, and development extension volunteers. When possible, it may be advantageous to integrate existing community health workers into conservation activities. They may be more trusted regarding sensitive issues of health and resource use than an outsider would be. They are able to interact with beneficiaries as equals by understanding their true needs and communicating not only in the same language, but from the same cultural perspective. In addition, many of these workers may have ready-made networks that could prove useful to conservation efforts.

In Mayapo, CI-Peru worked with the health promoters and teachers to complete the needs assessment and implement the projects because they are highly regarded by the community. “Teachers enjoy a high degree of prestige and the information they convey is highly valuable,” comments

project coordinator, Luis Dávalos. But he also warns, however, that “teachers and health promoters working in the area are often not permanent fixtures in the community. There is a fear of building the capacity of people who will leave the community.”



Local health workers can leverage community involvement in conservation projects.

Project Monitoring and Evaluation

Monitor both the health and conservation conditions and outcomes.

As we have mentioned before, few of the projects included in our study adequately monitored either the health or conservation aspects of their activities. As with any conservation and development project, it is essential to incorporate monitoring into a project's design. Baseline data should be collected at the project's inception to determine the current health condition of project recipients and the status of conservation.

Without baseline data and monitoring, it is not possible to be sure whether the health assistance you are providing is having the desired effect or is even addressing the correct causes and types of illnesses. In the HCI project in Brazil, for example, strong anecdotal evidence suggests a decline in malaria rates among A'Ukre community members, however, the true impact of the project's interventions are difficult to determine because no baseline data were collected. Records detailing how many individuals contracted malaria before and after project implementation would be valuable to help gauge the effectiveness of the health intervention. Proyek Pesisir activities began with a survey of coastal management needs in 1995. The Blongko community now has a monitoring system in place to evaluate the community's drinking water quality and to determine whether the fish population in the sanctuary has increased. Adequate tracking can be very telling. In Guaraqueçaba Bay, Brazil, project staff report that diarrhea and dysentery were reduced by 90% and dehydration rates fell by 75% due to improvements in sanitation and drinking water supply.

Community members can play an important role in monitoring health and conservation outcomes and should be trained accordingly. In Guatemala, CI trained health promoters in Paso Caballos to monitor and record how many women have begun to use the family planning methods that the health promoters and midwives promote and distribute. This is a good indicator of how many women the project is reaching.



Monitoring both social and biological variables is essential to make the health and conservation link.

Evaluate the strength of association between health and conservation activities and results.

Without adequate monitoring data, it is virtually impossible to determine a causal link between health interventions and conservation outcomes at your project site. Project monitoring can help disclose the extent to which your activities have influenced both health and conservation status, as well as how improvements in one affect the other. This is critical when evaluating whether the decision to work on health was sensible. If a project is based on the assumption that improving health will directly lead to better conservation practices, you must not only measure changes in the health outcomes of your project but must also measure how these health outcomes have affected perceptions, knowledge, attitudes, and behavior related to conservation. If a project is designed to reach conservation goals through some intermediate result — such as building community capacity to manage project activities — then it is important to measure this result and any impact that it has had on conservation outcomes.

In recent years, some organizations have come to realize the importance of measuring cause-and-effect between health interventions and conservation outcomes and have begun to institute monitoring programs. For example, the Voahary Salama/Integrated Programs Initiative implemented by the Environmental Health Project in Madagascar began in 2000 and is planning to monitor and evaluate changes in health, family planning, and natural resource management in a way that permits project staff to analyze their interactions (Eckhard Kleinau pers. comm.).

Summarizing What We Have Learned

We include the following summary to provide you with a quick reference to the major findings and recommendations of this study.

Major Themes

In order to understand the links between health and conservation, we found it was important to distinguish between two types of linkage in projects — conceptual and operational.

Degree of Conceptual Linkage

Conceptual linkage refers to the extent that priority health issues in a community are directly related to the maintenance of intact biodiversity in the local environment. At the conceptual level, the degree of linkage between health and conservation must be assessed from two perspectives:

1. *the extent to which project staff perceive the health priorities of communities to be dependent on the existence of certain biodiversity, and*
2. *the extent to which community members perceive the interdependence between their own health priorities and conservation, either presently or in the future.*

Degree of Operational Linkage

Operational linkage describes the ways in which project managers utilize health activities to achieve conservation outcomes. We believe that there are at least four strategies by which project managers might functionally link health and conservation.

THE BARTER STRATEGY

This strategy involves promoting biodiversity protection by providing particular health services in exchange for community involvement in conservation activities.

THE ENTRY POINT STRATEGY

In this strategy, an organization provides health services or undertakes a health project in order to build a relationship with community residents that hopefully will result in future collaboration on conservation activities.

THE BRIDGE STRATEGY

In this strategy the implementing organization undertakes a health intervention with the intention of linking it conceptually to conservation activities.

THE SYMBIOTIC STRATEGY

The symbiotic strategy involves developing project interventions based on known common ground between the health needs of a population and conservation goals.

Observations

- *There is a relationship between the degree of linkage and the choice of strategy.*
- *Strategies are dynamic.*
- *Analyzing stated health priorities may reveal unseen opportunities for conservation.*
- *Organizational capacity and site conditions should influence choice of strategy.*
- *Health and conservation projects can address both internal and external threats.*
- *Early results are important no matter which strategy is chosen.*
- *Environmental education is important regardless of the strategy chosen.*
- *Monitoring of both health outcomes and the impacts of health interventions on conservation outcomes is essential.*

Recommendations

Project Design

- *Start with the community's highest priorities — these are often health-related.*
- *Seek out priorities that build on the conceptual linkage between health and conservation.*
- *Recognize that inappropriate health interventions can do harm.*
- *Be sure the health intervention you choose is practical.*
- *Make sure your team understands how the health intervention and intended conservation outcomes are related in the project.*
- *Be transparent about your conservation goals from the beginning.*

Project Management

- *Forge productive relationships with capable and appropriate partners including other NGOs and government agencies.*
- *Promote community ownership of health and conservation activities.*
- *Look for opportunities where building community members' capacity in health will build capacity to work on conservation-related projects.*
- *Incorporate local health and development workers into conservation activities.*

Project Monitoring and Evaluation

- *Monitor both the health and conservation conditions and outcomes.*
- *Evaluate the strength of association between health and conservation activities and results.*

Next Steps

We designed this study to answer some basic questions about the relationship between community-level health and conservation and to serve as the catalyst for further exploration and learning. Rather than being “the definitive study” on community-based health and conservation projects, we hope that this publication clarifies some concepts, focuses discussion, and sparks curiosity and interest in project managers around the world who might consider integrating health and conservation activities.

We were also hoping that the study would lead to some interesting questions that might show the way to future inquiry. Indeed, it did. What we discovered leads us to believe that there is much more to learn. Some of the questions that our study generated for us include the following:

- What effect does the degree of conceptual linkage between health and conservation have on conservation outcome?
- What is the relationship between degree of conceptual linkage in a health and conservation project and long-term sustainability?
- Under what conditions are each of the different strategies for linking health and conservation most effective?
- What is the relationship between type of strategy and long-term sustainability?
- What is the appropriate role for conservation professionals to play in health and conservation projects? When should they get directly involved in implementation and when should they only provide oversight to ensure that conservation goals are met?
- What are the basic skills and knowledge — in terms of understanding the linkages between health and conservation — that a conservation project manager must have if he or she is going to be involved in a health and conservation project?

Conservation and development practitioners only started trying to link health and conservation in the 1980s. As our sample of projects demonstrates, there are currently many examples of health and conservation projects around the world. There remains, however, much to be learned about how to make the connection effectively, and much work to be done in order to be able to accomplish that learning.

Perhaps the greatest challenge that we faced in our analysis was the absence of data explicitly documenting the assumptions, successes, and challenges of health and conservation projects. As we collected the information for this study, we were impressed by the insights and enlightening stories that many project managers shared regarding their experiences integrating health and conservation. At the project level, there was much to be learned and shared with the rest of the conservation community. Documentation of these lessons, however, was relatively scarce. Many of the documents that we surveyed were outdated or did not contain the relevant information that we were capturing from directly interviewing project managers. Advancing our collective understanding of the opportunities and challenges related to implementing health and conservation projects will require making a commitment to documenting and recording what we are learning at the project level.

Related to this, our analysis underscored the need to find ways of creating functional networks of project managers in order to promote and catalyze cross-site learning. With a few exceptions, there appears to be little opportunity for project managers to share what they are learning at their project sites with other practitioners around the world. Therefore, much of what conservation and development project managers are trying out in health and conservation projects is done in virtual isolation. Project managers unaccustomed to linking health and conservation do the best they can, learning as they go. Under these conditions, project managers run the risk of making the same errors that others made before them simply because they do not have the benefit of tapping into a network of colleagues that could help steer them in the right direction.

Another important point raised in this study was the fact that much of our analysis was based on subjective information. Although project managers were loosely tracking project successes in a variety of ways, only a handful of the projects we studied had developed systematic mechanisms for collecting objective monitoring data. We believe that the collection of this data is crucial if we are to better understand the complex relationships between health interventions and conservation outcomes at the community level. To accomplish this, project managers will need to first clearly define the basic underlying assumptions of their projects, then develop ways to test these assumptions by incorporating low-cost, simple monitoring systems into project design. One example of an assumption that must be systematically tested is the one that pervades all health and conservation projects: By addressing the health needs of communities, residents will see the benefit of biodiversity conservation, and will in turn, act to conserve.

Project-level monitoring is also the building block upon which cross-site learning can take place (Margoluis and Salafsky 1998). Organizing similar projects into functional portfolios — each portfolio focused on testing specific strategies — can help us learn more generalizable principles about these approaches (Salafsky and Margoluis 1999). It is apparent from this study that the use of health interventions as a strategy to reach conservation goals has not been sufficiently studied in the past to allow us to glean precise operational principles based on testing specific assumptions. We believe, therefore, that one of the next steps to gaining a deeper understanding of the relationship between health and conservation should be to clearly define testable assumptions about what works, what doesn't, and why, both within and between health and conservation projects. To move the field of conservation practice forward, we must find ways to learn quickly and efficiently by clearly identifying critical questions and assumptions, making wise investments in relevant data, and creating opportunities for conservation practitioners to come together for collective learning.

As the conservation community develops new strategies for integrating conservation and development, it would be wise to draw on the vast experience that already exists related to the opportunities and challenges of designing and implementing health projects. We have seen that it is not a simple task for conservation organizations to “retool” to take on primary responsibility for implementing development activities (Margoluis et al. 2000). There are many organizations that exist to carry out health and development projects — it is important that the conservation

community learn from others who have gone before us and take the opportunity to build partnerships with these groups wherever possible. In this way, we can avoid “reinventing the wheel” and repeating old mistakes.

Finally, it is clear from this study that there remains much to be learned about making the link between health and conservation in community-based projects. We hope that this publication has, in some small way, helped to bring some clarity to the discussion centered on the intersection of health, conservation, and development. And we hope that it points the way for future exploration and discovery.

Looking Forward With the Healthy Communities Initiative

HCI represents one attempt to do the kind of learning that is necessary to evaluate the connections between development interventions and conservation impacts. We have heavily emphasized learning at both the project and portfolio levels. At the project level, we have been working to clearly define the assumptions we are making about how our health activities will lead to conservation outcomes. Testing these assumptions then becomes an important part of our monitoring plans. We hope this will allow us to improve our project design, to learn which assumptions hold and which don't, and to advance our understanding of how to connect health and conservation. At the portfolio level, we hope to identify common themes or hypotheses across projects in order to compare learning across projects. We recognize the need to have common design and monitoring elements across projects in order to accomplish this goal.

Throughout the existence of HCI, we have worked to strengthen our common identity by creating a network that links projects and project staff. While one benefit of creating a linked network is more powerful learning, there are also many other benefits as well. The network provides important opportunities for exchange between projects facing similar challenges. It also provides built-in training opportunities as project staff share experiences formally through exchanges as well as informally through annual gatherings, e-mail, and the internet. Most importantly perhaps, it provides project staff who often work in isolated settings with a virtual peer group, to share challenges and successes and provide often needed support.

We hope that this analysis will stimulate further discussion and provide a starting point for collectively defining this discipline. By defining a common platform of questions from which we all can work, we can begin to learn not only at the project and portfolio levels, but also at the super-portfolio level as different organizations work together to test common hypotheses. We hope other organizations will join us in moving this important field forward.

TO HELP YOU ON YOUR WAY

If you work for a conservation organization and are thinking about designing and implementing a health and conservation project, there are a number of questions you can ask yourself to make sure that you start off and continue on the right track.

First, ask about your own organization

- To what extent are we willing to get involved in health projects when we are a conservation organization?
- Do we have the staff necessary to design, manage, and monitor a health and conservation project?
- What are the threats we wish to address at the project site? Are they internal or external?
- Do we need to get approval from any government agencies or offices in order to develop and implement a health-related project? If so, what implications does this have for the project or program?
- What are our regional conservation objectives around the proposed site and how would an integrated health and conservation project help us to meet these objectives?

Ask about the communities where you would be working

- How do we know what the highest priorities are for the communities? Has there been a thorough needs assessment? Did it point to health?
- Are there natural linkages — perceived by us or the community that we can build on? If so, what are they?
- Does the community directly rely on biodiversity in a way that it may be possible to link health to conservation?
- Does the community receive health support from any other organizations? How effective is that support?
- Are there health or development workers in the community with whom we can work to promote our health and conservation project?
- Is there a history of successful or failed health projects in this community that may affect how our organization is perceived?
- Is the community fully aware that our organization's goal is biodiversity conservation?

Ask about the project activities you intend to implement

- What is the general approach to implementing a health and conservation project that we think we will want to take?
- How can we be sure that the health intervention we have selected adequately addresses the communities' problems?
- Can our project team clearly articulate the connection between the health project we wish to implement and the conservation outcome we wish to achieve?
- How will we know if our health and conservation project is successful? What will be our monitoring system?
- How will we incorporate environmental education into our project activities?
- If we do both health and conservation activities, how do we ensure that they remain integrated throughout the life of the project?
- What types of inputs are necessary to implement interventions related to the health priorities identified by communities? Will they require large inputs of staff and money or will they require relatively small investments? Is the proposed health intervention we have selected practical and sustainable?
- How can we design the project so that the communities take ownership?
- How can we design the intervention so that it builds the capacity of the communities to design and manage their own projects?

Ask about possible strategic alliances

- Are there health or development organizations with which we can partner on a health and conservation project?
- What health and development organizations have the best reputation in the area where we'll be working?
- If we choose to work in partnership with another organization, what is the best way to establish this partnership?
- How can we share the costs of a health and conservation project with a partner organization?

TO LEARN MORE

The authors of this study encourage others to continue learning more about what makes for effective health and conservation projects.

Suggested Readings

Caudill, D. 1998. Integration of population and environment: World Neighbors people-centered, capacity-strengthening approach. In *Lessons from the field: Integration of population and environment*, ed. D. Caudill, 11-20. Oklahoma City, OK: World Neighbors.

Engelman, R. 1998. Plan and conserve: A source book on linking population and environmental services in communities. Washington, D.C.: Population Action International.

Future Generations. Retrieved August 15, 2000 from the World Wide Web: <http://www.future.org>

Gibb Vogel, C. and R. Engelman. 1999. Forging the link: Emerging accounts of population and environment work in communities. Washington, D.C.: Population Action International.

Grifo, F. and J. Rosenthal, eds. 1997. *Biodiversity and human health*. Washington, D.C.: Island Press.

Poffenberger, M. ed. 1998. Stewards of Vietnam's upland forests. Research Network Report. Number 10. January 1998. California: Asia Forest Network.

PuChong. 1999. Pendeba Action in the Qomolangma (Mt. Everest) National Nature Preserve. In *Sustainable Development International*, 169-174. London: ICG Publishing.

Salafsky, N. and E. Wollenberg. 2000. Linking livelihoods and conservation: A conceptual framework and scale for assessing the integration of human needs and biodiversity. *World Development*. 28(8):1421-1438.

Taylor-Ide, D., and C. Taylor. In press. Chapter Fifteen-Tibet, China: Conservation integrated within development. *When communities own their futures: Examples and a process for just and sustainable development*. University of California Press.

Wells, M. and K. Brandon. 1992. *People and parks: Linking protected area management with local communities*. Washington, D.C.: The World Bank.

Western, D., M. Wright, and S. Strum, eds. 1994. *Natural connections: Perspectives in community-based conservation*. Washington, D.C.: Island Press.

Whyner, D. 1999-2000. Collaborating for more effective population-environment interventions: The experience of the APPROPOP project and its environmental partners in Madagascar. *Population-Environment Fellows Newsletter*. Winter 1999-2000: 1-8.

World Neighbors. 1999. *Lessons from the Field: Integration of population and environment II: Ecuador case study*. Oklahoma City, OK: World Neighbors.

Complete Literature Review

The complete documentation of the extensive literature review for this study (including material from project documents and interviews with key informants) is available online in the **publications** section of the BSP Web site at www.BSPonline.org.

References

☞ Publications noted with this symbol are available to be downloaded, free of charge, in the **publications** section of the BSP Web site at www.BSPonline.org.

Alcorn, J. B. 1984. Development policy, forests and peasant farms: Reflections on Huastec-managed forest contribution to commercial and resource conservation. *Economic Botany*, 38(4): 389-406.

Alcorn, J. B. and A. G. Royo, eds. 2000. *Indigenous social movements and ecological resilience: Lessons from the Dayak of Indonesia*. Washington, D.C.: Biodiversity Support Program.

American Museum of Natural History. 1997. *Biodiversity and human health: A guide for policymakers*. Washington, D.C.: Center for Biodiversity and Conservation, American Museum of Natural History.

Asian Development Bank. 1997. Summary environmental impact assessment of the proposed Central Sulawesi Integrated Area Development and Conservation Project (Indonesia).

Biodiversity Conservation Network. 1999. *Evaluating linkages between business, the environment, and local communities: Final stories from the field*. Washington, D.C.: Biodiversity Support Program.

Bioresources Development and Conservation Programme. Retrieved October 1, 2000 from the World Wide Web: <http://www.bioresources.org/about.htm>

Brown, M. and B. Wycoff-Baird. 1994. *Designing integrated conservation and development projects*. Washington, D.C.: Biodiversity Support Program.

CARE. Amboro Conservation and Development Project. Retrieved August 6, 2000 from the World Wide Web: http://www.care.org/programs/program_area.cfm?PID=1256

CARE. Jozani-Chwaka Bay Environment. Retrieved August 6, 2000 from the World Wide Web: http://www.care.org/programs/program_area.cfm?PID=1538

CARE. Development through Conservation. Retrieved August 6, 2000 from the World Wide Web: http://www.care.org/programs/program_area.cfm?PID=1182

Caudill, D. 1998. Integration of population and environment: World Neighbors people-centered, capacity-strengthening approach. In *Lessons from the Field: Integration of Population and Environment*, ed. D. Caudill, pp.11-20. Oklahoma City, OK: World Neighbors.

Caudill, D. 2000. Exploring capacity for integration: University of Michigan Population-Environment Fellows Programs Impact Assessment Project. *Environmental Change and Security Project Report*. 6:66-76.

Chivian, E. 1997. Global environmental degradation and biodiversity loss: Implications for human health. In *Biodiversity and Human Health*, ed. F. Grifo and J. Rosenthal, pp. 7-38. Washington, D.C.: Island Press.

Columbia, R. and M. Brown. 1999. *A monitoring and evaluation framework for integrated population and environment projects*. Boston: Pathfinder International.

Crawford, B. R., I. M. Dutton, C. Rotinsulu and L. Z. Hale. 1998. Community-based coastal resources management in Indonesia: Examples and initial lessons from North Sulawesi. International Tropical Marine Ecosystems Management Symposium, Townsville, Australia, November 23-26, 1998.

Dahuri, R. and I. M. Dutton. 2000. Integrated coastal and marine management enters a new era in Indonesia. *Coastal Zone Management Journal* 1:11-16.

Daily, G., ed. 1997. *Nature's services: Societal dependence on natural ecosystems*. Washington, D.C.: Island Press.

De Beer, J. H. and M. McDermott. 1989. *The economic value of non-timber forest products in Southeast Asia with emphasis on Indonesia, Malaysia and Thailand*. Amsterdam: Netherlands Committee for the IUCN and WWF.

Dobson, A., M. Campbell, and J. Bell. 1997. Fatal Synergisms: Interactions between infectious diseases, human population growth and loss of biodiversity. In *Biodiversity and Human Health*, ed. F. Grifo and J. Rosenthal, pp. 87-110. Washington, D.C.: Island Press.


Dorji, S. 2000. Pendebas build community trust. *Future Generations*. Spring 2000: 2.


Ehrlich, P. R. and A. H. Ehrlich. 1990. *The population bomb*. New York: Touchstone.


Ehrlich, P. R. and A. H. Ehrlich. 1991. *Healing the planet: Strategies for resolving the environmental crisis*. New York: Addison-Wesley Publishing Company, Inc.

- Eléonore, R. and M.D. Whyner. nd. Evaluation Finale des "AAPS Environnementaux."
- Engelman, R. 1998. Plan and conserve: A source book on linking population and environmental services in communities. Washington, D.C.: Population Action International.
- Environmental Health Project. Retrieved September 2, 2000 from the World Wide Web: <http://www.ehproject.org>, <http://www.ehproject.org/live/April.html>
- Ericson, J., M. S. Freudenberger and E. Boege. 1999. Population dynamics, migration and the future of the Calakmul Biosphere Reserve, Occasional Paper No. 1, Program on Population and Sustainable Development. Washington, D.C. American Association for the Advancement of Science.
- Falconer, J. and C. R. S. Koppell. 1990. *The major significance of "minor" forest products: The local use and value of forests in the West African Humid Forest Zone*. Community Forestry Note 6. Rome: Forests, Trees and People Program, Swedish International Development Authority and the Food and Agriculture Organization of the United Nations.
- FAO. 1989a. *Household food security and forestry: An analysis of socio-economic issues*. Rome: Forest, Trees and People Program, Swedish International Development Authority and the Food and Agriculture Organization of the United Nations.
- FAO. 1989b. *Forestry and nutrition: A reference manual*. Rome: Forest, Trees and People Program, Swedish International Development Authority and the Food and Agriculture Organization of the United Nations.
- FAO. 1997. Medicinal plants for forest conservation and health care. *Non-Wood Forest Products 11*. Rome: Food and Agriculture Organization of the United Nations.
- Farnsworth, N. R. 1988. Screening plants for new medicines. In *Biodiversity*, ed. E. O. Wilson, pp. 83-97. Washington, D.C.: National Academy Press.
- Fundación Defensores de la Naturaleza. 1993. *Diagnóstico para la integración humana a la Reserva de la Biosfera Sierra de las Minas*. Informe Final. Richard Margoluis, E. G. Ramirez, Biodiversity Support Program, The World Wildlife Fund, The Nature Conservancy, the World Resources Institute, Proyecto PACA-CARE. Guatemala.
- Furlich, D. S. 2000. From peril to progress. *Nature Conservancy*. September/October 2000:14-24.
- Future Generations. Retrieved August 15, 2000 from the World Wide Web: <http://www.future.org>
- Garrity, D. P., V. B. Amoroso, S. Koffa, and D. Catacutan. In press. Innovations in participatory watershed resource management to conserve tropical biodiversity. *Conservation Ecology*.
- Grifo, F. and J. Rosenthal, (ed.). 1997. *Biodiversity and human health*. Washington, D.C.: Island Press.
- Integrated Health Care and Conservation Program, Madagascar. Retrieved October 7, 2000 from the World Wide Web: <http://www.rbgekew.org.uk/peopleplants/dp/dp2/issues.htm>, <http://www.goldmanprize.org>, http://www.panda.org/resources/inthefield/lop/lop_mg.htm
- Integrated Reproductive Health and Conservation Project. Retrieved October 7, 2000 from the World Wide Web: <http://www.wn.org>, http://www.wwfcanada.org/wwf_international.htm
- IPGRI, 2000. Plant erosion threatens world food supply expert warns. Retrieved June 17, 2000 from the World Wide Web: <http://www.cgiar.org/ipgri>
- IUCN. People and their environments. Retrieved August 8, 2000 from the World Wide Web: <http://www.iucn.org/2000/communities/content/index.html>
- IUCN. 1990. *Caring for the World: A Strategy for Sustainability*. Gland: IUCN.
- Lane, P. 1988. Community based economic development: Our trojan horse. *Studies in Political Economy*, Vol. 25, Spring.
- Larson, E. 1998. *From strength to strength as ACTS (African Center for Technology Studies) celebrates ten years of great service*. Retrieved December 11, 2000 from the World Wide Web: <http://www.acts.or.ke/innovation>
- Lembaga Pengkajian Pedesaan, Pantai dan Masyarakat. Retrieved December 21, 2000 from the World Wide Web: <http://www.coral.org/NGO/LP3MIRCCS.htm>
- Lintas Nusantara: Jepang Bantu Warga Ujungpandang. Retrieved December 21, 2000 from the World Wide Web: <http://www.suarapembaruan.com/News/1998/03/200398/Daerah/dh07/dh07.htm>
- Lynch, O. and J. B. Alcorn. 1994. Tenurial rights and community-based conservation. In *Natural Connections: Perspectives in Community-based Conservation*, ed. D. Western and R. M. Wright, associate editor, S. Strum, pp. 373-392. Washington, D.C.: Island Press.

Mander, M. 1997. The marketing of indigenous medicinal plants in South Africa: A case study in KwaZulu-Natal. Rome: Food and Agricultural Organization of the United Nations.

 Margoluis, R. 1996. *Biodiversity: Facts on the foundation of life*. Washington, D.C.: Biodiversity Support Program.

 Margoluis, R. and C. Margoluis. (2000). *What does it take to make conservation work?: Conditions for success in conservation*. Washington, D.C.: Biodiversity Support Program.

 Margoluis, R., C. Margoluis, K. Brandon, and N. Salafsky. 2000. *In good company: Effective alliances for conservation*. Washington, D.C.: Island Press.

Margoluis, R. and N. Salafsky. 1998. *Measures of success: Designing, managing, and monitoring conservation and development projects*. Washington, D.C.: Island Press.

Melnyk, M. 1994. Biodiversity's contribution to rural livelihoods: A component of environmental impact assessment. In *Widening Perspectives on Biodiversity*, eds. A. F. Krattiger, et al., 347-51. Geneva: IUCN and International Academy of the Environment.

Melnyk, M. A. 1995. *The contributions of forest foods to the livelihoods of the Huottuja (Piaroa) People of Southern Venezuela*. Thesis submitted for the degree of Doctor of Philosophy of the University of London. London: Centre for Environmental Technology, Imperial College of Science, Technology and Medicine.

Melnyk, M. In press. *Resource rights: A condition for effective community-based fire management*. Prepared for the International Workshop on Community-Based Fire Management. December 6-8, 2000. Kasetsart University, Bangkok, Thailand: RECOFTC.
<http://eapei.home.att.net/Products/ForestService/melnyk1.htm>

Michon, G., Mary, F. and J. Bompard. 1986. Multistoried agroforestry garden system in West Sumatra, Indonesia. *Agroforestry Systems*, 4(4): 315-338.

Mittermeier, R. February, 1999. *Pulse of the Planet* radio talk show interview. Retrieved December 11, 2000 from the World Wide Web:
<http://www.pulseplanet.com/Feb99/1822.html>

Mothers and nature. Retrieved August 25, 2000 from the World Wide Web: <http://www.future.org>

Natural and Cultural Reserve of Huiricuta. Retrieved December 15, 2000 from the World Wide Web: <http://ld.panda.org>

Ndoye, O., M. Ruiz-Perez, A. D. Mamoun, and D. Lema Ngono. Les effets de la crise économique et de la dévaluation sur l'utilisation des plantes médicinales au Cameroun. Implications pour la gestion durable des forêts. Séminaire FORAFRI de Libreville.

O'Connor T. 2000. Interest drops in rainforest remedies. *Health24News*, 1(49) July 7, 2000
<http://www.health24news.com/Archive/Channel+Content/Health+News/Alternative+Health/ethno+pharm0705.htm>

Ogden, C. L. and C. R. S. Koppell. 1991. *Guidelines for integrating nutrition concerns into forestry projects*. Rome: Food and Agriculture Organization of the United Nations.

Pathfinder International. Retrieved August 6, 2000 from the World Wide Web: <http://www.pathfind.org>

Pimbert, M. P. and J. N. Pretty. 1995. *Parks, people and professionals: Putting "participation" into protected area management*. Discussion Paper 57. United Nations Institute for Social Development, International Institute for Environment and Development and World Wide Fund for Nature.

Platt, K. *Tibet's environmental good Samaritans*. November 18, 1999. Christian Science Monitor. Retrieved August 15, 2000 from the World Wide Web:
<http://www.csmonitor.com/durable/1999/11/18/p15s1.htm>

Poffenberger, M. ed. 1998. *Stewards of Vietnam's Upland Forests*. Research Network Report. Number 10. January 1998. California: Asia Forest Network.

Pro Naturaleza and The Nature Conservancy. n.d. Informe Final de Ejecución, Resultados y Logros de Proyecto: Empleo y Uso Sostenible de Recursos en la Reserva Nacional Pacaya-Samiria. Loreta, Peru: USAID.

Protecting Guinea's forests through co-management. Retrieved December 5, 2000 from the World Wide Web: <http://www.usaid.gov/gn/nrm/news/forest/tatasoumah.htm>

PuChong. 1999. Pendeba Action in the Qomolangma (Mt. Everest) National Nature Preserve. In *Sustainable Development International*, 169-174. London: ICG Publishing.

Rabelahasa, E. and D. Whyner. 1998. Final Evaluation of MSH-APPROPOP/[PF'S Grants to Environmental Organizations.

Ringkasan Kliping Berita Kesehatan. Retrieved December 21, 2000 from the World Wide Web: <http://www.depkes.go.id/Ind/News/Kliping/1999/Mar99/mar0608.htm>

Salafsky, N., B. Cordes, J. Parks, and C. Hochman. 1999. *Evaluating linkages between business, the environment, and local communities. Final analytical results from the Biodiversity Conservation Network*. Washington, D.C.: Biodiversity Support Program.

Salafsky, N. and R. Margoluis. 1999. *Greater than the sum of their parts: Designing conservation programs to maximize results and learning*. Washington, D.C.: Biodiversity Support Program.

Salafsky, N. and E. Wollenberg. 2000. Linking livelihoods and conservation: A conceptual framework and scale for assessing the integration of human needs and biodiversity. *World Development*. 28(8):1421-1438.

Saude e Alegria. The proposal of Saude e Alegria. Retrieved July 20, 2000 from the World Wide Web: <http://www.brazilonline.com/psa/prop.html>

Scoones, I., M. Melnyk and J. N. Pretty. 1992. The hidden harvest: Wild foods and agricultural systems. A Literature Review and Annotated Bibliography. London: Sustainable Agriculture Program, International Institute for Environment and Development, World Wide Fund for Nature and Swedish International Development Authority.

Sea Water Desalination Project. Retrieved December 21, 2000 from the World Wide Web: <http://www.coral.org/NGO/LP3MIRCCS.htm>, <http://www.depkes.go.id/Ind/News/Kliping/1999/Mar99/mar0608.htm>, <http://www.suarapembaruan.com/News/1998/03/200398/Daerah/dh07/dh07.htm>

Shanley, P. and G. Rodrigues Gaia. 2000. Break Barriers, Increase Impact: Equitable generation and dissemination of natural resource information in the Brazilian Amazon, presented at Workshop on Deepening the Basis of Rural Resource Management, International Service for National Agricultural Research, 16-18 February 2000, The Hague, The Netherlands (<http://www.cgiar.org/isnar/environment/nrm-basis.htm>).

Shanley, P. 2000. As the forest falls: the changing use, ecology and value of non-timber forest resources among Caboclo Communities in Eastern Amazonia. Ph.D. Dissertation, University of Kent, England.

Shanley, P., Hohn, I., A. V. da Silva, 1996. *Receitas sem Palavras: Plantas Mediciniais da Amazonia*. Belem: Editora Supercores.

Shepherd, G., J. Watts, A. Ifeka, and D. Blais. 1991. *Communal management of forests in the semi-arid and sub-humid regions of Africa*. Report prepared for the FAO forestry Department, Social Forestry Network, Overseas Development Institute, London.

Society for Conservation Biology. 2000. *Conservation medicine: The ecological context of health*. A symposium at the Society for Conservation Biology annual meeting, June 2000, Missoula, Montana, U.S.A.

Stolton, S., B. Geier, and J. McNeely. 2000. *The relationship between nature conservation, biodiversity and organic agriculture*. Geneva: International Federation of Organic Agriculture Movements, IUCN and WWF.

Suratmo, F. G. 1999. The Indonesian perspective and experience in forest fire management. In *FAO Meeting on Public Policies Affecting Forest Fires*, FAO Forestry Paper 138, 267-289. Rome: Food and Agriculture Organization of the United Nations.

TACARE. Retrieved September 25, 2000 from the World Wide Web: http://www.janegoodall.org/inst/inst_tacare_hist.html

Taylor-Ide, D., and C. Taylor. In press. Chapter Fifteen-Tibet, China: Conservation integrated within development. *When communities own their futures: Examples and a process for just and sustainable Development*. Berkeley, CA: University of California Press.

The Jane Goodall Institute. 1999. TACARE Project: Annual Report 1999.

The Nature Conservancy. 1997. *Water: Together we can care for it*. Arlington, VA. The Nature Conservancy.

The Nature Conservancy. n.d. *Community-Based Conservation: International Program*. Arlington, Virginia: The Nature Conservancy.

The Nature Conservancy. 1999. Reports for projects funded by the Johnson and Johnson Foundation.

The Nature Conservancy. 2000. Environmental Health and Community Organization, Guaraqueçaba, Brazil. Mid-term Report (1999-2000 Season), May 2000.

The Nature Conservancy and Pro Naturaleza. 2000. Promotion of Community Fisheries and Palm Management to Protect Biodiversity and Improve Nutrition, Health and Food Security in the Pacaya Samiria National Reserve, Peru. A Report and Proposal submitted to Johnson & Johnson.

- Ulrich, R. 1989. The role of trees in human well-being and health. Proceedings of the Fourth Urban Forestry Conference. In: Rodbell, P.D., ed., Proceedings of the Fourth Urban Forestry Conference, October 15-19, 1989, St. Louis, Missouri. Washington, D.C.: American Forestry Association: pp. 25-30.
- UNEP. 1999. *Global environmental outlook – 2000*. Nairobi, Kenya: United Nations Environment Program.
- University of Michigan Population Environment Fellows. Retrieved September 15, 2000 from the World Wide Web: <http://www.sph.umich.edu/pfps/FEIProfPE.html>
- Vogel, C. G. and R. Engelman. 1999. *Forging the link: Emerging accounts of population and environment work in communities*. Washington, D.C.: Population Action International.
- Weissman A. L. and M. S. Freudenberger. 1998. World Wildlife Fund's Population Dynamics and Resource Conservation Initiative: Forging constructive linkages between population and conservation. In *Lessons from the Field: Integration of Population and Environment*, ed. D. Caudill, 21-36. Oklahoma City, OK: World Neighbors.
- Wells, M. P. 1994. A profile and interim assessment of the Annapurna Conservation Area Project, Nepal. *Natural Connections: Perspectives in Community-based Conservation*, ed. D. Western and R. M. Wright, associate editor, S. Strum, 261-281. Washington, D.C.: Island Press.
- Wells, M. and K. Brandon. 1992. *People and parks: linking protected area management with local communities*. Washington, D.C.: The World Bank.
- Wells, M., S. Guggenheim, A. Khan, W. Wardogo, and P. Jepson. 1999. *Investing in biodiversity: A review of Indonesia's integrated conservation and development projects*. Washington, D.C.: The World Bank.
- Western, D., M. Wright, and S. Strum, eds. 1994. *Natural connections: Perspectives in community-based conservation*. Washington, D.C.: Island Press.
- Whitten, T. n.d. Bank-Netherlands Partnership Program, Global and Regional Initiatives, Funding Proposal.
- Whyner, D. 1999-2000. Collaborating for more effective population-environment interventions: The experience of the APPROPOP Project and its environmental partners in Madagascar. *Population-Environment Fellows Newsletter*. Winter: 1-8.
- Wilson, K.B. 1989. Trees in fields in Southern Zimbabwe. *Journal of Southern African Studies*, 15(2): 1-15.
- World Neighbors. 1999. *Lessons from the field: Integration of population and environment II: Ecuador Case Study*. Oklahoma City, OK: World Neighbors.
- World Resources Institute, United Nations Development Programme, United Nations Environment Programme, World Bank. 1998. *1998-99 World Resources: Environmental Change and Human Health*. Retrieved September 15, 2000 from the World Wide Web: <http://www.wri.org/wri/wr-98-99>
- WWF-Canada. Arenal Conservation Area. Retrieved December 15, 2000 from the World Wide Web: http://www.wwfcanada.org/wwf_international.htm
- Zuluaga, G. 1999. Cultura, Naturaleza y Salud: Elementos de reflexión para la conservación de la diversidad biológica y cultural. In *Memorias del Taller sobre experiencias prácticas en gestión de Areas Protegidas por los pueblos indígenas en Iberoamérica*, Ministerio del Medio Ambiente de Colombia, Unidad Especial de Parques Naturales de Colombia, Agencia Española de Cooperación Internacional (AECI), Fondo Mundial para la Naturaleza (WWF) y Ecodesarrollo, Cartagena de Indias, Noviembre 29 a Diciembre 3 de 1999.

Complete List of Projects Included in the Study

Key:

1. Conducted field visit of the project
2. Interviewed key informants in person, via telephone, and/or via e-mail and reviewed literature (including publications, project reports, and/or web sites)
3. Reviewed literature only

REGION	PROJECT	LOCATION	PRIMARY IMPLEMENTING INSTITUTION(S)	KEY
HCI PROJECTS				
	Health Promoter and Midwife Training in Paso Caballos	Paso Caballos, Maya Biosphere Reserve, Guatemala	Healthy Communities Initiative, Conservation International	1,2
	Health and Conservation in the Machiguenga Community of Mayapo	Apurimac Reserve Zone, Peru	Healthy Communities Initiative, Conservation International	1,2
	The Kayapo Health Project	Pará, Brazil	Healthy Communities Initiative, Conservation International	2
ADDITIONAL PROJECTS FROM AROUND THE WORLD				
Africa and Madagascar	Bioresources Development and Conservation Program	Cameroon and Nigeria	Bioresources Development and Conservation Program	3
	Protecting Guinea's Forests through Co-Management	Yemouna, Guinea	Winrock International	3
	Lake Tanganyika Catchment Reforestation and Education Project (TACARE)	Communities located between Mahale and Gombe National Parks, Tanzania	The Jane Goodall Institute	2
	Development through Conservation	Bwindi Impenetrable the Mgahinga Gorilla National Park, Uganda	CARE	3
	Voahary Salama/ Integrated Programs Initiative (VS/IPI)	Fort Dauphin, Zahamena and Betioky and the buffer zones of two environmental corridors, Moramanga and Fianarantsoa, Madagascar	VS/IPI, Environmental Health Project	2
	Integrated Health Care and Conservation Program	Manongarivo Special Reserve, Madagascar	World Wildlife Fund	3
	APPROPOP: Appui au Programmes de Population (Population Support Project)	Zahamena Integral Reserve, Ranomafana National Park, and Andohahela National	Conservation International, The Madagascar Institute for the Conservation of Tropical Environments, State University of New York at Stony Brook, World Wildlife Fund, Association Santé Organisation Secours	3

REGION	PROJECT	LOCATION	PRIMARY IMPLEMENTING INSTITUTION(S)	KEY
Asia and Pacific	Mothers and Nature	Arunachal Pradesh, India	Future Generations	3
	Environment and Health	Indian Sundarbans, India	Asian Development Bank	2
	Integrated Ecological Development Program around the Ranthambhore National Park	Ranthambhore National Park, India	Ranthambhore Foundation	3
	Central Sulawesi Integrated Area Development and Conservation	Lore Lindu National Park, Indonesia	Central Sulawesi government offices	2
	Proyek Pesisir (Coastal Resources Management Project), North Sulawesi Sub-Program	North Sulawesi, Indonesia	Coastal Resources Center of the University of Rhode Island	2
	Sea Water Desalination Project	Southern Sulawesi, Indonesia	Lembaga Pengkajian Pedesaan Pantai dan Masyarakat: (Institute for Rural, Coastal and Community Studies)	2
	Food Security and Conservation	Lao People's Democratic Republic	The World Conservation Union (IUCN)	2
	Annapurna Conservation Area Project	Annapurna, Nepal	World Wildlife Fund, King Mahendra Trust for Nature Conservation	3
	Four Great Rivers Nature Preserve	Four Great Rivers Nature Preserve, Tibet	Future Generations	3
	Pendebeba program	Qomolangma National Nature Preserve, Tibet	Management Bureau of Qomolangma National Nature Preserve, Future Generations, Tibet Academy of Social Sciences, Tibet Department of Health, World Concerns, Trace Foundation	2
Local efforts to conserve medicinal plants	Ba Vi National Park, Vietnam	Local communities	2	
Latin America and Caribbean	Health and the Environment	Grande Sertao National Park, Brazil	Pathfinder International, FUNATURA	3
	Environmental health and community organization	Guaraqueçaba, Brazil	The Nature Conservancy, Society for Wildlife Research and Environmental Education	2
	Medicinal plant utilization and conservation in Eastern Amazonia	Paragominas, Brazil	Mulheres da Mata	2
	Saude e Alegria (Health and Happiness)	Santarem, Brazil	Saude e Alegria	3
	Health, Environment and Women's Empowerment	Una Biological Reserve, Brazil	Pathfinder International, Jupara, World Wildlife Fund	3

REGION	PROJECT	LOCATION	PRIMARY IMPLEMENTING INSTITUTION(S)	KEY
Latin America and Caribbean (continued)	Health and Sustainable Agriculture	Guaranda, Ecuador	World Neighbors, Center for Medical Guidance and Family Planning (CEMOPLAF)	3
	Integrated Reproductive Health and Conservation Project	Rio Platano Biosphere Reserve, Honduras	World Neighbors, World Wildlife Fund, The World Conservation Union (IUCN)	3
	Integrated Conservation and Development Project	Calakmul Biosphere Reserve, Mexico	World Wildlife Fund, Pronatura Península de Yucatan	3
	Jocotepec Development Center	Lake Chapala, Mexico	Jocotepec Development Center, CEDPA	3
	Medical assistance to the Ache of Mbaracayu	Mbaracayu Nature Reserve, Paraguay	Anthropologists, government, Fundación Moises Bertoni, doctors, priests and missionaries	2
	Promoting community fisheries and palm management to protect biodiversity and improve nutrition, health and food security	Pacaya-Samiria National Reserve, Peru	The Nature Conservancy and Pro Naturaleza	2
	Reproductive Health Services	Rio Abiseo National Park, Peru	World Wildlife Fund, Peruvian Association for Nature Conservation (APECO)	3
	Traditional Medicine	Costa Rica	Amazon Conservation Team (ACT), Fundación Tierras Unidas Vecinales por el Ambiente (TUVA), and indigenous peoples.	2

About the Biodiversity Support Program

The Biodiversity Support Program (BSP) is a consortium of World Wildlife Fund, The Nature Conservancy, and World Resources Institute, funded by the United States Agency for International Development (USAID). BSP's mission is to promote conservation of the world's biological diversity. We believe that a healthy and secure living resource base is essential to meet the needs and aspirations of present and future generations. BSP began in 1988 and will close down in December 2001.

A Commitment to Learning

Our communications activities are designed to share what we are learning through our field and research activities. To accomplish this, we try to analyze both our successes and our failures. We hope our work will serve conservation practitioners as a catalyst for further discussion, learning, and action so that more biodiversity is conserved. Our communications programs include print publications, Web sites, presentations, and workshops.

BSP Web Sites

We invite you to visit our general and program-specific Web sites even after the program closes down.

***Biodiversity Support Program...**
www.BSPonline.org

***Biodiversity Conservation Network...**
www.BCNet.org

CARPE: Central African Regional Program for the Environment...
<http://carpe.umd.edu>

* Until the end of 2006, these two sites will be available at the addresses above. WWF-US will be hosting these sites on the WWF site at www.worldwildlife.org. BSP thanks WWF for providing this service.

BSP Listserv

Through June 2001, you can receive e-mail updates about BSP through www.BSPonline.org. To join our listserv, click on **stay informed** and enter your e-mail address. We will keep you posted on project highlights, upcoming events, and our latest publications.

BSP Publications

Many of our print publications are now also available online at www.BSPonline.org. On our home page, click on **publications**. You can view publications online until the end of 2006. You may contact us by mail, phone, or fax until December 2001.

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Conservation International (CI) believes that the Earth's natural heritage must be maintained if future generations are to thrive spiritually, culturally and economically. Our mission is to conserve the Earth's living heritage, our global biodiversity, and to demonstrate that human societies are able to live harmoniously with nature.

CI is a global nonprofit organization, working in 32 countries on four continents. Practical and people-centered, CI recognizes conservation will only be successful with the support and involvement of local communities. We draw upon a unique array of scientific, economic, awareness and policy tools to help inhabitants of Earth's biologically richest ecosystems improve the quality of their lives without depleting natural resources.

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Foundations of Success – Carrying BSP's Work Forward

Foundations of Success (FOS) is a legacy of BSP, born out of its Analysis and Adaptive Management (AAM) Program and the Biodiversity Conservation Network (BCN). FOS is a non-profit organization dedicated to improving the practice of conservation by working with practitioners to develop and communicate tested knowledge about what works, what doesn't, and why. FOS works with conservation practitioners around the world to clearly define conservation success, develop guiding principles, and build the capacity to do adaptive management. FOS operates as a network of learning portfolios – clusters of projects focused on testing specific conservation tools or strategies. FOS partners share and document lessons learned and contribute to building capacity throughout the FOS network. For more information on Foundations of Success, go to www.FOSonline.org or send an e-mail to info@FOSonline.org.